

Facilitating the Design of Data-Informed Andragogic Tools to  
Promote Hypercognition for UK Access to Higher Education  
Learners.

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# Abstract

Access to Higher Education courses in the UK serve the purpose of providing a route to Higher Education level study for those without the requisite qualifications to do so. However, students on these courses tend to be disproportionately from groups underrepresented in education compared with those on equivalent routes to HE study such as A levels (QAA, 2016). Therefore, developing an understanding of how this understudied group of AHE students experience their education has potential to promote equality through the development of assistive tools and techniques. With recent advances in data science and Hypercognitive Theory (Demetriou et. al., 1993), a model of intellectual development which has explanatory power over andragogic learning , the potential for new tools to provide learning aid to AHE students is great and as such this thesis explores the AHE learning experience and develops Design Principles upon which Data-Informed Andragogic tools can be developed.

In order to investigate the AHE learning experience amid a dearth of consistent data collection on the topic, an exploratory approach to design principle development was required. This began with an autoethnographic analysis that identified areas of focus for exploration by means of a topic

set. This was then used by groups of AHE students to explore their experience in focus group settings. The data from these discussions was used in two ways, firstly to inform co-design activity, and secondly to provide data for codification and analysis using a Grounded Theory approach.

By means of a Participatory Workshop method (Mor et. al. 2015), Co-design activity over the course of ten months saw students develop twenty-eight practice narratives, which they and the researcher grouped and abstracted to eight more generalised practice patterns. From these, four design principles emerged: 'Design for the Social', 'Design with Andragogic Intent' and 'Make Thinking Visible'. From codification of focus group discussion, a grounded theory was identified: 'Reciprocal Equilibria Theory'.

Conclusions drawn from this work are that an approach which focusses on the learning of the individual student fails to capture the mechanism or effect of AHE learning, that in this context, there is value in learning being viewed in the context of a co-dependent social network. In addition, data-analytic tools being developed for use with these students need to be designed for them explicitly rather than taking a broader 'one for all' approach to Further Education. Finally, in order to be successful at hypercognitive processing, skill development opportunities need to be exposed for explicit learner consideration.

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# Chapter 1: Introduction

Access to Higher Education (AHE) courses serve to provide adult learners in Britain with the qualification and experience needed to apply for and attend Higher Education (HE) level study. This thesis identifies differential factors between AHE and other student populations such as A level in terms of sociodemographic makeup and retention rates (QAA (2009) which showed up to 30% dropout. This was vastly less among Advanced level (A level) students (2.4%; CESI, 2015)) t also identifies issues around expectations for progression to HE (Atkins & Ebdon, 2014). Given the makeup of AHE learners and their result differential with other equivalent programmes, if equality of opportunity in education is sought, there is value to understanding this understudied group's experience. This thesis looks for an approach to supporting AHE students so that more of those who can do so, attain the opportunity to study at HE level can without being foiled by hypercognitive barriers unrelated to their aptitude for learning or their chosen subject. It does this by developing design principles from which data-analytic andragogic tools can be developed, and by employing Grounded Theory to qualitatively explore the student experience. It finds that an individualistic focus on the learner alone does not capture the best picture of AHE learning, or the way in which students

interact with one another in a co-dependent social system of mutual help-seeking that this thesis terms '[Reciprocal Equilibria](#)'. It also identifies a design principle around the need for data-informed andragogic design to be explicit, rather than for tools to be designed for child education and applied to AHE without contextual consideration. Finally, affirms that in order to facilitate AHE learning, exposing hypercognitive processing activity to the learner is key because of its increased importance in adult learners who have broader prior experience and embedded perspectives to bring to bear than a child, and who may have been out of education for some time. Hypercognitive skill development (Demetriou, Efklides, & Platsidou, 1993) is intellectual ability associated with the cognitive 'umbrella system' which facilitates planning and problem solving by drawing other systems together. hypercognitive development is key for students to develop intellectually (Demetriou, 2005) and therefore ultimately to achieve at Higher Education (HE) level which places such emphasis on critical thinking (Liu, Frankel, & Roohr, 2014). The thesis concludes that this hypercognitive conceptualisation of AHE is a valuable mechanism with which to understand factors which preclude achievement, including the [restrictive nature of the concept of Study Skills](#).

In recent years, the volume of data available to a learner and their facilitators has grown vastly (Mayer-Schonberger &

Cukier, 2013). This, coupled with novel ways of understanding that data being developed by data scientists, which have proven so potent elsewhere, could be turned to identifying and shaping opportunities for hypercognitive development in the adult learner. This leads to the conclusion that drawing on a broader range of data sources could serve as a mechanism to develop new and innovative assistive tools for AHE learners. To investigate the AHE learner, Hypercognition and Data Science more thoroughly, a [literature review](#) has been carried out to identify the sociodemographic makeup of the AHE student body, and to account for students' failure to complete and achieve compared with peers on equivalent programs of study, as well as an assessment of the nature of support that students get from a course of AHE study. Then, by drawing on autoethnographic, design-based research and grounded theory methods, a series of [design principles](#) to guide the research, design and development of data-informed interventions will be designed and assessed, and any emergent theoretical insight informed by a grounded theory analysis of the data will be explored. It is hoped that this will ultimately lead to the design and implementation of tools which promote equality of opportunity in education, with commonly under-represented groups becoming more able to access the education they would most benefit from.

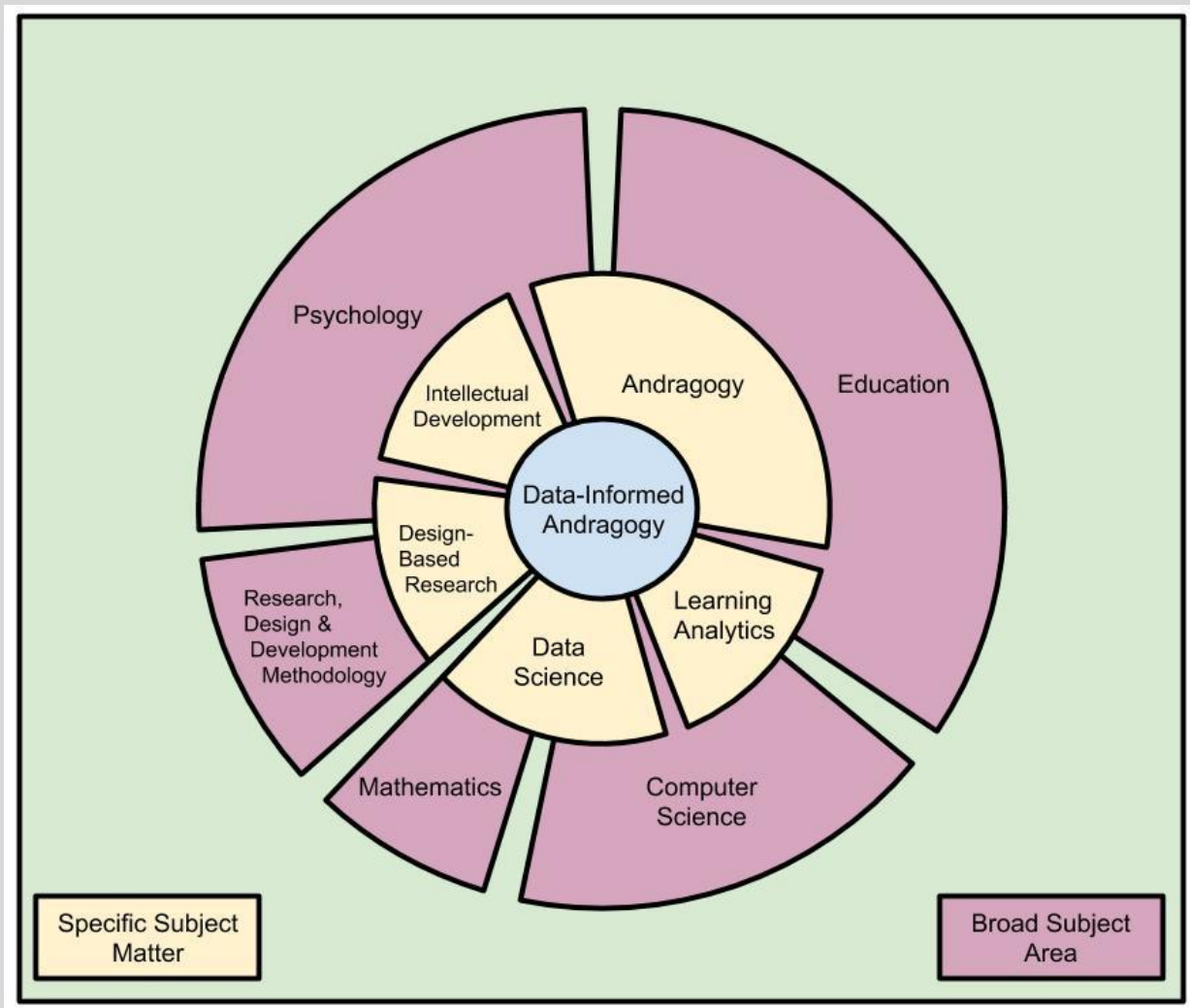
To best introduce this thesis, each core concept will be presented to form a picture of the area of study: The policy

position and makeup of the AHE student body, the value of andragogy, hypercognitive development and data-analytic thinking. These core concepts will lead to justification for the thesis, the knowledge gaps it addresses, its aims and limitations. Following this, an outline of the thesis structure will be presented.

## **1.2. Orientation**

This thesis touches upon several areas of study, drawing upon theories of Andragogy and Intellectual Development, with Learning Analytics, Data Science and Design-Based Research. This combines to form the field of knowledge within which this thesis operates, which it terms 'Data-Informed Andragogy'. This is illustrated in the diagram in Figure 2 below, indicating for the reader how these theories and approaches are cited within the broader subject matter area:

**Figure 1: Data-Informed Andragogy Cognate Area Diagram**



The foundation of this thesis can be found in the synthesis of four underlying assumptions which will be explored and justified: That studying AHE has the potential for meaningful insight for those interested in educational equality of opportunity due to its sociodemographic makeup and achievement differential, that Andragogy is worthy of consideration aside from pedagogic study, that the theory of Hypercognitive Development holds a key framework for understanding the adult learner and that data is now more

ubiquitous, which leads to unexplored opportunity for design and development work in adult education. Each of these is described below to offer an orientation to the reader from which the justification for the study arises.

### **Importance of Studying AHE**

The suite of AHE courses (mandatory regulatory parameters for which are laid out in their most recent specification; QAA, 2013) serve a singular purpose in the UK education ecosystem. First recognised as one of three routes to Higher Education by a UK Government white paper (Department of Education and Science, Great Britain, 1987), Attendance was limited to mature students over the age of twenty-one who had not obtained the appropriate qualifications prior to undertaking the Access course. This age restriction remained in place until 2013 when the specification was rewritten as it stands today (QAA, 2013). Provision bearing the name 'Access to Higher Education' first began in the early 1970's to help train new teachers and served this purpose for a number of years attracting people from many subject backgrounds into the profession. This focus changed when a government white paper in 1987 (Department of Education and Science, Great Britain) identified the value that AHE had represented for initial teacher training, recognised that it was being adopted by institutions as a route to other areas of higher education study and commended this expansion into other areas of study. The authors of that

paper recognise that there was a political imperative for the improvement of rates of application and acceptance to HE, and with that aim, the white paper called for a regulatory framework for Access to HE courses. This was later implemented with the establishment of a governing body which would have regulatory power over the suite of AHE provision. Today that is called the Quality Assurance Agency (QAA). It can be assumed that this move towards regulatory oversight lent credence to the provision as there was a broadening of subject pathways to support any student looking to study at Higher Education (HE) level. Today, the most recent specification details (QAA, 2013) lay out a course which is designed to operate primarily on a one-year full-time basis. This AHE provision contains a range of pathways such as Art and Design, Healthcare and the less esoteric Combined Studies and is designed primarily to enable prospective undergraduates to develop the qualification and skills they need in their area of interest to apply to and operate effectively at HE level. This, with the increased contextual focus on employability in the British education system (Harvey, 2005) means that today, most students join to progress to university level education, with 20% of domestic acceptances to undergraduate study being from AHE students (QAA, 2016). The primary factor that differentiated it from alternate progression routes, most notably [A level](#) (for which a description is in the glossary), is that it is completed over



a single academic year of full-time study as opposed to the two year A level equivalent. Also, it was made up mostly of others who were similarly motivated and 88% of whom were over 21 years of age (QAA, 2016), despite the lower age of enrolment restriction being removed several years ago with the introduction of the latest Specification in 2013. A full portrait of the AHE provision and student composition is contained in the ['Justifying an Andragogic Focus'](#) section of the literature review chapter. The conclusion drawn from that literature review is that AHE serves a population group which stands somewhat apart from their peers studying at the same academic level. Parr (2016) noted that there is overrepresentation of those from POLAR Quintile 1 and of Black, Asian and Minority Ethnic students. HEFCE (2015) shows and an over-representation of those with Specific Learning Difficulties on AHE provision and McCulloch (2014) evidences an achievement differential relating to gender. This picture of a course set which disproportionally contains groups that are historically underrepresented in UK higher education suggests that promoting AHE education could be a mechanism to addressing inequality in Higher Education study, which in turn offers a social policy imperative for focussing on AHE students. Furthermore, these students represent a valuable opportunity to study a diverse group of motivated adult learners, working together in close proximity, despite a wide variety of subject interests. This allows for the chance to

account for subject specialism as an extraneous variable and therefore more effectively investigate ways of improving the educational experience for adult learners more generally.

There are further compelling reasons to study AHE learners. They are understudied compared to those on other routes such as A levels and consequently their learning experience is poorly understood, something which could limit the ability of designers and educators to facilitate their learning as well as they otherwise might. This is exacerbated by the quality of data collection and analysis available. As a result, anyone looking to study AHE students are limited to admissions reporting from the University and College Admissions Service (UCAS), and the reports put out by the QAA. The UCAS data only focusses on a small part of the AHE experience, that of applying to university. The QAA data, while potentially more overarching, is unavailable in raw form, leaving the researcher to rely on key statistics documents published on an ad-hoc basis, the most recent of which was released in 2015 (QAA, 2015). These serve primarily as marketing material designed to show AHE in the best possible light. Consequently, comparative analysis using secondary data is challenging. Application rates from AHE students to university are dropping and a more restricted profile of courses being applied for has built up (UCAS, 2016). If this is as a result of a lack of contextual understanding leading to the AHE student group being

underserved, there can be expected to be benefit in studying their experience. The literature review concludes that there is a skill shortage among AHE students which needs addressing. This thesis aims to facilitate design, research and development work that will address this and promote equality of opportunity.

Having summarised how the access course came about, how it is distinct from alternative routes to HE in terms of its student composition and how it represents an opportunity to study a cohort of adult learners with an eclectic range of academic interests, andragogy, the value of the study of adult learning, will be considered to further orient the reader to this thesis' context. If adult learning is functionally different from the more prevalent pedagogy, or practice of child learning, then AHE learners could be underserved by the design and development work on tools and methods introduced into their learning environment.

### **The Value of Andragogy**

Having an interesting group of subjects such as the AHE students described above is not enough to justify their study if they are not functionally different from other more commonly studied groups. Much work has been done arguing for (Knowles, 1984, Henschke, 2013) and against (Hartree, 1984) the study of adults in education and this must be considered in order to delineate the context to this thesis.

Andragogy is explored in the literature review in more depth. However, Knowles (1984) highlights the characteristics of the adult learner, particularly in relation to their psychological orientation towards learning. Adults have the propensity to accept more information before needing to process and store it, they tend to appreciate the goal of the learning experience, they can manage their own behaviour and they have a wealth of experience which could be relevant to their learning. As such, any theoretical model which informs the teaching of adults should not only take these factors into consideration, but actively employ them to enrich the experience of the learner.

The practical expression of this differential between adult and adolescent or child learners is the achievement gap. AHE students complete (HEFCE, 2015) and progress to university (Howls, 2015) less than their a-level counterparts and appear limited to success in a relatively narrow range of fields (QAA, 2016), despite the intent of AHE provision to be multi-disciplinary. Consequently, this thesis addresses the possibility that the achievement gap may be created or exacerbated by a lack of andragogic focus through the application of educational theory to adults as to children without consideration of their differentiating qualities such as King and Widdowson (2012) identified.

Of course, Knowles and others who argue for the

distinction between child and adult learning have had detractors for many years. From Hartree (1984) who led the call for the abolishment of the distinction by arguing that this was primarily an attempt by tutors of adult learners to professionalize and justify their work in education as distinct from others, through to Griffin (2000) who argued that there was not enough breadth to the theory to properly encompass historical, economic and cultural forces upon the adult learner. Since 2000, study of the phenomenon has diversified, with fewer general critiques of andragogy, and more individually targeted applications and considerations. Hence, the work of Sandlin (2005) is valuable in mapping these. Sandlin describes Andragogy from a range of critical perspectives that are important to consider. Firstly, that andragogy assumes that education is value neutral and apolitical. When an adult comes to their study with a series of embedded perspectives this cannot be the case, and thus this study must [identify and highlight the implications of these preconceived ideas](#). Secondly, they theorise that the generic learner andragogic literature assumes is white and middle-class. AHE is [more diverse](#) than this and therefore the study of AHE students, who are more diverse than the national average (Parr, 2016) is valuable in addressing this critique. Thirdly they argue that adult-specific theorising silences other voices by means of its imposition of a framework. The issue this critique raises is that without any imposition,

study becomes functionally impossible, and is as much a justification for removing all a-priori theory from consideration. In order to be sensitive to the experience of the adult in particular, this thesis employs a [grounded theory approach](#) in order to allow theory to emerge from the material in question, but nevertheless necessarily brings theory to bear as [design principles are developed](#). Fourthly Sandlin argues that andragogy ignores the impact of society on the individual, again ignoring the value of their experience, something that Knowles cited as one of their driving principles. Lastly Sandlin argues that andragogy supports the status quo, dissuading the development of paradigm redefining tools and methods for education. This thesis therefore employs a [framework for enquiry](#) that incorporates the autoethnographic, co-design and grounded theory methods to allow for these paradigm changing outcomes to emerge. In counterpoint to these criticisms of Knowles andragogy, this thesis argues that while the approach is not all that some sociologists would hope for in terms of its lack of focus on societal value impact, it does nevertheless leave the user free to bring these aspects of the learning journey into discussion, which is an ethical imperative if they are keen to avoid stereotyping all adult learners as having a homogeneous, fully quantifiable set of motivations.

Having summarised why the study of adults as a distinct group is seen as important and identified AHE students as a

potentially valuable source of cross-disciplinary students to study, it is necessary to consider the way in which those adults develop intellectually, how they learn. This thesis takes a view that Hypercognitive theory has explanatory power over this.

Past life experience is a core part of the andragogic experience (Knowles, 1984) and part of what makes Demetriou and colleagues' hypercognitive model so prescient for application to adult education. Given that a higher proportion of students on AHE provision are aged over twenty-one years compared with A levels (88% of AHE students (QAA, 2016), compared with a negligible proportion of A level students, such that statistics aren't released), the logical conclusion based upon an acceptance of andragogic theory, is that AHE students will have different needs and that these needs are different because of their greater life experience and more embedded perspectives than younger learners have to draw from.

### **Hypercognitive Development**

It is the contention of this thesis that a study skill deficit exists in AHE provision between what students need for higher study and what they are currently prepared with. This means that students are not being prepared as well as they might be for further study and is demonstrated in the attainment gap between AHE and students on equivalent pathways to HE such as Foundation Programmes, as highlighted in the Office for Students

comparative analysis (Finlayson, 2019). This thesis aims to address this, firstly through a comprehensive literature review and then through primary research underpinned by an understanding of Hypercognitive Theory.

According to Demetriou, Efklides, & Platsidou (1993), intellectual development is the evolution of a series of Specific Semantic Systems (SSSs) which inform cognition and consequently behaviour. These include SSSs associated with quantity, proportional value and others. They form the building blocks of knowledge, but to facilitate cognitive action, there needs to be an executive control system to select parts from SSSs which can be applied to a novel situation so that the person may engage in problem solving. They term the action of this control system 'hypercognition'. In adult learners, shaping this hypercognitive system is therefore key for further intellectual development, as increasing specialist subject knowledge in SSSs without the ability to access and synthesise that most effectively results in learning that is less applicable to novel situations and therefore less valuable.

Condensing the framework presented in Demetriou, Spanoudis and Shayer (2014) where they present a broader, more encompassing model of human intellectual function, Educational designers must do three things: Firstly, make the development of hypercognitive skills discrete in their provision such that learners have the tools to evaluate their own praxis.



Secondly, once this is occurring, learners need the opportunity for meaningful management of their learning such that they may employ their hypercognitive skill. Thirdly, the process of reflection and adaptation needs to be an iterative one which follows a cycle of feedback, reflection and deployment. This thesis considers its findings about AHE in relation to this model.

There is little critique of Demetriou and colleagues' approach in literature, however one might level criticism at this approach because of its multi-disciplinary nature, that is that there are concepts drawn from a range of areas of study which have been synthesized to develop this approach. The danger of this is that a lack of rigour in one of those areas questions the validity and reliability of the whole. As a cognitive model, although it is built upon experimental evidence, it remains non-falsifiable and potentially reductionist. This is shown by Demetriou's own efforts to build on this model since his monograph publication until the present day. As such, care should be taken when applying the principles of the model to novel situations such as the adult learner. This is pertinent as most studies underpinning the model have been carried out on child subjects. The purpose of the cognitive model is that it can be extrapolated to novel situations, so care must nevertheless be taken. That said, Demetriou (2009) offers a precedent for this application to the adult learner that draws verified links between

hypercognitive theory and intellectual development in adolescents and adults which offers some encouragement as to its efficacy in the andragogic domain.

Having critically framed the lens through which this thesis views learning, the last of the four assertion this thesis makes, that of the rise of data-analytic thinking must be considered to fully orient the reader to the thesis' cognate area. This is discussed below.

### **Data-Analytic Thinking**

Over recent years there has been a rise in the amount of data collected on people (McKinsey & Company, 2011). In addition, there has been an increased focus on using that data to assess and shape aspects of behaviour and society (Sclater, Webb and Danson, 2017). There is not as much uptake of data analytics in education as in other areas such as defence and intelligence and marketing (Hawksey, Jeffery, & Pea, 2013) and this thesis looks to address that gap by constructing the groundwork in the form of design principles and grounded theory from which data scientists may work with educationalists, designers and developers to develop tools and interventions which draw on novel or growing data sources.

There are currently few data scientists who are educationalists and vice versa, a challenge which is not unique to education (Sclater, Webb, & Danson, 2017). Therefore, the design of any data-rich tool for hypercognitive

development will be inherently cross-disciplinary until there are more education-specific data science professionals. Consequently, any methodological framework this thesis employs needs to factor in the experience of the educationalist and the data scientist, along with other relevant stakeholders such research, design and development practice can be best undertaken. This thesis addresses this need using the PPD framework (Mor et. al. 2015), while bringing the voice of the learner to the fore by means of grounded theory.

Data analytic thinking is a term used in the field of data science to refer to the way in which a person problem solves and innovates based primarily on the results of analysis of pertinent data (Provost & Fawcett, 2013). This approach has seen great uptake in business, finance and marketing contexts (McKinsey, 2011), to the extent that the ownership of data is being perceived evermore as a quantifiable measure of value: Whereas before the success of a company could be measured with performance indicators such as land ownership, now a company can be valued at billions of pounds based solely on the data they have collected or have access to, with little in the way of infrastructure (Selby & Kosack, 2015). Given the value of data-analytic thinking elsewhere, it is becoming well understood by Lawn (2013) and others that the value to educational research, design, development and practice could be significant and remains relatively unexplored. The reason that data quantity is

valuable is because of techniques which were previously not available with slower processing speeds becoming more accessible, which look for correlations between much larger sets of variables than humans are able to. This helps identify possible causal relationships which otherwise were hidden between variables previously not thought to be linked, providing insight that was not previously available. An example of this in established practice today which is specific to a learning analytics context is 'Jenzabar Retention' (Jenzabar inc. 2016), which draws on a wider range of sources than a tutor would be able to alone to create a more comprehensive view of a student cohort, individual to the most relevant contextual factors of that cohort in order to perform drop out risk management activity.

### **Thesis Aims**

Therefore, this thesis aims to address the gaps in knowledge described above by:

1. Delineating the study skills gap and exploring how the skills students need for HE may be reconceptualized or made explicit so that provision may be designed to address these and in order to reduce the attainment gap between AHE students and their compatriots taking other routes and consequently to promote equality of opportunity across pathways to Higher Education.

2. Employing a methodological approach which allows interdisciplinary working between a range of stakeholders for the research, design and development of data-rich tools and which allows for novel approaches to be considered so that paradigms may be altered as well as established designs may be iterated upon.
3. Exploring the experience of the Access to HE student so that further research, design and development activity may benefit from greater contextual understanding and be better able to design meaningful data-driven interventions to improve learning based upon a series of evidence-based principles.

## **Research Questions**

To meet these aims, four key research questions have been formulated:

1. Is access to and experience of AHE equitable and egalitarian?
2. Is there a difference between the skills AHE students have and those which they most need to achieve at university?
3. What design principles can be developed to underpin requirements engineering of the design and development of data-informed andragogic tools?
4. What can be learned from the AHE student experience which offers insight into their learning?

## **Value to Human Understanding**

By addressing the research questions, this thesis adds value to the field in four ways. Firstly, it increases awareness of issues facing AHE students which are currently poorly defined. Secondly, the importance to adult learners of hypercognitive function is reinforced. Thirdly, this thesis empowers people to collaborate with one another in educational research, design and development activity through the formulation of design principles and the grounded theory exploration of the student experience. The voice of the learner is of high importance to this process as shown successfully elsewhere (e.g. Mitchell et. al., 2016 and Trischler et. al., 2017) and consequently, it allows design and development activity in AHE to be shaped by novel perspectives (Chase, 2008).

## **Methodology Introduction**

This thesis takes a qualitative approach to exploring the learning experience of the AHE student. Initially, the work takes an inward look, with an auto-ethnographic exploration of the foundational knowledge that the thesis is built upon. This forms the basis of stem questions with which the researcher will facilitate group interviews among AHE students about their learning journeys. The data produced will allow for the answering of the first two research questions.

Following this, participants and the researcher will collaborate to form practice narratives and patterns, while ethnographic study of the AHE student experience will be explored using grounded theory to identify any emerging insight from the group discussion process. Upon review of these patterns, and alongside consideration of any grounded theory emerging from the ethnographic data set, design principles applicable to the AHE experience will be developed to inform future design, development and research activity, addressing the third research question. From the grounded theory analysis of the data collected, the fourth research question will be answered.

## **1.4. Thesis Outline**

### **Chapter 2: Literature Review**

The literature review section of this thesis will begin by defining, describing and justifying the situation of this work in andragogy as opposed to pedagogy. Following this, the evidence in literature for a sociodemographic skew in the AHE population is considered as per research question one. Then, a hypercognitive deficit is considered by means of an assessment of retention and application rates on AHE courses and consideration of previous attempts to address this gap that the second research question enquires into is made. The primary conclusion from this is that the nature of the AHE

student is changing, and that there is a skill deficit between what the students are taught and what they need to best access university. From here the development of data as an emergent resource is charted, and its implications for AHE is discussed. Opportunities for the innovation of data rich tools for the promotion of hypercognition are identified from literature and demonstrate that there is a space for the design of data-rich tools in the educational zeitgeist. Following this, the aims and research questions this thesis addresses will be presented and the case for their construction made.

### **Chapter 3: Methodology**

This chapter lays out how the primary data collection for this study occurs. It begins with discussion of ontology and epistemology before focusing on the methodological process chosen. The way in which Grounded Theory is to be used alongside Design-Based Research approach is explained and then autoethnographic and ethnographic stages of the data collection using a slightly modified version of Mor et. al.'s (2015) PPD method and group interview techniques are described and justified. Following this, sampling and ethical considerations are discussed.

### **Chapter 4: Data Presentation and Analysis**



The Analysis and Discussion section directs the reader to consider the data collected in terms of several key phases. Firstly, autoethnographic work is considered, both in terms of the data collected and the practical operation of doing so. The same is then done for the ethnographic portion of the primary data collection. Here the data collected during group interview and co-design activity is toured through design pattern by design pattern, followed by a review of the methodological framework that the thesis uses.

## **Chapter 5: Discussion**

The Discussion chapter opens by using the data collected and analysed to address the first two of the four research questions. Then the Reciprocal Equilibria Grounded Theory that emerged from the data is presented, followed by the three design principles that the thesis instantiates. The application of these principles is considered.

## **Chapter 6: Conclusions**

Conclusions are drawn about the gaps in knowledge that this thesis addresses and breaks down the implications by stakeholder. The limitations of the work this thesis does are considered, followed by an assessment of the potential for future activity which this thesis could predicate. The

contribution to knowledge that this thesis makes is delineated followed by a final summary conclusion.

## **1.5. Conclusion**

This introductory chapter lays the foundation for the study to come. It introduces themes of andragogy, hypercognition and data science in relation to the AHE student and relates these to the aims and ultimately the research questions this thesis investigates. This research is justified as of value to human understanding, clarification of terms is undertaken to serve as a reference resource for the reader. Limitations of the thesis are summarised, and the forthcoming chapters outlined. Working from these foundations, a thorough exploratory examination of the literature around andragogy, hypercognition, the AHE student, data science and research, design and development methodology is presented in the following chapter.

## Chapter 2: Literature Review

A review of literature was conducted to interrogate the [research questions](#) this thesis asks of whether AHE provision is equitable and egalitarian (as per research question 1), whether there is a skill deficit (as per research question 2) and what can be learned from secondary sources about the AHE student experience (as per research question 4). Based on analysis of the rise of data science and a framing of adult learning through the theoretical stance this thesis adopts of Hypercognitive Theory, the need for design predicates that research question 3 calls for is laid out.

In order to locate the context of this study for the reader, the study of adult education, termed andragogy, is critically justified. Following this justification, the case for the use of Hypercognitive Theory to enquire about andragogic practice is laid out. Following this contextualisation, this review finds that the AHE student body is skewed in terms of gender, ethnicity, specific learning difficulty and social mobility compared with their compatriots on other equivalent courses or the general population. This, along with assessment of the progression prospects of AHE students to HE and beyond shows a lack of equitable outcomes, addressing research question one. From this, a [skill and expectation deficit](#) was identified, reinforced by evidence

that provision has not changed to account for modern learning experiences which remain comparatively under-studied, which addresses research question two. [Past attempts to address this](#) deficit were explored and have included training teachers in the hope that skill knowledge will trickle down to their students and moving away from modular generic skills study towards specific subject training. This historical assessment concludes that these approaches have been found wanting. In terms of contemporary practice, the literature review found that while sold as a benefit of AHE, current student support arrangements are opaque, undocumented and decentralized, offering more evidence of the need for the primary data collection activity this thesis undertakes framed by research question four. It is the contention of this thesis that student support and historical interventions fail to appropriately address hypercognitive development needs. However, this shortfall, along with the growth in availability and prevalence of data and an understanding of Hypercognitive Theory, suggests opportunities for the innovation of data-analytic tools which tie a disparate learning experience together, offer swifter detection of need and which offer discrete, embedded, on-demand skill development opportunities to students, suggesting that there is benefit in better understanding the experience of the AHE learner and the design predicates for the development of novel interventions as called for in research question three.

## **2.1. Studying AHE Andragogically**

This thesis aims to focus upon the adult learner primarily, which is in stark contrast to most of the work in the field which is pedagogic. Therefore, a review of the literature must justify breaking away from this norm. The first step is defining the difference between Pedagogy and Andragogy, the second is to justify the recognition of that difference and once this has been recognised, a sound theoretical basis from which the Adult learner may be studied needs to be delineated.

### **Differentiating between Andragogy and Pedagogy**

Pedagogy is the study of educating children, and in many works, it serves as a catch-all term to describe any sort of teaching (e.g. Mortimer, 1999). However, the prefix 'Peda-' indicates the child. This issue transcends mere semantics, it also encapsulates the way the teacher-student relationship is oriented. Teaching in the pedagogic style requires the teacher to take responsibility for the student experience, classroom environment and ultimately the learning that takes place there. this attitude has also pervaded adult education and has defined the zeitgeist for many years. As early as 1926, Lindemann (as cited in Hansman, 2001) wrote:

"Our academic system has grown in reverse order. Subjects

and teachers constitute the starting point, [learners] are secondary. In conventional education the [learner] is required to adjust himself (sic) to an established curriculum ... Too much learning consists of vicarious substitution off someone else's experience and knowledge. Psychology teaches us that we learn what we do...

Experience of the adult learners living textbook."

Self-determination theory (Ryan & Powelson, 1991) blames this teacher focused attitude to learning for the 'burnout' that so many people seem to experience with schooling (and carry into their AHE experience): When the teacher controls so much of the learning environment and the learning experience that the learner has no agency in that process, their experience and perspectives cannot impact the course of their learning journey.

The first major proponent of andragogic study was Lindeman's protege, Knowles (1984). To address what he perceived to be a bias towards the consideration of the child learner, he proposed five simple considerations that should be accounted for when learning or managing learning of adults. The first was to Let learners know why something is important to learn and showing them how to direct themselves through information. The third was that good andragogic practice Relates the topic to the learner's experiences and the fourth was about helping students to learn best by being ready and motivated. Finally he argued that the andragogue needed to

help learners overcome inhibitions, behaviours and preconceptions about learning they have developed over time.

Only one of these five necessarily relates more to adults than children, so there appears to be some overlap between the andragogic and pedagogic (Darbyshire, 1993). However, this approach signals a change in perspective from a focus on the tutor to focus on the learner, what the learner learns and their experience of doing so, what this thesis will term their 'learning experience'.

### **Critiquing and Justifying an Andragogic Focus**

Considering Andragogic theory critically, The Knowles (1984) principles were based primarily on psychological research from humanist and the cognitive traditions. These approaches, being fundamentally at odds with one another, means that one must question the veracity of his claims if they are built upon two opposing foundations as Hartree (1984) and Derbyshire (1993) have most notably done.

Secondly, it isn't clear if the Knowles work was a model, a set of assumptions, a theoretical approach or a set of good practice advice for the teacher of the adult learner. Hartree (1984) calls this into question. He points out that it isn't clear from Knowles' work whether these should be a description of what the adult learner is, or what they should ideally be. The findings of this thesis will add credence to the idea that it is a fair description of AHE students, but this doesn't

clarify the fundamental challenge to Knowles' contribution as non-specific.

Thirdly, is it true that educational burnout occurs? There is a good amount of evidence for Self-Determination Theory, both from sociological evidence, educational research and the psychological study of agency. Sociologically speaking, a Wellbeing report by the YMCA (2016) describes an approximately 30% drop in wellbeing later in life in those who self-reported poor experience at school compared with those who did not. This establishes a baseline of effect, where schooling can be seen to have lasting consequences. On the other end of the experience, the impacts of schooling outcomes can be seen in terms of capital differential (UNESCO, 2005; Shambaugh, Bauer & Breitwieser, 2018), so not only do poor scholastic experiences carry forward in terms of self-esteem and wellbeing, but it also impacts the potential of the person to earn. In terms of Agency, attribution theory shows that perception of agency is reduced following poor experience of education (Graham, 1990, in Graham and Volkes, 2014), and can be increased through further study (Smith, 2003). While there are likely other contributing factors this means that the learner is internalising value judgments from these experiences which are shaping their personal identity moving forward. One point of caution should be noted however: There is a troubling correlation between outcomes and agency as given by sociodemographic circumstance (Rodriguez, 2013) which



should temper such an analysis - there are other factors at work here beyond prior experience such as race, gender and age which can also shape the attributions the learner makes about themselves. These will be explored in an AHE context in the next section of this thesis.

Fourthly, Knowles' work on Andragogy is based upon the work of Dewey (best described in their later 2007 work), which states that a learning project is triggered by several coalescing factors to motivate them to pursue it. This is a rather simplistic interpretation as Lam and Ahmad, (2011) illustrated, as the actual practice of those adults is then to choose from a set of limited alternatives for learning which happen to occur in their environment. This idealistic view of the wholly self-directed learner cannot exist when that learner is confined, either in practice or perception, to a given context.

Knowles himself admitted that his work was conceptually limited:

"while this was important... [it was] far from the core of adult learning theory' (Knowles, 1989, p.76). As such, any work choosing to take an andragogic focus using Knowles alone would be fundamentally flawed. Jarvis (1987) notes that there is a lack of criticality to Knowles' Andragogy and a lack of awareness of the context into which that learning takes place. To address this shortcoming, this thesis introduces a theoretical lens through which adult learning may be

investigated, the theory of Hypercognition, which constructs an evidence-based multi-disciplinary theoretical framework around this that is complementary to Knowles' informal proto-theory. It is on this basis that this thesis defines the [Reciprocal Equilibria grounded theory](#) which adds structure to the understanding of adult education and builds on Knowles' base.

Despite these challenges to Knowles' Andragogy, this thesis chooses to follow the lead of McKenzie (1979) who accepted andragogy on the basis that regardless of anything else:

"The existential differences between children and adults require a strategic differentiation of education practice". Thus, while it is recognised that Andragogy cannot stand alone as a monolithic theory from which to work, it is a useful perspective because it highlights measurable differences between adult and child learners and because cohesive agreement has not been reached in the educational community on a more comprehensive approach. Given that these differences between adult and child learners exist, it is logically sound to assume that a focus on adults, and those differences that they tend to show, will precipitate a more well-adjusted, focused design output. At a sociodemographic level there is also justification for an Andragogic focus. The population of the UK is aging and growing (Park, 2018) and adults are expected to be more active in work for a longer period than

previous generations (Hughes, Adriaanse & Barnes, 2016). As a result, the need for a focus explicitly on adult and continuing education is growing in importance. Therefore, it is important that andragogic education is a distinct focus of study.

### **Andragogic Hypercognitive Development**

With a mandate from Knowles and others for the study of the adult learner as distinct from the child, it is next necessary to define a framework by which adult learning can be investigated. This thesis argues that Hypercognitive theory offers this. The theoretical approach of Demetriou, Efklides, & Platsidou (1993) and his neo-Piagetian peers offers the basis for the argument that transformative learning literature such as Mezirow (1997) doesn't go far enough in establishing the need for comprehensive mapping of skill development over time. Transformative learning theory describes 'thinking skills' as central to educational progression. In addition, there is evidence of the growing uptake of degree-apprenticeship style courses and evidence from Finlayson (2019) suggests that graduates of these courses went on to degree courses more than AHE graduates (79% versus 62%). If more appropriate skill preparation is a contributing factor to that, the need for review of the AHE experience from a skill perspective is strengthened. Demetriou and colleagues go beyond Mezirow and construct a view of cognitive development

predicated upon a collection of systems which are specialised to tasks, with a hypercognitive matrix overlaying them that facilitates task completion through organisation and connection with the context specific systems. This is exciting, because by affecting the system of the mind at the hypercognitive level, a student's ability to complete complex, novel cognitive tasks increases as they become more adept at taking a given perceptive input and drawing on [Specific Semantic Systems](#) to break down and organise subtasks. When applied to adult learning experience, there is the potential for andragogic improvement through intervention which facilitates a student's hypercognitive development by tying together aspects of their learning experience in their minds such that they may be empowered to reflect upon it and target their effort towards relevant skill development opportunities: It is the ability to draw upon multiple specific semantic systems to solve future problems. This sort of skill development is especially relevant to AHE students because they will have to take the skills they have learned in the context of their course, integrate them with their experience and be equipped to apply them to the novel context of their HE studies. It is the contention of this thesis that andragogic development must include an understanding of students' experience from their perspective and that many of the skills necessary for success in HE which the AHE provision aims to foster are related to cognitive problem solving and

information synthesis. Consequently, maturing the hypercognitive matrix is key to their success. To better delineate this, the theory will be presented in more detail below and its justification for AHE will be expanded upon.

### **Historical Significance and the Ten Postulates of Hypercognitive Theory**

Demetriou and colleagues developed the theoretical framework of hypercognitive development with roots in historical theory, born from the constructivist Vygotskian and Piagetian approaches to cognitive development (Demetriou, et. al., 1993). The value of this model is that it addresses many of the foundational principles of Vygotsky and Piaget that are widely questioned, even by post-Vygotskian ( e.g. Cook, Santos-Rodriguez & Griffin 2015) and neo-Piagetian (e.g. Case, 1992) writers who base their work on those emergent concepts. This is most thoroughly explained in Demetriou et. al.'s 1993 Monograph. However, Demetriou's 1998 article summarises those points of departure succinctly in terms of ten postulates that concern themselves with the architecture of the mind, its development and dynamics, and the nature of learning. By inspecting these, Hypercognitive theory shows itself to be able to provide a lens of enquiry which is prescient for adult learning. To this end, each of these are presented and critiqued below in terms of how they differ from more

traditional Piagetian and Vygotskian perspectives in order to contextualise and justify its employment as the foundational theoretical framework for this thesis.

Demetriou's first postulate is that the mind is "a hierarchical, multi system and multidimensional universe" (Demetriou, 1998). This has been believed for as long as it has been a subject of study by psychology. Demetriou cites an 1894 article from Baldwin, but any introduction to cognitive psychology immediately manifests this as a core understanding (e.g. Bruning et. al. 1995). The mind has evolved to be this way, and while there may not be complete agreement as to what these dimensions are, and how they are positioned hierarchically, the idea of the mind as a single system which takes in, processes, stores and retrieves information is reductive when devoid of social context (Gillespie, 1992). Piaget was driven to describe humans as logicians (Beth & Piaget, 1962) and Hypercognitive theory moves beyond this to more specifically describe that structure, while incorporating a portion of the contextuality that Vygotsky prized, without writing off the creation of a structure as a result (Demetriou, 1998). This thesis therefore chooses to take Hypercognitive Theory as a model of the mind that is cogent with more established Vygotskian approaches that have explanatory power.

The second postulate presented by Demetriou (1998) is that "the levels and modules of the mind obey different formal

rules". Put more simply, different parts of the mind are distinct in form and function from one another. This rejects the Piagetian view that the mind functions in a single way following a logic that can be mapped, quantified and shown to be underpinning the process of a subsection of the mind as Wadsworth (1996) lays out, and offers a case for the use of hypercognitive theory in this thesis as a result. Domain-specific and domain-general sections of the mind operate with different parameters, and under Demetriou and colleagues' theory, the person can bring these to bear by operationalising in a novel context. It is the contention of Demetriou's theory that this more esoteric reading doesn't preclude mapping and measurement as some have claimed (e.g. Fischer & Bidell, 2006). This is supported by a preponderance of experimental evidence which is something that has been carried out in a variety of contexts (several of which are presented in Demetriou et. al., 1993) and has been mapped by other notable researchers such as Case (2005) and Hirschfeld & Gelman (1994). Thus, the mind functions using multiple logics rather than a single umbrella logic (insofar as the term logic can describe rules governing the operation of dynamic systems), and this theory could potentially have more explanatory power than those of the Piagetian tradition. The third postulate of Demetriou (1998) about his Hypercognitive theory of intellectual development is that "the mind develops along multiple roads". This diverges from the

stage theory Piaget postulated in 1952 and Brainerd most famously questioned in 1978. According to Demetriou's third postulate, the mind develops along three vectors. Firstly, from being driven by the information coming in from sensory organs to being driven by its own internal processes and ultimately by self-awareness. Secondly, from context grounded representations, to more reciprocally grounded ones, which allows for greater application to a broader range of future contexts. This move from context grounded representations to reciprocally grounded ones suggests a difference between the more and less mature minds. Therefore, the theory of Hypercognition requires an acceptance of andragogy, and adds credence to the idea that Hypercognitive theory can be used as a lens to investigate adult learning.

The fourth postulate made by Demetriou (1998) is that "as it occurs at multiple levels, development has many faces". Put simply, some developmental action is consistent across time and some is inconsistent. This differs from the stage-based theory of development such as Piaget's (1952), because it recognizes both forms of development as valid rather than rejecting one because it doesn't fit a particular reduction as the American empiricists were want to do upon its importation to America (Case, 1992). This is a step forward which allows for a more cogent theoretical framework to be constructed around intellectual function, as it draws together analysis at a granular scale using cross-sectional study methods such as



Siegler & Svetina (2002) and on a more global level such as the work of Case et. al. (1996). Of course, the ability to support theories includes dynamic systems theory (Thelen & Smith, 1996) which comes rather full circle, embracing some refinements of Piaget's stage theory. Nevertheless, this represents a strength of the hypercognitive framework, as it allows for the inclusion of theories and approaches from different and emerging subject areas. This is a key reason for using hypercognitive theory as the basis of the research, because in order to instantiate Data-Informed Andragogy, individuals from different backgrounds and perspectives will need to be brought to work together. To do this, they need to develop a shared understanding by which they can communicate effectively.

The fifth postulate is that the mind develops less linearly than either Piaget or Vygotsky would argue. Piaget felt that the mind develops through Relative Abstraction and Vygotsky underpinned his theory with Social Scaffolding.

Hypercognitive theory requires new knowledge be formed by means of symbolic representation, but the value of that knowledge is dependent upon the mechanisms which generate that representation and oversee its collection, management and synthesis with other knowledge from different SSS's. Thus, Hypercognitive theory opens consideration to the social context in which intellectual development is taking place. Given that AHE learning is exclusively delivered in social

groups, rather than through one-to-one tuition or self-study, this theory encapsulates an important part of the context of the learning experience.

Demetriou's sixth postulate (1998) is that "intra and inter-individual variability is the rule in development". This recognises the importance of accounting for individual differences . While some systems seem to develop in bursts over the course of cognitive construction, there is a cascading impact upon other aspects of system development. Thus, those management processes in the mind are of paramount importance in promoting development as advanced hypercognitive systems allow one to store and synthesize information more swiftly and more usefully, thereby problem solving more effectively than would otherwise be possible. AHE students demonstrate extraordinary differentiation issues given their range of backgrounds and career paths, so an approach to understanding cognitive function which recognizes these individual differences is essential to have explanatory power over the AHE student body and offers a more cogent model than a stage theory whereby while someone may get stuck, the developmental rule is linear progression.

The seventh postulate that Demetriou (1998) presents is that "Learning varies across hierarchical levels or systems." Each system develops to be more specialized over time and in so doing becomes more efficient, lending that efficiency to the gestalt. This belies the idea established in cognitive

psychology that cognition follows a uniform pattern of input, storage, retrieval and executive function. Domain specific and domain general information is acted upon by these systems and it is this postulation which bridges the gap from cognitive development to learning most clearly. This postulate is also a key in applying hypercognitive theory to the adult learner. Domain specific information is important to furthering understanding in a subject area. This information could be damaging if it is applied inappropriately to a different domain. On the other hand, domain general information benefits the individual more when it is abstracted to the greatest possible extent. For instance, understanding how to solve a spatial reasoning puzzle like the computer game 'Tetris', could benefit someone organizing a busy car park. The importance of this kind of knowledge gain activity, which Demetriou calls 'hyper learning' explains why this thesis places such great emphasis upon skill development as a key to preparation for study in a novel context such as AHE students are being prepared for.

The eighth postulate of Demetriou (1998) is that "although distinct, different types of learning constrain each other" Therefore, by this theory, hyper learning and domain specific learning can place limits on one another even though they are distinct in terms of content and efficacy. The criticism of this is that it raises the question of how distinct those systems are - maybe it is better not to make such categorical

distinctions? After all, this is one of the criticisms Demetriou and colleagues' level at Piagetian theory, so holding them to the same standard is to be expected. On the other hand, without some system delineation, even if there is clearly interaction between them, measurement of knowledge and learning becomes vastly more problematic. Like multiple domain specific knowledge silos interacting with one another, domain-free learning can be impacted by subject specific knowledge. Taking in and benefiting from novel domain specific knowledge becomes harder (Demoka et. al., 2011) or impossible (Seligman & Maier, 1967) at speed. This is argued to be even more difficult with hyper learning, because it necessarily requires reflection upon the nature of self, one's current abilities and cognitive function (Moulton et. al., 2007). Therefore, hyper learning needs to allow time for this necessarily slower hypercognitive processing to be enacted. [Thinking time](#) becomes a theme of the ethnographic findings of this study and is a part of the reason that this was investigated in exploratory discussions with AHE students.

The ninth postulate of Demetriou (1998) is that "there is no one-to-one correspondence between individual minds and knowledge structures in education". The way that knowledge is split into subject areas in education does not correspond to the way the mind stores its information. There are some general conclusions that can be drawn from research: Where students excel at humanities related subjects, they tend to

have more developed hypercognitive systems which Demetriou et. al. (1992), refer to as the 'humanities factor'. Whereas, the specific semantic systems which hold causal and quantitative measure are more associated with the 'school science achievement factor'. Nevertheless, it would be wholly inappropriate to map subjects of study to specific semantic systems any more than this because such mapping would misrepresent both the gamut of experience in a given subject, and the differing nature of specific semantic systems, the hypercognitive system and the way these interact. This has implications for the application of this theoretical framework which needs to be kept in mind by researchers, designers and practitioners alike. It adds credence to the framework that this 1:1 mapping is not possible - the systems described are simply not analogous to the subject areas most typically studied. This framework does not seek to falsely map learning in a way that fits with the pedagogic zeitgeist, like the now discredited Honey and Mumford (1982) does, regardless of how well it resonates with practitioners for years after (e.g. Rosewell, 2005). The study this thesis presents concludes that [this is the case](#) for AHE students in relation to how 'study skills' are conceptualised.

The last of Demetriou's postulates is that: "Learning and development are constructive but constructive possibilities in any system or level in the mind are constrained by the condition of other systems or levels." The development of the

individual cannot be separated from the classroom environment. Individual development is influenced by and influences other individuals' development. Therefore, trying to map an individual's development in isolation is futile, because the learning cycles such as Kolb & Kolb (2005) and others describe are occurring between as well as within individuals. Herein lies one of the strengths of the Demetriou framework for andragogic study: It recognises and values the social context of the individual learner in a way that many other attempts to describe learning do not. In addition, it maps out that learning process in enough detail that it can be experimentally explored. While Demetriou specifically focuses on the classroom, there is an assumption made that this could similarly be applied to other environments, although there may be a challenge in so doing if social cues are missing such as in an online learning situation. This is [found to be the case](#) for AHE students by this study. Nevertheless, this remains a model which incorporates the psychological, sociological and anthropological, something which enables the framework to be accessible to people from across disciplines. Consequently, it is a valuable underpinning framework for the study of adult learning.

In conclusion, the Hypercognitive theory of intellectual development is suitable for application in this thesis, particularly for one which looks to promote inter-disciplinary working, that values the social aspects of learning and

rejects a framework of based primarily upon subject categorization. It is grounded in scientific study and in this way establishes a precedent for moving beyond the constructivist assumptions that the work of Piaget and Vygotsky are based upon and which continue to persist in academic thought. While it was designed with a mind to child development, the andragogic applications are well documented, most notably in Demetriou and Bakracevic's 2009 and 2011 works, and justified in the postulates, particularly the first and third. The theoretical framework is lent credence because of its concrete description of mind systems and how they interact in context, rather than focusing on one at the expense of another. It recognizes that cognitive development is just that - development, and not a static state where complexity remains constant while more information is injected and stored for retrieval. It encompasses social context, cognitive processing and developmental 'stage', and embraces a more complex view of the progression of cognitive development than its predecessors. This theoretical framework is valuable for the andragogue because it is possible to view adults as intellectually malnourished when they have not unlocked their personal potential due to lack of learning skills, rather than unable to further develop cognitively after puberty, which if true would make adult learning endeavour of limited benefit. It is now taken as established knowledge that adults do have learning capacity beyond their mid-twenties and further

studies have assumed this position (e.g. Girgis, Lee, Goodarzi, & Ditterich, 2018). Ultimately it explains something of how adults learn. For these reasons Hypercognitive theory is included as an underpinning framework for the development of the methodology this thesis develops and presents. It is the lens through which the study's research questions will be explored below.

## **2.2. Is There Evidence of a Lack of Equality of Educational Opportunity or a Hypercognitive Skill and Expectation Deficit in AHE?**

Hypercognitive skill development as described and assessed in the previous section, is key for students to develop intellectually (Demetriou, 2005) and therefore ultimately to achieve at Higher Education (HE) level which places such emphasis on critical thinking (Liu, Frankel, & Roohr, 2014). In the UK, most of the candidates' access to university is through A level qualifications, but a minority, particularly of mature students, do so by means of AHE provision. This thesis asks if there is a sociodemographic skew in the AHE population which raises questions about equality of educational opportunity (research question one) and whether there is a skill or expectation deficit to be found in the AHE population (research question two).

This section draws evidence from published



sociodemographic data, retention and achievement statistics and literature around the changing cognitive landscape of those soon to enter AHE study to suggest that such a skew in demographic and hypercognitive skill exists both between AHE and students on equivalent courses and within the AHE group itself. To do this, a sociodemographic analysis of the AHE population is first undertaken, which concludes that AHE population does not match other provision, raising questions about quality of opportunity. This is followed by an exploration of retention and application rates to HE, that contextualise historical attempts to upskill students in AHE and the current state of student support on AHE programs.

Addressing this question in terms of sociodemographic and retention/application analysis without considering how these fit into the broader picture of student development is recognized to be somewhat reductionist. However, the preferred holistic conceptualization of skill development in terms of the student learning experience is unavailable given the dearth of andragogic literature. Consequently, it is difficult to offer a comprehensive view of which aspects of the andragogic experience have the highest impact factors for skill enhancement. However, by deconstructing skill development opportunities, a conceptual picture of the AHE learner is offered as an extension of Mezirow's (1997) view of learning as a transformative act, and suggests that there is a hypercognitive skill deficit between what AHE students have

and what they need to reach their potential at HE level study, addressing research question two.

### **Sociodemographic Analysis**

Widening participation and allowing equitable access to higher education is a UK governmental priority (Howls, 2015). However, in HEFCE's 2015 report, 'unexplained differences' are identified in AHE. It seems that these differences remain unexplained because of inconsistent data collection and reporting as can be seen from their report: a limiting factor for a comprehensive literature review, and a strong suggestion that a Hypercognitive deficit exists. AHE provision is a key part of making HE accessible and egalitarian mimicking the HE experience so that students are enculturated into the Higher Education zeitgeist prior to their attendance. Consequently, if the sociodemographic constitution of the AHE student body is skewed, this in turn makes HE study less egalitarian.

There is a greater proportion of students from the 'Participation of Local Areas' classification (POLAR3) Quintile 1, that is, those with socioeconomic attributes that make them least likely to participate in education (23% of AHE students are rated least likely to participate compared with 12% studying for other qualifications according to Parr, 2016). In addition, application rates to courses of Higher Education study rose in this quintile steadily over the past few years (UCAS, 2016). This highlights the need for

effective, targeted support of those people belonging to this classification. Other quintiles have seen growth (albeit less) over the last ten years too, so this is not necessarily inherently indicative of inequality. However, it does represent a difference between the constitution of AHE cohorts compared with their A-level colleagues and if AHE provision and education more generally is to be equitable and egalitarian, then this discrepancy needs to be addressed

There is a greater proportion of female to male students attending Access to Higher Education courses in the UK (QAA, 2015), which suggests that there is a lack of value being perceived by male students from the courses on offer to prompt them to apply or a lack of awareness the courses, assuming a fair selection process. While this is also the case for Further Education in general (UK Government, 2016a), it is particularly pronounced in AHE, with nearly three quarters of candidates identifying as women (Parr, 2016). Exacerbating this gender participation gap, men fail to complete proportionally more than women (McCulloch, 2014). Finally, there is some evidence that some women who drop from their studies do so due to reasons of childbearing (some 30% according to the National Campaign to Prevent Teen and Unplanned Pregnancy; 2012) which further reinforces the severity of the gender gap.

A similar gap is apparent in terms of candidates from Black and Minority Ethnic groups (BME; 29% of applicants

identified as BME compared with 24% of applicants to other qualifications; Parr, 2016); this has risen over recent times, with 17.8% of AHE cohorts reporting as BME in 2012-2013; (QAA, 2015a, 2015b) compared with 12.83% in the general population around the same time (Office of National Statistics, 2011).

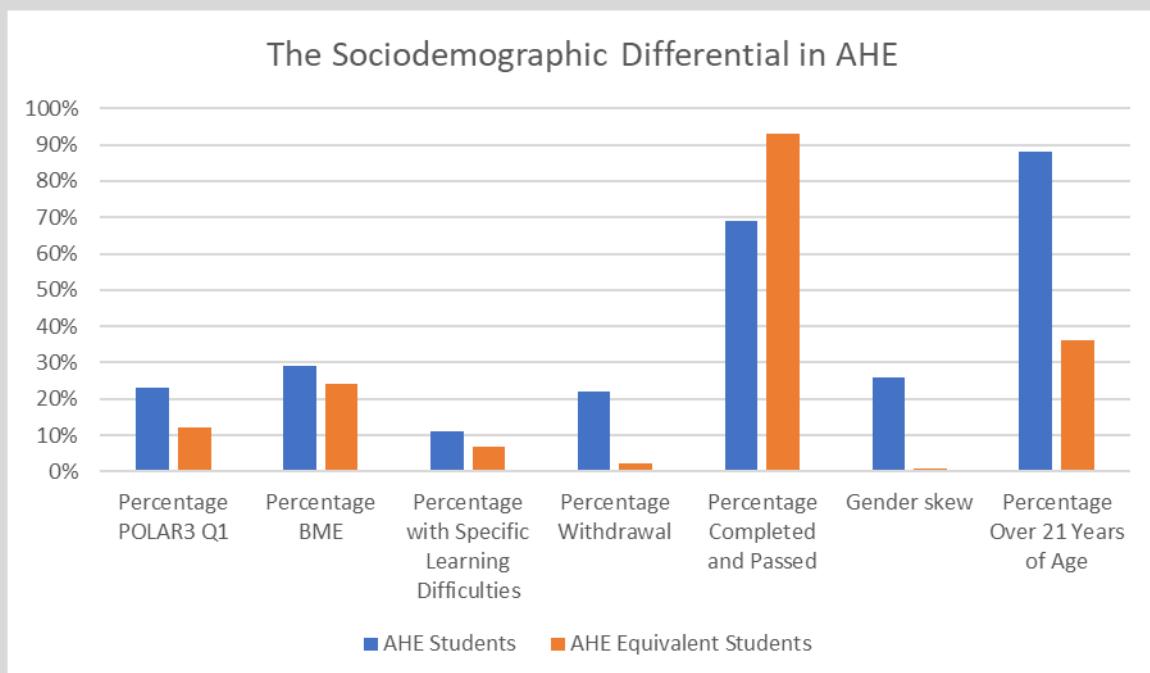
In other areas where this sort of over-representation has been seen there have been shown to be issues of social mobility and institutional racism at work. There is no causal evidence for this in AHE, but differential representation nevertheless indicates that BME AHE students are in some way disadvantaged and represents a call to action for those who would see AHE be as egalitarian as it is intended. Other studies have demonstrated that BME groups do not achieve as well at A level than their peers and are more likely to access university by means of alternative routes than the population average (e.g. Connor, Tyers, Modood, & Hillagu, 2004, and more recently Vveinhardt, Ahmed, & Stonkute, 2015). This adds further weight to the deficit argument.

The final sociodemographic variable that demonstrates concerning evidence of inequity in AHE is Specific Learning Difference. This is a well-studied area for which many valuable resources exist (e.g. Reid, 2009). However, HEFCE (2015) still raise concerns over these unexplained differences in progression between those experiencing such difficulties and those who are not. Eleven percent of AHE students reported a disability or learning difficulty (Parr, 2016),

whereas only seven percent of HE students did so in the corresponding year (Higher Education Statistics Agency, 2016), suggesting that those with specific learning disabilities are over-represented in AHE.

From this analysis, there is evidence of a sociodemographic skew in the AHE population that sheds light on the first research question this thesis asks, suggesting that no, access to and the experience of AHE is not equitable in comparison with other equivalent pathways. This is summarised graphically in figure 2 below:

**Figure 2: The Sociodemographic Differential in AHE**



**Investigating a hypercognitive skill equivalence between students of AHE and equivalent provision**

Having established that there appears to be a sociodemographic skew, the evidence from retention and application is explored. If there is a difference in this retention on the course and application to higher education between AHE, which is over-representative of historically disadvantaged groups, and other equivalent provision, this lends credence to the idea of an equality of opportunity gap, and suggests that group with lower retention and progression is lacking something the other group are equipped with.

The Quality Assurance Agency (QAA; Parr, 2016) found a withdrawal rate for AHE students of 22% on average in the 2014/2015 academic year. When compared with 2.4% of A level students (CESI, 2015), there is a difference. These two sources' numbers are not directly comparable on methodological grounds, and this is symptomatic of a lack of comparative analysis by providers, examining bodies and government (as can be seen at UK Government (2016) as well as methodological complication in so doing (CESI, 2015)). Given the limitations of this comparison, concrete conclusions are problematic. Nevertheless, with such a sharp difference, there are challenges facing AHE students that impact their completion. Given the sociodemographic differential [shown above](#), it is a reasonable conclusion that a skill differential could explain that gap.

In terms of achievement, 69% of AHE students completed, of which 93% passed (Parr, 2016). In comparison, 89.9% of

further education students completed nationally across the post-16 sector (CESI, 2015) and of completing A level students, 98.1% achieved the qualification (Joint Council for General Qualifications, 2015). This further highlights a gap between traditional progression routes and AHE provision in terms of students' chance of success. The result of this finding (again subject to the methodological issue of a lack of centralised source of statistical reporting) is that it is harder to access university via AHE. If a skill deficit exists for AHE students compared with their counterparts, in order to make provision equitable, these skills need to be successfully taught.

The picture of inequity between AHE and traditional education routes to higher education can similarly be seen in the reporting of the University and College Admissions Service of admission data. This corroborates the above findings from a data set that is more comprehensive. Their report shows a diverse range of applicants apply to HE courses from AHE (UCAS, 2014). That said, Atkins & Ebdon, (2014) have shown that application rates from mature students, who are the most likely to engage with AHE provision, have fallen from recent years (between 18 and 30 percent across the 2011 and 2012 application cycles). This has been more recently confirmed by a 2016 application rate report which shows rising application rates for those aged 18-19, but equivalent rates falling for most older age groups in England (UCAS, 2016). Finally,

Atkins & Ebdon (2014) report that fewer students are moving into part time HE study, where AHE students have traditionally been most well represented.

Such a diverse group of learners makes the job of AHE course staff extremely challenging when it comes to providing good quality, sensitively differentiated delivery (Taylor, 2017), something which has been identified as of paramount importance in educational theory (Dewey, 2007) and in practice (David & Brennan, 2009). What this drop in applicants is primarily caused by is unclear, however with a strongly developed hypercognitive system, students can consider the ways in which the skills that they have developed in their AHE study and experience can be applied to Higher Education level study. Developing these executive functioning abilities could offer students more ability to assess and apply themselves to the process of being accepted to university, which could reduce this progression differential.

An application differential alone does not show causal evidence of a skill deficit: If this is present it would be expected that students would also experience differential achievement at HE level due to their varying skill sets. The QAA does indeed find that the progression route a student takes makes a significant difference to the undergraduate degree outcome of progressing students: first class and upper second-class classifications are less well represented amongst AHE students compared with those on other qualifications. To



compound this, a greater proportion of the AHE progressing students achieve a lower second-class degree (QAA, 2015b).

Part of the reason for this could be a function of sociocultural disadvantage of a greater proportion of AHE students (HEFCE, 2015) but it evidences a skill deficit between the groups that is impacting AHE students that transcends their academic potential alone, which stands directly against the QAA (2013) AHE specification which calls for equality as a central aim in their provision, and also against the UK government (Atkins & Ebdon, 2014) who developed a strategy to address these issues because:

"Everyone with the potential to benefit from higher education should have equal opportunity to do so." (p.2)

### **2.3. Historical attempts to upskill students in AHE and the present state of student support**

[This literature review](#) shows evidence of a mismatch between skills delivered and those needed by AHE students. Thus, a case is made for change to address those issues and it is the contention of this thesis that addressing a skill mismatch, has the potential to be achieved through the promotion of hypercognitive function. The fourth research question has the potential to be answered by this thesis using secondary data alone, but as will be shown, there is a dearth of that data available, and this predicates the need for exploratory methods to be used to enquire about the AHE

student experience. In order to begin to make this case for a lack of sound secondary data, exploration of historical attempts to provide skill development opportunity for students, which the achievement differential suggests have been ineffective are explored. Following this, the modern student support situation is examined. It finds that in terms of the current context of AHE, individual colleges are left to deliver their course as they see fit assuming some basic quality criteria from QAA the regulatory body which has an oversight mandate are met (in their specification QAA 2013 refer to what they offer colleges about provision as 'core guidance', with the expectation being that they should build their provision around that core). Thus, colleges are expected to design and implement a support system for those students so that they can access their learning opportunity, free of any impediment which artificially limits their potential. This analysis will show that as a result variation exists between providers in this decentralised system. Consequently, the case is made for further exploratory investigation of the AHE student experience through primary research that this thesis undertakes.

**Curricular management of AHE provision over time:**

**Modularity and the move towards subject  
specialization.**

Courses are becoming more centred around specific professions, particularly subjects allied to medicine like midwifery (UK Government, 2016b, potentially speaking to the reason for such a significant AHE gender skew compared with the general population). In addition, AHE and HE courses alike have predominantly moved to modular structures over the past few years, which contradicts the view that there is benefit to an educational experience which is as coherent as possible across contexts and subjects. Skill development activity has traditionally come in the form of discrete 'study skills' sessions. However, there is a strong feeling that discrete study skills sessions such as these are ineffective (e.g. Wingate, 2006) and partly as a response to this, from 2015, students studying for Access to Higher Education courses in the UK are required by the Quality Assurance Agency to study with an updated specification (QAA, 2013). The grading of discrete study skills delivery has been removed. Now it is up to the delivery institutions as to how they wish to incorporate study skills into their delivery. Where study skills are assessed, it may only achieve a pass or a fail grade, not a merit or distinction like other subject material (QAA, 2014). There is no indication that resources will be diverted to subject specific sessions to embed these skills. This approach is easily disputed by long established research which shows that metacognitive strategies can be taught (Halpern, 2009) and that there is a close relationship between

the maturity of those skills and successful learning (Borkowski, Carr, & Pressley, 1987). Interestingly, there seems to be an awareness of this, although the issue has not been addressed. For instance, in her talk at the AHE Conference 2014, Cottrell highlighted the increasing range of cognitive skills demanded of applicants to higher education but offered no suggestion as to how AHE provision could better provide these. Thus, as the AHE curriculum becomes less skill-centric and effective remedies for this are not forthcoming, there is a greater need for novel technological innovations to address the skill gap between AHE and their counterparts on equivalent provision. This may be by tying together learning experiences to counteract course modularity overlaying an inconducive compartmental framework that doesn't reflect the intellectual structure of their thinking as identified in the ninth of Demetriou's (1998) postulates, or by facilitating development of hypercognitive skills in a way that is complementary to AHE learning.

### **The 'Trickle down' approach to skills training**

The second way that skills development and support needs have been implemented historically is through the teacher education model: Providing continuing professional development opportunities to teachers of AHE students which focusses upon important scholastic skills. The theory is that those tutors can then deliver better courses for their students which are

as accessible as possible (Reid, 2009).

While this enables an institution to address issues as they become apparent, there are two problems with this approach. Maybe some students begin to experience symptoms of disorganization. This may only be diagnosed following a drop-in retention on the course. Then, training for staff on enabling students to become internally motivated to organize may be put in place, by which time it is too late for the continuing professional development activity of the teachers to impact the learning experience of learners initially affected. This delay from diagnosis to implementation is exacerbated if the student studies with many tutors on their modular course, disguising the 'bigger picture' unless they are proactive in help seeking, or staff invest a lot of time liaising about each learner. When it is also considered that practical adjustment arrangements for disability tend primarily to be based on a medical model (Higher Education Statistics Agency, 2016) and based solely upon support with the student's primary course of study, training a staff member alone is inadequate. Therefore, the first critique of the trickle-down approach is that it does not address the changing needs of a learner in a proactive manner. As such, technological innovation which enables proactive identification of student needs and supports them at the point of need could be beneficial. This is something that Learner Analytic support is beginning to work to address and it is

encouraging that three institutions ran control group studies (Sclater & Mullen, 2017) which found statistically significant improvements in drop out and grade point average rates for students with whom these data-rich tools were employed.

Secondly, the teacher education approach does not directly address the learner's needs but assumes benefit to the learner following tutor practice change. With the great increase in the number of learning opportunities available through the internet such as MOOCs (O'Prey, 2013), the student/tutor relationship is abstracted somewhat, with most online learning opportunities advocating for a light touch support and moderation model (Haggard, 2013). In this context it cannot be expected that student support will propagate from tutor to student as well, when students increasingly operate in multi-screen, embedded learning environments (Sparks and Honey, 2014). Thus, tools which provide discrete skills training directly to the student could be of significant benefit in addressing the skills deficit that the evidence suggests exists for AHE learners compared with others.

### **Current support on AHE**

In assessing the nature of the skill gap in AHE, the current state of support for those students needs to be considered and this is challenging due to a lack of guidance, data and reporting. The regulating body for AHE provision, the Quality Assurance Agency for Higher Education (QAA) does

not prescribe this support. Instead, students are encouraged to enquire with individual service providers for details. On [accesstohe.co.uk](http://accesstohe.co.uk), which QAA own and run, there is no information about this (see: QAA, 2018). In a less formal document that details some case studies of ex-AHE students, QAA does recognise the importance of support during the course, through ex-student quotes:

"At times, I did find it difficult to get to classes on time - I was juggling three different jobs...but the tutors understood the situation and my wife gave me a lot of support." (QAA, 2007; p.9)

"The tutors were incredibly helpful and motivating, and the students supported and encouraged each other. I was surprised I enjoyed the learning so much." (QAA, 2007; p.15)

"The tutors were so enthusiastic and understood our learning needs really well. When your confidence was beginning to wobble, they'd step in with the right advice." (QAA, 2007; p.17)

This suggests that there is some support for students on AHE courses, although it says little more. A further critique of this document, aside from its age would be that most of the case studies were of AHE students who had then gone on to work either for QAA following graduation or for a partner college course, bringing into question the authenticity of these carefully curated accounts of success. Finally, one should note that in each of the accounts, support from family,

friends and course mates were cited more frequently than support from the institution at which they were studying or the tutors running that provision. There are several other mentions of support to AHE students on the site, but all are similarly outdated and focussed upon marketing AHE and the QAA. For more specific information, one must look to individual providers.

Investigating individual providers' provision is similarly fruitless. Perhaps the best source of information for this is the author's own experience and this justifies the use of an exploratory [autoethnographic](#) method of inquiry as detailed in the methodology chapter below. In addition, the author explored each AHE provider's website which offered an AHE course within 50 miles of the West Midlands (33 institutions, offering 153 courses). From this they determined that the Gloucestershire College website ([www.gloscol.ac.uk](http://www.gloscol.ac.uk)) is representative of what was found to be available, and this has a single quote as the sole relevant section:

"My lecturers are a constant source of encouragement and motivation. All classes are well planned and inclusive, and I appreciate the flexibility. Having two children means it can be difficult to juggle childcare, but all work is uploaded to the intranet, which allows us to catch up on anything missed." ([gloscol.ac.uk](http://gloscol.ac.uk), 2018)

The website is constructed with a clear divide between subject specific and generic information about support. This



is illustrative of most provider websites and mirrors the sparsity of information from QAA. Therefore, two conclusions may be drawn from the literature about current support. Firstly, that quality of support is local to individual courses, such that gestalt conclusions cannot be drawn. Secondly that courses are not marketed based on support students will receive and with no regulatory or voluntary reporting available, there is a strong case for exploration of the AHE student experience through exploratory methods of primary research to address the fourth research question.

### **The changing nature of the AHE student**

A snapshot of a skew in AHE in terms of sociodemographic differences, retention and achievement has been presented and in order to contextualise this, the way in which education is changing needs to be considered. Advances have led to a dramatic increase in the breadth of learning opportunities now available online (O'Prey, 2013). As such, it is unsurprising that the skill set required to access those learning opportunities has also diversified to include skills such as a predilection towards self-determined intrinsic motivation (Hartnett, St. George, & Dron, 2011), time management (Nawrot & Doucet, 2014) and effective forum use (Milligan, 2015). In contrast to this, current AHE provision is predominantly delivered offline in classroom or workshop settings. There are very few online AHE options currently offered in the UK

(QAA, 2015a), with distance options available from seven providers.

In contrast with this, and although precise measurement is difficult, the popularity of fast-track courses is growing (Pollard, Hadjivassiliou, & Swift, 2017; Bridgestock, 2012) and there seems to be a predilection towards more, shorter courses (Weller, 2013). In addition, Access to Higher Education students over the next few years are expecting to hold multiple careers by the time they are 30 years of age (Sparks and Honey, 2014). Each of these factors have implications for the support of a student's hypercognitive skill growth across their learning experience. Those looking to HE study are recognising the importance of broad subject applicability, evidenced by an increase in popularity of subjects perceived as applicable across a range of careers such as science, maths and computing (Weale, 2015, citing data from the Joint Council for Qualifications, 2015 report). In contrast, the average attention span when looking at a novel website is dropping and a proclivity towards multi-tasking is being shown (Sparks and Honey, 2014), characteristics which are projected to increase as members of 'Generation Z' access further and higher education over the coming years (Sparks and Honey, 2014). Caution should be noted when drawing conclusions from the Sparks and Honey report however, although they have a world leading reputation for making market predictions such as these, based upon detailed social science

activity, this is nevertheless not a peer reviewed source. This said, they are financially motivated to produce actionable business and marketing intelligence.

The changing nature of the AHE student could mean that learners will benefit from increased ability to access and make the most of peripheral learning opportunities such as those mentioned above. If this is the case it will require internal motivation as well as skills of self-advocacy, sifting through information with wider bandwidth and working in ad-hoc groups to achieve specific goals (Conley, 2007). There are hypercognitive aspects to each of these skills and therefore if learners are shown to benefit from these skills, a focus on hypercognitive skill development has the potential to benefit AHE students.

This represents a challenge for AHE. The 'traditional' Access experience correlates to that of the university student studying on a university campus for an undergraduate degree with a large group of peers, so Access to Higher Education provision can purport to offer much of the skillset needed for this. On the other hand, it is not delivering the range of skills that the learner now needs for success. This, combined with differential application, achievement and opportunity, suggests a need for innovation to address the hypercognitive skill gap. This answers this thesis' first research question in the affirmative and suggests that the answer to the second is that there is some gap between delivery and student need.

Finally, it can be concluded that while there may be much to learn about the AHE student experience, this is difficult to explore through secondary research due to the lack of centralised reporting, data collection or publication.

## **2.4. Data: An emergent resource**

The evidence and analysis presented above suggests that there is a skill gap, a sociodemographic skew and a dearth of evidence from which to understand the AHE experience. The nature of the AHE student is changing and the curriculum has been shown to be limited in its response to those needs. Therefore, it is necessary to look elsewhere to find potential sources of innovation which could disrupt the industry. This thesis argues below that data is getting more prevalent and data science techniques have matured such that there is a valuable opportunity to employ them to address the skill gap, to provide of opportunity and to better explore the AHE student experience. Therefore, Data-Analytic thinking and the field of data science will be outlined below, followed by a consideration of the advantages and disadvantages of its use. This sets the frame for consideration of the ways in which data science techniques could be employed in an AHE context to improve AHE experience.

'Data-analytic thinking' refers to problem solving based upon data that provide descriptive or predictive power over

the situation (Provost & Fawcett, 2013). This has grown in prevalence across industries (McKinsey, 2011) and similarly in Education (Eynon 2013), to the extent that the ownership of data is a quantifiable measure of value: Whereas traditionally the success of a company could be measured otherwise, now a company can be valued at billions based on the data they have collected or have access to, with little other infrastructure (Selby & Kosack, 2015). Computer-mediated big data analysis has driven this change. With the ability to build probabilistic connections between many more aspects of a data set than a human would be able from a large enough group of people, seemingly unrelated variables can be found to have correlation where there weren't before (Junqué de Fortuny, Martens, & Provost, 2013). Being able to draw on new data sources like this has several advantages and disadvantages, and ethical implications. These will be elucidated below following a short digression to define terms used in the field of data science and construct a use case for this thesis.

### **Defining Terms for Data Science**

At first glance, Data-Analytic Thinking and Data Science seem to be interchangeable, and indeed are in some literature (Provost & Fawcett, 2013) but it is important to differentiate for clarity.

Data-Analytic Thinking is a state of mind, a principle to shape design and practice, while Data Science is a field of

study and Machine Learning is a Data Science technique (Provost & Fawcett, 2013). Thus, Data-Analytic Thinking encompasses the use of data science techniques including machine learning. The Data-Analytic thinker will be open to insight that can be gained from a variety of data sources, be they computer mediated or experimental, ethnographic or otherwise (Wang, 2017). In the context of this thesis, data science techniques will be integral to the design and development of data rich tools and therefore a broad outline of this fledgling field is provided in order that an effective methodology can be constructed.

In contrast with Data-Analytic Thinking, Data Science is the 'study of the generalizable extraction of knowledge from data' (Dhar, 2013, p.64). The fundamental component of data science is the interface between the data scientists and the algorithms used (Sharma, 2018). These interact at key stages in the process of drawing inference. The first of these key stages is when a data scientist decides what to study (ibid.). Here there is ample opportunity for their views to influence that decision-making so this should be considered fundamentally subjective. This is ironic given that the use of large datasets to draw conclusions is designed to be as objective as possible. In this sense, data science mirrors the natural and social sciences (Livingston, 2018).

Once the target of study or problem is clear, there is data preparation, and this is the second point at which the

scientist and algorithms interact (Shearer et. al., 2000). The data scientist must think like a computer, putting aside schema developed in humans to best manage the data preparation. Data science techniques can be both more and less effective than a human alternative depending on application. Data science is most valuable in contexts where it is hard to scale the work of the human analyst, or they can't operate across a small enough time scale to be effective (e.g. Ripjar.com, 2018). Thus, Data Science allows hitherto unforeseen opportunities for insight.

Once the data are prepared, a model of data analysis is chosen and tested. This is an iterative process, with testing and retesting across different models rather than choosing the mathematically 'right' one for the situation as one might when deciding between a  $\chi^2$  and a  $p$  test in 'traditional' statistical analysis (Harlalka, 2018).

Following modelling, the veracity of the model is assessed. If it is good and accepted by stakeholders, then it can be deployed to impact decision making (for how long is context dependent). By this point in the process, either the context of the data may have changed, or the analysis may have revealed more about the data, in which case further iterations of the process are necessary.

Thus, a data scientist needs:

"an integrated skill set spanning mathematics, machine learning, artificial intelligence, statistics, databases

and optimization, along with a deep understanding of the craft of problem formation to engineer effective solutions" (Dhar, 2013, p.64).

This precludes its employment in the education sector because there are so few who work across this gamut of subject specialisms. Thus, the facilitation of multi-disciplinary working is vital for the employment of data-rich solutions in the educational environment, at least until enough professionals with these skills work in education. Consequently, this thesis will employ the PPD methodological approach to design-based research (Mor et. al., 2015) to collect its ethnographic data and co-design design principles to underpin solution development that the third research question calls for.

## **Supervised and Unsupervised approaches to Data**

### **Analytics**

There are two types of problems in data science and these are categorised into 'Supervised' or 'Unsupervised' cases (Provost & Fawcett, 2013). Where a data science problem is supervised, there is a tangible outcome or question to be answered. For example, a set of help-seeking queries from healthcare professionals online within a hybrid social network (such as the implementation example used in Cook et al., 2015), some of which are duplicates of one another.



Stakeholders have identified that it would be beneficial to identify instances of repetition and provide the questioner on the duplicate question a link to the original posting in the hope of resolving their query without the need for others to respond. In this instance a target variable is identified (similarity of query with a given target) and a model created to link a help seeker to the duplicate.

Having a question which begets a target variable is preferable but not mandatory, as it would be in human-led quantitative analysis which the education sector has relied upon for the most part for insight. Without this, the problem becomes 'unsupervised'. For instance, one could have a set of student records produced by a range of institutions over the course of the last year. In this instance the data scientist may wish to understand how some of these profiles have similarity to others. They don't know what particular criteria beget successful completion for these learners, and so they look to an algorithm to group the data by means of a cluster analysis. Examination of the similarities within clusters and the differences between them could offer insight into the characteristics of a successful student and ultimately lead them to the formulation of further hypotheses.

There are nine classes of model available to the data scientist (Provost & Fawcett, 2013). These are detailed below with educational examples in order to shape an understanding of where data-analytic tools could be employed in AHE. The

first is Classification, which involves putting target data points into categories based on the characteristics of that data point. For example, determining whether a learner should be classed as dyslectic by means of the SNAP-SPLD tool (RS Assessment, 2020). The second is regression analysis, which provides prediction of a numerical value for a target variable for each data point. For example, quantifying the extent to which each member of a group's relational distance from each other member impacted on their task completion (e.g. the Relational Proximity Framework, developed and employed by The Relationship Foundation, 2020). The third class of analytical model that can be employed is Similarity Matching. This tries to identify other data points which have a high degree of similarity with a target data point. This might be used to pair up students with similar interests or manners of learning with one another such that they can benefit most from their interactions with classmates such as in Katira et al. (2004). The next class of data science analytic method is Link Prediction. Link prediction algorithms estimate the strength of a link between data points. This could have particular use within hybrid social networking to link people with others interested in the same field of study. By establishing how strong links are between groups it becomes possible to prioritise paired matching. For example, a group member has a grade profile which is on average significantly below the class mean. They may therefore be associated with another

member of the group who not only has similar interests or manners of learning, but who will be able to act as a more knowledgeable other (such as in Sundararajan, 2010). Also available to the data scientist is the clustering technique which arranges data into groups based on similarities within those groups which are more heavily weighted than the similarity between a given data point and one from another target group. This is used to understand broad approaches taken to answering an essay question as a step towards automatic grade assignment (Kakkonen & Sutinen, 2004). When looking for new insight into a data rich environment, Co-occurrence analysis can be employed. This is the identification of conditions which tend to happen together such as the keyword extraction algorithm presented in Matsuo & Ishizuka (2004) which could provide an approach to the assessment of student-tutor discourse patterns when combined with the semantic analysis of Haggag (2013).

The final three methods data scientists can use are Profiling, Data Reduction and Causal Modelling. Profiling is when behaviour patterns that form schema are identified, against which abnormalities may be flagged. Profiling might be used to identify when students with emotional and behavioural disorders are experiencing a sudden change in emotional state, a tool for which a need has been identified (Lane, 2007) and is now employed through tools like Jenzibar (2020). Data Reduction involves assisting a user to understand a data set

by collating it into a form that can be easily digested or stored such as that used by Lane & Brodley (1999) to reduce the storage burden felt by those looking to analyse sequences of events such as forum interaction behaviour. This has application for managing online behaviour in virtual learning environments (Kreijns, Kirschner, & Jochems, 2003). Finally, Causal Modelling is the identification of causality between two or more conditions such as month of birth and likelihood of degree achievement as in Braakman (2010).

Awareness of the possibilities data science offers, the classes of problem it may solve, and its consequent limitations is important for the construction of tools which require careful design and development work. Data science activity can also be useful at the research stage of the research-design-development process. Through this activity a data scientist may be able to feed into the research which informs the development of the tool by providing insights which may have previously been unseen or unquantifiable. Therefore, the integration of data science into the research, design and development of educational tools requires careful consideration, not only to avoid biasing assumptions, but also to build soundly into the context. This suggests that if data science techniques are going to be employed in an AHE setting, that careful development of design predicates would help scaffold the successful integration. Thus, the third of this thesis' research questions is formed.

Some examples of where Data Science may be used in education are listed above as each broad investigation type commonly used in the field is described. It should be noted that the field of data science and education have overlapped for some time (Elias, 2011) and there is a growing body of literature springing from a business context and referred to as Educational Data Mining or more broadly, Learning Analytics (Shum & Ferguson, 2011). This was defined succinctly in the call for participation in the first conference dedicated to the field as:

"The measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimising learning and the environments in which it occurs" (Siemens, 2010)

However, those engaged in the study of learning analytics identify the currently limited knowledge exchange between researchers and practitioners as an issue which could stunt or end the development of the field (Siemens, 2012). Siemens goes on to say that there is:

"a need for an integrated and holistic vision for advancing learning analytics as a research discipline and domain of practice" (p. 1), something that this thesis aims to achieve. The groundwork for this has been laid over the previous few years: Along with educational institutions implementing policies of data-warehousing (Stiles, Jones, & Paradkar, 2011), some institutions also compete on research

performance indicators (e.g. Higher Education Funding Council for England, 2015) which determine funding allocation for future research. Shum & Ferguson (2011, pp.2-3) argue this is driving the development of the Learning Analytics field. Consequently, there is great potential for the field of Learning Analytics to grow and employing it to address issues of educational inequality and the expectation/opportunity gap evidenced in the field holds great promise.

While Learning Analytics has much to offer, there are nevertheless several factors which deserve challenge. This thesis argues that Learning Analytics does not yet go far enough in promoting a fully embedded model of data analytic thinking into research, design and development work, hence focussing primarily on Data Science and Data-Analytic Thinking over Learning Analytics in setting the scene for the work this thesis does to promote data-analytic andragogic tool development. While there have been some strong cases of application of specific data science techniques (e.g. Liu & Huang, 2017), and examples of hyper-focussed research which produce local applications (e.g. Stiles, Jones, & Paradkar, 2011), there remains a need for several things. Firstly, a model of design, development and research which embeds data analytic thinking and practice throughout the process, rather than borrowing tools from the field when appropriate, or when those with the requisite skill set are present and for only a research focused part of the process. Bakharia et. al. (2016)

represents the most concerted effort to date to produce a framework for this purpose, and it may be critiqued for both of these reasons, it does not indicate how context-aware professionals and analysts should work together in the process, or when. Additionally, it is research focussed, choosing to put aside development activity, assuming instead that tools are pre-designed and later applied to the context.

The Second remaining need for Learning analytics efforts is the inclusion of best practice as it relates to properly contextualizing findings to avoid misleading end users, be they educators or students, who may not be used to parsing the output of data science activity. This issue has been explored by Bennett (2018) and highlights the need for educators to be involved in that process for students. However, it does not address the educators' ability to appropriately interpret the data themselves. Thirdly, there are ethical issues outstanding which need to be addressed which are reviewed in the [Disadvantages of Employing Data Science](#) section below. In relation to Learning Analytics specifically though, the approach with the most traction in literature is Slade, Sharon and Prinsloo (2013), who propose a framework for addressing issues of data protection and management, but they recognise that this field is fast-changing and thus that their framework is limited in its application. The aged nature of the framework is highlighted by the development of near real-time analytic tools such as the StREAM tool from SolutionPath

(SolutionPath, 2019) which cannot be put under the governance structures their framework requires such that the output may be used in a timely manner. Lastly, there needs to be better education for those working in data science who simply do not have as clear a view of the field as necessary to fully engage with it in an educational context (e.g. Khalil & Ebner, 2016, in the educational sector versus Forrester Consulting, 2013, or Gou, Zhou, & Yang, 2014 elsewhere).

### **Acceptance of Data Science in Education**

There is currently little overlap between Data Science and Educational expertise (Stone, 2017). The perception of stakeholders has the potential to limit the application of learning analytics in education. As the application of Data Science techniques is highly contextually sensitive (Harlalka, 2018), doing so inappropriately or insensitively could damage public trust and stymie growth. From findings such as Lindqvist & Vestmann (2011) and Moffitt et. al. (2011) There is growing acceptance of the idea that the goal of producing successful, productive members of society by means of education necessitates a focus on a range of less commonly considered skills instead of the traditional reading/writing/arithmetic model described by St. Augustine around 400ad (Pusey, 2002) and in common parlance to date. Consequently, a great deal of research and discussion has arisen around terms like 'Grit' (Duckworth et. al., 2007) and



'Growth Mindset' (Mueller & Dweck, 1998). There is a need for hypercognitive skills such as these and other 'non-academic' or 'soft' skills to be quantified effectively (e.g. McKenzie 2016, relating to Grit and Hoskins, 2018, relating to Growth mindset), and their development measured by educators. If Data Science techniques can do this more effectively than traditional examinations, then there is great potential for the uptake in data science in education as those educators who represent the stakeholders with the most social capital in the situation embrace these methods.

There is scepticism about data science also which needs outlining in counterpoint to the potential for innovation it represents. There are a growing number of cases where application of Data Science principles have failed in a public fashion such as the 'Google Flu' project (Lazer et. al., 2014). As Leo Brehm (as cited in Stone, 2017) put it, data science needs to show results:

"They need to show how data can take the logistical burden off teachers. Teachers want to reach their students, and if you can free up their time to explore and make connections, they will be on board with that."

The other aspect of data science which is necessary is good data visualisation. David Hoffer writes about this in the popular press (Hoffer, 2018), and much of what he says echoes feeling on the issue in education. Therefore, a framework within which knowledge of data science can be

combined with the expertise of teachers, students and other stakeholders is important to frame the value of data science for those stakeholders in a way that they find tangible and which delivers insight while overcoming barriers to entry.

While a full study of public perception of data science is beyond the scope of this thesis, in order to consider the application of data science, its advantages and disadvantages must be considered critically to make the case for a focus on data-analytic andragogic tool development framed in research question three.

### **Advantages of Employing Data Science**

Data Science techniques can empower. They can make predictions and insight based on a larger evidence base than ever before (Junqué de Fortuny et al., 2013). This is the case partly because algorithmic design has advanced and partly because that larger data set is now available (Stiles et al., 2011). The primary increase in the availability of this data set has been due to the uptake of social media by the general population who are now offering up richer information about their behaviour than ever before (Dutton & Blank, 2011). However, novel sources of data available are not confined to social media. Retail habits are tracked through the use of customer reward cards (Duhigg, 2012b), movements are triangulated on CCTV (e.g. the service provided by [Prayas Analytics](#)), through geotagging (Crampton et al., 2013) and by

crowd sourcing (e.g. <https://www.streetbees.com>). Smartphones collect data such as barometer readings and walking patterns to predict where people are rushing for shelter and consequently where there is rainfall (Metz, 2015), finding insight from initially unrelated data sets. The constant among these is that while one data point may not be indicative of anything that is measurable (one person picking up their pace of walking for instance), when put together and analysed faster and more thoroughly than a human is capable of, precipitation is rightly predicted. There is no reason to believe that data produced by those in education should differ in this manner from that of the general populous (Sin & Muthu, 2015). Therefore, there is the potential to empower people by offering insight into their behaviour either to them, to other stakeholders in their education or to computer mediated processes (HEFCE, 2015).

The second advantage of big data analysis is that by drawing on a larger more representative data set (which carries its own challenges: Tung, 2005), it has the potential to minimise or exclude human bias from the process (Holt & Walker, 2009). Where a human may be predisposed to judge the behaviour of another based on prior information, a computer algorithm needn't do so unless it has been specifically programmed that way (which is still a significant caveat which is explored in depth in Borovicka, Kordik, & Jirina, 2012). Consider an AHE student who meets their tutor in a one-to-one

context to discuss their progress every term. That tutor must make several assessments about the progress and potential of the student to best feed back to them in a supportive and empowering manner which is fraught with challenges, not least that it is relatively under explored in literature (Slatter & Hall, 2013). There is always the possibility of biases influencing their perception of such a complex multifaceted situation such as the student (or tutor's) gender, their experience with that student in class or from what background either comes (Prendiville, 2008). In this instance, the quality or representativeness of the data that is being drawn upon is in question. Potential sources of data from the author's experience observing, managing and practicing in this environment, include the student's grade profile, diagnostic test results, anecdotes from others, perception of participation in class, analysis of previous discourse with the student and any self-reported information. Despite being triangulated across multiple sources to maximise validity (Shenton, 2004), this is an example of activity which is considered to be good practice in constructing a formative assessment experience for a learner, as it adheres to the Black and William (2009) framework for good formative assessment practice. However, it is also an example of when the data available by this method are not able to provide the tutor with what they need (Ainsworth et al., 2009). Ainsworth and colleagues go on to identify three key aspects

of formative assessment which mirror data analysis principles:

"Examination of data in isolation of its context can lead to erroneous conclusions...Educators must interpret the data available to them [and]... If we adhere to data-driven decision-making, we will make decisions based on the best data available at the time." (Ainsworth et al., 2009, p.144)

This highlights great potential to draw practice and the academic body of literature around Learning Analytics together to advance the field such as Siemens (2012) calls for. It also offers the chance for the achievement/progression differential this literature review identifies to be addressed if part of the reason for that is human bias.

Thirdly, Discovery Models such as those employed in machine learning contexts can operate more swiftly than traditional methods of analysis and across a greater volume of data (Miller, 2015). A mature predictive model can offer analysis of a data set constructed across hundreds of thousands of dimensions in near-real time. This means that it can be responsive to changing behaviour patterns in a manner which none of the data sources described in the tutor-student discussion described above can compete with aside from the discussion between the stakeholders themselves. For example, the grade profile data source may offer a quantitative measure of student progression across a period of time, but given that most access courses are made up predominantly of three credit modules (sixty credits overall; QAA, 2013), then the student

is only likely to produce twenty summative data points across their course, many of which will be at the end of their period of study once such data is no longer useful (Kneale & Collings, 2015). If a drop in that student's grades is detected, with the nature of the course even if this is responded to immediately by the tutor and student, the likelihood that more grades have been affected based on the work done across other modules simultaneously is very high. Thus, there is inertia to any initiative implemented based on the grade profile data source, which isn't an issue with access to a study of the behaviour online of a student that is run on a minute by minute or hour by hour basis. Developing access courses such as that reported in Butcher, Sinclair, & Clarke (2015) place modelling reflective practice such as one to one feedback as a central to the development of self-reflective learners with strong metacognitive skills. Here, reducing feedback could change outcomes and therefore lead to educational equality of opportunity.

In addition to the above, simply the raw potential of a field which is still being explored offers the potential corollary benefits to those aiming to apply its principles to a novel area such as AHE (what Walliman, (2011, p.8) calls a "sense of understanding"). Data science techniques are being applied to education contexts more generally, for example, Klamka, Cuong, & Cao, (2009) and Premchaiswadi & Porouhan, (2015). and as established above, the field of learning

analytics is emerging from technology enhanced learning as an area of study (Elias, 2011), which further suggests that it could have viable application to the AHE context. Data Science's continued uptake in marketing (Puri, 2015), business (e.g. Quinn & Brachmann, 2015; Selby & Kosack, 2015), politics (e.g. UK Government, 2014), philosophy (e.g. Leonelli, 2013) and the social sciences (e.g. Cook, Pachler, & Bachmair, 2011) including education (e.g. McKenney & Mor, 2015) speaks to this potential. Consequently, it is reasonable to conclude that data science is poised to impact education to a greater extent than any other single factor in past years (Kohlmeier, 2013).

Finally, data science can be used for methods of enquiry which break out of the confines of the traditional hypothetico-deductive method (Anderson, 2008) that is entrenched in the development of theory and research-based practice in education. It does this by offering exploratory opportunities (called 'unsupervised' analysis; Provost & Fawcett, 2013) where the objective is unknown but patterns in the data are uncovered to offer insight into the information without prior hypothesis. In the same way that the cognitive revolution of the 1950's led to a reinvigoration of the ideas of an obscure social philosopher in the form of Vygotsky as a reaction to the reductionist nature of the scientific cycle (Daniels, 2008, Mor et al., 2015), so data science is set to offer similar release to those who find the confines of the laboratory or field experiment lacking in ecological validity

(Roe & Just, 2009). Furthermore, with the development of the Internet of Things, data sets are becoming more granular in nature (European Commission, 2013). Therefore, the specificity of results can be finer as a broader range of data sources can be included in the analysis, something that wasn't available previously to the assessment of the AHE student experience. Of course, the scientific method remains valuable in enabling the 'human element' in the process (Hayes, 2015), so it retains value. Therefore, a framework which successfully marries the two would have great potential for the development of data-rich tools grounded in research methodology, thus the employment of the PPD framework of Mor et. al. (2015) which retains a degree of freedom to iterate in order to account for this human assessment loop.

In conclusion, there are several key benefits to the use of data science techniques for AHE. Firstly, there is the potential for a broader evidence base from which to draw insight that represents currently untapped potential. Alongside this there is the potential to reduce human bias, not just in the analysis of data, but in the selection and weighting of data sources. In addition, the speed of analysis is increased, leading to near-real time and rapidly iterating insight models which would not otherwise be possible, reducing the loop between diagnosis and intervention. Furthermore, with the advent of the Internet of things, novel data sources can be expected to increase in diversity and quantity, making



data sets more granular, raising its potential for impacting education over the coming years. Finally, data science offers the opportunity to go beyond the hypothetico deductive method with quantitative data into exploratory activity.

### **Disadvantages of Employing Data Science**

Data Science techniques also come with disadvantages. First and foremost, while the predictive power can be great, as demonstrated by after-the-fact assessment of those results (Junqué de Fortuny et al., 2013), the 'black box' nature of many machine learning techniques (Brownie, 2014) means that there is not necessarily any way of knowing why one set of behaviours represented in a data set may be predictive of an independent variable (Redman, 2014). For example, predicting who is pregnant from data associated with a given group of people might be tested by asking those people featured in the data set their pregnancy status to identify false negatives. Likewise, checking to see how many males are predicted to be pregnant by the produced model to identify false positives gives an idea of the veracity, but not the mechanism that enables the predictive model to have explanatory power. The 'depth' of insight is shallow as it doesn't add to the body of understanding on a topic. The 'black box' nature of machine learning algorithms presents ethical challenges also. Consider a scenario where a student is algorithmically predicted to fail a course, is told so and through the act of

getting that information loses confidence in their ability, so drops from their course of study: a self-fulfilling prophecy of the sort known to educationalists since Rosenthal & Jacobson's landmark 1968 study, and reflected in more contemporary work by Bennett (2018). Without appreciating the reasons behind a prediction, it is possible to do more harm than good in applying that to a given situation. This can be mitigated somewhat by the care that is taken in choosing the context into which to apply such techniques. This is possible in three ways, firstly it should be considered whether the data collection process could impact participant behaviour (the 'Hawthorne Effect': McCarney et al., 2007). Secondly, the impact of feedback should be allowed for. Thirdly, triangulation to avoid any false positive or false negative results should be carried out, so these drawbacks can be mitigated to some extent.

Another ethical issue arising from these techniques is privacy related. The Uber car sharing company found themselves afoul of social opinion when they allegedly tracked a journalist and others in real time without her knowledge or permission (Frizell, 2014), and when they put together a predictive model to identify sexual habits of their users through their car use (Besette, 2014) This example from a business context, unconstrained by the ethical safeguards available to the academic researcher, demonstrates the potential for people to 'give away' more information than they

were happy to.

The second issue is that while human interaction is removed to a certain extent, the methodology remains open to human influence (Provost & Fawcett, 2013). This must be factored into data science technique use. This could be relevant to way in which data are collected, how it is cleaned and the way in which it is fed back to participants or stakeholders. A hypothetical example of this might be a scientist looking to feed back the results of an analysis to a learner who does so differently when feeding back to a man compared with a woman because of their perception that members of one gender can cope with it while the other may not be strong or emotionally literate enough to do so (Frawley, 2005). These biases could be significantly more difficult to identify in the example above. For instance, following human assessment of an undirected Hartigan-Wong cluster analysis (Hartigan & Wong, 1979), a researcher assumes that those of different ethnicities are being represented in separate clusters when in fact it is an aspect of their culture which mitigates their learning behaviour and causes the algorithm to cluster them discretely. The danger is that conclusions wrongly drawn can result in harm, and this is something that must be carefully guarded against in a context where the user may have a duty of care to AHE learners.

The third the issue is 'fitting' (Gulyani, 2013). Consider a supervised classification model which aimed to

predict whether a poster to an online forum was an AHE student or not. It is known that most people who frequent it are AHE students. Simply by predicting that anyone joining a forum for AHE students is in fact one themselves, the model can achieve a high success rate, making it reliable. However, it doesn't identify trolls or bots, so it is up to the scientist to develop a model which has meaningful predictive power and not just a method of reproducing a tautology, even if that means that a confusion matrix shows it is not quite as efficient (Provost & Fawcett, 2013). Alternatively, the model could be 'Overfitted': Too complex a set of considerations could pick up links or differences between data points that occur by chance (Gulyani, 2013) and would need to be generalised to reduce the impact of non-predictive 'noise' in the data set. To continue the example above, a model which was overfitted might weight the probability of someone being a competent AHE student by means of lexical analysis - that is, it looks at the words they use and categorises them based upon the likelihood of being used by an AHE student. This could overfit and exclude those who are more conscious of how they come across to those they perceive as less experienced AHE students, and who are therefore moderating the language they use to make it more accessible. Part of the skill in employing data science techniques is understanding the context of the data to guard against each extreme. This is a risk to the employment of data science, though this can be mitigated

against with the use of hold-out data (that for which the target variable is known but that wasn't included in the original data set) and cross-validation (a concept familiar to statisticians as Split-Half Reliability). Fourthly, there needs to be an understanding of data obsolescence (Barlow, 2013). Once a model has been created, at what rate does its predictive power lose validity? Without human awareness of how the predictions are built, it is difficult to assess. On one hand, systems can rebuild the predictive model based on each new piece of information either periodically or on demand, so there are cases in which it doesn't matter, or where real-time data are being collected (e.g. Echo360 Active Learning Centre for Digital Education, 2014) on student feedback in a lecture theatre to establish how each part of a presentation made the greatest learning impact and on whom on a second by second basis. On the other hand, temporal degradation of a predictive model makes a continual assessment of veracity problematic (Barlow, 2013) as the previous activity forms new data on the basis of which the model needs rebuilding. In education, someone working with an AI classmate would need for that AI to make decisions in near-real time about how to interact to seem persuasive. Moving towards real time data analytic methods is a challenge that many analysts and organisations are beginning to explore (Linthicum, 2015). The lesson from this is that the use case must be carefully considered to strike a balance between

information degradation and other considerations such as processing resource (Forrester Consulting Thought Leadership, 2013, that is, how time and energy consuming it is for a processor to compute) and data-overload or information underload (Wang, Li, & Perizzo, 2014 feeding back so much information to the user such that none of it is able to be learned from).

The final issue with regression or classification problems is that predictive models are identifying correlation rather than causation (Mayer-Schonberger & Cukier, 2013). Across a larger data set the confidence level improves and there is a drop in false positives and negatives, but nevertheless, predictions are based upon human understanding of causal likelihood (e.g. it is more likely that ice cream sales are up following the sun coming out and triggering that desire than the sun coming out because of a rise in ice cream sales). This is something a human can know instinctively, but that a computer cannot differentiate without further information.

There is a word of encouragement to be had here in light of the issues assessed above: Those working in the sciences have worked on some of these issues in practice for years, albeit in differing circumstances: Issues of the addressing of false positives and negatives are considered in research around diagnostic practice (Altman & Bland, 2014) and the development of psychometric test measures (Weiss and Zureich,

2009). The ethical impact of novel information on a research participant is an inherent part of ethical codes (e.g. British Psychological Society, 2009, or the British Education Research Association, 2011). Human bias is a fundamental issue for social scientists looking to create insight about a sociological phenomenon (Thompson & Loewenstein, 1992) and researchers have broken the traditional boundaries of the hypothetico-deductive method using novel measures such as autoethnography (Ellis, Adams, & Bochner, 2011) and participatory research (Bergold & Thomas, 2012). Therefore, there is precedent for mitigation of each of these disadvantages.

In order to justify the use of data-analytic thinking as a potential source of innovation in the context of AHE provision, the advantages and disadvantages it represents have been considered, along with a class-level framing of approaches scientists in the field take to solving problems and gaining insight with data. Ultimately, given that the predictive power of data has become more of a central measure of social, financial and political capital compared with the past, education provision will adjust to this change and adapt practice to assimilate it. Indeed, the Higher Education Funding Council of England (HEFCE, 2015) recognise this need in their report about reducing the variability of provision and improving access to services for HE students: an example with direct applicability. It follows that Access to Higher

Education students who expect to develop a career following their studies will need to be properly prepared to enculturate into a society where data are given greater importance. Therefore, a course which similarly values data and aims to draw on its predictive power will more effectively mirror the world into which a student is to progress, and consequently better prepare the student for HE level study. Tutors engaging in data-analytic thinking can better model up to date professional practice for students, something that has broadly positive effects (Alexandra, 2008). Some reservations are in order however, particularly in terms of the ethical, fitting and temporal degradation issues shown above. While ways of mitigating these have been identified, they nevertheless represent a series of considerations that any new design and development work should consider when working to instantiate data-informed andragogic tools, and which this thesis will assess the design predicates it produces on the basis of its primary data collection and co-design activity for research question three.

## **2.5. Opportunities for Data-Informed Innovation for Hypercognitive Development in AHE students**

This literature review suggests that there could be a hypercognitive skill deficit in the population of AHE



students. If this is the case then the fact that these skills are not being taught discretely during AHE provision (QAA, 2013) leaves AHE provision unable to address that deficit in an organised manner. In addition, the nature of the skill set that AHE students need to compete with their peers at HE level appears to be changing. However, new opportunities for data-rich technological innovation to promote skill development for AHE learners exist. From the analysis above, the following opportunities for tool development which would address gaps in the learning analytics landscape, or which stand to benefit from further design iteration are identified, grouped into broad categories that will inform design pattern development and discussed and exemplified, with their aetiology in hypercognitive theory, data science or both defined.

### **Tools which Tie the Learning Experience Together**

With the learning experience of the AHE student becoming more distributed, tools which can draw data from those disparate experiences and tie it together in the mind of the student by means of link prediction algorithms, have the potential to scaffold hypercognitive development and transcend the artificial subject boundaries which Demetriou's ninth postulate identifies as potentially limiting the ability of the executive function system of the brain to work across.

'Learning Management Systems' such as 'Moodle' (<https://moodle.org>) and 'Blackboard'

(<https://www.blackboard.com>), serve as central organising structures for paperwork to be digitised. Allowing easy access to materials has the benefit of providing scaffolding to the development of organisational hypercognitive skills and therefore act as prototypical examples of these tools. On the other hand, there are significant limitations to these platforms (Conole, de Laat, Dillon, & Darby, 2008), as students may treat the learning environment as repository for lecture notes rather than as a tool for collaborative learning. Another example of a tool which ties learning experience together is ShareMe, an opt-in system built by (Gou, Zhou, & Yang, 2014) which draws upon social media engagement activity on the part of the user to describe personality related characteristics that can be fed back to the user for their reflection. This represents a feedback loop which is either absent from educational experience in many cases, or fraught with issues of validity, reliability and lexical convergence to such an extent that the results are best ignored and at worst actively retard the development of hypercognitive skills (e.g. Honey & Mumford's 1982 work on 'Learning Styles' which stands as a cautionary example).

### **Tools which Facilitate Discrete Skill Development**

As the AHE curriculum focus has moved away from discrete study skills development and towards specialist subject training (QAA 2013), a gap emerges for tools which use some

combination of causal modelling, co-occurrence analysis and profiling to enable students to think about and practice skill development. Hypercognitive theory says that this reflection process is foundational to the executive system's development (Kargopoulos & Demetriou, 1998), and putting time into this is important (Demetriou's 1998 eighth postulate). Higher education institutions have many examples of good practice in this area. Many make information available online for self-study such as in Kent (Kent University Careers and Employability Service, 2016) and some offer skills development centralised to the institution where staff have a wide remit to promote and develop skills across specialist subject areas, for example the University of Northampton (2016), which even goes so far as to physically centralise a skill development department in the design of their 'Waterside' campus. With the growing ubiquity of access to mobile learning (Cook, Pachler, & Bachmair, 2011), HE students being open to learning personalisation (Wanner & Palmer, 2015) and evidence emerging of the value for students, and AHE students in particular (Sullivan & Carlisle, 2017), there is great promise for the development of discrete skill training opportunities which are available to a wide range of learners, the distributed architecture of which allows more egalitarian access.

### **Tools which Narrow the Time Between Need**

## **Identification and Response**

By necessity, colleges operate a reactive approach to student needs, which change over time. Tools which are able to proactively identify student needs and thus shorten the time gap between the emergence of a student issue and the AHE provision response to that through classification, regression analysis and causal modelling have the potential to make a significant difference to AHE student experience, something which would be felt by the AHE student primarily, but which would also be reflected in the provision's retention and achievement as evidenced by Jenzabar One (Jenzabar, 2016). There are examples of these data-rich proactive investigations which can be found such as that operated by Nottingham Trent University (Sclater, Peasgood, & Joel, 2016) which flag students for tutor intervention to try to prevent them dropping out. The data science analysis above identifies this reduction between diagnosis and intervention as a key strength of data analytic practice, and hypercognitive theory suggests that a more rapid presentation of data for executive processing would beget efficiency at synthesising information across specific semantic stores and consequently problem solving using information in novel contexts.

## **Tools which Offer Students Distributed, Embedded and On-Demand Skill Development Opportunities**

With students becoming more self-motivated and proactive in seeking out a distributed, embedded range of learning and development opportunities that the secondary data show about current and future AHE students detailed above, discrete skills training will need to operate within this zeitgeist in order to be successful. Technological innovation which allows this through effective profiling, while offering motivation to the user could benefit AHE student experience. There are tools which recognise this being developed and tested, from platforms designed specifically for mobile 'micro learning' opportunities such as Agylia's Learning Management System (Buff, 2016), to purpose designed apps such as the 'ZoP App' (Cook & Santos, 2016) which take this design orientation as explained in Bannan, Cook, & Pachler, (2015) at the heart. Habituation of this design position has the potential to offer students an experience that is commensurate with their expectations for process agency. It is also conducive to mitigating the curricular change in focus from study skills which runs the risk of limiting hypercognitive development. The personalisation of learning that data science is beginning to underpin suggests that this is a potential growth area for data-analytic andragogic tools.

### **Tools which Allow Management of a Learning Experience in Terms of Control and Speed of Hypercognitive**

## **Processing**

Kargopoulos & Demetriou (1998) describe the importance of speed and control of learning as it relates to the hypercognitive system as they expand upon the eighth postulate of hypercognitive theory. Too much speed of information input and learning will be retarded or halted as attention and motivation waivers. Too little control and information which is taken in is not commensurate with the learning goals of the individual and their motivation is reduced. Therefore, tools which moderate these factors have the potential to be useful. This may have application for those with processing difficulties, to enable them to do so more effectively or efficiently. It could also moderate the presentation of information such that attention and focus can be managed, avoiding information overload which has been shown to be a confounding factor in learning experience (Warlick, 2009). With the ability to monitor attention and adjust the performance and presentation of software tools as a result, there is the potential for data science to improve the quality of hypercognitive processing.

## **Tools which Offer New Paradigms for Learning**

There needs to be considered the possibility that entirely new paradigms of learning are possible. These are by their nature not possible to quantify but to give an

illustration, the author was able to work on the early stages of the development of an operating system for the development of massive scale distributed simulation architecture called SpatialOS (<https://improbable.io>). The implications of this are years away from being realised in the classroom at the time of writing, but one may imagine that with access to a learning environment that has functionally unlimited compute power, it is possible to conceive of the development of AI which can learn alongside students as another learner, while being shaped and informed in such a way as to support specific aspects of those students' learning experiences and which in turn learn from those students how to be effective learners themselves. This is of course conjecture, but highlights the need for awareness of the potential for unconsidered advances in technology and data science to emerge. As a result this suggests that there is value in engaging with such science in order to be open to those advances if they present themselves.

## **2.6. Research Questions**

The findings of this literature review are at first glance, bleak from the point of view of the current state of AHE. They describe a system which enshrines unexplained differences between groups of students into its fabric at a fundamental level and a system which is not designed to assess and address hypercognitive skill development in students

studying in order to progress to Higher Education. However, multiple opportunities for digital innovation are apparent, which need to be focused upon drawing the disparate, individually curated learning experiences of the student together to empower their progress, providing distributed embedded opportunities for learning and which allow a fuller, more up-to-date understanding of the student by each of those involved in the student's AHE provision.

Following this literature review, several gaps in knowledge have emerged and as a result this thesis will address some of these. Unexplained differences in achievement, retention and access to HE by AHE students compared with their peers have been identified, as have sociodemographic differences between AHE students and the wider population, offering insight into the first two stated research questions. Coupled with little available understanding of the learner experience and unsuccessful previous attempts to address a skill deficit in AHE students, all suggest that exploring the AHE experience could shed light on the reasons for these. In addition, the student experience is changing as multi-screen, connected learning becomes more prevalent in FE and HE and there seems to be little effective use of data or data science techniques in AHE where it has been considered of great value in other sectors such as technology and logistics. To explore and gain insight into the gaps in understanding as to what is causing the inequality of educational experience and the skill



gap, and to provide a platform from which data-analytic andragogic tools may be designed and developed, the following research questions are instantiated by this thesis for further primary data collection and analysis.

### **Research Question One**

**'Is Access to and the Experience of AHE Provision Equitable and Egalitarian?'**

This literature review has found unexplained differences in the way in the sociodemographic makeup of the AHE student population. Therefore the conclusion which must be drawn prior to primary data collection is that there are equality issues extant in AHE. The primary research of this thesis therefore must focus upon whether these statistical and socio-demographic differences are evidenced in the experience of AHE students and if so, what impact they have upon those students' views and experience.

### **Research Question Two**

**'Is there a Difference Between the Skills AHE Students Have and Those which They Most Need to Achieve at University?'**

The nature of student experience and expectation is changing in favour of a more distributed, multi-screen model of learning, something that classroom-centric AHE provision is not yet embracing. Additionally, according to literature, AHE

students do experience a skill difference and therefore opportunities to design for the improvement of learning focussing on the hypercognitive function of the student is a fertile ground for innovation.

### **Research Questions Three and Four**

Research questions 3 and 4 are: 'What design principles can be developed to underpin requirements engineering of the design and development of data-informed andragogic tools' and 'What can be learned from the AHE student experience which offers insight into their learning?'

A range of possible opportunities for innovation in data-informed andragogic practice have emerged from the literature review above. These possible starting points for innovation from literature suggest that there is an opportunity to develop, research and implement well designed tools, provided that the contextual understanding is well grounded, and those working on the tool are sensitive to that. However, as it stands currently, understanding of the AHE student experience is limited in literature, and opaque and decentralised from a policy standpoint. Therefore, the primary data collection activity undertaken by this thesis will seek to explore this context from the point of view of AHE students themselves to reveal insight into AHE learning, providing a richer tapestry of understanding which can inform future design and development endeavour, and to identify what design principles should be

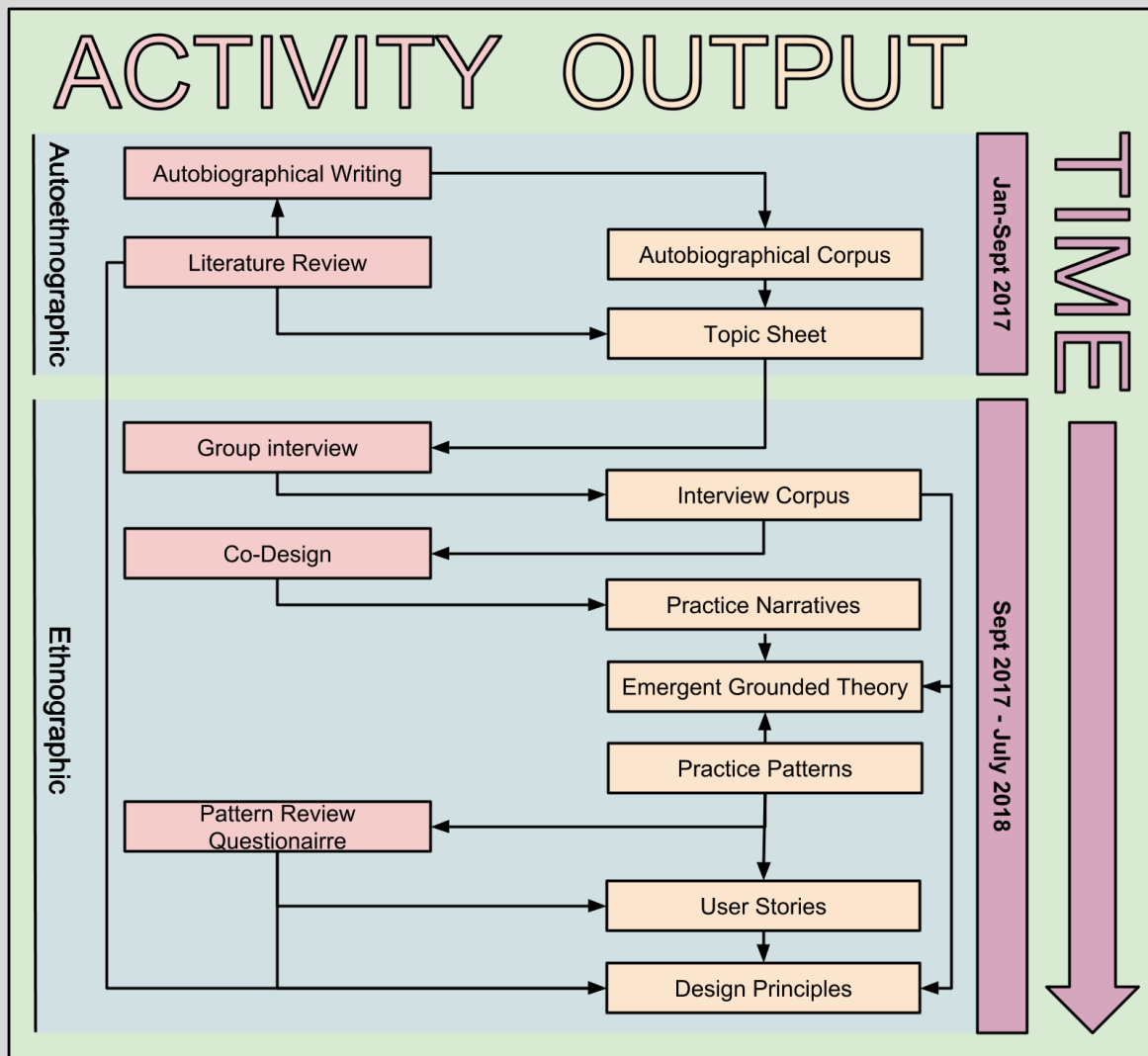
taken into account when designing and developing data-informed andragogic tools.

Following a review of literature, the need for and potential of the development of Data-Informed Andragogic tools for AHE has been identified and research questions formed to frame the following enquiry. The proceeding chapter develops and presents a methodological framework, which will be used for the primary data collection activity in the AHE context.

## Chapter 3: Methodology

This thesis aims to explore the AHE experience as it pertains to the cognitive development of the learner. It does this through the lens of an ontology informed by hypercognitive theory, by adopting an interpretivist epistemology and qualitative methodology. It uses Grounded Theory for exploratory analysis, to allow theory to emerge from that experience rather than being limited to researcher assumption in the face of a dearth of available data as the literature review identified. Data collection begins with a body of autoethnographic writing being produced. This forms the basis of the semi-structured topic guide that is used in group interview with consenting AHE student participants who were treated in conjunction with ethical guidelines. Co-design work is carried out with those participants in the form of Practice Narrative generation, and following peer review, these narratives are abstracted into a series of practice patterns that are returned to the participants for their input. From here, Design Principles will be developed. Thus, the output of the primary data collection and analysis will be a body of Design Principles, emergent Grounded Theory and an example of the application of the first phase of the Data-Informed Andragogy Framework presented below. The research procedure is summarised in Figure 24.

Figure 3: Methodology Procedural Diagram



### 3.1. Ontology - Epistemology - Methodology

This thesis aims to explore the AHE student experience, drawing on their voice to contextualise an area which [literature review](#) shows has the potential for the implementation of data rich tools for the advancement of learning. As such, the ontological approach of this thesis is informed by the postulates of Demetriou's hypercognitive theory presented in detail in the literature review. These

call for the rejection of a Piagetian view of learners as monolithic, who all learn in the same prescribed manner and in a linear order. This rejection was the same as that which prompted Knowles (1984) to describe [Andragogic Theory](#), and hypercognitive theory provides a justification for this rejection from Demetriou's (1998) sixth postulate in particular.

Through Demetriou's (1998) ninth postulate, the ontological position this thesis takes requires the rejection of artificial bounds applied to knowledge in a subject-by-subject breakdown that the AHE specification presents. However, it must not lose sight of this as a relevant contextual factor, as hypercognitive theory requires consideration of both the context of learning more generally (fourth postulate) and the social interaction in that context more explicitly (fifth postulate). Therefore, interaction between students will be welcomed in data collection and discussed explicitly. This thesis partly embraces contextual understanding by consideration of individual and [sociodemographic difference](#) in the learner population. By drawing on the voice of the learner, and ultimately including them in design activity through [Co-Design](#) methodology, it aims to provide insight into how AHE students perceive their experience, needs and concerns. There is sound precedent for this approach from Hanington (2007) and Donetto (2015).

Epistemologically, there is a need to reject a purely

[hypothetico-deductive](#) approach to the study of this context, as the dearth of literature around AHE student experience means that little is known explicitly from which to formulate hypotheses. The literature review above calls for the use of exploratory methods, aiming to illustrate the AHE experience to aid design and development work because of the challenge of pre-forming data-driven hypotheses from what is known of the AHE context. Therefore, taking a positivist approach would require assumptions to be made that could undermine subsequent testing by being of questionable validity.

If the scientific method is rejected as a common justifier, then an alternative approach is necessary. However, rejecting the scientific method does not beget the rejection of logical empiricism or pragmatism (Longino, 2019) and each of these are employed. This is justified because empiricism, that is the collection of evidence gathered by sense experience, remains possible in an exploratory setting with few a-priori assumptions and if employed well can be a powerful force for social change (Uebel, 2005). The issue with this however is that it makes drawing causal relationships out of data collection problematic or impossible without undermining the base upon which they are built. Consequently, the intent to do so is put to one side, and the concurrent aims of experience illustration, grounded theory emergence and design activity by those who know the environment intimately are undertaken. In this epistemological

framework, those best placed to develop insight are those who are involved with the context of study most often (Andriessen, 2006) in the case of this study, these people are tutors and students on AHE courses. To construct knowledge around this embedded experience, there is a need for the voice of the learner and the educationalist working in AHE to come through in the findings. Thus, an interpretivist, exploratory and design-based research (pragmatic-empirical) approach to data collection, analysis and interpretation is employed in order to effectively explore and capture as broad a picture of the AHE context as possible. This makes the case for the employment of exploratory methods, but what of design-based methods? Design Based Research will form a substantive portion of the epistemological framework from which the study this thesis presents operates. Thus, it is important to make the case for the use of design based research, and offer critique of the approach.

Historically, to appreciate the differences between research, design and development, one can look to the move towards Design-Based Research by researchers calling for that gap to be closed. As McKenny & Reeves (2014) highlight, there is a criticism laid at the feet of educational researchers who pursue the creation of new knowledge for its own sake, that it has oblique application to practice. The purpose of Design-Based Research is to reach into design and development activity in order to demonstrate the relevance of the research



itself. In combination they can validate one another, and this is what led Brown (1992) to originally define it as the confluence of research, design and development in practice.

Through Barab and Squire's (2004) work, the first benefit of this approach is highlighted. They concisely break out the facets of Design-Based Research that are fundamental to its identity. They argue that good Design-Based Research should produce educational theory in naturalistic contexts by iteratively and systematically experimenting through intervention in practice. This is valuable as the researchers in education are so often also part of that environment (Bakker & van Eerde, 2015). Breaking this down, firstly, theory is integrated into the process and is also an expected outcome. Thus, if carried out properly, a research cycle may be completed. If this happens, there could be said to be synergy with the hypothetico-deductive tradition. This is beneficial for those who take a more positivist epistemological position than the work of this thesis does, so that they may be enabled to build on its findings and find value in the insights it brings forth.

Having identified how a Design-based research approach can be conducive to research activity being built upon the design predicates the third research question this thesis presents calls for, there is the expectation of intervention in practice as valuable testing tool in both data science product development work (Kim, Zimmermann, Deline, & Begel,

2015) and Design-Based Research. (Georges & Romme, 2004). Thus, practitioners can relate to the methods used as well. This has advantages and disadvantages. On the one hand, it is pragmatic, as the epistemological description of the study earlier in this chapter identifies: It allows impact to be seen and measured as swiftly as possible in an ecologically valid environment (Andriessen, 2006). On the other hand, there is the potential for interventions to be based upon faulty, or reductionistic thinking following incorrect assumptions (Marr, 2015b). These interventions could have lasting effects upon the students involved, and this should be considered in counterpoint.

Other characteristics relevant to consideration of the epistemological approach of Design-Based Research are that it is iterative (Wang & Hannafin, 2005) and systematic, and that it is naturalistic in nature. In terms of the importance of iteration, this has synergy with positivist methodological traditions in the fields of design, research and development which mirror this, as they also involve an element of iteration. This suggests that a Design-Based Research approach can facilitate inter-disciplinary working. Similarly, many research, design and development approaches call for interventions in practical contexts to be systematic (Barab & Squire, 2004), and design-based research allows for that logical construction and progression. This is cogent with the hypotheticodeductive method, interaction design

methods, data science analytic practice and development practice, where it mimics a beta release schedule rather than a production release model. Finally, Design-Based Research is Naturalistic (Barab, 2006) - that is, it has a high focus on the practical context into which products are being designed, researched and developed. This is opposed to experimental testing conditions with low ecological validity. The advantage of this is once again that it can reduce iteration time because the context is present into which to test. The disadvantage is the ethical issue of impact on that context and delineating where that context ends or begins so that the full extent of any intervention can be observed and analysed (ibid.).

There are outstanding questions that those basing their work on Design-Based Research must reflect on beyond the delineation above, which represent disadvantages in the use of the epistemological framework. Demetriou's Hypercognitive theory proposes a view of learning that is wider than usually considered. Because of this, it asks of the design-based researcher: what are the boundaries of a naturalistic context, when parts of a learning experience cognitively overlap with other learners' experience and when the effects can be felt in the long as well as the short term? This needs to be considered to avoid unintended and unstudied consequences from the alteration to learning experience that may occur when too reductionist a view of intellectual development is employed.

On the other hand, some reductionism is necessary because a complete lack of reductionism in research and development cannot be overcome except with functionally infinite resources and time (Sayer, 2005).

While the Design-Based Research tradition adds some structure to the practice of research, design and development, but nevertheless leaves the potential for experimenter bias (Ørngreen, 2015). One of the ways this can be combated is with measures of inter-rater reliability and as such, the better those from different backgrounds and disciplines are sharing understanding of the context, the less likely statistically significant divergence is to be found (Stolarova, Wolf, Rinker, & Brielmann, 2014). This creates a powerful argument for an epistemological framework which values interdisciplinary cooperation. The final criticism of design-based research is that of generalisability. To what extent can user experience of an intervention be generalised out to the broader AHE or andragogic communities? This lack of generalisability can be mitigated by having an iterative and systematic approach to design-based research practice which gives someone looking to apply a tool more widely a path to review how the design and development decisions made fed into the final product, to allow them to more carefully consider its use in adjacent contexts. In this way, rather than generalising through population, users can perform meaningful theory development by means of propensities and processes

(Frick, 1998).

This section has asserted that Design-Based Research approach is an appropriate epistemological framework within which to develop design precursor objects for others to build upon as they develop data-informed andragogic tools. Having established this, methodological considerations must be taken into account.

Methodologically, given the empirical situation, a more qualitative, multi-method approach is preferable over a quantitative method to explore the field. This will allow light to be shed, in a systematic manner that is conducive with both design based research and grounded theory, on this [understudied](#) population of learners and their context. It will also avoid inadvertently giving too much prescience to the preconceptions of the researcher or other stakeholders in the process of formulating and exploring research questions, instead allowing through ethnography, the perception of AHE learner-participants to drive the work. This approach enjoys sound precedent in literature, a prescient example being O'Brien et. al. (2016) which used this qualitative approach, supported by expert opinion, to investigate and design for those experiencing retirement transition. Consequently, the methods which will allow exploration and presentation of the AHE context to be collaboratively constructed are a combination of autoethnography to inform an approach to AHE students, from and with whom ethnographic data will be

collected. This data collection will undergo grounded theory analysis to explore any emergent insight and will also inform the co-design of design predicates upon which future design and development work may build. Each of these stages of the data collection process will be expanded upon and more closely specified below, followed by an explanation of the analytical processes of co-design and grounded theory analysis which will be employed on that data.

## **3.2. Data Collection**

### **Autoethnographic Data Collection**

Autoethnography aims to draw on the experience of the researcher in a systematic manner, using autobiography to understand how one's experience interacts with culture (Ellis, Adams, & Bochner, 2011). It is distinct from traditional research methods as the researcher becomes both the studier and the studied (Spry, 2001). In addition, the act of writing autobiographically means that the research is both method and output at the same time. For the purposes of this research, it will provide a framework for developing the topic sheet used during group interviews and may allow for the specifics of the researcher's influence on Co-Design work to be considered

Autoethnography is an exploratory research technique which aims to remove ontological, epistemological, and axiological restrictions inherent in traditional inductive research techniques (Ellis & Bochner, 2000), and brings it in line with the epistemological framework this thesis sets out in the preceding section of this chapter. This method is

being used because there is little peer reviewed assessment of the AHE student journey from beginning their course to progression to higher level study. Bochner (1994) claims that when this is the case and there is a significant opportunity for the contextual information to be misunderstood by others who would seek to design into it, then the autoethnographic technique is useful to delineate that context from the point of view of a seasoned expert. Another reason, given precedent by Kuhn (2012) and Rorty (1982), is that this approach is useful when the paradigms and language that are used in the field of study are inappropriate or misleading when used to describe the area. This was identified [in the literature review](#) as an issue in relation to the use of Andragogy when describing AHE learners: in AHE, the language and paradigmatic frameworks so often applied the context are pedagogic rather than explicitly designed for adult education. Thus, an autoethnographic foundation in this study is appropriate. Autoethnography is justified in situations when a master narrative may not be helpful for capturing the complete gamut of experience of the participants in the studied context (such as in De Certeau, 2005). This is the case here: the AHE student body has been [sociodemographically considered](#) in the literature review and the picture painted is of a diverse set of learners compared with other more traditional routes to higher education such as A level. Just as differentiation in the classroom requires empathy, fully embracing the diversity

of the AHE learner group requires empathy to be central to the approach and this is something that the autoethnographic approach offers (Ellis & Brochner, 2000). This also offers the study ethical veracity, putting the researcher alongside the participants rather than entering, collecting data and then leaving in search of professional gain (Ellis, 2007) which could have a damaging effect on the likelihood of AHE students wishing to participate in future work If they perceive that they have been manipulated.

The proximity of the researcher to the area of study is important to consider. While some research methods allow for distance and objective analysis (e.g. Atkinson, 1997 & Delamont, 2009), grounded theory-underpinned co-design activity is not conducive to separation of researcher feeling and character from the work. This is considered because the sociodemographic characteristics of the researcher may be a biasing factor in research involving conversation (Schwarz, 2014) and this bias can be implicit or explicit (Greenwald & Krieger, 2006). Thus, some understanding of who the researcher claims to be, influences what is discussed, how that discussion is facilitated, and the conclusions drawn from that activity. Consequently, allowing for the collection of a corpus of autoethnographic writings around some of these perceptions is useful in allowing the findings to be analysed after the fact for that influence. It will be there, but by naming it, the findings may be allowed to transcend it in part



and for those seeking to make use of the findings, they will be able to more comprehensively appreciate from whence those findings sprang.

Ellis & Bochner (2011) summarises the motivation for autoethnographic study as a part of the methodological approach of the thesis: They say that autoethnographic approach is suitable for someone who wants to create:

"Meaningful, accessible, and evocative research grounded in personal experience, research that would sensitize readers to issues of identity politics, to experiences shrouded in silence, and to forms of representation that deepen our capacity to empathize with people who are different from us" (p.274)

There are some important criticisms levelled at the autoethnographic method which must be noted that relate to the reliability and validity of the findings. Firstly, there is significant variation in autoethnographic accounts, depending upon how native the writer is to the context and the extent to which they focus on social encounters, behavioural patterns, or other approaches to delineating their perspective.

Secondly, the act of Autoethnography is inherently reflexive: One learns from the act of doing it. How this act shapes a person can never be fully captured by a corpus of material gathered over a given period (Rambo, 2005), and thus is difficult to study even to quantify the extent to which this may be the case. Secondly, there is an issue of relational

ethics. This researcher does not exist in isolation, rather they are familiar with others' experiences and perceptions of them and their actions and is influenced by this. The autoethnographic approach does not necessarily capture those social factors and does not draw on the direct testimony of others, but rather on the researcher's perception of those social factors. In order to mitigate any ethical challenges, where others are discussed, identifying details will be changed in order to protect them from identification and the raw autoethnographic data will not be made publicly available. Thirdly, truthfulness is assumed, but not guaranteed. That said, one measure against this is that if the foundation of the topic sheet is somehow skewed, then employing a semi-structured interview process in the group interview and co-design sessions will allow participants to reshape the direction of discussion as appropriate. Taking these factors into account, the goal remains to produce analytical, accessible data (Holman-Jones, 2005) which facilitate the sound reflective development of the topic sheet. With the specificity of using this corpus to underpin the development of the topic sheet, there is sound reason to believe that the employment of autoethnographic material will be to the benefit of the study and thus will be employed.

### **Ethnographic Data Collection**

Following the autoethnographic data collection and the

topic sheet formation on the basis of emergent themes and in light of Hypercognitive theory, Ethnographic data collection will be undertaken. To do this, a series of group interviews will take place alongside co-design activity. This ethnographic work offers the opportunity to study the relational practices, shared experiences and values of the AHE students (Maso, 2001), so that those stakeholders in the design, research and development of data-rich tools may better understand the texture of the context into which they are acting. This mechanism has been identified as the primary strength of the ethnographic approach (Heath, 1982).

In terms of drawbacks of this method of investigation, there are still questions over the generalizability of ethnographic study as it does uncover much information about the specific studied context, leaving the researcher unclear about which parts of the findings are related to those participants at that time and which are applicable to a wider context. This said, full case study approaches have added to a body of literature from which theory has emerged, so this issue is not considered insurmountable. Many good examples of this can be found in medical research (McWhinney, 2001), where a phenomenon is rare enough that it cannot be studied any other way. Reid (1982) found that an approach that allowed general practitioner participants in their study to better express valuable contextual information necessitated them giving explicit case study like examples of the phenomena they

were trying to communicate. In this thesis, participants are current members of AHE communities studying for their qualification. They cannot necessarily be expected to have a comprehensive view of the AHE community at large but will be able to describe what has happened to them and their colleagues as they see it. This thesis rejects generalisability as an aim in order to be exploratory and allow grounded theory to emerge. It will not produce a comprehensive holistic view of the area, but this is not necessary for the purposes of generation of insight in an exploratory context.

Practically speaking, the ethnographic portion of the methodology employed entails gathering groups of students and performing semi-structured interviews working from a topic sheet designed based on the preceding autoethnographic work. These groups need to be small enough that students feel they can best express themselves, but large enough that a range of perspectives may be heard. Realistically, these will vary somewhat in size depending upon the availability and attendance of participants and any [decisions made to withdraw from the study](#) without prejudice.

### **3.3. Data Collection Considerations**

#### **Sampling**

A combination of opportunity and snowball sampling

methods were used. The author is professionally situated in the Further Education industry and as such the students and staff who will be included in the focus group and chosen for follow-up interview were selected and asked for referrals of others. The participants were volunteers aged 18-65, sourced from further education establishments. Those students selected were not considered at risk or vulnerable by the institutions from which they are recruited, and all participation was on a voluntary basis and with full expectation of their right to withdrawal.

## **Ethics**

The researcher ensured that all the research participants were treated accordingly to the following British Educational Research Association (BERA) Guidelines (2011), since reissued (BERA 2018):

"Individuals should be treated fairly, sensitively, and with dignity and freedom from prejudice, in recognition of both their rights and of differences arising from age, gender, sexuality, ethnicity, class, nationality, cultural identity, partnership status, faith, disability, political belief or any other significant characteristic." (p.6).

This was adhered to carefully. Firstly, the thesis supervisor and the University board of ethics had oversight over the ethical considerations in this thesis and full detail

of the ethical consent sought from the University board of ethics may be found in the [appendices](#). In addition, consent forms contained contact details for the supervisor, to whom any concerns about the researcher could be raised. When the data were analysed, participants were anonymised. In reporting on that data, that data were also edited to maintain gender neutral pronouns wherever gender was not pertinent to the topic of discussion. The researcher interacted with participants as much as possible in a way that treated them equitably based on the characteristics laid out in the BERA guidelines. They were reminded verbally that they had the right to withdraw at any time and were asked for permission to audio record before the commencement of any recording. Students were not selected for participation based on any of the above characteristics and no data were excluded on the basis of these.

### **Informed Consent**

All personal and institutional names were kept confidential. Institutional pseudonyms/numbers were used to safeguard participants in the study. Written and verbal assurances of confidentiality were provided to interviewees both before and after the interview (see the [consent form](#) and [information sheet](#) in the appendices) and in the [initial correspondence](#) as they were considering whether or not to participate in the study. In recruiting participants, a formal

letter was sent, asking for their participation in the study. In order to participate they provided a signed copy of the [consent form](#). This details the potential effects of the study, its aims and objectives, participants' unconditional right of withdrawal prior to the completion of the data collection activity, contact details for sources of support or if they wish to feed back on the process and plans for the storage and use of the information collected were also provided. This enabled fully informed consent to be sought that satisfied the requirements of the University of the West of England (UWE) Ethics Committee which oversaw this data collection activity.

### **Right to Withdraw**

Participants were fully briefed prior to the commencement of any data collection activity, both verbally and in writing (see [appendices](#)). Any confusion or concern over those matters were discussed verbally between the participant and the researcher, and while this didn't prove necessary in practice, the researcher was prepared to refer the potential recruit to relevant sources of advice and support (their AHE tutor and the UWE staff member supervising the researcher). This document includes detailed information about when a participant may withdraw (at any time during data collection, up to the full completion of all data collection activity for the study).

The [Topic Guide](#) and questionnaire details were provided to each participant as appropriate well in advance of each session of data collection activity to enable each participant to reflect upon their experience, assure themselves that they were happy to continue participating and prepare themselves. Interviews were approximately 1.5 hours in length and were conducted in person. Permission to digitally record each interview was sought from each participant.

### **3.4. Data Analysis**

With the autoethnographic and ethnographic data corpus collected as described above, insight will be sought by means of Grounded Theory and Co-Design methods. Each of these will be outlined and justified below.

#### **Grounded Theory**

This thesis will draw on a Grounded Theory approach for data analysis. Grounded Theory is a general, exploratory approach to research (Glaser, 1978) which uses inductive analysis for the exploration of sensitizing topics (Bowen, 2006). This is suitable for the AHE context because it is understudied, there is [little up-to-date](#) or systematically collected data available for study and it is not yet clear which aspects of AHE experience are most likely to provide insight about design and development opportunities. In



addition, this approach has been used successfully and widely, including in studies that explore similar themes as this thesis: Kolb (2012) for [adult education](#), McCallin et. al. (2004) for [multidisciplinary team working](#), Hussain, Slany, & Holzinger (2009) for [agile](#) and [user-centred design](#), Roschelle, Penuel, & Shechtman (2006) for [co-design](#) and Wang & Hannafin (2005) for [Design-Based Research](#).

In this thesis, Grounded Theory will be conducted by the following method: A series of autoethnographic writings will be collected on subjects or experiences which influenced the researcher's perception of the AHE context, the way it shaped them and informed their own development professionally and personally. These will serve three purposes. Firstly they will be valuable in the initial definition of the area of study, secondly they will influence the topic sheet construction for following stages of study and thirdly they will provide a corpus which can be referred to when considering the influence of the researcher on the grounded theory and co-design outputs. Then, ethnographic research will be undertaken, consisting of a series of six approximately ninety-minute group interviews with AHE students. These will be semi-structured by the aforementioned topic sheet and will explore AHE students' perception of their experience. Grounded theory will be used to draw themes and inform a point-by-point coding schema as described in Kolb (2012). Beginning as broad categories of enquiry identified

by open coding, this will be matured over the course of ethnographic data collection, which will take place over the course of an academic year (ten months) as the coding becomes more selective and higher level codes can be developed, and others can be assigned as subservient to those, or subsumed. Once this coding process has matured sufficiently, theoretical construction will take place, looking for emergent trending themes that can form the basis of a grounded theory.

There are several advantages and disadvantages of adopting a Grounded Theory approach which must be considered beyond its precedent described above. Some of these will be exposed as the autoethnographic and ethnographic methodologies used are explored, but others apply more broadly across the methodology and must be addressed first. Firstly, a strength of grounded theory is that it has ecological validity. It is being carried out in the AHE context, with students currently studying for their qualifications who are experiencing the learning journey. For them it has reality and immediacy that otherwise would be missed by other approaches. In addition, because the researcher has preconceived knowledge of the context following over a decade of successful professional practice in the area, ignoring that preponderance of personal experience would be a limitation of the methodology when it is being explored qualitatively because it is challenging to disassociate the researcher from the codes and themes emerging from the work. The method used for this study recognises

this, not by disassociating the researcher from the participants, but by allowing the consideration of autoethnographic writings from the researcher alongside the corpus of evidence provided by the students in-situ. This autoethnographic corpus serves two practical purposes: Firstly, it allows the group interview discussion to be contextualised with an understanding of the researcher's views and feelings in the process, exposing that consideration and formally considering it when conclusions are being drawn. Secondly, it allows for co-design work to take place with a knowledgeable asset who can facilitate their development of design narratives. This method has precedent in literature (e.g. Ellis, Adams and Bochner, 2011 & Mor & Mogilevsky, 2013), and is in line with established, andragogically sound design principles laid out by the author of this thesis and others in Mor et. al. (2015).

Thirdly, the use of grounded theory allows for the development of new theoretical postulation rather than limiting findings to ratification of an existing theory. Having established that andragogic research is comparatively less commonly undertaken than pedagogic research, and that AHE students have different outcome expectations compared with their A level studying compatriots, this gives the maximum possible affordance for the discovery of novel theory in the context of a field with a dearth of secondary data or concerted prior study.

Fourthly, grounded theory values parsimony (Glaser, 2002) - that is, finding simple and clear explanations for more complex phenomena. This may not always be possible with the hypothetico-deductive method when exploring a topic as broad as this thesis undertakes in the same time frame.

There is a limitation which has been associated with grounded theory and this should be considered so that it can be avoided in the context of this thesis' method. Allan (2003) argues that there is a history of researchers employing Grounded Theory as a method of exploratory research, without reference to current theory and literature in the area. This was not the intention of Glaser and Strauss (1967) who first presented the approach. As described above, with a comparative dearth of information about AHE students available, the professional experience of the author will be drawn upon in an autoethnographic manner in order to make explicit the 'hooks' upon which the field work is based and provide a corpus for reference as the influence of the researcher on participants is considered.

There are other contextual implications of the use of Grounded Theory. Firstly, the approach begins with micro-coding in a word-by-word and point-by-point manner. This is extremely time consuming. This constrains the number of participants who can be accommodated in a given study compared with other more scalable approaches such as survey completion or social media analysis. Thus, one of the potential

limitations of a study such as the one presented in this thesis is that the sample size is necessarily small. This raises questions about the generalisability of the findings. If Grounded theory disallows causal relationships to be uncovered, tested and applied in a wider manner, then does it still hold value? The counterpoint to this is that exploratory work has its own strengths. In this case it is of benefit, because rather than inductive reasoning, the illustration of the AHE experience and the issues emerging from that can then serve as clues as to the best approach to designing into that context. As the theory is emergent from this, it may still serve as a bedrock for future inductive research which aims to draw causal relationships between phenomena. Thus, although generalisability should be considered, the value of the grounded theory produced by this work nevertheless hold value for informing future design, research and development work. As such, generalisability is not an aim of the study.

### **Co-Design**

Alongside the grounded theory analysis described and justified above, which will serve as the mechanism by which research question four is addressed, co-design activity will be undertaken in order to develop a response to research question three. Co-design is a method that has grown out of the epistemological approach of Design-Based Research. It is a

design method which is based on the idea that a project runs most effectively by drawing upon the "collective creativity of designers and people who are not trained in design through the whole design process" (Lam & Dearden, 2012). This results in a blurring of the boundary between user (Cross, 1972), researcher (Sanders & Stappers, 2008) and designer (Lee, 2008). Whereas previously there was a clear dividing line between each of these roles, the user has increasingly been drawn into the process over the last few decades (Sanders & Stappers, 2008). Thus, it serves as a method of shaping requirements gathering activity for future research, design and development work in the AHE context. Practically, it involves the researcher working alongside participants to formalize accounts of experiences which they have had as a part of their AHE study. This process will be scaffolded by the participant's experience from the group interview portion of the method (itself predicated upon the autoethnographic corpus). The themes and issues which were discussed there and are perceived to be important by mutual agreement of participants and the researcher, form a body of relatable, context explicit data. This data is then abstracted from its context by participants and the researcher working together to make a series of context specific narratives, the importance of which is agreed by all as having explanatory power in elucidating the AHE student experience. From these, more generalised, less context-specific patterns of repeated

behaviour or events are developed and iterated upon, which represent patterns seen by the researcher and participants to be illustrative of the AHE experience. Following this process, design and hypercognitive theory will be overlaid to enable the distillation of design principles from those patterns. The design principles are further generalized guiding principles which it is felt will benefit the designer looking to build data-rich tools for the facilitation of the AHE context. These design principles represent a springboard into design and development work.

The advantages and disadvantages of the Co-design method must be considered critically in order to justify its use in this study. Firstly, an advantage is that Co-Design has a rich history of employment in education settings and particularly within the context of Technology Enhanced Learning. As Penuel, Roschelle, & Shechtman, (2007) note, that while Co-design doesn't allow improved student success rates alone,

"One can argue for selecting co-design because it powerfully surfaces and addresses the tensions between practitioners' and researchers' views of teaching and learning and thus has the potential to result in innovations that are both theoretically and practically compelling." (p.70).

Laying this bare is important for effective multidisciplinary cooperation and another compelling reason for employing it.

Examples of the employment of Co-Design methodology in adult education provide precedent for its inclusion in a Data-Informed Andragogy methodological framework. A prototypical example from the end of the last century is Scaife, Rogers, Aldrich, & Davies (1997). More contemporarily, Spikol, Milrad, Maldonado, & Pea (2009), Millard, Howard, Gilbert, & Wills (2009) and Garcia, Barberà, Gros, & Escofet (2014) all employ co-design methodology in the course of andragogic research. This lends credence to the use of Co-Design for andragogic purposes.

However, Penuel et al. (2007) identifies an issue with co-design in education. The student-tutor relationship has well-defined, proscriptive parameters. The Co-Design methodology is at odds with this, requiring a commitment to consistent re-evaluation of those parameters during group sense making activity. On the one hand, Sternberg (1985; 1997) argues that such a skill set is becoming necessary in the modern age where collaboration with geographically disparate partners is common and where many tasks are interconnected in a manner which questions the parameters of each role. On the other hand, this methodology is not primarily designed as an opportunity to facilitate a learning opportunity for the tutor or student in particular, and that by choosing to fight against this instinct, the validity of findings are undermined. Consequently, the importance of employing Co-Design with those who are familiar with it is



important as Penuel et al. (2007) reports following an attempt to employ the methodology. For the purpose of this thesis, Penuel et. al.'s experience highlights the fact that such a methodological approach is not a catch-all solution to every design scenario, but instead must be implemented with care and sensitivity to each stakeholder and their preconceptions about their relationships with one another.

Looking beyond education alone, the employment of Co-Design has several distinct documented benefits. Firstly, the designer doesn't need to personally develop as deep a contextual understanding of the situation as they otherwise would because they have users to refer to whenever needed. This improves the creative process by exploring a wider variety of ideas than may otherwise have been available (William-Powlett, 2013). Key to successfully drawing on this source of benefit is to define and explore a range of narratives that are pertinent to the case so that all involved can work together to construct as effective a solution as possible. This is built into the Mor et. al. (2015) framework described at the [beginning of the chapter](#). In addition, another more profound difference may be experienced through the employment of Co-Design methodology: Important issues can be explored from multiple perspectives (William-Powlett, 2013). Whereas relying upon users for contextual information sharing has value, valuing the perspective of the researcher in the process has the potential to ground the solution more

effectively in theory that offers explanatory power over the veracity of the implementation. Likewise, valuing the input of the designer, who may or may not be the same person as the researcher or user, depending upon the context of the given project, can draw implications for development into the discourse that enable a realistic and innovative solution to be practically deployable. The implication of this is that the interaction between each party is key as each brings insight which can complement the other in an ideal scenario. This enrichment is a persuasive argument for the inclusion of co-design methodology in a methodological framework designed to promote multidisciplinary operation.

The second broader benefit of the Co-Design approach is that the feedback loop can be shortened or removed as potential end-users are involved in the process throughout rather than consulted for feedback when others decide. This means that a lack of usability may be identified at an earlier point in the development process and that the eventual solution may be sensitively tailored to the context with fewer iterations. This is like rapid prototyping team design (Bowers & Pycoc, 1994) that is closely allied with [Agile development](#). As such, more evidence mounts that Co-Design and Agile are synergistic.

The third broad benefit is that agency in the development of the tool is increased greatly where practitioners are also end-users of the developed solution and have been involved in

the process throughout. This internalised motivation has the potential to make broad-scale impact more likely (Penuel et al., 2007) as those stakeholders, who often have deep connections within the application context, can become early adopters of the product, provide an initial user base and draw other users in.

Along with these benefits comes a disadvantage however. Where industry-centric input comes from a sample of potential end users, there may not be a clear understanding among them of the full gamut of potential challenges for the development or employment of the solution. This is one of the challenges of working in cross disciplinary teams but working with end users as well asks more of those involved, as not only are the end users not necessarily aware of research, design and development constraints, they may also not have so much experience upon which to base their understanding of those constraints. As a result, there may be a higher cost to integration in the process and potential for wider deployment missed. This mirrors an issue inherent in Agile methodology as identified in the [Development Methodology](#) section below and suggests that these two approaches are harmonious as Mor et. al. (2015) showed. Therefore, it is the contention of this thesis that the Participatory Pattern Workshop (PPW) methodology as described in Mor et. al. (2015) and explored [in this chapter](#), can provide a way of integrating the user in to the process which mitigates the issue through design activity

tool use.

There are some further important practical points to consider when employing Co-Design principles in educational context. These centre on the interaction between the different parties with one another. While these are not considerations for the construction of a methodological framework specifically, recommendations for good practice should be considered as the methodology is employed. Firstly, Language used by each group of professionals can alienate the other where jargon occludes understanding (Bowers & Pycock, 1994). Therefore, the development of a shared lexicon between involved parties is vital to the success of the project (Crabtree, 2003). Consequently, a key feature of successful Co-Design implementation is the work of describing user context in detail so that each party understands what they are feeding into (ibid). Secondly, education and design professionals are often at odds in terms of what importance they ascribe to criteria by which success is measured (Penuel et al., 2007). It is imperative that there is a clear communication between the parties so that they each understand enough of the relative importance of projected outcomes on an ongoing basis throughout the project. Indeed, there is much written about the importance of the development of a mutual understanding among stakeholders in the co-design process and this extends to a clear negotiation of individual roles in the project context (Shrader, et. al., 2001) the same authors

identify the fact that teachers often view researchers' contributions to the project as too high-brow and abstract, while Brown & Edelson (1998) recognise that researchers often see teacher's limited conceptual 'field of vision' as problematic. This is a reason for the inclusion of Hypercognitive theory as a foundational theoretical construct in this thesis as it speaks not only to how AHE students learn, but also to how members of a multidisciplinary project team can function together to create lexical convergence and reduce perspective disparity.

Thirdly and finally, some perceptual issues which have been faced in the past may need to be overcome. Like developing a shared understanding, these may also be addressed pre-emptively. Where the design process involves negotiation of a shared understanding, the process may be perceived as long-winded or boring (Ehn, 1992). Parties' input may also be contradictory, such as one practitioner wanting to include an override feature on a student-used software tool, and another being opposed to this because of concerns over taking away user agency. Such concerns can impact on shared meaning making practice (Rheinfrank & Evenson, 1996) and inhibit the process. These factors will need to be borne in mind and parties will need to be encouraged to discuss any such concerns at any point in the process to aid group problem solving and decision-making practice.

The following section handles the way in which the co-design

methodological framework this thesis adopts is conceptualised in order to provide design principles which are as applicable to continuing work of those looking to build data-analytic andragogic tools as they can be. Once this framework has been instantiated and justified, the chapter will conclude with clarification as to the way in which each of the stages in that model will be handled practically.

## **The Co-Design Methodological Framework this Thesis**

### **Employs**

Design-Based Research shows precedent for the tying together of research, design and development activity in order to affect change in educational contexts (Bakker & van Eerde, 2015). In order to do that most effectively for Data-Informed Andragogy, the Mor et. al. PPD framework was employed. Below this will be described and critiqued. From this critique, justification for adaption will be made, and the revised framework presented which will be employed for this thesis.

The purpose of the PPD framework is to facilitate educational design research. The researchers who developed it, including the author of this thesis, were interested in making change rather than simply understanding the situation as it stood, though its development is beyond the scope of this thesis and does not form part of the contribution to knowledge that this thesis claims to make. The PPD framework

required a blending of theory and practice and thereby a development of both in parallel. The primary outputs of the PPD approach are practice related theory development and innovative intervention in practice. In this way, practice and theory are intertwined such that they become co-dependent. It is characteristically multidisciplinary as in order to achieve this, theorists and practitioners must work together. It is also iterative. This is due to the interplay between practice and theory, whereby intervention in practice enhances theoretical understanding by raising questions of that framework and progression in theory can inform the nature of interventions such that actions taken are targeted and cogent. Consequently, as a methodological framework, the PPD approach is inherently situated in real-life settings, instead of abstracted controlled conditions. Being situated in an ecological valid environment, users of the framework must make value judgements as to what it means to make experience 'better' and in this regard, it is in line with the learning design approach (Warburton & Mor, 2015). Given that the learning design approach has a precedent of well-received tools (Prieto et al., 2013) and representations (Nardi, Whittaker, & Schwarz, 2002), this approach has sound foundations.

The PPD approach has synergy with andragogy. It is predicated upon the concept of hybrid social learning networks and was designed for use in facilitating adult training and

development activity. It also has significant synergy with hypercognitive theory, as it recognises that learning cycles occur in social situations rather than wholly within the mind of an individual learner, and that learning is emergent from that interaction. Finally, the approach is synergistic with multidisciplinary working. It does not constrain participants to a monolithic, a priori theory, participants may draw upon multiple sources as their needs dictate in order to address challenges as they occur. Therefore, it is deemed to be an appropriate initial basis for the methodological framework this thesis presents.

Two more reasons drove the development of the PPD methodology as an extension of the learning design approach. The first is that agile software development has synergy with it and leveraging this had the potential to be beneficial for the user. Secondly, there is a need for greater understanding of professional practices that exist in the context studied.

Consequently, the PPD framework allows for practice and design narratives to come together with user stories from agile methodology as boundary objects to form principles from which development activity can take place in iterative manner.

### **Evaluation of the PPD Framework and its Application in AHE**

Following the development of the PPD framework there are several pros and cons which are apparent when it is applied in the context of AHE. These will be considered below, and a



revised framework proposed that addresses these concerns which will form a structure around which primary data collection will be carried out in this novel context of AHE. Firstly, being theory-agnostic, the PPD framework allows the application of Hypercognitive theory without leading to a-priori assumptions. Thus, the theoretical approach this thesis takes to learning through hypercognitive skill development may be allowed to underpin a multidisciplinary team investigation of a tool development opportunity. On the other hand, the onus is on the participants to select and work sensitively to their chosen theoretical approach; the PPD methodology does not prescribe that adherence per se.

Secondly, the framework's use in practice as detailed in Mor et. al. (2015) clearly facilitated cross-stakeholder dialogue. This is key for bringing data scientists together with learners, educationalists and others to improve learning outcomes in the AHE context, where currently there are not embedded data scientists in educational institutions.

Thirdly, the framework allowed failure to occur, be recognised, discussed and decision making around that discussion be pursued. One of the potential benefits of multi-disciplinary teams is their ability to approach an issue with differing perspectives. However, this may only be operationalised when there is strong communication built on a foundation of trust and mutual respect. As such, a model which explicitly calls for consideration of that interaction

is a powerful catalyst for innovation over a more insular approach where everyone stays in their own area of understanding and feeds into a top-down managed process. Adjunct to this, there is a benefit that can be seen in the PPD framework application that it allowed stakeholders to present different priorities and negotiate those between them.

In terms of challenges to the PPD framework, Firstly, it only allows patterns to originate in practice or design, not in theory. This is an issue in terms of integration of new disciplines which aren't currently being used in situ. More specifically, this is an issue for the AHE context because it would not necessarily allow for the genesis of patterns from data science or educational theory. Therefore, the adapted framework for AHE presented below needs to closely mirror the CRISP-DM model in order to allow data science practitioners to fully integrate with the process. Then as opportunities become available, their prior knowledge of applications in other fields can be introduced to the process. It is by this mechanism that new paradigms can then be introduced to the education context from data science precedent.

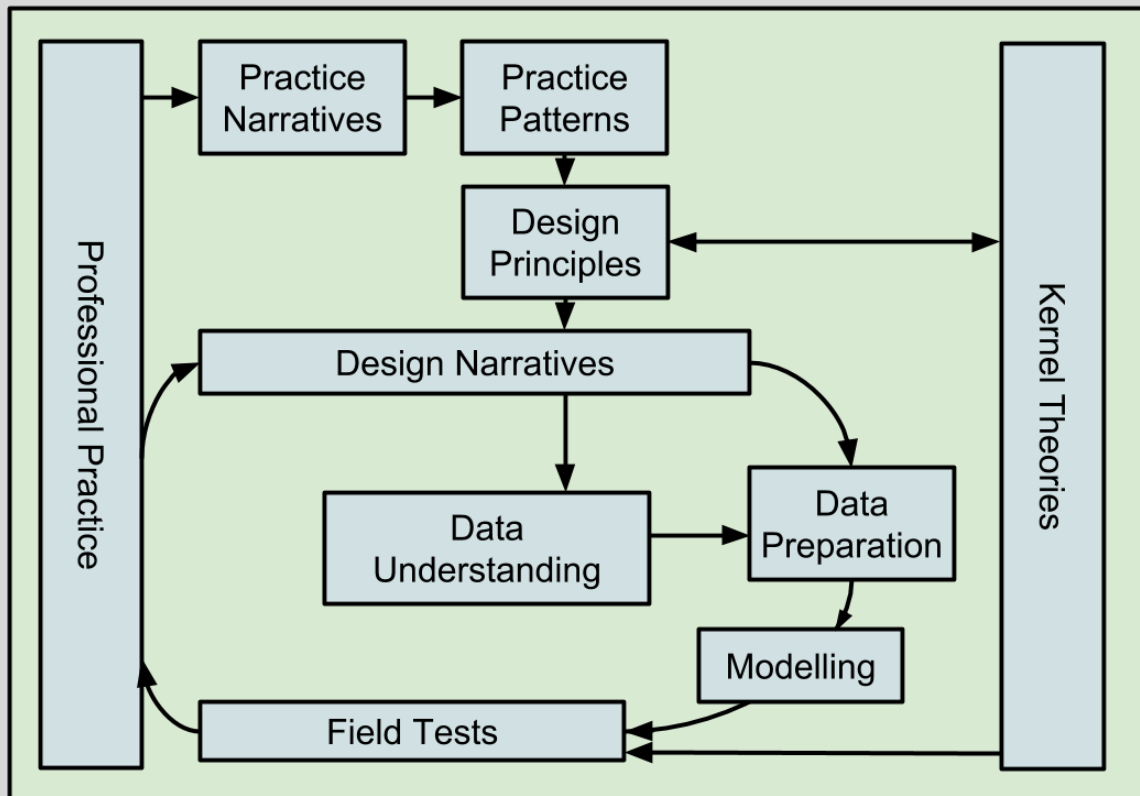
The second challenge to the PPD framework is that the patterns, as they are conceptualised therein, make causal assumptions. Where these are evidence-free, poor design and development decisions could result. Therefore, the hypothetico-deductive method needs to be integral to the framework, and underlying assumptions need to be falsified or

confirmed as much as possible through research as the design and development activity continues. Nevertheless, upon consideration of how to integrate this as the framework is adapted for the AHE context, it was decided that mandating this would both complicate the framework and restrict the practice of others involved in the design and development work, so like the PPD framework, this must be managed and advocated for by participants in the project that builds on the design predicates this thesis lays out.

The third challenge was one of procedure in the employment of the model as laid out in Mor et. al. (2015). The patterns were processed in two variations, some by participants in the exemplar application of the methodology and some by researchers. This had a practical purpose given the constraints of time and cost but is not ideal practice as these patterns' maturity needs to be assessed. This is a subjective judgment, and should not be expected to be wholly quantifiable, however that assessment takes place with one pattern in relation to the others, and therefore running two different procedures in the process of maturation has the potential to make comparison of those patterns less reliable. The primary data collection this thesis undertakes should be designed such that this divergence in method for two ostensibly comparable boundary objects should not be allowed to improve ease of understanding and minimise the risk of making false comparisons.

Finally, there is a cognitive cost of uptake to the model. The PPD framework was designed into a context where every stakeholder was somewhat expert: The users of the tool developed were qualified doctors, nurses and healthcare managers and the other stakeholders were acclimatised to the use of such approaches through their research and development expertise. In the context of AHE this may not be the case. AHE students have been shown to come from a variety of backgrounds and therefore, the framework needs to be easily comprehensible by the full range of users to avoid being exclusive and making confounding assumptions without a full view of stakeholders' context. It was the author's experience that the implementation of the PPD framework, even among seasoned healthcare professionals, was initially somewhat challenging due to its complexity. Therefore, the adaption of the framework for Data-Informed Andragogy in AHE should be as simple as possible without losing methodological resolution in order to reduce the cognitive cost of uptake. As a result of consideration of the advantages of the Mor et. al. (2015) model, it will be employed in the AHE context. To address the issues identified with the framework as it stands when considering it in this novel context, several changes were made. Thus, the PPD framework which this thesis will employ is shown below:

**Figure 4: Framework for Data-Informed Andragogic Enquiry**



For the purposes of design and development work towards data informed andragogic tool development that may be built upon the findings of this thesis, the revised framework is recommended for the reasons stated above. For the purpose of the primary data collection this thesis undertakes, the process of drawing practice narratives from professional practice experience, abstracting these to design patterns and then along with an understanding of hypercognitive theory, developing design principles will be undertaken. The following section describes the practical outplaying of that framework in terms of research procedure.

### **Practical Description of the Method of Employment of**

## **Co-Design this Study Undertakes.**

Practice Narrative development aims to record and formalise explicit experience in the AHE context. To that end, students were asked to work together to produce and peer review descriptions of those experiences according to the [proforma](#) shown in the appendices. In order to record their discussion, participants were asked to name their narrative, and were encouraged to make initial notes on what they were thinking about as they negotiated the contents. Then, a set of simple, non-leading headings were used: Who? Where and When? What? How? Results, and Gaps and Tensions. That is, who was involved? where and when did this thing take place? what happened in that event? How did those involved react? What was the result of this event taking place? Are there gaps in knowledge or continuing tensions you feel would be important to flag? In addition to these questions there was a section for them to record anything else they wished, titled 'Notes, Observations and Reflections'. Participants were given a good deal of leeway as to what to include here. The researcher answered questions as necessary, and took a proactive facilitative role in the process, working with the participants to enable them to draw upon a knowledgeable other to promote their zone of possibility (see Cook, Santos-Rodriguez and Griffin, 2015 for in depth discussion of this technique). As part of this involvement, the researcher managed the division of participants into sub groups to write

some of the narratives and peer review others so that each narrative that the group felt was important to bring out was written up and so that each might be agreed by the wider group. For further information about the development and use of aspects of this proforma and likewise for those relating to patterns and principles, see Mor and Warburton (2015) who designed them.

### **Practice Patterns**

"A 'pattern of practice' is a claim of the form: In a context C, actors of type T have intentions I and perform actions {A1, A2, A3...} to satisfy them." (Mor et. al. 2015).

As for practice narratives, practice patterns were formalised in a proforma which can be found in the [appendices](#). Context, Solution and Examples sections allowed the construction of information to fit the form described in Mor et. al. (2015). The Problem section allowed a broad summary of the pattern to be elucidated while examples allowed links to narratives to be identified and user stories to be added following consultation with students. Data and References sections allow for links to relevant external sources to be noted if that is felt to be helpful for the understanding of the pattern. Finally, links to Design Principles can be identified to allow someone interrogating the body of work to appreciate what insight was derived from that pattern.

These patterns were presented to students and edited

based upon their feedback before design principles could be instantiated.

## **Design Principles**

Design principles are drawn from a theoretical basis which has been validated by practical experience observation. In order to encapsulate them, the structure designed by Mor and Wharburton (2015) was used. This contains an opportunity first for an 'abstract like' summary of the design principle, and then asks what the theoretical basis is for the principle. Following this there is a chance for the author of the principle to lay out any challenges to practice or the current andragogic zeitgeist, notable limitations of the principle, trade-offs that it causes and potential design traps into which one could fall during requirements engineering. Finally, there is a mapping of Up, Down and Side Links. Up Links are references to more general principles which contain as part of them this principle, or under whose umbrella they could reasonably be expected to fall. Those might be other principles generated by this study, or other more established educational technology design principles that have precedent in literature. Likewise, with Down Links, where other principles are a subset of the one presented, there is the opportunity to flag these. Finally, Side Links are to identify which patterns and other data inform the generation of the design principle.



### **3.5. Methodology Summary**

This chapter situated the primary data collection activity this thesis undertakes in its ontological, epistemological and methodological contexts, before describing the autoethnographic and ethnographic data collection activity that will be undertaken in order to address the thesis' four research questions. Following this there was consideration of factors which could affect the data collection activity, around sampling validity and ethical considerations. Then, the methods of data analysis were introduced and justified, those of grounded theory and Co-Design, and for the purpose of making the design predicate output of this thesis that research question three calls for, as applicable as possible to those looking to innovate novel data-informed andragogic tools, a slightly modified version of Mor et. al.'s (2015) PPD framework for enquiry was presented and changes made for the purposes of this study were justified. The next chapter concerns the data presentation and analysis which will take place following the methodology this chapter has presented.

# **Chapter 4: Data Presentation and Analysis**

In order to present the data, the analysis of it and to draw conclusions, The autoethnographic data will be toured through, and the topic sheet formed as a result of that analysis. Then the patterns produced as a result of the co-design activity will be examined and this will allow the first two research questions to be addressed. In the following chapter, the Design Principles which emerged from the patterns and consideration of theory will be laid out and discussed. This will allow for the third research question to be answered. The Fourth research question will then be addressed through the development of the Reciprocal Equilibria Grounded Theory. Finally, discussion will centre around the limitations and implications of the thesis and the contribution to knowledge that this thesis represents. This will lead to some recommendations for further work and conclusion drawing.

## **4.1. Insight from the Autobiographical Data Corpus**

This section details analysis from the initial collection of autobiographical writing, through to the coding of that and

the formation of the topic sheet that was used to seed discussion in the group interviews with AHE students which followed.

### **Assessment of the Practical Operation of Autoethnographic Data Collection Activity**

An autoethnographic corpus was collected over the course of approximately a year, containing writings on epiphanal moments for the researcher in their work in the AHE context and recollections of student experiences which they perceived to be indicative of the AHE student condition. These writings formed the basis for the construction of the topic sheet that was then used in semi-structured group interviews at the ethnographic stage of this research study. The purpose of the autoethnographic research activity was firstly to draw upon the voice of an experienced professional in the AHE context to provide a launch pad for meaningful exploration of the under-studied andragogic and AHE landscapes in as effective a manner as possible given the resource limitations of the study, to address the research questions this thesis poses, and create a foundation from which to allow for the genesis of codes which would then serve as a starting point for the grounded theory interrogation of the ethnographic data. Secondly, this autoethnographic data collection was undertaken to provide an evidence base from which the topic sheet would be developed which would guide the ethnographic data collection.

The autoethnographic corpus was constructed of 11 pieces

of autobiographical writing completed by the researcher totalling 14628 words, with a mean word count of 1330 per piece. These were broadly completed alone rather than being generated from interview data as some studies have done. With such an approach, it is impossible to separate the researcher from the environment in which they find themselves and this case was no different. What follows is a brief description of each and an explanation as to how each part of the group interview [topic guide](#) was informed. A note of caution should be given: The way in which the researcher is changed through the experience of carrying out the analysis of their autobiographical corpus is relevant and difficult to quantify. This could be a drawback of the study because it allows for some rather tautological checks and balances on the ethnographic work, but it serves as a necessary part of the knowledge building process that this postmodern research method embraces. The process of analysis was ongoing in the course of producing the data and reviewing it over several passes. Donning the mantle of the research participant in this part of the study, the researcher did not go into the act of autobiography with the intention of establishing a series of norms and baselines as would be expected from quantitative data collection, but rather to try to illustrate their perspective on the AHE context, and allow coding activity to fall where it would subsequently. These writings were read many times following their drafting, and although grammar and

spelling issues were resolved to improve readability, a self-imposed ban on further editing was undertaken to preserve the thoughts of the researcher in flow rather than adjust them for convenience after the fact. That said, they did allow themselves to append new text to the documents where they later decided that there was a missing aspect of the piece which needed to come out. Finally, summaries of those notes were curated into the brief summaries of each which are presented in this section. What follows is that summary, followed by an explanation of how the individual parts of the [Topic Guide](#) were constructed from each autobiographic account and codes which came to light upon their analysis. Given the nature of the data being personal to the researcher, the following sections will be presented in first person. The topic sheet that was created from these is as follows:

**Figure 5: Topic Sheet**

1. Where do you get your information from?
  - a. Re. the course
  - b. Re. what you are learning
2. Why are you doing an Access course?
3. What is your method of going from being set a task or assignment to 'handing it in'?
4. What sources do you use for this?
5. What makes you feel like you know something?
6. Describe a transformative moment in your learning either here or elsewhere, which changed your perspective on something.
7. What differentiates those doing well from those not doing so well?
8. Why do people drop from Access?
9. When do you read stuff?
10. When do you read course stuff?
11. What inspires you?
12. What do you expect from your tutors?
13. What, in an ideal world, would you like them to be able to do for you?
14. Is your course what you had expected before beginning on it?
15. Is your course as you had hoped before beginning on it?
16. What do you find helpful as you study?
17. Describe the most useful thing you have done to learn so far
18. How does AHE compare with your previous experience of education?
19. How have you used your previous experience of education in AHE?
20. How do you think AHE is viewed by others?
21. How do you view AHE?
22. What tools or opportunities do you wish you had access to that you don't?
23. What tools or opportunities are you particularly happy you have access to?
24. What support is available for you?
25. What support have you accessed?
26. How have you accessed it?
27. What is the process for this?

The veracity of the topic sheet will be assessed when the ethnographic data collection activity is analysed.

## **Autoethnographic Account Presentation and Analysis**

### **Autoethnographic Account 1: Agency**

The account entitled 'Agency' centred around my experience being diagnosed as dyslectic. I describe instances of being considered intelligent and experiencing cognitive dissonance at the idea that his exam results did not match others' perception of my ability. I describe internalising others' disappointment at my academic achievement and feeling

helpless as a result. I describe sublimating that frustration through sport and this behaviour is useful to look back on years later as evidence of that frustration as I recall it. I describe my concern increasing as I moved through secondary school and both instances of my teachers and I limiting my potential for achievement further through the labels we applied to me, damaging my belief in how much I felt I had an opportunity to take ownership of my progression. Further examples of this are given from university undergraduate level study and what follows is an account of being diagnosed as dyslexic, learning study skills strategies for the first time and having others believe in my ability to take control of my academic outcomes which I ultimately internalised. I describe employing these new strategies and seeing significant improvement much to my surprise. With this came a switch from considering my study a reactive process whereby information is provided which should be memorized, to an exploratory experience filled with potential. I describe watching my son, who is approaching diagnosable age, causing me to reflect upon how the assistance that I was given to understand myself and the way that I thought empowered me with the agency to achieve and excel.

In terms of coding, this writing informed the inclusion of a locus of control and agency code that would later be used to draw parallels in the group interview transcripts. In terms of the topic sheet, students were asked to describe

transformative moments in their learning (Question 6) so that it could be assessed whether their agency had changed as a result of those. They were also asked to qualify how they decide when they know something. This was deliberately vague and would later turn out to prompt calls for clarification from participants. However, the purpose of this was to explore the extent to which their identity impacts the way they perceive their learning. Given that this was an account of an education system unable to accommodate an academic difference, any such parallels in the access student experience were also explored through question 13 and 22 which look to participants to describe the ideal environment with the intent of contrasting this with the actual as explored in questions 14, 15 and 21. The relevance of personal identity as it informed participants perception of their ability, potential and achievement was also explored through question 21 in which participants were given the opportunity to couch their view of AHE as they wished. It was hoped that it would be telling whether they described their experience in terms of their own identity or not. Finally, there were some practical questions around what support was available for students in order to delineate in a more concrete manner, the nature of the support structure available to AHE students.

## **Autoethnographic Account 2: Delay Between Issue, Diagnosis and Intervention**



This account centres around my description of the experience of watching my students drop from their course. I describe all such events as disheartening but recognise that my response to each of them is different depending on the context and antecedents. I recognise my own vested interest in the course retention, and the pressure I was put under to maintain that level of retention, even to the point of sitting in a meeting and having the question asked as to what could be done to improve retention in the future despite the fact that the student who had dropped, left the course because they died. Taking this into account however, I describe several instances of students dropping from their courses and my feeling very differently about each. For those students who dropped without explanation and who became un-contactable, is difficult to draw conclusions except to say that there was clearly a reason and that reason simply wasn't known or maybe even knowable with the resources and tools available to me and others at the time. I describe an instance where a student would have benefited from earlier intervention than they received because their technophobia issues weren't identified as early as they could have been with more resources, or if that student had been more forthcoming earlier about their troubles. I describe some other students who dropped out, having had good support, having identified issues which mean that they could not continue, and I recall wishing them well and fully supporting their decision. However, for the others I

identify a delay between the diagnosis of an issue and support being put in place as one factor, and the lateness of the diagnosis as another. I assert that with swifter diagnosis and less of a delay, more students have the potential to achieve the qualification than otherwise would.

This autobiographic account spawned codes relating to the establishment support and expectation coming into AHE. On a later coding pass, a portion of it was additionally coded as relevant to back door support structures. This account speaks to the accessibility of and the egalitarian nature of AHE. As such, several questions were influenced by this account.

Question one (a) tries to map student behaviour patterns when it comes to finding out information about the course. This was included because it is seen as a precursor to later help seeking behaviour and it was thought it could provide insight into the behaviour patterns of students as they seek out new information. Question six is also influenced by this account insofar as it was hoped that with some participants asking this question might elicit accounts of troubles and difficulties, they had experienced during their AHE study. Question seven was designed to offer students the opportunity to talk about difference between high and low achievers on the course. Part of the aim of this question was to elicit examples of situations where diagnosis and a delay before intervention had an impact as was identified as an issue in the [literature review](#). Question twelve allowed students to

describe their expectations of their tutors. This represents an opportunity for students to delineate their expectations around diagnosis and intervention as it pertains to course staff. Questions 22 and 23 ask for a description of support desired and support received. A comparison of these was hoped to provide insight into any mismatch. Questions 24 to 27 give the researcher the opportunity to explore and understand concrete examples of the support structures functioning in the AHE context and how students perceive them.

### **Autoethnographic Account 3: Developing a Learning Theory**

I conceived this account to explore how I conceptualise learning. A significant portion of its value therefore is to be found in reflecting upon the impact of a hypercognitive perspective on the act of facilitating group interviews. However, there is nevertheless some relevance to the group discussion topic sheet that should be noted.

The account begins with a description of my motivation in getting into teaching and learning professionally. I recognize that the answer I give to the question of why I did so may be different in public than in private, but that this is largely due to the issue being multifaceted and therefore the answer being longer than my audience wants. I describe finding the process of learning fascinating and describe how over time I have come to conceptualise learning in terms of 'lightbulb moments' of new understanding or inspiration that students

achieve through study. I describe the necessary building blocks of these lightbulb moments that are quite often drawn from a range of aspects of the student experience. I recognise that this is a vaguer description than I am necessarily happy with, but that to sum it up, it's about how a student takes information and applies it to a novel situation, synthesising it with that which is already there. I identify that these experiences can be both minor and major, that in many ways these moments occur regularly and in small increments but that they may also involve 'Road to Damascus' like moments of significant change. An example I give is of a student gaining understanding about how the mind of one of their relatives is working from the study of psychology. They describe their corresponding change in behaviour towards that person as evidence of that learning. I sum this up:

"It's not about the things that they now know, is about the things that they now understand better about themselves, about the society in which they live [and] about the world around them."

This account heavily influenced the inclusion of hypercognitive theory in this thesis as basis for understanding learning. The act of writing a description of my personal mental model of learning was much more difficult than the sheer length of the account would suggest and is an example of where the act of research itself has impacted me. Had an account been kept of the number of false starts and

discarded drafts that this topic spawned, then that may be more representative of its import than the length of the final piece. This account influences question six. Here students are asked about transformative moments in their learning. Question 11 was also an attempt to get at how students learn more obliquely by asking them to explore moments of inspiration in their experience. Question 16 gives students the opportunity to frame how they would ideally like to construct a learning environment to see what students would surround themselves with in order to facilitate those 'lightbulb moments'.

#### **Autoethnographic Account 4: Developing Hypercognitive Awareness**

My account of developing hypercognitive awareness overlaps somewhat with the [Developing a Learning Theory](#) account and came about through the consideration of hypercognitive theory as part of this thesis' development. I first describe an internal personal conflict I experienced in my early twenties, in which I wished to work in a caring role but also, more narcissistically, wanted to be seen as an expert in something. Following on from the revelation that being diagnosed as dyslectic had been for me and conversations with my grandfather about his academic career, I settled upon teaching as a way of helping others to benefit in a similar way as I had. I felt that this would serve both of my desires

for caring and recognition. While this is not something I am now particularly proud of, it is a necessary part of the process because it speaks to my motivation when I first had to conceptualise learning. Therefore, this account next describes how I viewed learning as knowledge at the time. I considered somebody more intelligent if they were able to recall a lot of information about a given subject. My experience of teaching AHE changed this. I describe an incident where I was catapulted into a classroom situation to cover another member of staff who was absent. I cast around for ways of delivering a two-hour session on the psychology of relationships. Having just experienced a relationship breakdown myself that morning, it was all I could think about and so I shared my experience with the students and allowed them to analyse it in the context of the material they were due to cover. While I admit in hindsight that the class may not have benefitted from the best practice in teaching and learning that afternoon, I nevertheless learned a great deal myself, to the extent that I describe it as transformative. My own '[lightbulb moment](#)'. For the first time I began to understand the importance of the link between real-world experience and the material being taught. I describe the experience for the student as enriching because they can associate a practical example with theoretical construct. This process of becoming aware of this was seminal in my development as a tutor. I describe actively looking for ways to synthesise knowledge from one part of my

life to another. Examples are given of activities I would have previously considered unrelated, but which now benefitted from the drawing of skills and techniques from one to the other. Though it isn't directly discussed, upon rereading, it seems that this was also an opportunity for me to engage emotionally with my teaching rather than maintaining an artificial 'professional wall' between my delivery and character. Following a description of more recent experiences of synthesising skill and experience across activity areas, I reflect upon the fact that most of my teaching time is spent aiming to develop hypercognitive skills in my students. For many years I saw this as an inalienable truth and found it difficult to understand why others didn't feel similarly. I describe relief and satisfaction when I first came across the work of Demetriou and colleagues (1993) who described hypercognition and gave credible experimental evidence for its construction. The fact that it was a multidisciplinary approach to cognitive development was also encouraging as it appeared to be 'practising what it preached'.

As with [Developing a Learning Theory](#), this is primarily designed to describe my approach and motivation to the study so that my influence may be considered at the ethnographic stage. However, some questions on the group discussion topic sheet were influenced by this account. Question six gives the opportunity for students to describe moment of transformation for them. This is the chance to see whether those experiences

described detailed synthesising information from one area to another as an act of learning or whether the students framed differently. Questions 12 and 13 deal with student expectations of tutor behaviour. These are designed not to lead the student into discussion of the tutor's emotional involvement with their learning but if they choose to bring those aspects out during their input, this could reinforce the use of the hypercognitive theory as an underpinning construct which advances understanding of learning in the AHE context.

#### **Autoethnographic Account 5: Enculturation**

Enculturation is a piece about the way in which my perspective was shaped by the AHE students that I taught. I begin once again by laying out my motivation for moving into teaching AHE, though in this case through a political lens. In order to demonstrate distance travelled, I lay out my former political view of liberal politics as weak, morally underhanded, and lazy. I describe their assumption that everybody had full agency in the development and outcome of their lives. From here I describe the way in which one of the classes I taught towards the beginning of my career changed that view. For the first time I experienced communication difficulties with a significant portion of the class due to language and cultural barriers: Around 80% of the class were people who were Muslim, female wearing hijab and I found the confluence of these factors to be limiting to my ability to



relate the material to their experience, and communicate to them my passion for the subject and for learning. Within the same class, another student stood out. With that student's two compatriots they made up one of two sub-classes in one from a social point of view. These three students were from a working-class background and sat apart from the others - two classes in one room. Although I perceived one of those students do be particularly intelligent, I learned that they were unable to attend the local sixth form because they couldn't afford the bus ticket and was therefore in my class only because it was within walking distance. I describe my confusion at this, confusion as to why the student wasn't angrier about the situation in which they found themselves. Combining their good nature over the course of the year with faultless attendance and enthusiastic classroom involvement, it shook my views to their core. I looked at the student's example and understood for the first time that if I was in their position, that I would not have had the fortitude to persevere and achieve in the way that this student had. I describe this experience as seminal in teaching me about the political context in which education takes place. I go on to describe some change over time in terms of my political outlook and how seeing what I did in that classroom planted a seed that would enable me to be a more empathetic and understanding educator moving forward. I now understood that context mattered. Whereas before, so much of the liberal

outlook appeared to me to be weakness, it now felt more like compassion. Finally, I map out the process of coming to terms with the fact that different students in different contexts measure success differently in terms of their educational outcomes. I cite an example of somebody whose confidence was built by the AHE experience despite dropping out partway through. While I recognise in my writing that people do still have personal agency in the process of education, I feel like my perspective has grown to more widely encompass the contextual factors which might influence that.

This piece was an effort to frame why I felt that exploring the AHE context is important. It serves to highlight the parallel factors of personal agency contextual constraint. It was one of the pieces which inspired an effort to code the data of this study presents in terms of agency and locus of control. In terms of the topic sheet, question two was designed to allow students to describe in as free a manner as possible their personal reasons for undertaking the AHE course, rather than assuming that everybody simply does it to attend university and for no other primary reason. Question seven allowed the chance for participants to describe personal or contextual factors as they wished which act as a hindrance to students on AHE. Question 17 asked for examples of positive experiences that students have had on AHE. The motivation there was to identify empowering factors, be they internally or externally situated to the learner. This piece caused

question 24 to be edited such that although it asks about support available and so that it didn't presuppose that this is provided by the tutor to the student and allows more freedom for the student to explore anything they feel has been beneficial to them.

### **Autoethnographic Account 6: Expectation Misalignment**

The account of Expectation Misalignment is about a contrast between the relative values students appear to put on skills learned in the AHE course compared with those which I tend to believe they will find most useful at university. I recognise that people come into the AHE context with different perspectives and a range of life experiences. I describe questions that are asked by students early in the course as telling about what they value the most. Predominantly these are about specific subject knowledge that they will need part of the course they want to go on to study. These are particularly centred around placement work or classroom material that is allied to their subject interest such as anatomy for a fledgling nursing student. In reality, it has been the researcher's experience that specialist subject material is not the most valuable learning which AHE student will complete to prepare them for further study, it is the 'soft' or 'study' skills. This isn't to say that there is no benefit in studying specialist subject material which both interests the students and builds their confidence that

they're making the right career decision, but simply that students appear to be interested in the specialist subject matter predominantly early in their study, and when asked after a year or two of University study, they universally site study skills as the part which they have benefited the most from: there is resistance to explicit study skills modules on the AHE provision. I note that this is reflected in the recent changes to the syllabus as is described in the [literature review](#). I recognise that the study skills which are most important for which students varies enormously. Examples are given of a student who learned tenacity, and another who learned to work with organisational superiors. Further examples are given of the student who learned to disassociate their sense of personal identity from the abusive relationship out of which they had come shortly before beginning AHE. Ultimately therefore, given that each of those students actively enquired about specialist subject material towards the beginning of the course, I write that I feel this is evidence of expectation misalignment that explains both why study skills are less than popular among students, and why their inclusion in AHE provision is so important. This highlights the immense differentiation difficulties for staff charged with the delivery and management of it.

This account informs the discussion topic sheet in question one (b) where students can describe what they are learning. Seeing how they couch this, either in terms of study

skills or in terms of specialist subject knowledge (or a combination of the two) may offer insight into the veracity of this idea of an expectation misalignment. Question 16 offers students the opportunity to describe useful assistance as it pertains to their studying and questions eight through ten are designed to give insight into how explicitly students are thinking about their study skills. Perhaps this account's greatest contribution to the study however is enabling its focus on student expectations, skills preparation for university, matters of personal identity and study skills to be considered. Each of these became primary codes against which the interview corpus were assessed.

#### **Autoethnographic Account 7: MOOC Experience**

A primary way in which I explored the impact of my own experience on the study this thesis presents, was to undertake a new learning journey. While other accounts were primarily focused upon experience, this account deals with recent participation in a massive online open course (MOOC). I describe signing up speculatively and finding that a relatively easy process. I was cognizant of my own learning during the process and I recognise that this inevitably influenced my perception of the experience. I describe paying a fee that was optional to get certificates despite not needing to, so that they I invested enough to complete the course. Once studying, I was frustrated by a lack of real-life

application for the material covered. I completed the first module and achieved a certificate, following which I chose not to continue with additional modules. I cited a lack of practical application, along with low applicability of the programming language studied to industry. I felt the greatest lesson from that period of study was a better understanding of how to search for answers and solve problems as they arose in the code I was writing. Taking solutions for other related problems and applying them to mine seemed key to achievement. I didn't gain a sense of community around the course, which is partly a result of the way I chose to interact with it and partly a result of the platform design that left me feeling isolated. I noted that there were a small dedicated group of individuals who had previously completed the qualification and stayed in the chat rooms and so on in order to help other people achieve in future cohorts. This was done voluntarily and speaks to the socially complex nature of peer support. I conclude that having advanced hypercognitive skills is necessary for successful completion of a course such as that and I wonder whether that is part of the reason that there is such a low achievement rate among participants. I recognise that despite feeling self-aware in this regard, I nevertheless found continuing to be motivated difficult when I found some of the coursework I was doing taking longer to complete than I was told to expect. I had to work hard not to internalise what felt to me like defeat. From this I recognise that there may

be a difference between the experience of completing student and that of a one who will drop out. If so, understanding both would be necessary in order to best assess the effectiveness of the provision.

By its nature, this account touches on several key codes that emerged later from the ethnographic study and were retroactively applied. It also spawned the 'success markers' code to understand what differentiates those who succeed with those who do not (however that is defined). The topic sheet was also influenced by this account. It raised the need for good understanding of procedural and behavioural signposts that occur during study. Questions 3, 4, 9, 10, 11, 14, 15 and 27 allow for the investigation of these. Furthermore, the topic sheet was designed to investigate questions around achievement versus non-achievement through questions 7 and 8. Finally it allows for the exploration of previous experience to inform adult learners' AHE study in question 18. Of note, it also highlights a shortcoming of this study, that the method used only drew on the voice of the successful student rather than also those who withdrew or failed. Ignoring the methodological limitations of doing so, it would be interesting to find out whether responses from those students who did not complete would be similar to those who did. To this end, institutions from whom the participants were drawn were asked towards the end of the course which of the students had dropped out and which had not. Were a significant

proportion of the students to have failed, this could allow for a comparison. However, each of the students who participated in the study also completed the AHE course, putting a comparative analysis beyond the scope of the study.

### **Autoethnographic Account 8: On Demand and Embedded Skill**

#### **Development**

This account focuses on the nature of the skills that are necessary to succeed in AHE. By way of illustration, I describe gaining more from an unofficial source of information (a knowledgeable friend) than from university for part of the first year of my doctoral study. I describe entering into a period of ad hoc study in coffee shops with a helpful friend to get up to speed on the basic mathematical principles that would need to understand in order to undertake advanced study in data science. This experience got me thinking about how embedded skill development opportunities are in students' lives rather than simply being delivered in the classroom at a set time and place on the course. I recognise that not every skill should be learned in practice (e.g. CPR), but that better understanding of those more distributed opportunities for learning could be valuable in understanding how students are prepared for university through their AHE study. Useful features of my experience include lexical convergence and negotiation with my friend and a growing understanding of how best to explain material to one another. This value is not



something ordinarily studied in educational research and this realisation represents part of the reason for considering the use of grounded theory. It also represents a personal experience of that 'Reciprocal Equilibria' grounded theory presented below although I didn't know this at the time of writing. I go on to reflect on how a discreet focus on study skills abstracts the learner from an ecologically valid environment. I highlight the challenge of discerning cause and effect: do one's organisational skills improve one's ability to complete a woodwork project or does the need to complete a woodwork project promote those organisational skills? Regardless of the answer to that, I postulate that the first step towards understanding those skills is to make them "real" (recognising discreet benefits of a given activity) so that they can be reflected upon and best learned from. By way of exemplar, I described a student who I taught getting frustrated that their compatriots who seem to them to be understanding to material 'too slowly'. Having stormed out of the classroom in frustration, they were able to come to an understanding about what had happened by making a concerted effort to vocalise both the antecedents and consequences of that behavioural incident. The outcome of doing this was described as positive. Therefore, there is a question about whether skill development opportunities should be designed for on demand access or for discreet learning opportunity, for instance in the classroom. It was identified that making these

things on demand could potentially class them as add-ons to the AHE experience rather than central to its aims and objectives. On the other hand, in my own words:

"teaching somebody to develop their hypercognitive system needs to meet them where they are, psychologically and physically and at the point where they are most cognisant of a particular issue and the skills or knowledge they are trying to synthesise to address that".

This account influenced the creation of the 'integrating study skills with life' code and brought an expectation that skill preparation for university should be explored with participants at the ethnographic stage. The topic sheet was influenced by this account in terms of question three which looks to interrogate the extent to which students are aware of the parts of their learning that take place outside of the classroom and outside of dedicated home study time. Likewise question five. Question ten further prompts this in a more direct manner in question thirteen aims to give the opportunity for students to fantasize about the sort of support they would most like, free of resource constraints. Question nineteen asks about their previous experience of education not in terms of how it compares with the AHE experience but relating to how they've been able to use that past knowledge more recently. This is designed to scaffold, without leading, a discussion around how students have built their knowledge base and the mechanisms behind that.

**Autoethnographic Account 9: Being an Outsider**

This account centres around identity and learning context. It begins by laying out my perception that Further Education is treated somewhat as a second-class citizen in comparison with six form colleges, grammar schools and universities. I describe an example of delivering a session about some resources I had developed for one of my A-level courses to absolutely no acclaim from others at a conference. While wondering why, I watched the other delegates at the conference I had organised present more successfully. I was amazed that everything the other tutors presented seemed to be tools for examination completion such as a paragraph to learn verbatim that could then have the verbs added in as the question required. I write about my view that my material fell flat upon presentation because it didn't teach strictly to the exam and it was coming from somebody from Further Education. I saw this as a stark highlighting of the difference between andragogic and pedagogic practice. I highlight opportunities for technology infused tools to reduce the gap between experts and learners even more than globalism has done over the last 20 years. I discuss opportunities to assess learning better than traditional exam conditions might be able while keeping some essence of the enthusiasm and fun that learning can bring about. I conclude that my experience of feeling like an outsider as an educator in that situation was a limiting

factor and therefore is excited about the development of tools which make sure that all learners are included wherever possible.

While this piece highlighted the difference between andragogy and pedagogy in such a way as reinforces the need for each to be treated individually, this piece did not inform the coding that took place at the ethnographic research in the way that other parts of the autobiographical corpus did. However, on the topic sheet it is important that students have an opportunity to discuss their own identity on the course and within the group rather than relying on my perception of their identity as an AHE student. As such, questions 4 and 6 offer an opportunity to flag peers as sources should students choose and questions 20 and 21 were specifically designed to enable students to contextualise their experience in a wider environment. Then they could discuss feelings of being an outsider if they felt that was relevant.

### **Autoethnographic Account 10: Paradigm-Changing Education (Technology)**

At first glance this piece seems less related to the AHE context than other writings in the corpus. This is a fair challenge because it was written to reflect upon something different. For a while, I was in a unique position to explore a piece of genuinely ground-breaking, paradigm changing technology that has yet to be applied to the educational

domain while working at a technological start-up company. I felt that it was important to reflect more generally on the way in which technology is used in the classroom so that any methodological recommendation may consider factors that really matter rather than using technology for technology's sake. I write about my hope that any methodological construct would allow for new paradigm changing tools to be implemented and developed rather than being restricted to helping to develop incremental advantage from known technology. This is reflected in the thesis as one of its' [aims](#) and later in the development of the [Data-Informed Andragogy Framework](#) engaging with this autobiographical writing enabled me to better understand why I felt that this was important to include (the aims were decided upon well before the autoethnographic writing task was carried out).

It was this piece of writing which, along with an understanding of andragogic principles, inspired the development of the 'transformative moment' code used on the ethnographic corpus. The topic sheet wasn't significantly impacted by this piece, however question six allow students to describe such transformative moments so that learning experiences which are perceived as notable are captured alongside more incremental learning.

### **Autoethnographic Account 11: The Distributed Nature of the Learning Experience**

The final autoethnographic piece presented here details how I perceive learning to have become more 'fragmented' over recent years. By fragmented I mean that students are often completing shorter, more regular periods of learning rather than longer monolithic ones. I begin by discussing students who have children and how it took me some time to understand what they had to deal with alongside completing their course. I was concerned that like any other caring tutor I may be falling into the trap of unreasonably considering my students to be 'special' compared with others. However, on balance, I felt that this was not the case. By way of illustration I discuss a task that I had been required to perform with my students which was not age or stage appropriate for them and the conflict that created between me and the management of the organisation for which I worked. I identify one of the most insidious parts of this experience as being how what students were being asked to do have no bearing upon their course, their future aspirations or the things that motivated them to be there. Inherent in this account is that the relationship and rapport between the tutor and student is extremely important. Likewise, having different parts of the student's AHE experience linked together has benefits in terms of motivation as well as allowing students to synthesize more fragmented learning experiences with one another to create a cohesive whole.

This writing heavily influenced the inclusion of

'Integrating Study Skills with Life' as a code for the assessment of the ethnographic corpus and encouraged me to create questions which allow participants the chance to illustrate their working patterns and by so doing demonstrate whether or not their learning experiences more fragmented than one might expect without being directly led into that line of discussion. Questions 3, 4, 9,10, and 25-27 were all informed by this intent.

No concrete conclusions should be drawn from the autoethnographic data alone, as stated above, it serves the purpose of providing a starting point for the grounded theory coding, and underpins the development of the topic sheet used for the ethnographic data collection activity which proceeded it. Consequently, the next section lays out design considerations for the development of the topic sheet, before the ethnographic data collection activity carried out using this is detailed.

## **Topic Guide Design and Group Interview Technique**

### **Considerations**

There were several design considerations that went into assembling the topic guide.

To mature the Topic Guide from prototype to research ready design required four primary considerations. Firstly, was the issue of how prescriptive the topic sheet should be.

The group interviews were to be semi-structured and as such it was considered appropriate to have several questions that act as conversation stubs rather than a list of questions to which answers should be provided on the one hand, or a list of general topic areas around which less structured discussion to take place on the other. Consequently, rather than ask students each question in order, it was decided that all questions would be asked to a reasonable proportion of sample, but that not every group would be asked all the questions individually. This was effective in enabling students to discuss issues which matters most to them, without the researcher limiting their scope artificially and disallowing their voice to come through in the discourse that followed, although it also limited the amount of quantitative data which could be drawn from responses. This was considered an acceptable trade-off because of the small nature of the sample calling those numbers into question.

Secondly, it was important that the questions were designed to avoid leading the respondents to a particular answer. Research has shown that a small amount of leading material can have a significant skewing effect on the data that are produced (Loftus and Palmer, 1974, demonstrated this in a seminal study). Consequently, during interview, rather than asking "do you use Jstor to find peer-reviewed journals online?", Students would be asked "what sources do you use for this?" during a discussion about assignment completion.



Thirdly, the topic sheet was designed to be inclusive. As such, the language used was gender neutral, and the questions were designed so that any participant could answer rather than the researcher putting one student on the spot. During the conducting of the group interviews, there were times when the researcher asked specific questions of individual respondents, however in those instances that question was prefaced with a phrase such as "if you don't mind me asking..." or "if you would like to say more about that...". Although it was the belief of the researcher prior to conducting the interviews that factors such as gender would be relevant to the discussion, rather than asking about that in particular, questions were designed so that students could refer to gender-related issues if they felt that was relevant to the topic of discussion, allowing that to emerge as a theme rather than being primed by the researcher. To maintain total transparency with the participants, each had a copy of the topic sheet before them during the discussion and encouragingly, there are examples of students posing these questions to one another at times. The researcher takes this as an indication of participants general willingness to explore and explain the AHE experience as well as tacit acceptance of the questions' design. Interestingly, some students posed the questions to the researcher and in order to avoid leading their answers, these questions were deflected with an honest explanation of the potential biasing effect that could occur if the researchers own opinions were

brought into discussion before the students' voices were fully heard. In one instance, following completion of the interview a participant asked the researcher about their opinion of the impact of childcare responsibility in AHE. In this instance, the need to maintain an open and sharing relationship with the participants for when they were due to review the design patterns at a future date was deemed of primary importance, and an answer was given, though the researcher reinforced again that they were interested in the student perspective rather than trying to confirm any particular preconception that they held.

Lastly, ethical issues needed to be factored into the design of the topic sheet. It was recognised early on in this study that there was no need for anything other than full disclosure to participants about the nature and aims of the study, and therefore no need for deception of any kind which could impede their ability to offer continuous and fully informed consent.

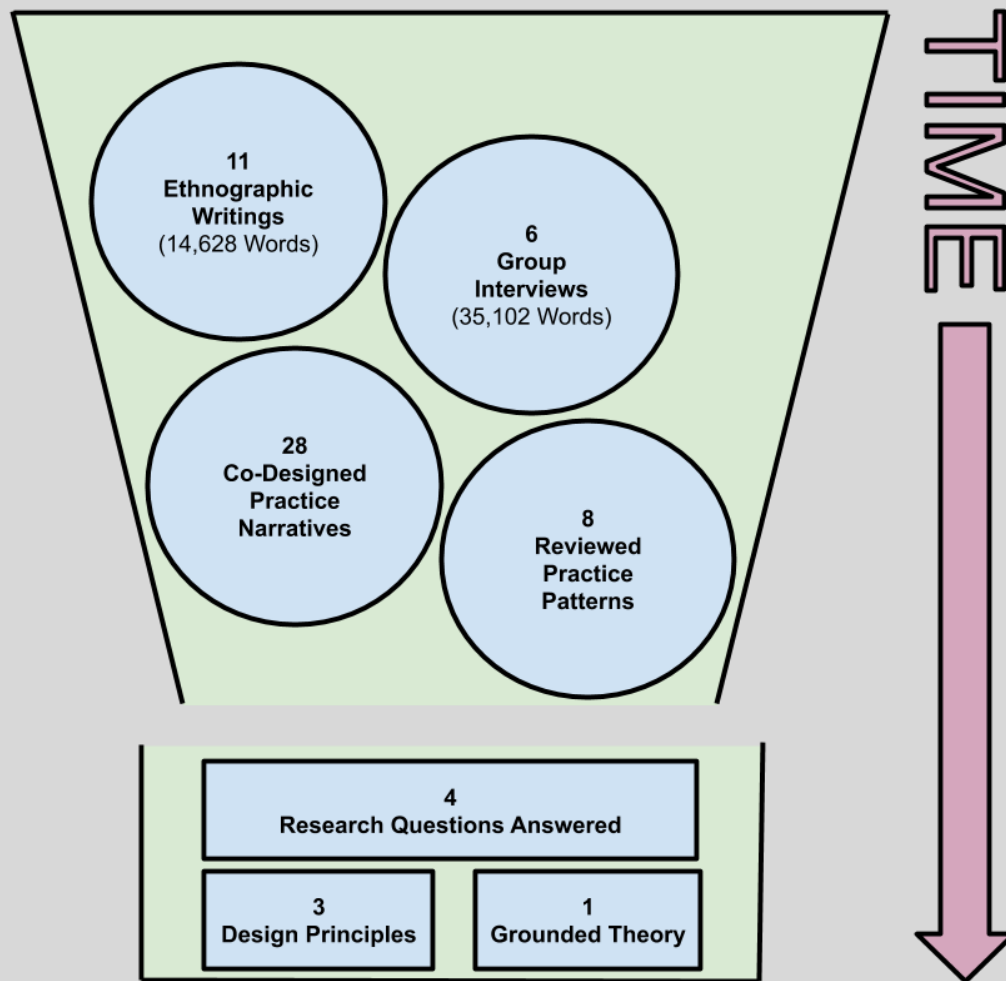
The following section moves from the autoethnographic data, which yielded a first pass coding set for grounded theory analysis and the aetiology of the topic sheet, to the ethnographic data collection activity of group interviews of AHE students, from which additional coding passes were completed and grounded theory emerged that represented an answer to the third research question. Concurrently, co-

design activity took place and developed practice narratives, which were abstracted to peer-reviewed patterns from which the third research question could be addressed.

## **4.2. Evaluating and Reflecting on the Practical Operation of Ethnographic Data Collection**

Summarised in Figure 6 is the data collection and output from this thesis. Data collection consisted of 11 pieces of autoethnographic writing toured through in the previous section above. Co-design activity produced 28 peer-reviewed practice narratives and this led to the formation of 7 practice patterns upon which 12 students fed back user stories and had the opportunity to highlight areas missed. This led to the development of 3 design principles that address research question three and 1 grounded theory which addresses research question four.

**Figure 1: Data Collection and Output Summary**



In order to properly cite the ethnographic portion of the data in context, the sample needs to be considered, along with the ethical and practical implications of the data collection activity which occurred. This is described and analysed below in advance of the presentation of data.

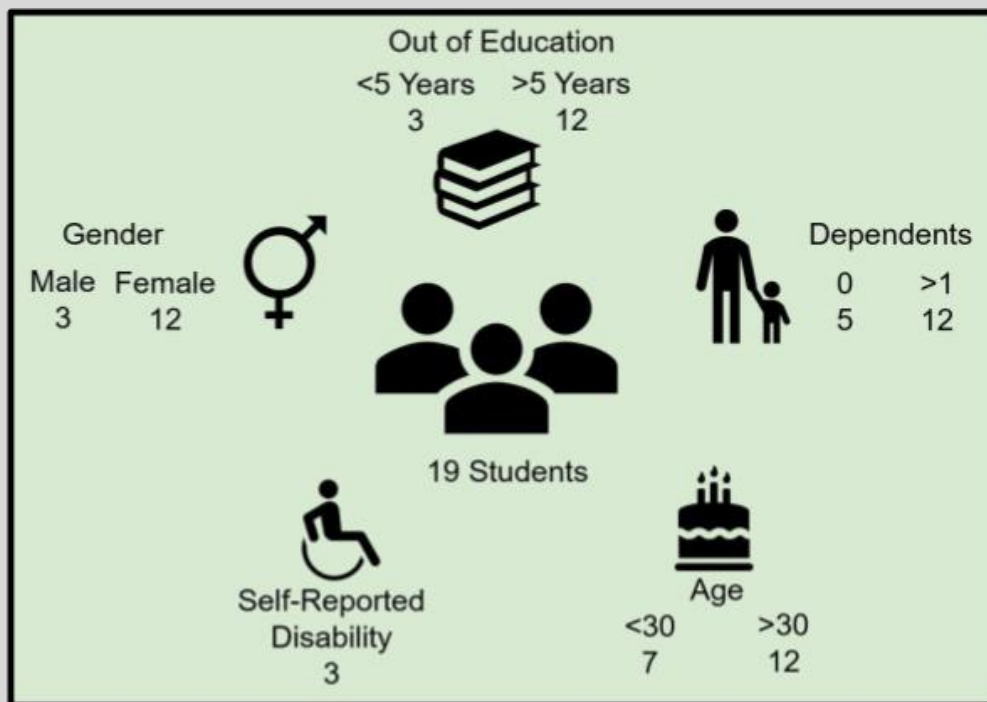
### **Participant Characteristic Analysis**

Assessing the sample used in the study is important in allowing for critical assessment of the sample validity, and

secondly it speaks somewhat to the first research question that this thesis addresses by adding to the body of evidence presented in the literature review that the AHE student body is not representative of the wider population. This analysis was completed upon the 19 participants whose group interview data were used in the course of analysis. The additional eight participants from the rejected focus group have been excluded to avoid presenting an image of the sample which is different from that which the data analysis of the ethnographic data suggest. The [exclusion decision](#) is discussed following this participant analysis.

An initial classification analysis of the data show that the sample collected, though small by necessity (n=19), is nevertheless relatively representative of the sociodemographic make up the AHE provision. While representation and consequent generalisation is not a primary aim of the study, it is nevertheless in line with the first research question of whether the AHE is egalitarian or whether the people who become AHE students are drawn from specific parts of the wider population. Figure 7 shows a summary of the sample.

**Figure 2: Participant Sociodemographic Characteristic Infographic**



In terms of age, 12 participants were over 30 and seven under. This is in line with expectations laid out on the QAA website and reported on in the [literature review](#).

Most students who chose to participate in the study had been out of education for more than five years (twelve, compared with seven who had been in formal education more recently). This confirms that AHE is being used predominantly by people who would fit the '[classic profile](#)' of the AHE student - the mature student, returning to education after some time at work or elsewhere. That said, AHE provision clearly isn't solely servicing this subgroup, with a significant representation of younger, more recent ex-students also represented as would be expected since the moratorium on

recruitment of those under 21 has been lifted (QAA, 2013). Above all, this represents a view of the AHE student as less homogeneous than may have been expected given the continuing popularity of A-levels and the diversification of other routes into higher education study. Without wanting to extrapolate too far from a small sample, this nevertheless lends some credence to the differentiation challenges facing AHE educators described in the [literature review](#) and in the [autoethnographic](#) data presented above.

The gender mix of participants was on the one hand unfortunate, with women predominating at 12-3 with zero undeclared, as this makes gender comparison problematic, however this is somewhat to be expected based on [statistical reporting from examining bodies](#) (Parr, 2016) which reports three quarters of participants in AHE to be women.

Participants were not asked about histories of specific learning difficulties. However, the fact that three of the 19 volunteered this information about themselves during the group interview administration, suggests that those who took part were likely somewhat representative of the levels of these conditions within the wider AHE population (16% in this sample, 11% in UK AHE according to Parr, 2013).

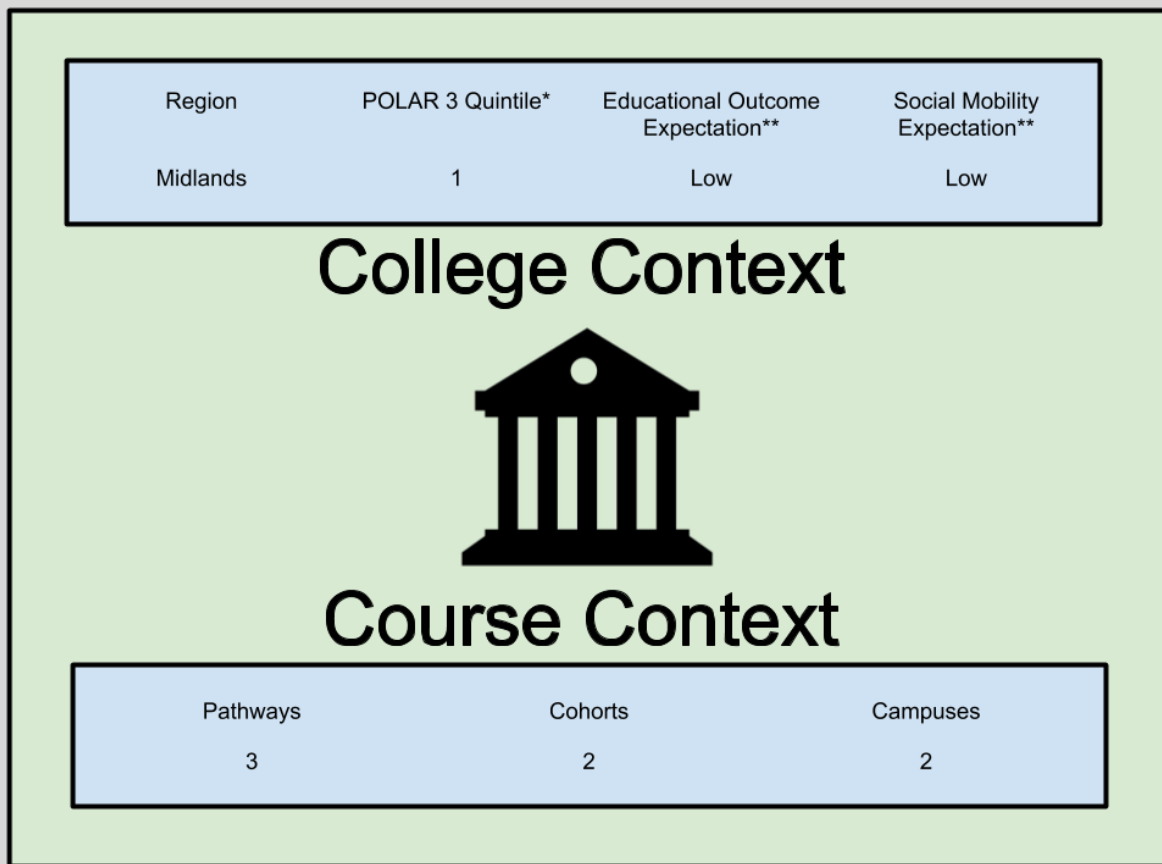
An interesting emergent participant property was apparent in the focus group transcripts. Despite not being asked specifically to declare whether they have dependents, every student indicated one way or the other during the focus group

discussion. An initial conclusion which can be drawn from this is that parental responsibility was clearly of importance to those participating in the study. It should be noted that of those participants, 74% (n=14) self-identified as having dependent children and 26% (n=5) declared themselves childless. This is in line with what is known about [dropout rates for students](#), particularly mothers, on AHE.

Therefore, tentative initial insights that can be gained from this sociodemographic sample analysis. Firstly, it shows that this sample is broadly in line with expectations from literature review of the UK AHE population. This reinforces the assertion pertaining to the first research question, that AHE as it currently stands is not representative of the wider population. Secondly, the conclusion that having dependents was seen by participants to be of relevance to questions asked is important to note. While it doesn't address a research question this thesis poses directly, it did inform early stages of the Grounded Theory coding process.

Alongside consideration of the sociodemographic makeup of the participants, their broader context within which they studied has salient features which can enable the reader to appreciate the environment in which the primary data collection were carried out. Figure 8 summarises these as specifically as possible while protecting the anonymity of the college and therefore the students in question:



**Figure 3: Research Context Characteristics**

\* Office for Students (2019); specifics omitted to protect participant identity.

\*\*Data from Social Mobility Commission (2017); specifics omitted to protect participant identity.

Students came from a college in the middle of the UK where on average students were from the most socioeconomically deprived living contexts according to the POLAR3 dataset (Office for Students, 2019). In the area around each campus, the average educational outcome expectation was low, with each being identified as a 'cold spot' by the Social Mobility Commission (2017). This was also the case in terms of inhabitants' expectation for social mobility. This is an environment which is both challenging and fertile for AHE

provision. It is challenging for the provision to thrive in if population expectations tend towards a lack of agency in the act of improving their outcome prospects. On the other hand, it is fertile insofar as there are likely a good portion of the population who stand to gain significantly from provision which offers the opportunity to pursue higher learning.

Within the College institution partnered with for the data collection this thesis presents, the AHE provision ran at two campuses, with separate cohorts at each. These cohorts were geographically disparate and had no direct contact with one another in a formal manner on the course (although they shared some tutors between them, and one student mentioned knowing a member of the other cohort socially during group interview). Within this student population, three pathways were represented: Healthcare, Humanities and Education. Of these, healthcare was the most populous, again in line with national expectations based upon regulatory reporting (Parr, 2016).

### **Assessing the Experience of Data Collection with AHE Students**

Data were collected from consenting participants over the course of the 2017-2018 academic year. The group interviews were carried out between September 2017 and March 2018, and

the pattern feedback data were collected in June 2018. Each of the interviews were carried out in a classroom with little external distraction (although one group experienced some noise pollution from an adjacent room which caused brief comment by participants). Pattern feedback forms were completed in more eclectic environments. On one campus students did so in a pre-booked computer room, away from any college tutors, other students from different courses or other external distractions. On the other, and by virtue of the fact that students were coming into college on an ad hoc basis to have their coursework binders signed off by course staff, the researcher spent some time in a computer room where students could choose to work and recruited participants as they arrived prior to their final submission. While this room was closed to non-AHE students, it was open to tutors and from time to time a tutor would come in to find a student to invite to another room for the purposes of signing off their coursework. It is hard to know what impact this had on results, if any, but the material being reported upon was not critical of tutors or the course, the tutors had received no briefing on the data collected and had no access to raw data. Finally, tutors did not interact with students who were completing the pattern feedback survey, so the working assumption is that this was not confounding to the feedback given. One participant who took the survey away and completed it at home. This was a function of their practical situation

and while it was only one participant, there is nevertheless a lack of environmental control here in comparison with others.

The conclusion to be drawn from this experience is that the AHE student experience is a busy one, with poor availability for many students, particularly those with dependents that had to rearrange their appointments to participate several times over the course of the academic year. This made environmental control for data collection challenging. However, it was the researcher's experience that AHE students were enthusiastic participants in research work that they believed stood to improve AHE experience for others, suggesting that the AHE student population, with its eclectic range of specialist subject interests represented, may be a valuable source of research participants for the educationalist.

### **Sampling Validity and Reliability**

The sample was necessarily small so that students and the author could collaborate meaningfully in co-design activity. This makes broad generalisations about the nature of the participants challenging. Although the initial [case analysis](#) detailed above suggests that the sample used matches the sociodemographic expectations of the AHE population, generalisability is not a primary aim of this exploratory study into the AHE context.

[Sampling methods used](#) were not random, they were a

combination of opportunity and snowball methods. As such, the sample has the potential to be biased. This said, in practice, the data collection activity saw every student studying on AHE provision during the period of data collection provide data as participants of the study, so any sampling bias is likely to be either introduced at the point of recruitment of the participants onto their AHE courses rather than at the point of selection for this study, or if the sociodemographic makeup of the course was non-representative of the wider AHE population due to location or other contextual factors. Finally, the researcher felt that it was important to collect participants from courses upon which they had not taught. They wanted to avoid the sort of experimenter bias which could become problematic in such a case. For instance, if a participant criticized a part of the provision the researcher had designed, they may be less inclined to hear what the participant is saying and more focused on what was wrong with their design work.

### **Adherence to Ethical Standards**

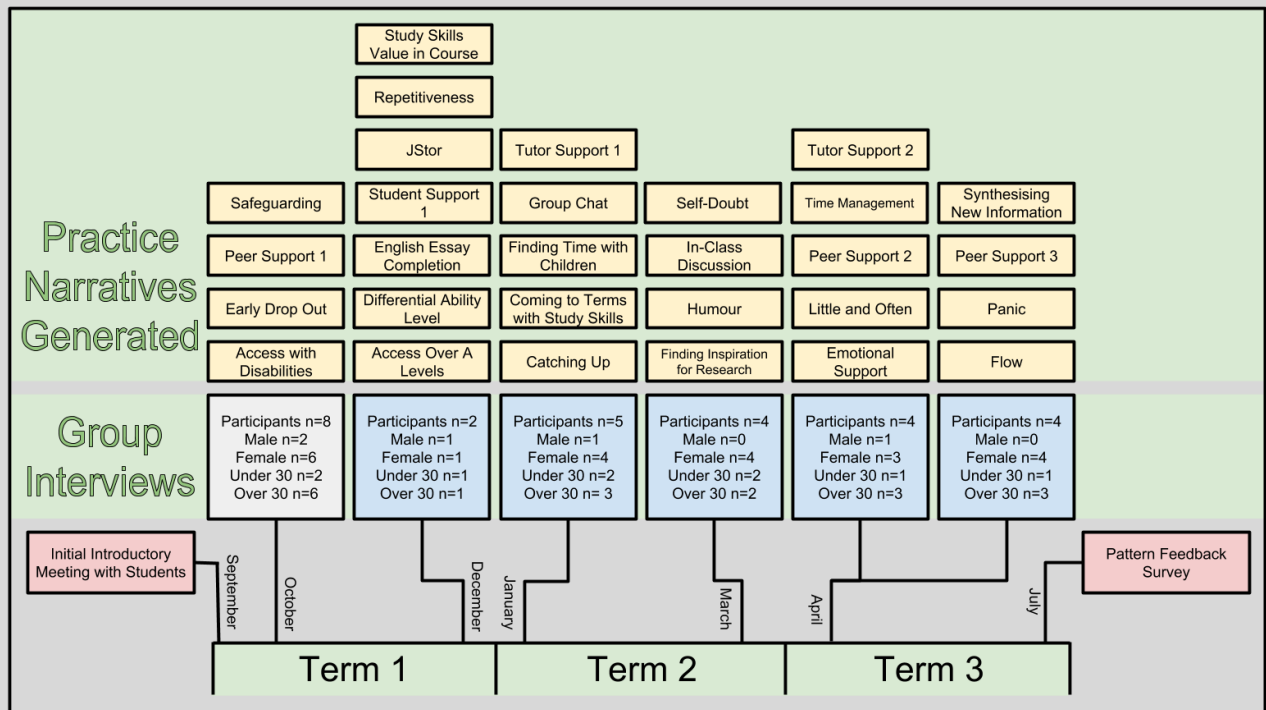
All the participants gave their consent for data collection prior to that collection taking place and did not request the removal of that data from the study either during or in the allotted period following the data collection. Audio recordings confirm that this consent was reaffirmed verbally alongside the written consent forms collected prior

to the commencement of data collection activity. For these reasons, along with continuing monitoring from the writer's Director of Studies and the destruction of securely stored data in line with University requirements, it is concluded that participants and their data were handled ethically during data collection and the ensuing analysis.

### **Discussing Student Experience and Eliciting Design Narratives**

A short summary of the researcher's experience facilitating the group interviews and working with participants in Co-Design activity is necessary to contextualise the data and consider any potentially confounding factors arising from the way in which the collection of data were carried out. A summary of each of the group interviews, with the patterns which were generated in Co-Design activity following them are represented on a timeline in Figure 9.

**Figure 4: Primary Ethnographic Data Collection Timeline**



As noted above, the transcript of the first group interview was not used for the purposes of coding and further analysis. This was for two key reasons. Firstly, despite the researcher's efforts to avoid it, two students spoke over the others and one another for a significant proportion of the interview and thus obscured one another's speech for the purposes of playback or transcription. The second reason was that one of the students was experiencing a period of intense frustration at the institution, the course staff and their fellow students. This participant relentlessly dominated the conversation, returning constantly to how they perceived they had been slighted. On the one hand the researcher wanted to faithfully represent what was told to him by the participants,

but on the other, there was little meaningful addressing of the questions on the topic sheet for significant portions of the interview. Given the specifics of the situation, it was deemed too difficult to remove personal identifying factors from the transcript for the purposes of maintaining anonymity as promised to the participants prior to their agreement to participate.

Despite the transcript not being used for the purposes of analysis, it was considered appropriate to include the co-design activity output nevertheless, which included most notably the '[Safeguarding](#)' and '[Access with Disabilities](#)' narratives. This is important because aims to bring out the voice of the learner and to silence the voices of a portion of the participants would be antithetical - this way their input is still included to a as much as possible. Consequently, it was considered less confounding to include those narratives than exclude them. The other factor which allowed their inclusion was that they were subsequently peer reviewed by members of other group discussions. The final reason for including the narratives generated by that first focus group is that there is the potential for those narratives to speak to the way in which students communicate, rather than simply the contents of the narrative itself.

A lesson learned from this group interview experience was that the researcher chose later to facilitate these interviews with smaller numbers of participants. This avoided the



crosstalk which caused the transcription issues. In addition, the smaller number of participants in each session allowed the audio equipment to more intelligibly collect what each participant said. Thus, though it is regrettable that some data was excluded from coding for the grounded theory analysis, the net result of this experience was positive as it pertained to lessons learned for future data collection activity. The remaining five group interviews were conducted without issue and notably, none of the participants in any of those groups refer directly or indirectly to the incident that precipitated the grievance the participant in the first group described. This again suggests that its inclusion would be more confounding than its exclusion.

The interviews took place spread over the course of the academic year and therefore accounts for a range of student views from towards the beginning of their time on the AHE course up until they were working on the final major project at its conclusion. Due to competing demands on their time such as childcare issues, it was difficult to coordinate each group of students to be equal in size and as such to students were shuffled between groups even on the day of data collection. The net result of this is that the number of participants in each group varied somewhat as Figure 29 shows. This was a likely challenge which had been identified by the researcher and staff at the institution within which the data were being collected in advance. It is the view of the

researcher from that experience and from careful review of the transcripts, that dealing with mature and capable adult participants, this variation in group size had no negative effect on the ability of students to response to the topic sheet questions.

### **Coding the Ethnographic Corpus**

The grounded theory coding procedure undertaken represents a small deviation from traditional grounded theory due to the co-design activity which took place concurrently. This [Co-Design](#) methodology has been chosen due to its usefulness in generating student buy-in, as a framework for negotiation around which participants and the researcher can come to understand one another better and because it is sound interaction design activity with grounding in effective professional practice. Given that this represented a complication of the traditional grounded theory analysis, it is important to clarify the nature of the activity. Coding activity had begun with the autoethnographic corpus and a first pass at the ethnographic corpus was also made before the design patterns had all been produced and before the design patterns had been developed and peer reviewed. Consequently, it is not possible to explicitly confirm that there was no influence from the co-design workshops which produced the narratives and the coding procedure. However, given that both tasks are working to explore the AHE student experience,

comorbidity here is not thought to present a disrupting factor for either the co-design activity or the coding.

The process of coding was carried out in NVIVO 12 (QSR International, 2019). Each transcript was produced and entered as a file, along with each autoethnographic piece, narratives, (and later patterns, the pattern feedback survey and design principles). Cases for the researcher and each participant were formed allowing their information to be stored and queried. Initial coding occurred on the autoethnographic corpus to inform the development of the topic sheet and serve as a first pass coding effort. Following completion of the group interviews and narrative co-design activity, further coding passes were made in the light of the ethnographic corpus. As per grounded theory good practice (Kolb, 2012), where new themes emerged, the autoethnographic writings were then coded for that too. Another coding pass was completed following the development of patterns, which allowed for some codes to be condensed into broader ones where the distinction between them was no longer relevant and further review was undertaken following pattern feedback.

### **Narrative Construction**

In order to illustrate the co-design work which took place with participants during participatory design workshops, one of the narratives will be considered along with discussion of how it came about. Each of the narratives produced by this

thesis can be found in the [appendices](#) should the reader wish to consult them further. The 'Catching Up' Narrative, shown in Table 8, came about through discussion of the way in which participants had experienced support mechanisms in college on their AHE provision. During the group interview the researcher kept broad notes on the themes which they felt the students had explored. These were discussed with participants and students were asked to review these, identify any which they felt should be brought out explicitly as narratives and then to form small groups of 2-3 students to write them. The researcher facilitated this process by identifying where students had given examples of an experience, which the group had discussed and encouraging those to take the lead in the narrative development activity. Then, while these were being written by the sub-groups, the researcher was on hand to facilitate, answering questions about wording, expectations and any other queries participants had. Where necessary they also prompted further discussion to enable the recording of the most archetypal example as a core description. Following this process, they swapped narratives between sub-groups and edited them as they saw fit, providing some initial peer review and discussing changes needed as necessary. Then, from the second group onwards, they reviewed some narratives produced by other groups. This way, most narratives were reviewed by members of at least one different group interview cohort. The exception to this process was focus group 2,

which consisted of only two participants due to scheduling difficulties. Consequently, they produced narratives together and these were subsequently reviewed by other group interview cohorts.

Figure 10: 'Catching Up' Narrative

## Catching Up Practice Narrative

### Initial Notes

Use Moodle a lot, research books, classmates

### Synopsis

As a student, if I miss a lesson, then there is [virtual learning environment] that has all the information on it. I use the textbooks to help understand what is on [the virtual learning environment] and I talk to classmates so I can catch up on the discussion.

### Who?

[8 students names listed]

### Where and When?

At college or at home after lessons

### What?

Depending what is missed. I signed up to do humanities and didn't like it but still wanted to do law. I rang around the uni and I found I could swap to health and still do law

### How?

I read a lot on the subject of cells which I missed

### Results

I passed

### Gaps and Tensions

### Notes, Observations and Reflections

If you miss anything you can always catch up if you worked hard

As can be seen from [Catching Up](#), students were encouraged to describe a particular example which they felt was

illustrative of a pattern of behaviour or experience with which they identified. Upon peer review, the fact that additional students chose to add their names to the list of affected students suggests the depth of feeling around the experience detailed, particularly as this was not something they had been asked to do explicitly. Another interesting note from the production of this narrative is that there were no gaps or tensions mentioned by the progenitors or reviewers, suggesting that students felt this pattern of behaviour was an expected part of the AHE experience, that they preferred to seek help from peers and literature before staff or other experts and finally the fact that in the last section, the note had been included which says that it is possible to catch up from any deficit through hard work, suggests that feelings of agency around catching up are high. Consequently, this narrative became a contributing factor to patterns 1,2,3,4,7 and 8 that will be discussed below.

Another note which should be considered is that students asked during two of the co-design sessions (2 & 5), for further clarification as to the meaning of the subheadings listed on the proforma. It is thus a consideration for future application of this method that although the short titles represent simplicity and freedom on the part of those completing it, they also have the potential to leave participants feeling that they don't have enough scaffolding to complete the task most effectively.

Following narrative collection, the co-design and grounded theory analysis diverged somewhat, aside from the fact that patterns inherited the codes of the progenitor narratives. Consequently, the co-design practice pattern output will be focussed upon next, to begin to address research question four, with the theory emergent from the grounded theory presented distinct from this in the next chapter in order to avoid confusion about the aetiology of each.

### **4.3. Pattern Presentation and Analysis**

Practice patterns are design artefacts that represent themes emerging from the ethnographic and narrative co-design portions of the data collection. Each pattern will be described, with the Introduction, Context and Solutions sections recreated as they were for students to review, with user stories and references to narratives added. This is in line with the way that Warburton and Mor (2015) prescribe as good practice for participatory design activity in learning environments. The coding associated with the narratives and inherited by the pattern will be used to identify prescient quotes from the data where these have explanatory or exemplifying value, and multiple examples will be preferred to provide triangulation. Justification for these patterns from theory and data are explored further in the Conclusions



Chapter which follows this one. There will be some commentary on the pattern, what insight it gives into the AHE context and how the material from the group discussions that shares coding can help illustrate or shed further light on the texture of the pattern.

### **Reviewing Design Patterns with User Feedback**

Following an initial draft of the patterns, they were taken back to the students who were surveyed to get their thoughts on them. For each pattern they were asked if they felt it represented a pattern of behaviour that they recognise in AHE, whether they had any examples of it happening to them (User Stories) and to evaluate the exemplar solutions suggested. Ten of the nineteen were available to be surveyed and each of those consented to do so. This served several purposes. Firstly, it allowed the researcher to be assured that the patterns reflected adequately the narratives that the students had developed and peer reviewed, and that participants were given the opportunity to flag any part of what we had discussed that they felt was not adequately represented. Secondly, it allowed the researcher to adjust language that students considered unclear. During Co-Design activity, this sort of adaptation is vital to scaffold lexical convergence and more so in relation to the sort of interdisciplinary teams that would be working on a design project in this field. Another valuable insight was for

students to provide some examples to assign to the patterns in the form of illustrative User Stories. Some quotes taken from stories in the transcripts were pre-assigned, but not shown to the students upon that review to avoid biasing any example they chose to give. They were then asked to describe any examples that they felt were relevant to the pattern. Some chose to do this, and these were added in to allow other readers a little illustration of the 'texture' of the pattern. It also allowed the researcher to cross check that the examples they gave were cogent to the pattern to be assured that the wording was not misleading. Some minor changes to the wording were made, survey respondents' and responses were used where appropriate to illustrate the pattern with examples. There weren't perceived to be any more major changes necessary to the corpus of patterns, although the feedback material was of great assistance to the tutor throughout the process of distilling principles from those patterns.

What follows is the presentation of and commentary on each of the patterns in the corpus of data, along with a summary of the conclusions drawn from each.

## **Presenting and Analysing Design Patterns**

### **Pattern 1: Anxiety and Stress**

As a student, my experience of education is directly

impacted by the amount of stress and anxiety I am feeling over the course of my time studying.

### **Context**

A short, intensive and time-poor course, with additional concerns outside of that course such as part- or full-time work, health issues and childcare. On top of this, I may be coming back into education after some amount of time out, and I must deal with past experiences of education.

### **Solutions**

- Provide tools which teach stress and anxiety management techniques
- Provide tools which identify stress and anxiety antecedents
- Provide support for the relieving of those symptoms through peer support or by other means
- Provide tools which simulate the reality of the additional stress of contending with the access course alongside other parts of the student's life prior to beginning the course so that they know what they are getting themselves into more clearly (though how this would fit with the current model of recruitment it is not clear).
- Provide tools which allow students to seek help from one another, free of the sight and consequential judgment of other students or staff (particularly relevant for male members of the course who agree help seeking is important

but are not able to give examples of when that has happened).

- To provide tools which allow students to crowd source help from peers, but which does not add to the data overload students experience on group chat and similar platforms.

### **Examples**

"They sort of throw you in at the deep end isn't it?"

(Student 2)

"They don't kind of trust themselves to write...and be like

'yes this is good!'" (Student 1)

"O God I'm at college so I need to do work" (Student 1)

"It's swings and roundabouts with your emotions, isn't it? It's like, one your edge and the next minute, you're like, whoa!" (Student 5)

"Any time anyone even mentioned maths I wanted to cry in the toilet". (Student 18)

"Stress should be acknowledged as a major factor throughout the duration of the course and students need to be provided with an outlet or coping mechanisms".

(Pattern Feedback Survey)

### **Anxiety and Stress Discussion**

Students perceive stress and anxiety to be a relevant factor in AHE (only one student didn't contribute to discussion of stress and anxiety). Anxiety and panic is seen

to have a damaging effect on academic performance. Left unchecked, it may lead to learned helplessness behaviour as the 'Panic' narrative suggests.

"It's about beasting it out and getting away from the uncomfortableness of knowing that there is a deadline that is coming. I mean, I know that one person is already done their psychology and handed it all in, and we got until the 29th. And then I'm sitting here thinking well, you miss that off your poster, you'd miss that off the poster, you miss that occupies the off the poster, because you know, you've already handed it in and submitted it, so now..." (Student 1)

"Because there are some people that are super prepared get it done straight away and they don't want to change it and then it goes downhill." (Student 6)

It is important to note however, that students didn't universally draw the conclusion that the correlation between academic performance and anxiety was linear, with the self-doubt narrative questioning that conclusion.

### **The Aetiology of Anxiety**

Anxiety is demonstrated by students because of a lack of confidence in the direction they are taking their work. For instance, as student one put it of others:

"They panicked because they're not sure they're doing it right or wrong" (Student 1)

That said, anxiety aetiology was not monolithically perceived, with some recognising the relevance of individual differences. This primarily manifested in terms of how different students perceive time available for study, and in line with Hypercognitive Theory's sixth postulate. Therefore, it suggests that some of the time management study skills have a key role to play in the process:

"I don't really panic about my deadlines at all, like a lot of people are not classing to panic about get stressed out about the exams because of the lot going on, but I haven't really had that experience of 'O God I'm at college, so I need to do work'" (Student 1).

"Give yourself enough time, so with English I gave myself enough time to write it and to be like is this good? Is this what I wanted to see?" (Student 1)

This last example from Student 1 further implies that a degree of confidence comes from feeling agency in the process (note where the student asks if it is what they wanted to see, not whether it is what the tutor wanted). This idea of the importance of time management and time availability is reinforced by the 'Coming to Terms with Study Skills', 'Catching Up' and 'Time Management' narratives participants produced. If this is a reasonable observation then one would expect the opposite to be true, that well-developed time management and essay writing skills reduce stress and anxiety. Student 2 says it best:

"I think some people panic, like you're saying... Some people can plan, and some people have got the knack of writing." (Student 2)

Interesting due to its lack of appearance, no student cited their study skills classes as a cause of stress or anxiety, but several referenced specialist subject matter, including English, Maths, History and Anatomy during consideration of this issue in group interview, suggesting that they view study skills differently from other taught material and that they automatically categorise knowledge along subject delineated lines, something that hypercognitive theory's ninth postulate predicts to be restricting, so finding evidence of this framework in place is an important indication of the curricular impact of a modular system.

### **The Impact of Past Experience**

Previous experience of education was discussed by several in relation to anxiety and stress. A good example of experience reducing anxiety can be found in an interaction between two students in the second group:

"I don't feel the pressure either like I did when I was at school... I didn't like school as it was, but the teachers didn't help either. So, I never even did A levels, I did my GCSEs when I was 15 and left so that was it. I didn't get very good GCSEs at all, but I didn't really care at that time, I just want to get out of

school." (Student 2)

"[In AS Level English we would] have to write one [essay] every week. So, I feel like that didn't... The high-pressure environment with my work hindered more than helped in the long term because by Christmas I was just really... My first year was completely burnt out in English." (Student 1)

Not every student felt that experience reduced stress however, with student 10 expressing it well:

"If you go straight into work in the real world, you miss out on all of the constant feedback that you get from people so you get a sense of this adult who don't need that feedback...It seems as well that a lot of people have had children...they don't have someone above them giving them feedback like 'Oh, you are doing this'. Well, you get it sometimes in work, but when you come back into it, that's where you miss all that. You lose all your confidence because you don't know how well you're doing in it." (Student 10)

The 'Access with Disabilities' narrative suggested that factors around additional needs could also play a part in the promotion of stress and anxiety. Therefore, it can be concluded that identity plays a key part in the expectation of and management of anxiety in AHE students and this identity is produced as a product of the student's past. Internalised issues from that previous experience and placing confidence in



an external source (the tutor) over one's own ability can have an impact, as can barriers to participation such as disability or behavioural difficulty.

### **The Impact of Feedback on Self Doubt**

Self-doubt, and the anxiety with which it comes, is seen by students as a key underlying cause of anxiety and is addressed through feedback:

"The feedback destroys your self-doubt a bit, it pushes it away. The more feedback you get over this course, then by the time you get to uni I think self-doubt will have gone. Well maybe not gone completely but it will be no longer what it was at the start". (Student 9)

"But then, when [they're] reading over it and [they're] nodding and saying mmhmm, mmhmm, I love it when [they do] that" (Student 3)

Although getting feedback can be a cultural shock:

"Having nice things said about you as well though that's kind of off putting, when you're really not used to it. We got a chance to read our references to UCAS before they went off and it was uncomfortable." (student 10)

One student describes this mechanism of anxiety reduction following feedback:

"...Because you gain like trust in them, because they are not going to slap you down and so this gives you more freedom and more confidence to be able to speak out".

(Student 8)

Based upon the extent to which identity runs through this and other patterns, it is the contention of the researcher that feedback is not an end unto itself, but rather a method of impacting one's identity. The question then becomes how can that process to relieve stress be used to help students internalise their loci of control around their scholastic performance so that they are able to better self-regulate that anxiety?

### **The Impact of Peer Support**

There were some factors which were identified as potential mechanisms by which one could reduce stress and anxiety. Peer Support was seen to be beneficial and was well illustrated in the 'Peer Support 1' narrative. However, this can cut both ways as Student 3 elucidated at various points:

"And you email each other on online group chats and stuff to help each other although that can make it worse like alike when I forgot to turn my phone off and it was like pinging at four in the morning" (Student 3)

"As soon as [student] posted the criteria for that [coursework assignment] on the chat, and I was like [gesticulates] it's stressing me out!...I am trying to look at it now, because I was known as the panicker and I used to have some kind of mini meltdowns but I try not to do it so much now because apparently I kind of rubbed off

on everybody didn't I?" (Student 3)

Therefore, there is a good deal of evidence from the ethnographic corpus that peer support can play a significant role in anxiety and stress levels felt by AHE students. Peer support 1-3 narratives and 'Group Chat' reinforces both the benefits and drawbacks, 'Emotional Support' described how peer support can be vital in managing anxiety. Given this, it is pertinent to recognise that tools which aim to assess a given student in isolation from their peers risks being overly reductionistic.

### **'Turning Off' as a Coping Mechanism**

Students describe 'turning off' as something they feel helps them and is something that they should do more of. Examples were given from students 3, 4, 5 and 6. Student 3 described it most compellingly:

"I do find it quite stressful because I can never turn off from it. I find myself watching a movie and pausing it and going on Google and going... 'cwor, gotta find this'." (student 6)

"I just always feel like I should be doing something"  
(Student 4)

"I had paper next to me last night because I've done more research and I wanted to watch a bit of criminal minds but I might think of something and I couldn't like switch my mind off or anything...Then, three in the morning, I was

half asleep and I was still thinking about it while I was sleeping so I had a piece of paper with me so when I woke up I could write it down. [another time] I was thinking of poetry and in my head I was going do do do do do and because I don't really sleep very well these days either I'm half asleep and half not a lot of the time from worry I think. Stress." (Student 3)

That said, students discussed their working at various points in the day with what the researcher interpreted as fatalistic pride, in that students simultaneously wanted to demonstrate their commitment to AHE (and thus protect their self-identity from the harm that feeling that there was more they could be doing would do), but also recognising that this has a damaging effect on them in terms of their general stress levels. Examples of when the researcher perceived this cognitive dissonance playing out may be illustrated with an excerpt from a longer discussion between the members of one of the groups:

"when you have time, [you] read... textbooks... I don't do as much about as I should, but even like on a Monday when my little boy goes to dancing I'm sitting in the car reading textbooks while he's dancing just for that half an hour, so you just cram it where ever you can". (Student 3)

"If I pick my daughters up from school, which I don't often do because I'm too busy, but when I do, I'm taking a textbook and reading it in the playground...back when we

were doing psychology, I was using customer orders and writing stuff on the back of customer orders". (Student 4)

Two groups mentioned one of the staff modelling this behaviour:

"Actually during school time, the children aren't [Tutor's] children. [tutor] said that we are and the [their] children get [them] fully during the summer holidays. [they have] actually admitted it. [They] said they pretty much bring themselves up during term time." (Student 10)

This modelling raises the possibility that the working context of the staff have a direct impact on the students coping mechanisms as these are modelled for them by authority figures during the course.

### **Additional Mitigating Factors**

Along with getting feedback, internalising that praise, and 'turning off' sometimes to relax, students cited several other factors which mitigate stress and anxiety. Firstly, a belief in the quality of teaching reduces anxiety:

"Yes, [tutor] really knows [their] stuff, but that makes us somewhat more confident, none of us are worried about when we got an assignment coming up, whether it's an essay, exam or whatever, because we all feel so confident in what we've learned, so that makes a big difference."

(Student 15)

This was reinforced by a couple of students speaking to the researcher when they were packing up ready to leave following the completion of their data collection activity, who said that they wouldn't normally have considered taking part in something like this study, but that the confidence that their tutors had in the researcher meant that they were willing to do so. Aside from being a credit to the teaching establishment at which they were studying, this insight was thought provoking because it raised the idea that the feedback being given to students as described above likely only had such an impact because of that trusting relationship.

Secondly, working shorter, more regular sessions was seen as helpful in reducing stress - Students 3 and 4 both agreed confidently with this assertion from student 6. However, they perceived a tutor to disagree:

"I don't think [tutor] should hear any of this because [they] want it all done in eight hours flat and not have any of this panic." (student 4)

"It would be good if you have eight hours to try though... You need to do little and often don't you? Or you go crazy." (Student 5)

Thirdly, it would appear that having awareness of your own cognitive functioning reduces anxiety:

"Because, I think sometimes a group chat about it, everyone was just putting in their own views on how they

were going to do it and it was just confusing somebody who was doing it differently." (Student 3)

"You need to do it how you think." (Student 4)

"You need to do it your way." (Student 5)

### **Anxiety and Stress Pattern Conclusions**

Anxiety and stress is a prescient part of the AHE experience and is born from a lack of confidence in the direction they are taking their work. Individual differences were said to have an impact on this, as were specific educational needs, mental health issues and past experience. This is in line with andragogic expectation, from Knowles theory of andragogy (1968) and Demetriou's sixth postulate (1998) and suggests that the sociodemographic makeup of the AHE student population may have an impact on success and matriculation. This represents a piece of evidence which confirms the relevance of the sociodemographic skew identified in research question one. Specialist subject matter was seen as a greater source of stress than the study skills content of their course, suggesting that the focus the 2013 AHE specification has taken on specialist subject skills may have exacerbated the stress and anxiety levels of AHE students compared with their forebears.

Feedback was seen by AHE students as a mechanism to salve anxiety and self-doubt, though the participants in the study had received predominantly positive feedback, so there may be

an opposite effect too. Likewise, peer support was found to be an important factor in counteracting stress and anxiety, which suggests that assessment of the student should include assessment of their social context, something that the eighth postulate of hypercognitive theory affirms. The Reciprocal Equilibria grounded theory presented following this pattern too expands upon further. Finally, Time management that is proactive on the part of the AHE student, self-aware, which promotes a feeling of agency, builds in opportunities to 'switch off' from the AHE work and is undertaken in short frequent chunks was reported to be helpful in reducing stress and anxiety.

Students reported treating AHE tutors as role models with regards dealing with stress and anxiety, and that their confidence in the quality of teaching had an impact, suggesting that the AHE tutor may also have agency in the reduction of stress for students of AHE provision.

Consequent to this analysis, and in furtherance of research question four, is the conclusion that stress and anxiety are facets of AHE provision for students, but that these can be mitigated through student and tutor action.

### **Pattern 2: Time Management**

As a student, my ability to succeed on an intense course such as Access to Higher Education is dependent upon the successful management of my time.



**Context**

Students on Access courses tend to have other pressures on that time such as work and childcare.

**Solutions**

- Integrate time management skill development with the course (as it already is in some ways)
- Select students for the course based partly upon their ability to demonstrate effective time management from experience (but who does this exclude?).
- To provide assistive time management tools to students which allow them to manage their time and reflect upon their time management with a view to improving it in the future.

**Examples**

"You've got to be good at time management otherwise you simply would not succeed on the course" (Student 5)

"If you got two kids, you can't leave it till the Friday that its due in to do it, because if they are sick on your essay you've got no one else to blame except yourself when you had two weeks to do it. Friday should be proofreading and fine tuning." (Student 4)

"You still get it done though, like my last one I did on the day and I freaked myself out doing it on the day, but

I did it" (Student 6)

"Yes, I've literally just made college my life, I don't do anything else". (Student 5)

"Your brain can only stay switched on for so long".  
(Student 12)

"There have been numerous occasions where I have put work off thinking that I have plenty of time but after leaving the research/assignment until the last minute something has then occurred in my personal life which has prevented me from completing work on time." (Survey Respondent)

"Balancing work and college constantly. Having a full-time job and full-time education really took its toll on me so I would advise a plan to work around work." (Survey Respondent)

### **Time Management Discussion**

Students with good time management skills are seen to do better than those without (see '[Time Management](#)'). In addition, good time management enables proactive help seeking behaviour (see '[Peer Support 3](#)').

Students' perception of their time management skills vary:

"It is a time management thing isn't it? 'I don't see why I should have to work on my time management' is the sort of thing people say. I'm absolutely fine." (student 2)

"And then you've got [student] who is three hours before

[their] essay's got to be in panicking and not finishing it because of time management wasn't it? Like [they've] had the time, [they've] just been watching Netflix".

(Student 1)

Although it seems easier for some students to look externally for criticism in this regard. Student 2 astutely paused and reflected for a moment before admitting to a similar experience as student 1 had just described. The way that student later went on to describe her experience was illustrative of the immense pressure that some students put themselves under on AHE:

"Time is precious, because I have eight children so... So, coming here full-time and managing them and their activities and everything else on top of that, it is literally like... I've got a little bit of time here let's find something to read, let's do some research, but I can actually put into one of my things, and then the study skills and things like that, when I have that time I can open my laptop and see if I can get half an hours planning or something like that. It literally bits and bobs." (Student 2)

Student 4 described their experience similarly:

"I work Monday Tuesday Wednesday, so I can access Monday night for maths because I want to get my maths out the way college Tuesday Wednesday Thursday then Thursday night I got work, Friday Saturday Sunday at work so, I

just do it in my dinner hours, or half asleep at 3 o'clock in the morning" (Student 4)

Perhaps then it is not surprising that they cite time management often when discussing study skills. Two students described not understanding why they had to cover study skills on their course until they began to work on time management as illustrated by the '[Coming to Terms with Study Skills](#)' narrative.

The intensity of the course and demands on student time are good preparation:

"It's the prep for uni I think, because I was not ready to go to uni after I done A-levels and I didn't feel like be comfortable but here I feel like I'm a lot more confident to go onto the next step". (Student 11)

### **Time Management as Social Capital**

Students value advice on time management from someone who is seen as having good results, over someone who is not. Student 4 became particularly animated on this topic in relation to an exchange with another student:

"But she kept on giving me advice, and I'm like hey! Who got a merit distinction, distinction, merit in the English and who got a pass? So, stop giving me advice doll! And then I said yeah, we're not going to panic this time are we [student], and do it at the last minute are we?" (student 4)

Through discussion with their compatriots in the

interview they went on to identify that the behaviour that had caused her frustrated outburst was waking up to "like 56 messages" that morning following a night time game of 'I spy' on the group chat they shared membership of. It seems that a sense of professionalism with one another is a relevant mechanism by which AHE students negotiate and perceive their social position above results attained. Another student tells of a breach of what might be termed professional ethics:

"There was one other person on our course who was ill, she'd been really poorly so I wrote a list of things that she could use to catch up and some extras in there because she was struggling and then some other people who had been here every single day and not missed a session decided they were going to photograph it anyway and use it and then moan because they didn't know what they were doing but it's like, you've been here the whole time, just ask someone! Like, don't just expect it from someone..." (Student 6)

However, they were quick to defend their own behaviour in front of their peers in interview:

"Obviously, you wouldn't not help them though, you still help everyone it's just to what extent people need it."

(Student 6)

The necessary conclusion from this is that students repeatedly demonstrated an economic model of their time, notes and other resources. They see time spent on peer support as

an investment and are quick to criticize when this is not well headed by the person accepting the help (see '[Group Chat](#)' for an illustration of this).

This economic model of social capital seems to persist into students' relationships with their tutors. Students see tutors as being aware of external pressures on student time but are quick to take responsibility for their own situation, suggesting that they feel they have ownership of the process rather than simply allowing external pressures to happen to them in a passive sense:

"You are your own person, you have your own destiny in front of you. Life didn't come into it when you're at school, it didn't... It was assumed that you were just being in school, it was assumed you didn't have a life on the side whereas here except there might be issues going on at home, or something at work, there is life pressure as well, and they understand, and we get support with that as well. They are just here to support you in your education, are they? They are here to help you get through what is going on." (Student 10)

The '[Catching Up](#)' narrative supports this sense of personal control over the success or otherwise of the student's academic performance, making the bold claim that 'if you work hard you can always catch up'. This may be a feature of so few students dropping from their course, and therefore the continuing students not seeing what the issues were that

led to that dropping out, but regardless, most students were quick to take ownership of their 'fate' with the course.

### **Tutors as Time Management Paragons**

Students consider their tutors over worked and yet hold them as exemplars of good practice. Following on from evidence presented in the [Anxiety and Stress](#) pattern, students talk about their tutors in relation to their available time on several occasions. For instance:

"Yes, they [tutors] have a lot on their plate though haven't they? Like 70 different courses though, it's ridiculous." (Student 6)

"And I think they're not just here during class time, they are here from morning until night, like I emailed my tutor the other day, God it must have been about 10 o'clock [in the evening] and [they] answered at 10 o'clock" (Student 10)

This is not in itself of note, but some students continued to use tutor behaviour to justify their own overwork, even when they observe that this is detrimental to the professional performance of that tutor:

"Yes, so the one we are talking about, [they do] have a lot on [their] plate, but [they] get the information across I suppose." (student 4)

### **Enthusiasm and Trust as Social Equity Indemnifiers**

Considering this 'economic' model of give and take among students supporting one another, one might assume that any time spent in class and not working independently would be considered time 'wasted'. This proved not to be the case however, at least for the tutors that expressed enthusiasm for their subject area and AHE in general. Despite feeling pressured time-wise, students nevertheless expressed enthusiasm for tutors who would be flexible in class, slowing down where necessary, revisiting previous topics and generally adjusting to students' needs. They recognized that their learning wasn't necessarily going to take place linearly or without the need for differentiation. Of one tutor:

"It's a constant "have you got any questions?" And a quick recap, right, does that make sense then? Does everyone still know where we are? No? Right, okay, let's quickly go back to that bit, does that make sense? And [they] will stop and let us discuss, which [they] said the other day in our session didn't [they]? That [they] really likes that we do discuss things when given the chance. Because we all ask...different questions, and then we bounce off each other as well don't we?" (Student 15)

Thus, with trust in the tutor comes allowance for them to be flexible in their delivery and thereby take ownership over the students' time management. It doesn't seem that any of the students resented giving a tutor they spoke highly of this control, although less enthusiasm was shown in making this



allowance to tutors they felt didn't enthuse or engage as much. When referring to tutors with whom they had less positive relationships, often their classroom experience was discussed in terms of how some students' time was being underutilized (see '[Repetitiveness](#)' narrative), while the tutor worked with those who had yet to 'get' something and tutors were criticized for being unable or unwilling to keep the group on topic (see the '[Tangenting](#)' Pattern for deeper consideration of this).

### **Time Management Facilitates Good Thinking**

Thinking time is key to good performance according to some of the students who were cited by their colleagues as academically strong. Student 13 claimed to spend most of their time thinking rather than writing, reading or researching:

"The writing part comes last, I've got to get into my head first. If I haven't got the information there, I wouldn't be able to put it into writing" (Student 13)

This was best illustrated however in the '[English Essay Completion](#)' narrative and raises the question of whether students who already have a more fragmented series of shorter time periods within which to work get the 'head space' to allow material to sit in their mind and be managed by their hypercognitive system, synthesizing with prior knowledge, drawing links between things the student had not seen before

and consequently inspiring them in the subject. Several students are referenced in the 'Help Seeking' pattern as finding performing creative, and inspired acts difficult such as writing their own essay title rather than working from one that was provided, and it would be interesting to investigate further the question of whether the availability of that passive thinking time is a differentiating factor between students in this regard.

### **Time Management Pattern Conclusions**

As the stress and anxiety pattern indicated, and this pattern shows, students with good time management skills are perceived to have agency in the act of progression on the course and thus do better on AHE provision than those without such strong time management skills. Many AHE students are under significant pressure from other aspects of their lives but see this as a useful skill to progress to university level study with. Perhaps underpinned by this recognition of importance, time spent was a currency by which social capital between students and tutors was tracked. Tutors had the power to act as role models in terms of time management, much as with stress and anxiety mitigation. Students recognised that time spent in class was an investment to their AHE progression and were as a result open to group work where differentiation requirements resulted in a slowing in learning, providing that the tutor facilitating the class was trusted to be an

organised subject expert.

As per Hypercognitive theory's eighth postulate (Demetriou, 1998), thinking time was seen by students to be key to good performance, and more work would be required to establish if there was a causal relationship between allowance for that thinking time and academic outcome.

### **Pattern 3: Help-Seeking**

During the course I will need to turn to others for help. I value that help being given as quickly as possible at the point of need, and so I turn to course staff, peers or others who have done or are doing the course for that help.

#### **Context**

As I study, I value the chance to seek clarification and further discussion of topics under study. I am both highly motivated to seek out this help, and highly motivated to provide it for others. However, time is short, and students or staff can experience 'information overload' which causes me to feel helpless and can result in social withdrawal.

#### **Solutions**

- Provide back channels to students to one another for help on a given issue, assignment or topic area
- Streamline the help seeking process by dividing the information flow such that not everyone is asked to parse

every call for help.

- Provide channels for more direct communication with staff
- Provide resources for staff to have the time to communicate with students more effectively.
- Provide tools which manage the timing of help seeking requests so that they don't impact negatively on others' time doing things other than Access.

### **Examples**

"You can talk to individual people, but I tend to put it in the group chat." (Student 10)

"I spent most of the academic year being very shy and too afraid to ask for help at all. I felt I would be wasting the time of the teachers and just couldn't bring myself to ask." (Survey Respondent)

"I often avoid asking for help and this has resulted in me falling behind and getting stressed." (Survey Respondent)

"Some learners email [tutors] at 2:00am expecting speedy replies!" (Survey Respondent)

### **Help Seeking Commentary**

No students expressed disagreement with the idea that they often need to seek help as a part of the AHE experience. During discussion it became apparent that this is a natural part of the day to day experience of the course rather than

only around a time of unexpected difficulty. The following is representative of the extent to which it seems to be embedded in their experience of AHE. Firstly, in terms of peer support:

"We send our notes, pictures of our notes in the WhatsApp group, we are normally quite good about that." (Student 4)

"Yeah, I got like five yesterday when I wasn't in" (Student 3)

"Yes, my group do that as well... it makes you feel comforted ... if you get stuck on something you can always ask someone" (Student 5)

The help that is sought comes from fellow students:

"It's the students that you're in the classroom with, they give a lot of the support... Yes, we got loads, whatever we want" (Student 9)

"It's a lot of 'Oh my God I'm really nervous and I don't think I understand this, and can you have a look at this for me?' And we all have a look and be like 'Stop worrying, it's really good, maybe you could at this in?' Or 'You don't really need to talk about this bit' it's all that. It's a really good support network isn't it? I think." (Student 15)

...And, in terms of staff support:

"Everywhere, all of our teachers, the teachers, tutors and college themselves, the library, the student services

downstairs, always helpful." (Student 10)

"The library is really good as well, they're really good at helping students" (Student 8)

Literature (see the Catching Up narrative):

"And they also give out quite a lot of handouts on the access to give you information, what you need. So, you have quite a lot of the information in front of you without having to go... It's not like they're just giving it all to you, but there's enough there to start you off." (Student 3)

...and others who students perceive as experts:

"I'm lucky, I've got one of the girls at my work, she's actually doing access through open University, so we tend to team up together working, and we discussed loads of stuff, I mean she's doing health but I'm doing humanities, but we still... What we are doing with things and the colleges and UCAS, we just discuss everything as we're going along" (Student 10)

Factors which inhibit help seeking include personal identity and the perception of discrimination resulting as illustrated in the 'Safeguarding' narrative.

Sometimes help seeking is inappropriate. For instance, when a student needs to come up with an idea. This example is described in the 'English Essay Completion' and 'Finding Inspiration for Research Narratives'. At other times it may be seen as inappropriate (see '[Self Doubt](#)') such as in the

classroom where it will cause an impact on other members of the class or in terms of professional boundaries:

"The weekends and stuff is a bit different, because you know they've got families in such, but you do want to be up to have a bit of communication or else you feel a bit on your own". (Student 9)

### **Reciprocity**

There is a perceived cost to providing help to one student and not another identified from the '[Differential Ability Level](#)' and '[Group Chat](#)' Narratives. In addition, students preferred help seeking situations with a high degree of reciprocity such as that found in the '[Finding Time with Children](#)' narrative. In addition, students actively resisted when they perceived that another member of the group is unbalancing the equilibrium:

"Sometimes even the tutors can't stop others from being on this tangent." (student 6)

"We actually finish their sentences off, in a quicker way just shut them up." (Student 3)

"Oh, please if I ever do that, tell me just to shut up!"  
(Student 4)

This concept of reciprocity seems to be a mitigating factor in the structure of conversations among the group in person and online. Several students indicated seeking out smaller more exclusive groups in group chats, creating a range

of overlapping and temporally shifting groups across the course of the academic year as this exchange illustrates:

"Us girls you see have one for WhatsApp." (Student 3)

"We got one for our health subject and we all use it."  
(Student 5)

"Yet it got annoying though, so we just muted ours and got on WhatsApp on a smaller group." Student 4)

"I want to know if there are any secret WhatsApp groups going on without me" (Student 3)

"Oh, there's definitely, secret WhatsApp groups in our group <laughs>." (Student 5)

Emotional help seeking particularly highlights the need for exclusiveness in help seeking behaviour, that although others would gossip, having a narrow group of help providers (even one on one) can be preferable.

"The thing that stops people leaving is the support network, because I did try to leave in the first couple of weeks, and the two girls that I've become quite close with quite quickly, literally didn't let me...it was...about the stress, and not being up to deal with it emotionally and the support from students that were on course with me was key. Again, it was these guys that didn't let me go and I'm glad they didn't let me go"(Student 12)

Students discuss forming smaller exclusive groups which better represent those people with whom they identify. For instance, there was a girls group discussed which was freely



talked about in front of a male, and the male student expressed relief that he wasn't a part of it. If people seek out those most like them this could pose challenges with bringing in people into the course more broadly representative of the sociodemographic makeup of the group. Modelling these overlapping groups could help identify those in need of assistance based upon their social equity for help seeking behaviour in the AHE context.

Further evidence of this focus on reciprocity is found in the conflict that ensued when students disregard it. A good example would be Student 6, quoted in [Time Management as Social Capital](#). In addition, if this reciprocity was central to the functioning of the help seeking behaviour then one would expect to see evidence of students keeping track of who owes who what. This exchange shows evidence of that when discussing getting assistance with their assignment. Note the diffusing of the concept that this would pit one against another at the end:

"I'll be honest, I started the group like 2 ½ weeks later when we had... I actually got thrown in at the deep end when we had an assignment psychology assessment, and I was really panicking because I've never done psychology before and I remember the people that helped me <indicating student 4>" (Student 3)

"I helped you?" (Student 6)

"Yeah you did, so yeah, certain people helped, and

certain people didn't." (Student 3)

"Oh yeah, I got you hooked on highlighters now (Student 4)

"Yes! <laughs> It's not a competition, you're all in it together!" (Student 3)

## **Targeting**

As part of reciprocity in help-seeking, there is also the issue of the targets of that help seeking: Who they are and how they are chosen. On the one hand participants described 'crowd sourcing' answers to general questions which were low psychological risk (i.e. didn't put them 'on the spot' and ask them to open up or own up to a misunderstanding, see '[Peer Support 3](#)'), but seeking out help on a less wide ranging basis when it came to issues of social support and emotional support (The '[Peer Support 2](#)' Narrative reinforces this idea of a psychological cost to that action).

"Unless it is a personal issue that someone might not want to talk about over the group chat, and they feel comfortable because maybe you've gone through it, and they will... Message you, but other than that it goes through the group chat." (Student 9)

Colleagues were preferred to staff initially for emotional support. This sort of activity requires space and time (see '[Emotional Support](#)'). It also requires one to open up about their feelings.

"I certainly gone to somebody, yes, but that's because you just don't want to air it...Because, we have created

quite strong bonds between ourselves." (Student 11)

This could be a sub-function of the reciprocity factor, as 'crowd sourcing' allows someone who happens to know the answer to briefly respond with little time cost and therefore as little upsetting of the reciprocity equilibrium as possible.

It was noted that with high time pressure on them, tutors were less favoured targets for help seeking:

"Staff or teachers are a little less approachable due to their time constraints with work, so for instance [tutor] straight after this has to go and teach a lesson so if I wanted to talk to [them] about something after study skills session I couldn't... we got each other's backs though. The class is all very good that the teachers try their best but unfortunately don't necessarily have the time so it's a bit annoying". (Student 2)

If students choose targets based upon the desire to achieve as much reciprocity as possible, it makes sense that students would look to one another before tutors as they have a greater ability to 'repay the debt' of the activity. This would have to be offset by the expertise of the target of that help seeking. Also, if students feel that they are going to inconvenience a staff member much more than a peer then they would likewise be inclined to turn to other sources first. Two tutors handled this by setting expectations early about student help seeking, albeit in different ways:

"[Tutor] seems to be the one who replies very quickly but is very brief which is what [they] said [they] does, [they're] quite upfront about that then if we ask the question then it is usually a yes or no. [they] won't shy away from saying that an email but in [their] lesson [they are] quite supportive and if [they are] about when you ask something [they're]... [they're] there... [they] will." (Student 2)

"[Tutor]'s all over the place so I can never talk to [them] on email... I very rarely... If I email it very rarely gets a reply." (Student 1)

To reinforce this, when students were asked about their ideal experience of Access free of resource constraints, several immediately reinforced that they would gift the tutors more time so that they could offer more support at the point of need:

"I just think that smaller groups would be better, I mean you would never get one-to-one with the tutor, but if it was smaller groups then you would have more of a chance." (Student 5)

"I think I get sufficient support from them whenever I need it to be honest." (Student 3)

This underlying reciprocity mechanism is reinforced by evidence of students negotiating targets for their help seeking who are perceived to be less put out than others:

"Now I don't think you should include [student] for

example, I don't think [they'd] survive, [they'd] go mad in our WhatsApp group and it's better for [them] not to be in it". (Student 6)

"But we love [student], it's not that...it's not that we don't like [them, they] just wouldn't cope in it".  
(Student 4)

### **Links with other Patterns**

Having assessed the ethnographic data and designed the Help-Seeking pattern, there are two key parts of this which overlap with other patterns that should be considered.

### **Time Management**

Given that [students look to staff to model time management](#), maybe they would look to staff to model help seeking behaviour also?

Staff see such a small proportion of the help seeking behaviour that goes on among students, if this was activity that was to be supported, then doing so would require much more effective data collection than is currently available:

"There's quite a few times, when we have been bombing out on essays and things, and [tutor] said 'but why didn't you say anything?', And [they] didn't get any messages and we thought well, no, we all messaged each other and we all sorted it ourselves, so..." (Student 10)

### **Coming to Terms with Study Skills**

Help seeking could be diagnostic of other skill development needs. For instance, the amount of help seeking behaviour around a particular online journal store (see '[JStor](#)' narrative) could indicate that this is an area of academic weakness for one or more of the students. Modelling this would be difficult, however. It also 'muddies the waters' of what a 'study skill' really is. Given the importance of help seeking behaviour, maybe it should be considered one too? There are two conclusions that may be drawn from this assessment of help-seeking behaviour among AHE students: that the concept of 'Study Skills' may not be wide enough in terms of both the range of skills which are included and the fact that it is inherently social in nature: Taking the student out of the context and assessing their behaviour alone would offer an overly reductionistic view. These themes are explored further in the next pattern [Coming to Terms with Study Skills](#).

### **Help Seeking Pattern Conclusions**

Help seeking is par for the course when it comes to involvement in AHE provision and sheds doubt on an individualistic model of adult learning which fails to account for the social situation between students and their peers or subject experts. Personal identity and impact on others are each consideration factors in this process, as Demetriou's

fifth and sixth postulates predict (Demetriou, 1998).

Reciprocity was an important factor in help-seeking. Social partnerships which were seen as reciprocal encouraged more help-seeking behaviour than those where one party had the expectation that the other would not do the same for them. Valuation of these relationships were recognised by the AHE participants to change over time as illustrated by the changing 'WhatsApp' group combinations in action at any given time. This is explored further as Reciprocal Equilibria grounded theory is discussed following the tour through the design patterns.

Some help-seeking was directed widely, and other help-seeking behaviour was more targeted towards an individual, particularly with emotional assistance. Examples of effective emotional support predicating AHE progression were given. Peers were preferred targets of support over staff initially, though whether this is down to availability or due to an explicit preference is unclear from this data set and would require further study to ascertain.

#### **Pattern 4: Coming to Terms with Study Skills**

As a person beginning the Access course, I recognize that I am being prepared to attend university. However, as an adult I don't appreciate being told how to manage my time or how to reflect on my strengths and weaknesses as these are often not things that are asked of me in work or elsewhere in life. I

find it patronizing and I have experience upon which to lean.

### **Context**

Access students have their own experience with which to contend, habits to learn and habits to break, and the sense of personal identity which is already under threat by virtue of having taken this course on in the first place, with all the upheaval that involves. It is understood that the Access course's primary goal is to prepare someone with the skills they need to attend university, rather than to imbue them with specialist subject knowledge. As such, many of those habits need to be challenged, and in turn, some may feel threatened by this process, or feel bored because those challenges are not relevant to them. Balancing all of this on the course so that everyone feels challenged appropriately is a serious educational challenge.

### **Solutions**

- Develop tools which allow students to contend with study skill development without having to make themselves vulnerable by opening up as publicly as they reflect on it.
- Develop activities which enable students to work on a given study skill explicitly but in relation to another task relevant to them and their course: Students need to understand what relevance a given study skill has for



their course, at university and beyond.

- Develop activities which are highly differentiated to enable students to work to their level at a given point in time.
- Develop tools which track and visualize study skills progress so that students can correctly identify and value study skill development and consequently their time on the access course.
- Develop tools which allow the linking of study skill development with examples from other course related activities so that the student might understand both the overt and covert aims of the tutor in setting a given task or assignment.

### **Examples**

"The time management was a bit...I mean at our age, at our time of life, with lives, with kids, if we haven't got time management then we are bit screwed really [laughter]. I say it was a tick box exercise really."  
(Student 16)

"Our study skills time seems to be just chat, not a serious lesson." (Survey Respondent)

"Being able to open up less publicly would work for this course as being adult learners you don't want to reflect and open yourself up in front of people and finding your faults and achievements can be very hard to overcome."  
(Survey Respondent)

"Making study skills more relevant to adults, particularly more mature students groups would be beneficial." (Survey Respondent)

"Merging study skills (when possible) with core units of the course will make them seem more relevant and therefore important." (Survey Respondent)

### **Coming to Terms with Study Skills Discussion**

Student 15 expresses some of the frustration that they felt when they were faced with study skills specific tasks described in the pattern context:

"Well it is relevant, but it does sometimes seem pointless. At the time, for example writing 10 diary entries or whatever it was, was pointless. Because, you didn't have to be written in an academic way and we were basically just writing a diary. I thought, that was really pointless." (Student 15)

Immediately before another student took them to task over the perception that they had just expressed:

"But that was about your time management and you said that your time management has gotten better, so is relevant in that way, it's trying to get you better."  
(Student 13)

This exchange represents the conflict between students' desire to do the study skills work and the value they later find in it which is a theme that played out with most students

over the course of the discussion.

Students 13, 14 and 15 discussed their perception of study skills at length, and their discussion is the most interesting to the researcher because they were interviewed towards the end of the academic year, and so had a broader perspective on how the Study Skills work fitted with the course. Consequently, over time this frustration has subsided and was qualified by the group. However, they nevertheless noted that they believed that being asked to work on study skills explicit material was patronising and aimed at younger people without their life experience and that they were priced into it by virtue of their maturity alone. This is in line with an understanding of [the distinction between andragogy and pedagogy](#) and the issues with misapplication and demonstrates some of the social equity cost in asking students to participate in study skills delivery without a clear view of how it is applicable to them:

"To be fair [they] did say that a lot of that is aimed at younger students, so doing three weeks like you said on transferable skills were a lot of us have actually already have good jobs anyway while you do your personal development in your job, so doing three weeks on it was a bit of a pain." (Student 13)

"But I think because we are older students, that's why we carried on doing it as well. Because, if we had been younger, maybe we would just have not turned up, if I was

18, maybe I would have been like relied on this, so I don't see the point in coming in, but we have a different outlook." (Student 14)

Students 17 and 18 also discussed this mismatch between andragogic and pedagogic practice in detail. This excerpt is illustrative of their perception and occurred immediately after identifying that 'everyone' already has the requisite study skills:

"Well I said it [to the tutor], and everyone agreed with me, or they didn't speak up loud enough." (Student 17)

"We obviously know there are some things which have to be ticked, it's a course, it has a structure and such. But sometimes, it is a bit..." (Student 18)

"...Repetitive" (Student 17)

"Yeah when we think we are adult students and not sixteen- or seventeen-year olds. And I know the access is meant to be geared towards the older student, but sometimes you see some things and think 'really?'" (Student 18)

This indicates the extent to which the AHE students are enculturated to the idea of 'sitting at the kiddie table' when they come to college. Finally, in terms of this critique of the study skills experience, front loading the material left late starters short of the experience, something that they felt later:

"Was that mostly before I joined then?" (Student 16)

"Oh yeah you joined a couple of weeks in, didn't you?"

(Student 19)

"Yeah the academic writing was yeah. I mean the writing our strengths and weaknesses was. I mean yeah it was good for our personal statement but it didn't need to go on for weeks and weeks [laughter]" (Student 18)

Given this critique though, nevertheless students interviewed towards the end of the course returned to positives time and again unbidden by the researcher:

"I think the referencing was helpful" (Student 17)

"Yeah, the essay writing, personally for me it was [helpful] because when I was [recently] at school and doing my GCSE's we didn't have to do any form of essay writing and then I went on to do a BTEC and didn't have to do any essay writing then because it was mostly exam based, so when I started [AHE] I didn't have a clue."

(student 19)

They demonstrated that they understood that a key part of it was reflection activity and interestingly, their recognition that many university courses include a proportion of their time to be spent on study skills related material made it seem less 'pointless' than Student 15 initially said:

"It was good from the point of view that it may just be reflective about ourselves and about things." (Student 14)

"because a lot of university courses now make you do blog

posts, so if your diary entries that are relevant for that again if you're going to do a blog you've got to be able to do reflective writing" (Student 15)

"So, your reflective writing, in your diary entries, you will be writing yeah! I can do this!" (Student 13)

Therefore, with the benefit of hindsight, it can be concluded that these students do recognise the value of the study skills:

"I think it all does play a part, and it is all relevant, it just doesn't feel like that when you... You know, the three weeks you are just doing... Transferable skills and is helpful in different ways. But then that got us ready for writing personal statements. Your transferable skills, I mean other it's a pain to write it out, looking back you can see why that was useful." Student 14

Students 5 and 11 were an exception to the dissatisfaction narrative. Student 5 demonstrated a strong enthusiasm for the course and shared the following after being asked what the most useful thing they have learned so far in terms of study skills was:

"I wouldn't have been able to write an essay before I got into this. When I left school, I stopped writing, I stopped reading, because of the struggles with my dyslexia. I prepared myself before I came here, by doing the pre-access course and it's just got me back into the reading and the writing. Before, if I needed a letter, I

would ask my wife to write a letter, I wouldn't write it, I would give it to somebody else to do." (Student 5)

...and Student 11 felt an ethical obligation to do study skills regardless of his feelings on it:

"And they have so many people going to uni, coming out of it and quitting because they don't want to do the course of that doing, is not promoting healthy education. I've got loads of friends that are at uni for the sake of it, and some of them... I just don't agree with that."

There are two groups of conclusions that the researcher draws from this pattern of perception of study skills over time. Firstly, that effectively resolving this tension as early as possible would improve student experience of AHE. The mechanism by which this occurs seems to be student's perspective on those skills and their applicability in preparing them for higher education study. Exposing those benefits and making efforts to develop students hypercognitive skill set early so that they can make those links for themselves.

The second conclusion is that the concept of study skills itself is misleading term. Students discuss Study Skills as a relatively narrow range of practical skills such as the ability to use PowerPoint in a presentation or using a white board to plan out an essay prior to beginning it. Running discrete study skills provision to apply as it implies a narrower range of skills and abilities that are needed. While

these wider skills are being wilfully taught by thoughtful tutors, adjusting the language and syllabus would help clarify expectations and better focus on the skills needed. This does ask a more existential question of when 'study skills' stop being so and begin just being useful life skills. This lack of definition could paradoxically make it more difficult to secure buy-in from students. One of the questions that needs answering then is whether the arguments for and against running discrete study skills delivery should incline a course designer one way or another. On the one hand it reinforces the central importance of the skill set needed for success at university, but it incurs a cost in social equity which results in student dissatisfaction and lays bare differentiation issues. If the concept of study skills were refactored to include a wider array of relevant cognitive skills and students were worked with to develop their hypercognitive systems early in the process, discrete delivery could be brought into more readily.

### **Coming to Terms with Study Skills Pattern Conclusions**

Students value study skills specific activity after the fact more than during its delivery. They responded negatively to material they perceive to be designed for younger people, further supporting the stance this thesis takes of accepting andragogy, and reinforcing the use of Hypercognitive theory through the third postulate (Demetriou, 1998). Thus, finding



methods to move students towards seeing the concrete impact of study skills would likely improve their perception of study skills specific delivery, which hypercognitive theory predicts through maturation of the executive management function of the mind. Also, the term study skills means something rather different from the hypercognitive skills that Demetriou's model suggests. Changes in syllabus could better focus this provision. Consequently, while there is a psychological cost for discrete study skills provision on AHE, the value is recognised later, and hypercognitive theory predicts that the development of study skills' underlying cognitive processing skills is valuable and to be encouraged.

#### **Pattern 5: Range of Ability Levels**

As a student on the course I have my own specific set of needs and skills. In order to get the most out of my learning, I need to be operating at the right level. However, many of my colleagues have very different needs and skills. Accounting for each of them detracts from others' experience.

#### **Context**

In any given group of students studying for the Access to Higher Education qualification, there are some people who are very new to this sort of study, and others who have completed other qualifications and have the study skills needed already in place. Similarly, there are some with more life experience

and some less, some with specialist subject or professional experience and some without. Bringing all these people together in a learning environment is a challenge because of the startling range of individual needs which must be met for everyone to have a valuable learning experience.

### **Solutions**

- Design and develop activities which value the range of ability levels in a group and harness this for the benefit of each student involved
- Design tools which allow some students to assign themselves expert status on a given topic or classroom activity, which makes them available to help others who are still struggling to come to grips with it and which unlocks extension tasks to enable them to push themselves further on that material.
- Design predictive tools which allow students to be selected in and out of learning experiences as their skillset allows. This has the advantage of dropping work levels for some (but would work better in an online learning environment).

### **Examples**

"Yes, in Maths for nursing I found it very simple as it was level 2, whereas some people still struggled."

(Survey Respondent)

"We are all individual and I often need areas of teaching revisited in a different way." (Survey Respondent)

"I found the diversity of ability was good because it meant that I could learn different things from different people." (Survey Respondent)

### **Range of Ability Levels Discussion**

"I think just the experience of getting on and doing it. You know, doing the essays and stuff. I mean we could have done the maths stuff in one lesson ..." (Student 17)

"aah shoot me!" (Student 16)

"...instead of four". (Student 17)

"No, I am glad we did it in four, otherwise my head would have gone 'poof!' [exploding gesture] because I walked out of the first lesson and my head was just so confused, any time anyone even mentioned maths I wanted to cry in the toilet." (Student 18)

Differentiation issues clearly exist in the AHE student body. In the [Integrating New Knowledge with Past Experience](#) pattern, the impact of students' lives before they attended and the impact that has is explored and it is concluded that this is one of the precipitating factors that leads to AHE classes having challenging differentiation issues. This isn't necessarily a bad thing: students' experience, while creating differentiation issues, can also enrich learning:

"There's a lot of us who have stuff going on and it's

'well does that mean that my condition means X, Y, and Z?', Like my mum's got a brain condition and we [were] doing neurons and stuff. Because you can link it to something that is relevant to you, it does make it that bit more interesting because most of us at that age where we got relatives who have got Parkinson's or cancer or something like that, so it's quite easy to link that to something that really gives you that passion." (Student 12 In relation to their Anatomy and Physiology subject material)

Most students demonstrated awareness of these differentiation issues during interview and were keen to help to address them by closing the gap in understanding, but with that awareness comes fatalism (learned helplessness behaviour) for some:

"Because she knows she has limitations herself, she puts more time and effort into independent study at home, doesn't she? Reading around the subject and I think as a group we do that quite well because we all kind of do a bit of independent study. The ones that every now and again just try to do the bare minimum because they don't understand it, it really shows. It shows in their marks, shows and the questions they ask in their group chat and questions they ask in class". (Student 14)

Differentiation issues change over time (See the ['Emotional Support'](#) Narrative). They aren't static like one

might expect if it was as simple as 'the most intelligent students do the best'. Therefore, modelling this over time would be a multifaceted challenge and expecting tutors to intuit the issues for each student, when it is known from the [Help Seeking pattern](#) that students don't tend to seek out tutors in the first instance, and expecting them to mentally model those needs and apply that to their classroom practice and management is a tall order. Time management speaks to a facet of the differentiation issue too: Not all students have the same time resources with which to work, and this too can change as the course progresses. For instance, some might have childcare issues at one point in the academic year and at others experience more child free time that can be used for study as the Finding Time with Children narrative showed.

Finally, the concept of reciprocity is relevant here (see '[Differential Ability Level](#)' Narrative). Offering differentiation is only acceptable to students without a social equity cost if all students are seen to be being treated equitably in the process. Any movement away from that equilibrium creates a perceived good will deficit between the tutor and each student according to their perception of the severity of the breach. This is discussed more thoroughly in the [Help Seeking Commentary section](#) above.

### **Addressing Differentiation**

At least a proportion of differentiation issues can be

addressed. For instance, the [English Essay Completion](#) narrative offers an example of a student who drew value from their study skills training and applied that to their assignment and experienced academic success partially as a result. However, some challenges students face require more of a time investment to address than others. A student who has been bereaved for example, may be resilient enough to be back in class the next day, or could need six months before they could continue their study, so individual differences play a part in this.

Students' suggestions for dealing with the differentiation issues included more applied examples (for instance Student 19 discussing their experience of maths):

"I think maybe because we are doing maths as part of a healthcare course, and there are so many places you will need to use different formulas and such." (Student 19)

More extension activities for those at the top end of the spectrum as it related to that subject matter:

"I think it is to do with back up stuff. Obviously [another student] is sat there waiting for us to catch up, so maybe if there was other stuff around the same topic to like keep [them] going on it to help [them], or even some other subject, then that could have kept [them] going while the tutor was going over it again and again and again with us [laughter]." (student 19)

And more tutor resources (although they note that this

would likely be impractical):

"I think what would be helpful obviously, is if there is a way the tutors can have more time dedicated to the ones who are struggling, but that's not realistic, because they have got so many students and there are only so many of them. [the college] isn't going to employ another tutor for every class, so..." (Student 17)

Regardless of these potential solutions, if the issue is informed by the reciprocity principle, then any specific mechanism for change should be reviewed in this regard to avoid new tools and initiatives causing social deficit and leading to dissatisfaction.

### **Differentiation Pattern Conclusions**

In summary, differentiation is a challenge on AHE provision which is recognised by the students. It is also a challenge that changes over time with individual student circumstance and individual resilience as predicted by Demetriou's (1998) sixth postulate. At worst if they are perceived to be poorly handled, then it can lead to learned helplessness behaviour. Poor handling was identified when there was a social equity cost for some of the cohort upon others and stands as an example of experience value measured on the basis of a reciprocal social relationship being avoidably unbalanced. In summary, differentiation is a challenge on AHE provision which is recognised by the students. It is also a challenge

that changes over time with individual student circumstance and individual resilience as predicted by Demetriou's (1998) sixth postulate. At worst if they are perceived to be poorly handled, then it can lead to learned helplessness behaviour. Poor handling was identified when there was a social equity cost for some of the cohort upon others and stands as an example of experience value measured on the basis of a reciprocal social relationship being avoidably unbalanced.

#### **Pattern 6: Integrating New Knowledge with Past Experience**

As a student on the Access course, I have a life experience which is unique to me. In order to best learn, I need to be able to integrate this new information with what I already know. However, doing this in a time poor environment, with people from very different walks of life puts a lot of pressure on my ability to think in this way.

#### **Context**

Access students attend their course with a degree of life experience from which to draw. Beyond the primary function of the access course to teach the study skills which will enable them to achieve at university level, it also teaches specialist subject knowledge which will be relevant to the course the student wishes to go on and study. Key to the retention of this knowledge and the development of the university-ready skill set is the student's ability to see



this new information in the context of their experience in such a way as they can best interpret novel situations moving forward.

### **Solutions**

- Develop tools which allow students to map life experience such that it can be related to material to be covered on the course in advance of that material being covered. This will allow students to think in advance how their experience is relevant.
- Develop tools which scaffold the development of these skills by means of after class feedback to be collated as a part of a reflective journal

### **Examples**

"Yes, I don't say lessons I say lectures." (Student 13)

"it was only a few weeks ago I realised that I was basically working at a level, and I thought "oh no! I'm not good enough to be doing A-levels!" (Student 10)

"Certain students were very forward and slightly aggressive in terms of conversing and sharing [their life experience] but this was quickly squashed by meetups and general understanding of one another!" (Survey Respondent)

### **Integrating New Knowledge with Past Experience Discussion**

Students experience in the past has an impact on their learning in the present as can be seen in the Access with Disabilities narrative and which is illustrated by students 13 and 14:

"I think that comes from having a life though doesn't it? It comes with having a bit of life experience that you learn how to link stuff, whereas again you haven't got that as a youngster, you come from school and then you don't necessarily make those links". (Student 13)

"You're still in the mindset of... Rules and regulations, facts, tick boxes, you've not got those hooks to hang your new knowledge on." (Student 14)

This impact can have a positive or a negative effect on the student. One student discusses what they perceived as bad advice at school, which they took and ended up subsequently dropping out of their A levels. While most students talked about maths in this regard, this quote was chosen because it demonstrates the change in perspective that the student has undertaken since beginning the AHE course:

"I was at school, and I knew what I wanted to do, but because we had careers advisers then I was told 'you can't do that because you're not doing the right A-levels'. It is utter rubbish. Because, it is about transferable skills isn't it?" (Student 14)

Another student talks of the benefits of their experience writing essays elsewhere making them more resilient to the

stresses of the course (even if the initial experience was one they perceived to be negative):

"when I was at sixth form, we was constantly... The English we were constantly being given essays to write every other week so I imagine if the essays were doing at the minute, considering we only have 12 in the year, but three for a subject, we would have three over a term for over a term have to write one every week. So, I feel like that didn't... by Christmas I was just really... My first year was completely burnt out" (Student 1)

Positive or negative, bringing that information into the classroom is an inevitable part of teaching adults according to andragogic theory. This can be constructive or disruptive or both:

"Is there some value to being able to bring that [past] experience in?" (Researcher)

"I don't want to know about people's kids. I don't care your kid does at night! Say what you need to say, and then stop!" (Student 4).

This theme is explored more fully in the '[Tangenting](#)' pattern.

### **The Psychological Toll of Perspective and Identity Change**

The act of synthesising new information exerts a psychological cost if that information challenges students' identities as the '[Safeguarding](#)' narrative identified or asks

them to make a perspective change (See the '[Emotional Support](#)' narrative for an example). Tutors and students recognised that and felt that being pushed through this was a fundamental part of the course:

"I think it comes up when we are in class, [tutor] always says you can do more than what you think you can, so [they're] there putting into the back of our heads that we can push, but I don't really want to push to get better grades because I do want to go to uni and I do want to push myself when I'm there and I want to be able to feel comfortable there stepping outside the box with an assignment and feeling comfortable that it's going to be right."

The act of challenging oneself to build the course content and experience into their body of knowledge was perceived as a powerful motivator for some. This student spoke emotionally about a period of illness that sapped them of their motivation. This quickly changed upon attendance at the college for the first time:

"I literally just rang out the college and was like 'I really want to do something with my life, I'm in a bit of a rut', and they said I should go to the open day. I literally turned up, they signed me up, and I'm here. So, I knew where I was going, but I didn't have a clue how to get there whatsoever but I made a phone call just enquiring not with no intention of signing up for

anything this year whatsoever, walked in, signed up, started." (Student 12)

"And now you're smashing it! And you got a place at uni"

"And yeah, I didn't think I was ever going to be doing it this year so yes, it's crazy, but it's good, I like it."

As with this example, students were immensely supportive of one another as they came to terms with the way that their AHE experience needed to be built into their own identity:

"...which again is where the group chat comes in useful because we will be like 'pack it in, we know exactly what's happening. We know what questions you ask in the lessons, you sent us little snippets of your work, we know it's good'". (Student 13)

Time and again, the biggest leaps forward in this identity change were made when something or someone caused a student to reflect on the AHE experience in a way that they haven't previously and offered them a moment of self-awareness as a result. One example is Student 12 who described a simple transformative moment like that that made a real difference to them:

"I agree, I got somebody to proofread my whole essay and they said, 'oh my God, I didn't have any idea what you are really doing'" (Student 12)

When Students cited examples of when they experienced greater leaps in this process of perspective change that went hand in hand with descriptions of their hypercognitive

development. Student 14 provided a good example. Here they are discussing how they went from storing information for retrieval to making connections between them and their prior knowledge or novel situations:

"I think that when you're younger, you are not encouraged to look into things too deeply, it is all about this is what you need to know, this is how you need to know it, how you need to explain it or whatever. Statistics, facts, it is all factors you're growing up and this is what you must do, and you don't make connections, but as you get older, and specifically with the access course, you are encouraged to look into the answers and why is that the answer? What does this mean? What is the wider environmental [contextual] implications?" (Student 14)

Conclusions that can be drawn from this are that AHE often requires perspective or identity change in order to succeed on it. This is an inevitable feature of andragogic practice because students come to that period of study with previous life experience (and a diverse range of it at that). A facilitative mechanism for identity or perspective change is when perspectives that differ from the students' own are expressed in a way that causes them to reflect on the way that they think and function. Thus, laying bare the thinking processes could be a powerful tool in helping students to come to terms with the AHE experience as it prepares them for university study.

### **Reflecting on the Metacognitive Effect of the Research Process**

When identity is challenged and attention is brought to his, there is the potential for that act of attention drawing to have a modifying effect. This was chiefly on the researcher's mind during an exchange with a group of female students (whose designated numbers have been removed to avoid revealing identifying information) following the researcher, a male, referring to one of the students as a woman, which drew immediate surprise and amusement from the participants. Students explained that it had happened to them also on the course and came as quite a culture shock the first time:

"I think it's the terms are used today, you don't get called a woman..."

"I'm a girl"

"A woman is a grown-up and that sounds really wrong doesn't it?"

[laughs]

"It seems more powerful, it seems like you got more of the same things, it seems like a stronger word than saying 'yeah, that girl'"

"So, it's like, you wouldn't refer to the Prime Minister as a girl, you would refer to her as a woman?"

(Researcher)

"It's probably just in my mindset to me, but with boys is just boys, lads, men. There is no other distinguishing

feature is there really? But with women it's like girls, lasses and that's it, women doesn't come into it."

This is important because it speaks to the part that this study played in the lives of the participants' experience of AHE. While there was no ethical violation here, care must be taken to have as light an effect on participants as possible.

### **Past Experience Pattern Summary Conclusions**

Past experience of oneself and one's colleagues has a relevant effect upon the AHE student experience. This can be a useful way of contextually framing new information and thus scaffolding hypercognitive processing, or it can detract from the flow of the classroom experience and disrupt the value that might otherwise be gained. Regardless, there is a psychological toll of perspective and identity change that comes with the intake of new information in an adult who has a grounded sense of their own ontological approach to life. This was recognised by students as a legitimate reason to need and offer peer support, and so tools which facilitate the exploration of the impact of previously held perspectives and beliefs has the potential to improve the AHE experience.

### **Pattern 7: Tangenting**

My in-class experience is both enriched and limited by staff and students discussing things which don't directly relate to the Access Course material.

### **Context**

Both in classroom and on WhatsApp or equivalent chat groups, students can personalise their own learning by relating material to their own, known experience. In so



doing, this can detract for others for whom this moves the area of discussion away from their own experience or away from the subject material they perceive should instead being covered.

### **Solutions**

- Develop tools which allow the application of in class material to personal experience but that occurs asynchronously with class time
- Develop recommender tools which map material taught in class with experience and/or future study opportunity and share that so that people who are more personally associated with a subject under discussion can assist those for whom this is not so relatable.
- Develop activities which allow students to unobtrusively fill 'dead air' time when another student is benefiting from a tangent, so that the time is not wasted for the waiting students.
- Develop tools which flag material off topic and on topic so that the validity of a tangent can be engaged with.

### **Examples**

"[This happened] all year. We rarely finished the actual content that was needed to do the assignments due to how much time it wasted." (Survey Respondent)

"I have encountered students who do not realise the

extent of the tangents they are creating in their responses and who (due to learning difficulties) do not identify cues to allow others to speak or to bring their tangent to an end." (Survey Respondent)

"It happened in Psychology lessons but because of this subject being such a wide and broad area, tangents will be inevitable... [it] was unclear what was tangent and what was vital information." (Survey Respondent)

### **Tangenting Discussion**

Tangenting is self-propagating in that one tangent leads to another and so on, which gradually get further off topic:

"I will mention something borderline, like on topic, and it will be an actual topic worth talking about, but it might just go over and into something else. And then someone, and it could be anyone, will randomly take that little bit and start talking about it for like an hour while everybody else just sits there on their phones and zones out because it's nothing to do the lesson."

(Student 6)

Another feature of tangenting is that it is exacerbated by a lack of willingness to adjust one's personal viewpoint:

"[The tangents] take ages, because they are right and that is it." (Student 4)

Tangenting is clearly context dependent. Students expressed frustration at others who allowed tangenting to

occur in class:

"Sorry, but you get it in context if you are in the middle of it." (Student 4)

"Now I don't have kids, so it doesn't really bother me" (Student 6)

"It bothers me, and I've got kids!" (Student 4)

But none expressed frustration that when their work for the AHE course encroached upon other activities such as dropping their child off to school when they discussed those aspects of their time management. (See [English Essay Completion](#)):

"If I'm out and about, I use Google I Google things and read up on something." (Student 5)

"Back when we were doing psychology, I was using customer orders and writing stuff on the back of customer orders." (Student 4)

"I find myself sitting there thinking about things while I'm doing stuff, like if I'm sitting about chopping potato, I'm thinking about cutting through eukaryotic cells it's really weird, I'm really sad." (Student 5)

In the classroom, tutor behaviour is clearly a factor in tangential. Students have demonstrated that they are willing to give staff leeway in terms of how they run their class and do value flexibility from a tutor. For example:

"They can also be the way the teacher breaks it down because with our teacher [name] we go one angle but

[they] will also go at it a different angle if [they] can sense by your face that's not quite the angle you're learning at so [they'll] do things, silly things like building a burger using alliteration and it stuck in everyone's mind because you can laugh. So, I think it's the tactics that the teacher uses as well." (Student 9)

On the other hand, when tangenting occurs if it is not pulled 'back on track' quickly, students have little patience for that tutor. Often, like in the example below, students felt inclined to initially criticise a tutor and then immediately pull back from that assertion which suggests a good deal of loyalty to the college and course staff which is to their credit:

"The first term is definitely a lot of... We're talking about [tutor] actually here to be doing something in some sense, so those people who struggle... And as I say those people who struggle, I don't think it has actually got much to do with actual planning because I know people are done all they were very very early and not necessarily have read some of it... And I don't think it's...Amazing is it?" (Student 1)

### **Positive Aspects of Tangenting**

A possible mitigating factor to tangenting is that students can operate back-door support networks with one another during that tangent. Student 6 reported doing this

although others didn't volunteer that information which throws into doubt the extent to which discussion via WhatsApp during tangenting is constructive rather than an opportunity to negotiate the impact on reciprocal social equilibria or a mechanism which perpetuates off topic discussion.

Another way in which tangenting might be valuable is to allow students the opportunity to think through what they've been learning and allow it to 'percolate'. At the very least students talk positively about that aspect of their classroom experience. As one student put it:

"You were given the space to let that sort of thing to percolate through your mind and actually settle before you come to your own conclusions" (Student 2)

There may be an advantage of tangenting that it allows the students engaged in such activity to negotiate their perspective changing thought process in a way that they might find more difficult without explicitly verbalising their thought process. Also, it could allow students the opportunity to explore the material by psychologically getting 'hands on' with it, something that not every student found was a skill which came naturally to them (See the 'Finding Inspiration for Research' pattern for an example of this and some clues in the example below):

"But, when we are in psychology, and we are doing attachment for babies, and it's a three-hour lesson, about an hour and half of that is everyone who does have

kids: 'well my kids do this, well my kids do that.'"

(Student 6)

"I don't do that. I don't think you even know how many kids I had" (Student 4)

"I'm so glad she said that, because I didn't want to come over a sexist but yes, that happens in my lesson."

(Student 5)

It should be noted however that when students described the person(s) precipitating or propagating the tangent they did so in terms of their lack of care for others rather than someone who is coming to terms with a new idea.

One final advantage of tangenting could potentially be that the tutors benefit from new data which they can use to assess students. Given the reported lack of time the tutors have for student interaction, particularly on a one-to-one basis, the allowance of tangenting behaviour may in fact enable staff to think diagnostically about the about the smaller subsection of the group, the way they think and their progress. While this has been the experience of the researcher as described in the 'Delay Between Issue and Diagnosis' autoethnographic piece, this highlights one of the limitations of this study, that it takes the perspective of the student rather than the tutor. Tutor feedback on this would be important to confirm or refute this.

### **Tangenting Pattern Summary Discussion**

Tangenting, a broadly undesirable classroom experience for participants is self-propagating and reinforced by challenges to embedded viewpoints. This was spoken about differently from other demands on student time however, suggesting that it deserves a focus separately from time management issues. Tutors were seen as mitigators of tangenting behaviour, although where tangents were seen to be constructive, students demonstrated willingness to allow staff that leeway. Students experiencing a classroom tangent which they perceived to be time wasting, often used backdoor methods to research the topic from which discussion had moved, negotiate blame and adjust social network edge weighting. Tangenting may be a useful data collection opportunity for staff, but it is beyond the scope of this study to be conclusive on this.

### **Pattern 8: Sourcing Information**

As a student on the Access Course I must find out information relevant to the subject I am studying. There is a dizzying array of options to choose from and I have a limited amount of time to decide about which I choose to follow up and why.

### **Context**

Students being prepared to university are provided with a number of different avenues for research information. Some of these are more reliable than others, some will be useful for

assignment writing and some will not. Additionally, some will promote higher education ready research skills (e.g. JStor) and some will not (e.g. over reliance on lesson notes or peer assistance).

### **Solutions**

- Create and develop tools which allow the visualization of relationships between sources in order to better scaffold student research.
- Create analytical tools which identify suspect claims in sources
- Develop and allow students access to tools which identify plagiarism, to allow primary sources to be most easily identified
- Develop recommender systems which allow students to find novel sources on a given topic and with a given set of current sources.
- Develop a portal through which multiple sources of data can be presented in such a way as to allow the student to make an educated decision as quickly as possible about the veracity of the source and its relevance to the task at hand.
- Make reading material as easy as possible regardless of where it is sourced from (download to e-readers? Easily printable? Extraction of a directory system from the document to aid navigation?)



- Make complex activities like latent semantic analysis of sources easily accessible to students who don't have command line coding ability.

### **Examples**

"I don't really use Google Scholar, I think it's quite user unfriendly. I tried using it twice... It's like early Google. It's not set out nicely, like current Google, is just all kind of a mess of S\*\*\* really." (Student 1)

"Having one place that shows you what is the information would be very useful to stop endless searching on wrong websites". (Survey Respondent)

### **Sourcing Information Discussion**

While sourcing information may at first glance up in more concrete skill than pattern of behaviour or events, it is illustrative of the study skills development process the students go through and represents one of the core skill components that the students were keen to discuss (referencing research skills more than three times as much as feedback which was the next most discussed assignment related factor). In addition, students spoke about it in emotional terms as well as practical ones which further raises the spectre of study skills being mislabelled or inadequate to define how students are prepared for higher education level study as it cannot be said to be concrete behavioural skill set as opposed

to emotional skills which should be considered separately.

For example:

"I do believe a little bit of self-doubt can be slightly good, because you can check out some research that wasn't something you would otherwise look at [laughs]" (Student 9)

### **Student Information Seeking Behaviour**

Students are willing to source information from multiple locations (see the '[Access with Disabilities](#)' narrative for an example of political source seeking in this regard):

"There is a combination of books on the Internet. A lot of the sites, if they recommend on the Moodle system we use, or if I can find one that sources correctly, or as someone for instance... I tend to check who's writing it and if it's some professor at a university who has been teaching for years and I'll use it, but generally the Internet and I bought a few books from the library just found really useful." (Student 1)

Where students go to find this material is important because it exposes their perspective on the usefulness of different types of sources for designers looking to work in this space. As such, when recovering to re-join their compatriots following an unforeseen event, the [Catching Up](#) narrative suggests that students sought information from their VLE, research books and classmates rather than peer-reviewed

journals and from tutors in the first instance. On the one hand this could demonstrate that students are able to use scaffolding tools to assist in their work, on the other hand a mature researcher will be able to go directly to primary sources and navigate those systems in a more exploratory manner.

In terms of exploratory research and idea generation, online source finding is an important mechanism for this. The '[English Essay Completion](#)' narrative is a good example: In this situation, a student's research skills facilitate their ability to be exposed to a broad range of information and consequently to rehearse the process of synthesising new information with what is already known. Therefore, it can be concluded that in this case good research skills are facilitative of hypercognitive system development.

Students report that it's difficult to find sources if the amount of time that is available to the student is too short, which is to be expected. However, for those students who have children and have to work [little and often](#), potentially with a significant amount distraction if they are also being the primary caregiver at the time, those students also reported that their ability to find sources limited.

Finding sources of information and evaluating them is a complex and multifaceted skill. It is however one that students can internalise and perform almost autonomously in a flow state according to the '[flow](#)' narrative. Further

exploration of flow and its impact upon hypercognitive system development would be beneficial here.

Another observation which sheds light on the association of this skill set with the hypercognitive system development is that several students look to find sources outside of what may be considered traditional channels. This is because the material is made applicable for the student:

"I found it in A-levels as well as GCSE, you were talking about lessons and it's not relevant at all with what's going on outside of school and where is this course I find it's relevant and you can think more about it because I be like watching a program or something outside of college and I realise actually that links in, like healthcare, like I've watched documentaries and things and I think though I could use that as a reference in assignments as well, not just thinking oh, it's college work, it's trying to not involved..." (Student 8)

Student 9 was the most effusive (and creative) about seeking out non-traditional sources of information and inspiration for their assignment work:

"Yes, it's like we can use art on the side of the wall as a reference for English essay if we can justify it, ...so it's healthy to be educational wherever you go, you're always thinking. Even on your shopping trip you'll be seeing things and thinking 'ooh that's quite relevant', like when I went to Cadbury's world that was relevant to

one of our essays, we're doing it about Roald Dahl. See? you're always thinking." (Student 9)

Being able to capture that information as they perceive it and as they find it in life and map that together the other sources of research they do could be valuable in scaffolding the cognitive system development as it would serve to scaffold link building within Specific Semantic Systems.

Although tutors are not most students' first source for help-seeking behaviour in terms of their research, they are used: the '[Tutor Support 1](#)' narrative shows that students do seek help from tutors when necessary sought information from an assignment. One interesting example of students doing this was around the English poem that some had to write. While the researcher was present, one of the students approached a tutor and asked for advice. The tutor recommended several specific poems for that student to look at. During the group interview they spoke more about this:

"I think with our tutors well, it's... I like how she doesn't give us the answers, she sort of directs us, like when I was talking to her about the poems, she doesn't just say oh go and look at this poem, it was overview, it was teaching you to learn yourself still because in the next step [university], you're not going to have much one-to-one" (Student 7)

It seems that this student and their compatriots in interview who all agreed with them, value scaffolding over

either being given the answers or a more hands-off approach. But recognize that this is a function that represents an intermediate step towards the greater independence they will need in higher education.

Finally, The '[Study Skills Value in Course](#)' narrative describes those students who perceive themselves to have good information sourcing capability well are less inclined to attend talks study skills sessions. If the sessions aim to do more simply teach students to use online repositories for journal articles, they could therefore be missing out ironically on the basis of their mature research skills or at least their positive opinion of those skills. This is the case that could lead to more problems as those skills need to be revisited by tutors in class.

### **Sourcing Information from other students**

When information is sourced from other students, there is a cost in terms of their social equity with that person and with the wider group. Students who will seem to be taking advantage of one another are quickly rebuffed:

"Some people are a bit more lazier than other people in that they don't do their own work, so you have to be careful with what questions they are asking you as to what they want to know from you..." (Student 3)

Others would prefer to seek out sources of information which do not demand that cost from them. Three students across

two interviews indicated that the Virtual Learning Environment (VLE) was their first thought when asked about sourcing information, and this is cogent with the idea of social equilibria maintenance. In addition, students cite helpers in the library as a common source of assistance. This likewise is consistent with social equilibria upkeep, even though on the surface it may not appear that this could be a balanced relationship. This group explained it most clearly:

"Because I think you get used to going to the library to look, but it's the librarians that are really helpful, aren't they?" (Student 11)

"Yes, totally, they don't mind taking the time out to help you" (Student 9)

"They are often the ones to offer themselves, rather than you asking. Sometimes they are like 'oh, I'll look for it for you'." (Student 8)

This shows that library staff actively sought out opportunities to assist access students. They also sympathised with them as adults operating in a child's environment. This excerpt was from a conversation about the assistance they get in the library including a 'quiet study room' which was policed by the library staff:

"From my point of view is more about concentration I can concentrate better at home than sometimes in the library when you've got classes in there or younger students that don't know how to behave [laughs]" (Student 14)

"Yes, I'm the same, the library and the other students [in there] have a massive implication for our learning, and I think you will only find that from the access students. There are times when you sit in there, and they are just being loud or disrespectful..." (Student 13)

Oh yes, some of the things they have said to me have been disgusting. Some of the men." (Student 15)

"You mean boys." (Student 14)

Overall it is clear that a good rapport was created, which led all the students who discussed it to feel comfortable seeking them out when they needed assistance without social penalty.

#### **Sourcing Information Pattern Summary Conclusions**

Activity around the sourcing of information was spoken about at length by students and seen as an important undertaking. When that information was sourced from others, the social equity cost was recognised. Rapport had a mitigating effect on the social cost of sourcing information from colleagues and college staff.

#### **4.4. Reviewing the methodological framework in light of the material developed herein**

While this study doesn't represent a comprehensive testing of the methodological framework employed which is a



slightly modified version of that presented in Mor et. al. (2015), in that it doesn't fully test the [second phase](#) and doesn't include as diverse a team as the process was designed to accommodate, it does employ the first two vectors to develop design predicates from which data rich tools could be developed. As such, consideration should be given to the veracity of that process with regards the methodological framework. There are two key findings in this regard:

Firstly, the experience of data collection and co-design was easy for student participants to grasp and engage with. While [clarification was sought](#) in terms of the wording of some patterns and the headings on the [narrative proforma](#), the patterns were edited for clarity and brevity and the narrative form avoided being overly restrictive quite deliberately. Students chose to use it as such, with some opting to fill some of the sections and others choosing to leave some blank if they felt that it was already explained elsewhere. A strong sign that this was comprehensible and represents a cogent pattern of design progression was that the patterns were broadly accepted by students and none chose to propose additional ones based on what had been discussed during interview. Ergo, they felt that the patterns were broadly representative of the narratives and thus of their AHE experience.

Secondly, the output of this process was as predicted by the model: Actionable intelligence was collated for designers

to begin requirements engineering upon, and pertinent questions were asked into which researchers can now delve in order to add substantively to the process. Examples of actionable intelligence included the absence of a tool to enable students to manage their anxiety as it pertained explicitly to their studies and the need for tools which draw links between key experiences in a student's wider context, their life experience and novel material being explored. Examples of pertinent questions which could then feed into tool design and development include 'to what extent can game theory and economic modelling inform understanding of Reciprocal Equilibria theory?' And 'What are the behavioural precursors to student drop out that can be identified and through which support can be prophylactically provided?'

## **4.5 From Autobiography to Design Patterns: A**

### **Chapter Summary**

Beginning with the Autobiographical corpus, each piece was summarised and assessed, and themes drawn from them via a coding pass, which identified broad categories that questions for the topic sheet could be developed based upon. The process of doing this was discussed and the topic sheet was presented. This was then used to underpin the group discussion and co-design workshop activity of the AHE student participants. This experience was critically considered by

examination of the sample and ethical considerations raised in the methodology chapter which precedes this. Then Coding the ethnographic corpus was considered along with analysis of how the narratives were constructed. Finally, the Process of distilling narratives to design patterns and their subsequent review by the participants was discussed, and the patterns presented, and their findings analysed. In the following chapter, these findings will be applied to the four research questions this thesis asks. During this process, The Grounded Theory which emerges from the data presented above will be delineated and assessed and the design principles which were developed from the patterns will likewise be laid out and discussed.

## Chapter 5: Discussion

This chapter details responses from the data to each of the research questions. It charts the progression from the body of Practice Patterns laid out above, to Design Principles, addressing research question three, and the formulation of the Reciprocal Equilibria grounded theory in response to research question four.

### 5.1. Addressing Research Questions 1 and 2

Following the completion and editing of the design pattern corpus, this material along with the rest of the data collected offers insight into the first two of the four research questions that this study asks.

#### **Research Question 1: Is Access to and the Experience of AHE Provision Equitable and Egalitarian?**

This study concludes access to and experience of AHE provision is not equitable and egalitarian for several reasons and does so primarily based on the review of literature, with some supporting evidence from primary data collection. Firstly, the sociodemographic distribution of the students is not representative of the general population to the extent that one would expect if the course was drawing equitably from

those who could benefit from the AHE experience. Literature review has shown that despite some inconsistencies in data collection and presentation, a pattern of inequality in participation can be seen: 23% of AHE students are rated least likely to participate compared with 12% studying for other qualifications according to the POLAR3 measure (Parr, 2016). There are three times as many females as males on AHE (QAA, 2015) and males are more likely to drop out of their studies prior to completion (McCulloch, 2014). AHE students are more likely to identify as from Black and Minority Ethnic groups (29% vs. 24% on other qualifications; Parr, 2016) and are more likely to report specific learning difficulties than HE students (Parr, 2016; Higher Education Statistics Agency, 2016). The sample recruited for this study, which represented every member of an institution's cohort, showed similar a matching skew in terms of gender (74% female, 26% male) and a similar skew specific learning difficulty (16% in this sample volunteered this information although participants were not asked directly, versus 11% in UK AHE; Parr, 2016) Secondly, the experience of AHE provision is impacted greatly by students' personal circumstances. This was shown by student discussion around childcare responsibility, how they arranged their working to fill the gaps between other tasks such as when waiting to collect their children at the school gate and when unexpected setbacks occur.

## Diversity in AHE

It may be that addressing this sociodemographic skew could make managing AHE provision more complex, because students have demonstrated a desire to [help seek from those who share similarities](#), both academic and non-academic, with them. So, being on a course with a group of people just like them may actually improve group cohesion, for instance when they can relate to one another more effectively over a [shared fear of maths](#), or each having [parental responsibility](#). However, the diversity of AHE student groups is already significant in terms of their previous life experience and students interviewed showed that they valued that diversity as enriching in the classroom. While there are other courses on offer to people who may look to do the AHE course, and may therefore be self-selecting elsewhere, the question remains: Why there is such a skew in terms of gender and other sociodemographic characteristics on AHE?

Students perceive that greater diversity in the classroom is enriching, however practically, students are both restricted and enriched when they can relate their experience to subject matter at hand. They are enriched insofar as examples to which people can relate may be useful in framing the material and aiding comprehension. They are restricted where life experience is not shared ('[stop talking about your kids!](#)') and [Tangenting](#) occurs. This is predicted by Knowles' theory of Andragogy which predicts that past life experience

will have an impact upon adult learning and is harmonious with hypercognitive theory which frames learning in terms of synthesising new information with existing corpuses of knowledge and the development of the management and processing system that oversees that (Demetriou's 1998 sixth postulate). Given these factors, there is reason to believe that developing AHE student body with a greater array of life experiences would be beneficial to the learning of students involved. However, it could exacerbate any group cohesion issues if students find it harder to relate to one another's experiences and would ask even more of those looking to manage the already substantial differentiation challenge shown in the [Range of Ability Levels](#) pattern for tutors and learning designers.

### **The Experience of AHE**

In terms of students' experience of the AHE provision, this is also not particularly equitable, although students' personal circumstances have a lot to do with this. Some students necessarily must work little and often and need to rely on well-developed time management skills in order to function course, while others can work undisturbed for significant periods of time. The impact of this is cognitive: hypercognitive processing requires time for information to 'percolate' and be reflected upon (the eighth postulate of Demetriou, 1998). Other impacts are practical: help seeking

behaviour requires more advanced time management skills to do so well in a more time poor environment and students are motivated to retain social equity within the group in this regard, something which that student's availability to assist others hinders. There is no expectation of a reduction in differentiation challenges, therefore design opportunity exists around helping people to communicate with one another and helping tutors to facilitate learning experiences which cater for wider range of skill sets.

Students are however motivated to assist in addressing differentiation issues, being as they are extremely sensitive to issues of equality between them and their compatriots on the course. The grounded theory of reciprocal equilibria described later in this chapter delineates a social network in which each member's perceived social equity is dependent upon both giving and receiving assistance from one another, working to maintain a balance across the system, both in the classroom, in social situations and via social media. In the most extreme cases, those who are perceived to have caused too much disruption in that social spiderweb are ultimately ostracised. Tutors play a key role in and are looked to for adjudication of these reciprocal social equilibria.

Looking beyond the within group issues as the context within which the group operates, Students experience within the wider college environment lays bare the challenges of being adults and operating in an environment designed



primarily for younger people. Student support was routinely targeted elsewhere, environments such as the library were set up and used as social spaces rather than for the sort of quiet study that adult AHE students felt they required, and study skills material was reported by some in the pattern feedback survey as being age-inappropriate. Each of these findings add credence to the answering of the first research question in the negative: that Access to and the experience of Access to Higher Education provision is neither equitable nor egalitarian in nature.

**Research Question 2: Is there a difference between the skills AHE students have and those which they need most to achieve at university?**

There is a difference between the skills AHE students perceive themselves to be explicitly prepared with and those which they need to best achieve at university according to the autoethnographic, group interview and co-design data. This study exposed a number of other skills that are not traditionally taught discreetly that students recognise would be helpful to them such as [anxiety and stress management](#), [peer help seeking](#) and [integrating new knowledge with past experience](#). Therefore, this thesis contends that the concept of 'study skills' has been shown to be too narrow a term to effectively describe the full gamut of necessary preparation

undertaken on AHE. While students speak proudly of the way in which they are prepared for university, they focus on [time management](#), [referencing](#) and [essay writing](#) almost to the exclusion of anything else when asked about study skills. These are clearly part of what is necessary, but this demonstrates a skew in focus that precludes discreet management of the above as well as [group negotiation and management in the classroom](#) and [hypercognitive processing](#). These findings are in line with what Hypercognitive theory predicts in Demetriou's (1998) ninth postulate. This study shows those to be key to student success as well. In addition, this study has found that a focus on the individual over the group in terms of study skills is reductionistic as it cannot factor in students' motivation to balance reciprocal equilibria during their AHE experience. Successfully managing this is a fundamental driving factor for any skill which requires social interaction such as classroom behaviour management, help seeking and renegotiation of identity as perspectives are challenged and conceptualisation of experience is reflected upon and processed by the hypercognitive system as a result. Having addressed two research questions, the fourth will be approached via an exploration of the Grounded Theory emerging from the study and the third through the abstraction from Design Patterns to Design Principles.

## 5.2. Reciprocal Equilibria: A Grounded Theory

The concept of Reciprocal Equilibria has emerged from the ethnographic data collected in group interviews. Refined through the coding passes undertaken on the data, aspects of this theory can be seen reflected in aspects of narratives and patterns produced, along with some of the quotations presented in the preceding chapter. This theory states that AHE students form a co-dependent network during their course and in order to achieve with the minimum stress and maximum satisfaction, they need to engage with this network.

The network is co-dependent because help seeking necessarily occurs across the group rather than only between pairs of students. This was shown by the [Anxiety and Stress](#) pattern.

If students are motivated to maintain a reciprocal equilibrium, then evidence of students actively seeking out opportunities to do so would be seen. There is good evidence of this from several groups:

"[the WhatsApp group is used] to pick people up, if you know someone is struggling, it is that it picks people up. Keeps us going." (Student 10)

"Just having that praise for other people as well, who are in the same situation, they know how much is appreciated to get a little "well done" rather than getting it from someone who is not doing the course".

(Student 8)

Much of the data points associated with co-dependent system are what social network analysis calls relational (Scott, 1987). That is, they can't be associated with a particular individual, but rather they define the bonds between people, the mechanisms they use to negotiate and renegotiate social equity.

Looking at the [Catching Up](#) narrative, which is described in the [Help-Seeking pattern](#), it is clear that students feel they should be able to make up ground lost by unexpected events that might get in their way such as a period of family illness or court case. This suggests that they are identifying agency in the process that transcends their ability to prevent unexpected life events from occurring. In turn this suggests that there is a mechanism by which that agency can be reclaimed. While those catching up experiences invariably cause anxiety or stress (see the [Anxiety and Stress pattern](#)), in terms of frustration created, tangenting appears to cause more stress. If frustration levels were simply a function of the amount of time lost from a given disruption, the opposite would be true. Therefore, there must be another mechanism at play. Interestingly, in the case of times when students must catch up, this is seen as an opportunity to assist one another and a surmountable challenge. In the case of tangenting however it would appear the social equity is lost when a student or tutor strays off topic to a point where other

students feel that they are not covering what they perceive to be relevant material effectively enough.

There is some corroborating evidence that tangenting upsets the reciprocal equilibria at play in the classroom, students described their initial cognitive dissonance in relation to the use of humour (see the '[Humour](#)' Narrative) as a waste of time in the same way as tangenting. If reciprocal social equilibria theory is to be applied, then that result that would be expected.

One might wonder how tangenting happens in the first place if students are motivated against it by reciprocal equilibrium theory. Something intriguing came out of the interview process, which was that some students were widely criticised for not listening properly in-class. Bearing in mind that that social equilibria is about perceived social equity, if one student sees their tangent is relevant, they may be frustrated by others' lack of attention:

"There are a lot of stupid questions that get asked in the lessons" (Student 1)

"I think one of the things that does get a bit... Annoying, I generally agree, is like the same people will ask the same questions for five times again and again." (Student 2)

while simultaneously those who the tangenting student perceives as uninterested, may be frustrated by that tangent:

"Oh my God the tangents! being able to keep on topic. I

think a lot of people struggle, I think. Other people struggle when they come into education. It's actually realising they are there to learn, they are not there to have a chat with everyone. " (Student 1)

Thus, both students perceive the other is that little bit more indebted to them and find themselves at loggerheads.

Other examples of students valuing something differently causing issues abound. A humorous example was when students 3 and 6 took student 4 to task in interview:

"...sometimes even the tutors can't stop others from being on this tangent" (Student 6)

"We actually finish their sentences off, in a quicker way just shut them up." (Student 3)

"Oh, please if I ever do that, tell me just to shut up!" (Student 4)

"We do!" (Student 6 and 3 simultaneously).

From the data this study collected, [staff enthusiasm and trust](#) were discussed most when talking about what makes a particular tutor good at what they do. Trust allows students to give up some agency, even only temporarily, in the classroom to those tutors in terms of how they manage their time, providing that they do so with a view to maintaining the reciprocal balance among the students. Examples of breaking that balance include the [Tangenting](#) pattern, where tutors were seen as culpable by some students when they felt that time was being wasted by others. Likewise, in the [Range of Ability](#)

Levels pattern, differentiation activity was shown to be acceptable to students if members of the group were seen to be being treated equitably.

There was evidence of students acting in their own best interest within that social network, if reciprocal equilibria theory is in effect, where it may not be otherwise explainable. For instance, the scope of help-seeking behaviour seems counterproductive in two ways, firstly it would be in a student's best interest to reach out to as many others as possible for help when they need it, and secondly it would benefit them to conceptualise drains on their time as weighted based upon the amount of time lost, but neither of these appeared to be the case. In terms of the targets of students' help seeking behaviour, one might expect a student to maximize their chances of gaining help by reaching out to as wide a group of peers as possible, even more so when they feel that the issue is urgent and problematic. What was found instead, was that students described some issues which could be dealt with by virtually anybody in class (for instance when someone needed to confirm a deadline) and others which required a more targeted approach. When dealing with issues in that first category, namely issues which didn't negatively reflect on that student, they talked about a desire to avoid singling out a colleague from whom to get information and instead described asking through online group chat so that whoever was least inconvenienced (and most motivated to gain

social capital) could answer. When the issue was more specialised, students were concerned that others would judge them negatively and therefore they would lose that social capital as students gossiped about them. In this case help seeking was described as taking place on a more targeted basis, where students sought out another individual to garner emotional support or act as a point of contact with tutors and other stakeholders. This is in line with the view of the social network which is co-dependent and within which students are both motivated to gain and maintain social capital. Competent management of this can therefore be considered a valuable skill. In terms of conceptualizing drains on their time, students describe tangenting in the classroom as causing more frustration than the challenging time management issues many of them faced outside of it. Given that a short digression in the course of a class is clearly less of a time sink than for example, the illness of a dependent, this finding is incoherent if based on the amount of disruption alone. Reciprocal Equilibria theory offers explanatory power over this because in terms of the illness of an infant, successful management of that is seen as within the control of the student (through finding childcare, peer support or by other means). Conversely, classroom tangenting is out of their control and therefore, to reclaim that control, they must look to the tutor to whom they've entrusted their time management and to the person they perceive to be the culprit



who loses social equity as a result. In addition, demonstrating successful management of their personal issue [builds their social equity](#) when others see them do it. In this way Reciprocal Equilibria theory has explanatory power over otherwise unexplained behaviour which students described.

Finally, other stakeholders, particularly tutors, have an impact. Beyond their [ownership of tangential behaviour](#), they also appear to [act as models](#) for how students behaviour is valued within the group as the time management pattern showed. Where tutors describe putting their work before their family, students were quick to recognise and vocalise the same in their own experience. Therefore, it can be concluded that there is the potential for the social networks built in the cohorts studied to be influenced by those looking to innovate change in their learning environment.

The grounded theory of reciprocal equilibria has explanatory power over the behaviour observed in the data this study collected which individualistic models of learning cannot, which economic interaction alone cannot, and which altruism alone is unable to provide adequate justification for. Having identified the grounded theory of Reciprocal Equilibria as a way of framing understanding of learning and operation in the AHE adult learning setting, the fourth research question is answered: As hypercognitive theory predicts, AHE learning is social and corporate in nature. It motivates people to build their own social equity in order to

help seek, discuss tangents and manage unforeseen obstacles to their progression. This gives insight into AHE learning and provides a framework for future work to investigate the fourth research question this thesis poses in more depth. In order to address the third research question, design principles have been developed which speak to it. These are described below.

### **5.3. Design Principles for Data-Informed**

#### **Andragogy**

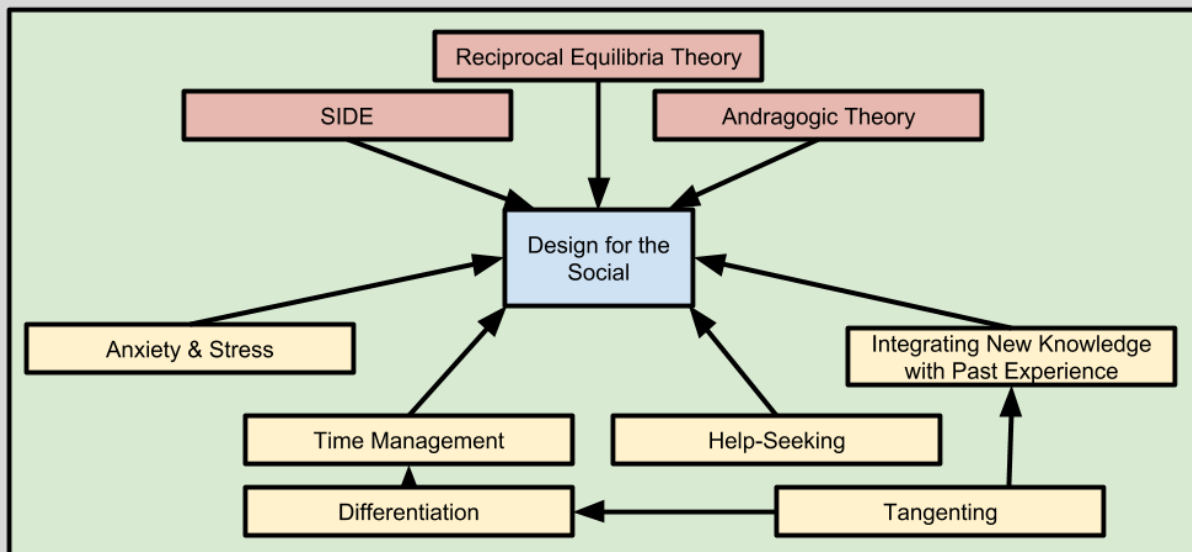
Progressing from Practice Patterns to Design Principles represents a distillation of the findings described in both the pattern commentary, along with consideration of how theory can be brought to bear with explanatory power. Below each of these principles is presented and discussed. In the same way as the Practice Patterns were presented, these will be first laid out following convention from Mor et. al. (2015) before explanation is added. Therefore, the reader should look to the commentary section to expand upon each of the links described.

#### **Design Principle 1: Design for the Social**

The first design principle is titled 'Design for the Social'. It is a key conclusion of this study that adult learning occurs embedded in context rather than devoid of it (as supported by Demetriou's fourth 1998 postulate). This

context is provided by the adult background, embedded perspectives, that Andragogy theory and Hypercognitive Theory's sixth postulate predicts, of the students and their colleagues on the course. They have a co-dependent relationship with them, framed by [Reciprocal Equilibria grounded theory](#). All students reported that [anxiety and stress](#) was an issue for them at some point during their study and this can only be understood in a helpful manner if the aetiology of those feelings can be identified and addressed. Often that aetiology is found either in student experience of social interaction with other students, or from other parts of their life such as illness of a dependent. All students help seek during their study and therefore rely on one another for the give-and-take of that activity. Understanding and effectively modelling that has the potential to identify ways in which assistive tools and technology can be used in hitherto unforeseen ways in the AHE context. The Design Principle's links with theory and Practice Patterns are shown in summary in Figure 11 and delineated below.

**Figure 5: Design for the Social Conceptual Map**



### Theoretical Links

- Reciprocal Equilibria Theory derived from this study.
- Social Identity Deindividuation Effect (SIDE; Reicher, Spears and Postmes, 1995)
- Andragogic Theory (Knowles, 1984)

### Up Links

None.

### Side Links

- Anxiety and Stress design narrative
- Time management design narrative
- Help seeking design narrative
- Integrating new knowledge with experience design narrative
- Differentiation Design narrative (indirectly related)

- Tangenting Design narrative (indirectly related)

### **Down Links**

Each of the four research questions this study poses.

### **'Design for the Social' Commentary**

During the autoethnographic work carried out in this study, the researcher describes feeling socially isolated while attempting to complete a massive open online course. What struck them then, and what emerges throughout the ethnographic data collection and analysis, is that the impact of social context is significant if learning to be properly understood. Reciprocal equilibria theory is fundamentally cited in social context: it posits a social network that operates on economic grounds whereby social equity is perceived to be gained and lost on the basis of assistance given received and mitigated by individuals perception of the value that is given by one party to another, both the giver, the receiver and third parties. This theory is closely allied with that. Designing into social context is important for andragogic tools, so doing so needs to be a design principle from which to work.

The data show that there is evidence of students building their own "brand" within the group and ostracising those who are seen as generating more need for assistance such as somebody going tangent in class about something another

student perceives not to be relevant. When reciprocal equilibria theory is applied, these behaviours can be understood and explained.

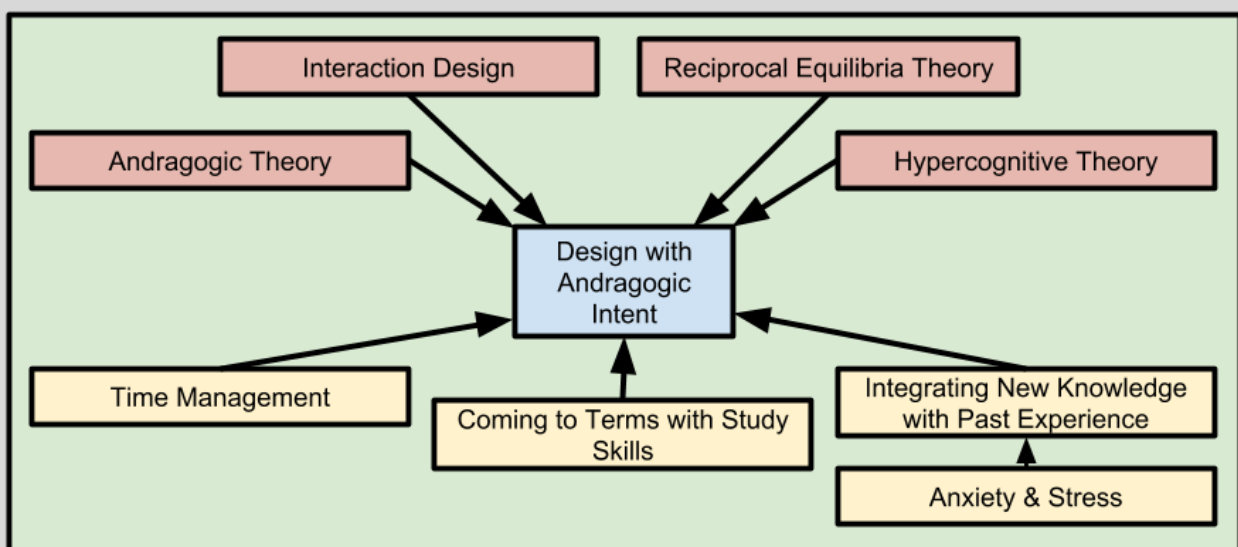
Help seeking plays a key role in this social interaction on AHE, forming the need and motivation for social currency management. In addition, anxiety and stress may be both transmitted and managed socially. For example, worrying about whether an essay should have an appendix on the whole group chat which then causes others concerned about their own efforts. Conversely, a student posting a link to a relevant documentary could kickstart others' efforts about an assignment and thus reduce their levels of concern. Studying students in isolation therefore is rather like expecting online education courses, completed on one's own at home to operate on an equal footing with classroom-based instruction in a social environment. SIDE (Social Identity Deindividuation Effect) theory predicts this too (Reicher, Spears & Postmes, 1995), that where social contextual cues are missing, there is more opportunity for misunderstanding in communication. Therefore, if effective andragogic tools are to be developed, they will benefit from being explicitly designed for students who operate in a social environment rather than a more reductionistic approach of assuming that each student operates individually and choosing to ignore the impact of factors external to that.

## **Design Principle 2: Design with Andragogic Intent**

The advent of Interaction Design methodology has led to a broader understanding of the need for designing with the user as a paramount consideration. Additionally, Andragogic theory (Knowles, 1984) and Hypercognitive theory's third postulate (Demetriou, 1998) describes adult learners as different from child learners both in terms of their past life experience and their more embedded perspectives. Therefore, where design occurs in education, the nature of the user or recipient (andragogic or pedagogic), should be considered in order to promote effective engagement with those design outputs. This was explored in the literature review portion of this study and it was concluded that Andragogy did warrant differential treatment and represented a distinct field of study from pedagogy. In support of this position, participants in this study provided numerous examples of adult students operating in a learning environment designed pedagogically. For instance, the library facilities were not managed in a way that was conducive to adult learning, and some personal development activities in the classroom were routinely considered 'box ticking that needed to happen' for institutional purposes rather than because they would further the learning of the student. In addition, as described above, there were examples of students 'putting up' with classroom materials which were designed for younger students. While these examples are not alone, this is also not a criticism of

the college and its staff: it highlights the need for a perspective change that has the potential to greatly improve AHE learning if tools and interventions can be designed with andragogic theory such as an understanding of hypercognitive processing development and Reciprocal Equilibria Theory at their centre. A summary of the patterns and theory which influenced this principle's creation is summarised in Figure 12 and listed in the manner Mor's PPD framework requires. Further commentary follows.

**Figure 6: Design with Andragogic Intent Conceptual Map**



### Theoretical Links

- Interaction Design
- Reciprocal Equilibria theory derived from the study
- Andragogic theory (Knowles, 1984)
- Hypercognitive theory (Demetriou et. al., 1993)



**Up Links**

None.

**Side Links**

- Time Management practice pattern
- Coming to Terms with Study Skills practice pattern
- Integrating new Knowledge with Past Experience practice pattern
- Tangenting practice pattern

**Down Links**

- Research question one
- Research question three

**'Design with Andragogic Intent' Commentary**

Designing with Andragogic Intent doesn't mean that adult learners such as Access students should be considered 'special' compared with other students, just that they should be considered as a distinct user group from children and adolescents because of their being adult. Like rows of parents at a primary school nativity play jammed onto chairs designed for four-year-olds, if the environment around them is tailored for others, their experience of education may not be as easy to access compared with their younger peers. Hypercognitive theory predicts that designing for an adult

learner requires one first to recognise how what they bring with them to their study may shape not only how they interact with new material, but also how they interact with others learning alongside them. In this way, design for the social is closely tied with Demetriou's fifth postulate and the 'design with andragogic intent' design principle.

A good example of how being adult impacts AHE students' experience is study skills. Discrete study skills delivery was met by most students with confusion, frustration or incredulity. This subsided somewhat once they understood the value of what they were doing, however it was felt to be patronising, which is to say that they perceive that activity as unnecessary because they have already developed the skills, they needed in life outside AHE. There is clearly a psychological cost for a student with established perspectives and self-identity to be challenged about their cognitive skill set in way that they may not have experienced in the workplace or elsewhere and design work which fails to account for this risks creating barriers for adult learners which impact upon the equality of accessibility to learning opportunity. This resistance was shown to subside over time, indicating that there was value in making the purpose and effect of the learning explicit, which in turn allows hypercognitive processing over the learning experience to take place. In this way 'Design with Andragogic Intent' is closely related to the 'Make Thinking Visible' principle described below.

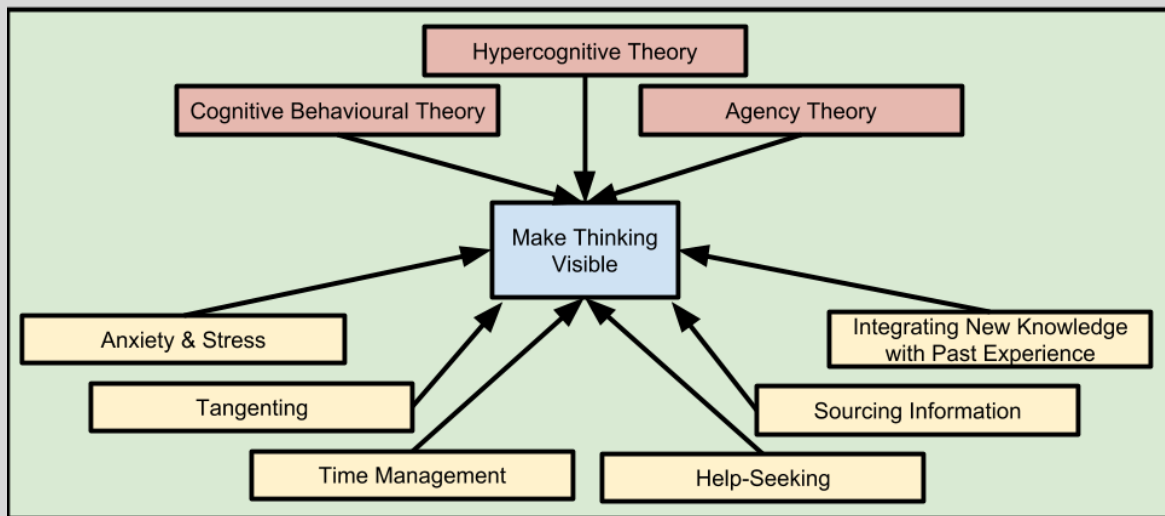
A confounding factor in the example of study skills activity is that the term study skills is somewhat semantically misleading: if what people call study skills and what they actually need differs (which research question two enquires into and finds that there is a mismatch there), then this design principle calls into question the way in which the QAA (2013) curricular framework under which AHE operates is constructed.

### **Design Principle 3: Make Thinking Visible**

Make Thinking Visible is a design principle which has emerged from this study because it represents the first step in developing AHE students hypercognitive processing capabilities. This theme can be seen throughout a range of narratives. Cognitive Behavioural Theory (Miechenbaum, 1977) suggests that enabling the student to become mindful of what they are thinking, the antecedents to that, and the results of it, will provide someone the means to see where within that they have agency and to take control of those thought processes in such a way as positive change can be achieved. Hypercognitive theory represents a development of this insight, to describe the framework of the intellectual mind as it undergoes learning experience. Students describe the need to take thinking time, such as described in the study skills pattern and reinforced by Demitriou's (1998) eighth postulate. Therefore, thinking provides a predicate to effective

learning. They also describe efforts to integrate their embedded perspectives with the new learning material such as described in the tangenting pattern. Doing so is necessarily more cognitively onerous than simply taking in a new piece of information with no or comparatively small amounts of embedded view to contend with. Therefore, allowing a mechanism by which this can be done is important to design and implement in an effective data-informed andragogic tool. This is particularly prescient for AHE because many of the skills needed for students at university require reflection and behavioural iteration to achieve. Some of these skills are taught explicitly on AHE provision, such as time management and referencing. Others are taught implicitly through the AHE experience, such as how to bring experience into the classroom without taking the learning experience 'off topic' for others. Still others are not taught at all, such as synthesising new information with experience. If the students' thought processes and those of people around them can be made more visible, this make it possible for them to reflect upon their strengths and weaknesses, make assistive changes to their learning and environment, help seek more effectively, understand others' perspectives and more. A summary of the theory and links associated with Make Thinking Visible can be found in Figure 33 and discussed in depth in the commentary section following the pattern proforma contents.

**Figure 7: Make Thinking Visible Conceptual Map**



### Theoretical Links

- Hypercognitive theory (Demetriou et. al., 1993)
- Cognitive Behavioural theory (Miechenbaum, 1977)

### Up Links

- Design with Andragogic Intent
- Design for the Social

### Side Links

- Anxiety and Stress practice pattern
- Time Management practice pattern
- Tangenting Practice pattern
- Help Seeking Practice pattern
- Sourcing Information Practice pattern
- Integrating New Knowledge with Past Experience Practice pattern

**Down Links**

- Research Question 2
- Research Question 3

**'Make Thinking Visible' Commentary**

Students who are able identify and assess the thought processes they go through could identify relevant learning opportunities and make changes to their course related circumstances if they possess the hypercognitive functioning skill and this could benefit them greatly. Consider the issue of study skills. Students dislike study skills delivery at the beginning of the academic year and yet cited as valuable later. The data this study collected found that students question whether more of it could be front-loaded. As this study has shown, there are several reasons why this is the case however one of them, a lack of full understanding of study skills' benefit, can only be addressed by first exposing the thought processes and cognitive skills that study skills sessions are designed to develop. Given that hypercognitive development is of paramount importance in preparing students for critical thinking, they will need to undertake development in this regard in order to succeed and thrive at university level study. It is therefore vital to create an environment which allows them to reflect upon their behaviours, thought processes and experiences and undergo the perspective and identity change that is required. Effective andragogic tool

design will play a part in shaping this learning environment. Given that so much of student satisfaction appears to be based on their perception of social equity among the group, tools which make such thought processes explicit could help avoid the sort of misunderstandings which leads to frustration access students often demonstrate. For instance, if a student understands that instead of finding an anecdote about their child's autism to clarify some part of the material in a psychology class, others instead find it distracting to the main topic, they can then choose to mitigate or adapt this behaviour. Likewise, if the students listening to the anecdote understand which part of the behavioural study the other student is trying to investigate and illustrate, they may be more inclined to use opportunity for critical thinking. However, all of this is predicated upon the notion that none of this is possible without first making discreet the thought processes of AHE students, their tutors and others. Therefore, tools which allow this to happen through innovative visualisation or in other ways have great potential for positive impact in the AHE context.

## **5.4. Applying the Design Principles to Data**

### **Informed Andragogic Tool Design**

The Design Principles described above suggest that there are many interesting potential opportunities to improve

learning through their application in the AHE environment. some of these will be described discreetly with an explanation of how the data collected in this study justifies their consideration. Of course further design work would be necessary to instantiate these into a tighter context such that requirements engineering activity can be undertaken, but offering broad classifiers based on the data collected is an important precursor to use case development in interaction design (Koh, 2019) and therefore undertaken here to provide a starting point for future design endeavour.

### **Andragogic Redesign**

Perhaps most simply, the act of employing interaction design methodology to produce tools which assess usability from an andragogic point of view rather than a pedagogic one as design principle 'Design with Andragogic Intent' suggests, could benefit users immensely. For example, as described in the autoethnographic corpus, the act of giving a task sheet to a group of AHE students was hampered enormously by the beginning of the first question 'your mum has sent you to your room...'. Even if the task was going to benefit them, the act of removing a huge amount of the social equity that Reciprocal Equilibria theory says the tutor needs to maintain in that situation is damaging to a point where the value of the task is overshadowed, or even functionally detrimental to the learners involved. If tools are designed or redesigned with



the andragogic user journey foremost in the process, then usability value could be increased.

### **Hypercognitive Development Tools**

Hypercognitive system development is identified in this study as a fulcrum around which students' skills for university are developed, in that many of them are dependent upon mature hypercognitive processing to function such as researching for an assignment or managing anxiety and stress. In addition, taking in new information and synthesise that with embedded perspectives or past experience has a cognitive load associated with it as Demetriou's (1998) sixth postulate predicts and the 'tangential' pattern describes in the previous chapter. Therefore, there could be a cluster of possible design and development opportunities which focus upon exposing these hypercognitive mechanisms. Tools which develop opportunities for learners to integrate novel specific semantic stores with new information and which allow students to properly manage their thinking as they learn, bringing in examples from their lives, their wider contexts and explicitly linking those with their specialist subject material and personal development targets could shape in a fundamental way what it means to be prepared for university. A simple example can be found in Pirie & Chatterton (2017), but a data-rich tool that can be responsive to the learner's needs over time and which can port between learning experiences and across

artificial subject divides such as Demetriou's ninth postulate identifies, has the potential to benefit a student's hypercognitive development substantially.

### **Tools for 'Study' Skills**

Tools which promote skill development that transcends the restrictive and misleading term 'study skills' have the potential to better prepare students for the rigors of study at higher education level. The first way that this can happen is with tools which signpost valuable skills or skill development opportunities for students, either directly like the service offered by ZK Analytics which integrates behavioural science and data science to identify behaviour change (<http://www.zkanalytics.com/>) or indirectly like SWRM (Griffin, 2016). In doing so, students' thought processes are exposed and therefore they can reflect upon them, process and ultimately develop hypercognitively on that basis of that reflection. The second is with tools which quantify student engagement through measurement of peer support and other social mechanisms rather than assessment of the student in isolation from their social environment. Predicated upon the insight of Reciprocal Equilibria Theory, This has the potential to ultimately provide predictive power over students dropping out, assuming that the grounded theory this thesis finds holds explanatory power over student behaviour and students who break those norms are ostracized by the group

prior to withdrawing as shown in the [Peer Support 1](#) narrative. This in turn would allow for support to be prophylactically engaged rather than 'cleaning up the mess' once a student has psychological barriers to continuing with the AHE course, including their lack of social equity with the group.

As long as the differentiation issues exist in AHE, and this thesis predicts that they could grow if AHE grows more egalitarian over time, there is the possibility of more granular analysis of progress and personalisation of learning plans to help students and other stakeholders to properly quantify the value of their learning through novel assessment methods and tools which scaffold the inclusion of past experience with novel material. These sorts of tools would have grounding in andragogic theory (as they are structured around the behaviour of the individual), hypercognitive theory (if they allow greater insight to be provided to the learner) and reciprocal equilibria theory too )if they are designed with social aspects of the students' learning factored in).

Examples of more study skill focussed possibilities include the development of tools which promote healthy time management, and which allow students to quickly get immersed in their material (and out again) to allow those with more fragmented experiences of learning time availability to function more effectively. It could include tools which promote effective stress and anxiety management, particularly those which enable the student to see the progress they have

made during their period of study. Finally, it could include tools which allow students to help-seek in a way that is most healthy for the whole group, which brings those disinclined to do so into the system or flags when someone is deviating significantly from the norm in that system.

### **Tools which Assess the Social**

Tools that are designed for the social aspects of the AHE experience that this study has exposed as important considerations through the 'Design for the Social' Design Principle have the potential to more effectively address the behaviour patterns and student experience which is indicative of AHE. Reducing the 'dark spot' of tutor visibility of student progress could be an asset in this regard, as could assessment methods which consider the way in which the student operates in that learning environment to identify areas for improvement which if addressed would help them to excel at university. In a nutshell, for assessment for a course aimed at developing people to operate in an educational environment could be designed to better assess well how those students operate in an educational environment, rather than restricting their focus to specialist subject skills, traditional notions of study skills or an individual out of their learning context which hypercognitive theory and the findings of this study indicate are important considerations. In relation to assessment, there is no reason beyond absence of technical

expertise in the AHE ecosystem and the college infrastructure within which that provision exists, and public acceptance of alternative methods that stops data scientists assessing learning to a more effective degree than currently leaned upon methods such as examinations which take snapshots of student attainment and which provide no data that any scientist would ever publish on without heavy caveats about the representativeness of the results for learning. Consequently, hypercognitive theory and the finding of this study that learning occurs in the context of a co-dependent social network assessment methods which measure social interaction as well as individual task performance could better encapsulate a measure of the value an individual gains from the AHE experience than the review of students essays or other more traditional techniques.

### **Methodological Catalysts**

Two areas of application in a methodological sense also apply here. Firstly, tools which allow learning analytics analysts to scale would enable more benefit to be had from currently small amounts of data science effort which are focussed on Further Education that the literature review identified as currently the case. The methodological approach taken to the development of design predicates that this study takes, of a slightly modified version of the Mor et. al. (2015) framework, while prescient at present, will be less

useful as research, design and development projects no longer need so many professionals with siloed expertise. If enough tutors can employ data science and students can provide better data about their user experience, then obsolescence of a methodology which is constructed around interdisciplinary working will be hastened. In the meantime, this methodological approach to the development of data-rich andragogic tools for the AHE environment can stand as a catalyst for the embedding of data science technology into the Further Education sector.

### **Paradigm Altering Technology**

This analysis could not be complete without recognizing that other currently unknown paradigm changing technologies which are still in development or in use in other sectors such as technology, intelligence and marketing have the potential to revolutionise AHE delivery, learning and preparation for university. The methodology, the first part of which this thesis employs, explicitly allows for the development of these paradigm altering technologies, rather than only focussing on iterative gains to known technology and data science techniques. Experience simulation which makes experiential learning more egalitarian and which is possible using distributed systems computing for more granularly detailed experiences is one example [described above](#), but it may never mature, and likewise there could be many others.

## 5.5. Summary

This thesis has explored the AHE context and identified evidence of inequality in terms of the [sociodemographic makeup](#) of the student body and their [outcomes at HE](#). It has also highlighted a range of skills which appear to be more central to the AHE experience, such as [perception and identity change through the synthesis of new information](#) and [peer help seeking](#) than the term 'study skills', or the emphasis on skill development [in the curriculum](#) would suggest. In addition, some areas which have the potential to be addressed with the addition of data-Informed Andragogic tool development have been [identified](#). In order to facilitate the development of these tools, a [methodological approach](#) has been constructed and engaged with that aims to facilitate multidisciplinary teams from the diverse range of backgrounds necessary for the innovation to occur. Finally, [Reciprocal Equilibria](#) Grounded Theory has emerged which offers explanation for adult learning in the context of a co-dependent social network.

## Chapter 6: Conclusions

Chapter five answered the four research questions that this thesis poses, presenting the design principles which are distilled from analysis of the Practice Pattern corpus and the Reciprocal Equilibria Grounded Theory which emerged from this exploratory study into the AHE learning experience. Chapter six explores these findings and discusses their limitations, implications and contribution to knowledge.

### 6.1. Addressing Gaps in Knowledge

This thesis fills four key gaps in knowledge as it addressed each of the four research questions posed.

Firstly, as per the first research question, the study identifies that AHE provision appears inequitable in terms of the [sociodemographic makeup](#) of the AHE student body and as it pertains to [outcomes](#) and consequently serves as a call to action on the part of AHE providers and policy makers to address this. Adjunct to this, the lack of cogent data available for study is highlighted.

Secondly and related to the second research question this thesis poses, the study highlights a gap in expectations and skills between what AHE students need and what the AHE provision prepares students for, highlighting the need for



reform to address this issue.

Thirdly, through the instantiation of Reciprocal Equilibria theory in answering the fourth research question, the study highlights the need to [extend the study of andragogy](#) into the social networking space, to encompass not only the individual, such as psychology tends to focus upon (e.g. Martin, 2007), and not simply one relationship with another stakeholder such as the teacher-pupil relationship that pedagogy (e.g. Vandenbroucke et al., 2018 & Gastaldi, et. al., 2015) and teacher training (e.g. Johnson & Golombek, 2018) have traditionally rallied around, but the interplay between groups of students working together in a co-dependent environment to learn.

Fourthly, as it relates to the third research question, the study uses the first two vectors of the slightly modified Mor et. al. (2015) framework to carry out exploratory co-design work to establish nature of experiences and interactions experienced by AHE students. This led to the identification of a set of design predicates for Data-Informed Andragogy, which instruct the designer or developer to design with andragogic intent, to design with the social context in mind and to lay bare thinking processes to scaffold those for the learner such that they may develop their hypercognitive processing ability to the greatest possible extent through interaction with the thing being designed.

## 6.2. Applicability of Findings for Stakeholders

These findings are seen to be of interest to a number of groups. For each, their point of view will be taken, and the applicability of the findings applied to them.

Firstly and most significantly, for AHE students, this study identifies a sociodemographic skew which could help them to understand their context, and for staff and policy makers to predicate their differentiation of delivery and management upon a clearer understanding of the needs of the group, improving their experience as a result. Also, for the AHE student, this study sets out a model for understanding their behaviour on the AHE course as a function of a co-dependent social network. Exposing this way of viewing their social interaction has the potential to aid the development of hypercognitive processing skills as greater self-awareness is fostered. Finally, the work towards the second research question indicates some of the skills which are helpful for progression to higher education. Armed with this knowledge, the student may be able to better conceptualise their learning in terms of skills developed rather than artificial bounds set between subjects and modules on their course.

Secondly, tutors and other course staff involved with AHE, or similar provision seeking to investigate potential [innovations in their field](#), or who wish to understand their students' learning through [hypercognitive](#) and [social networking](#) lenses may

find this work enlightening. Note this study alone does not offer proof of which innovations will have the biggest effect size when developed, as this is clearly outside the bounds of the data analysed herein to predict. However, there is the opportunity to take the design predicates and work with those from other disciplines with a shared knowledge base to discuss potential routes for innovation in the AHE context. In addition, working with students in the classroom, this work has the opportunity to impact practice. Reciprocal Equilibria grounded theory conceptualises learning in a manner which is social in nature and describes student behavioural motivations in terms of management of a co-dependent social network. While the staff member is not a part of that network in the way that a student is, they can seek to model good practice, and the data show that students look to them as paragon exemplars of help seeking, time management and other behaviours.

By following the design principles as curricular and classroom materials are produced, staff could build into their delivery opportunities to make hypercognitive processing explicit to the group (from 'Make Thinking Visible), and consequently model effective hypercognitive development behaviour. They could work with students to scaffold the formation of the group social network (Design for the Social) with a recognition of its operation across subjects, curriculum modules and sessions. Finally, this study justifies the analysis pre-made materials and curricula from an andragogic perspective ('Design with

Andragogic Intent'), to ensure that it is as suitable for the adult learner as possible.

One of the stated aims of this study was: 'Exploring the experience of the Access to HE student'. While the intent of this exploration was to inform future research, design and development work to improve AHE for participants, given the dearth of insightful material about the AHE experience that is available, an unintended side effect of this study has been the collection of arguably the most comprehensive corpus of student commentary on their AHE provision that is currently available in the public domain. With the study being exploratory, qualitative and using ethnographic methods, the student voice is presented in those students' own words where possible.

Consequently, this study could inform the expectations of prospective AHE students should they wish to learn more about what it feels like to be one before applying and experiencing it for themselves.

As the literature review showed, equality of opportunity in education has been a stated aim of the Government in relation to participation in higher education since the 1980s, and this is reflected in the broadening of subject areas available to study on AHE, the development of the regulatory framework and other innovations in the policy landscape since. Thus, policy makers who are exploring equality in this way may find the content of this study enlightening as to the lack of comparative study that has been done between different educational routes to higher

education, and the changing picture of skills that are required for that study.

This study justifies the need for an andragogic approach to AHE provision that goes beyond a 'one size fits all' approach that has been taken in the past to the consideration of AHE in the wider FE and adult learning ecosystem. This has policy issues as well as learning design ones, because it challenges policy makers to construct that policy with a more nuanced view of the Further Education student population.

Finally, if a policy designer is looking to improve performance in one of the areas identified by this thesis as ripe for innovation, such as the personalised assessment of the student experience on a more granular level, then this study provides an imperative to engage with the issue bringing novel data-analytic techniques to the fore, and to work to factor data science practice into the architecture of the further education institution.

For regulatory bodies of provision such as AHE, this study identifies several factors which should be considered. Firstly, that the curriculum design which constructs provision as highly modular carries with it challenges with creating a broad learning narrative for students as they look to develop their skillset prior to attending higher education. Secondly, that the way in which study skills has been traditionally constructed is changing with student need, and so provision which claims to build those skills must assure itself that it is doing what it

claims in a contextually specific manner.

For Data Scientists and designers, this study offers the chance to better understand the adult learner and to conceptualise their learning via social equilibria theory which accords with other areas that many data scientists and designers will have worked in such as online social networking, e-commerce and user interface design. Some possibilities for future development are identified, but more significantly, there is a set of design predicates from which to work to progress from ideation to requirements engineering activity.

For multidisciplinary teams of researchers, designers and developers, this thesis uses and slightly modifies the Mor et. al. (2015) framework for participatory design. This can therefore stand as another example of the employment of the framework, and also for those looking to develop on the basis of the design principles presented herein, they have been built using a methodological framework which is designed to facilitate multidisciplinary working while valuing the theory and epistemological approaches of such a diverse group of stakeholders.

Finally, for researchers working on understanding intellectual development in adults from a post-Vygotskian, neo-Piagetian point of view (Cook, Santos & Griffin, 2015) that is founded in practical context such as Cook et. al.'s Hybrid Social Learning Networks (2015) and those looking to integrate technology with social educational practice in a more meaningful way as framed

by Holley (2019), this study offers a novel theoretical marrying of hypercognitive theory to the debate and draws links with a concrete situation, that of AHE provision to identify and delineate its application.

### **6.3. Implications**

This thesis has four implications for those interested in employing this knowledge in a practical setting, one for the integration of data science into education and one for the advancement of educational theory. The first andragogic implication for the design and delivery of AHE provision is that what the AHE curriculum (QAA, 2013) labels 'study skills' could benefit from refactoring. This thesis does not make a determination about whether or not provision should be discrete or embedded, but it does explore the experience of learners, who [describe cognitive dissonance](#) between their expectations of AHE and their experience of discrete study skills delivery and it does identify [a disparity](#) between what they think they most need and what they actually need. Consequently, either bringing a more pertinent description of study skills into the curriculum or adjusting that curriculum to test for and value a broader range of skills has the potential to be a positive outcome for learners in terms of the extent of their preparation for university.

The second implication of this work is the identification

of the issue surrounding the time between diagnosis of student needs and intervention to address those. This was one of the primary reasons that data science techniques were deemed potentially valuable to adult education, and AHE in particular. The implication here is that data science techniques as they apply to AHE should be explored.

The third andragogic implication is that provision needs to be designed for adults, rather than designed for children and young people and then adapted for Access students. Participants discussed various experiences of finding that this was the case, from the design of the library space to the classroom activity expected of them during discrete study skills delivery.

The fourth andragogic implication of this thesis relates to hypercognitive skill development. The first step in allowing a student to reflect upon their executive functioning is to expose those thought processes to them. Thus, an implication of this work is that if these thought processes can be made visible to the student, they can develop agency over them and make conscious decisions about their learning, with a better understanding of why they are doing what they are during their study.

The call to move towards the embedding of data-informed andragogy has implications for data science practitioners and educationalists alike. There are two possible ways that these divergent areas of expertise can be drawn together in the mid-



term, either educationalists learn data science or vice versa, or both professionals must work in an increasingly multidisciplinary team for the delivery of the best educational experience. This thesis has aimed to [facilitate the second](#), but whichever proves dominant, there is [great potential for value to be gained](#) by doing so.

A practical implication of [Reciprocal Equilibria Theory](#) is its implications for measuring and understanding learning in practical contexts. Reviewing the behaviour of a single student from a class and then adjusting delivery to suit each of them as a result is a challenging thing for a tutor to do given how challenging it is even to predict success with accuracy (Jussim & Eccles, 1992). Doing so not only for each student but factoring in the co-dependent network within that is vastly more mathematically complex given that modelling the social relationships as each student sees them increases in complexity cubically (for  $n$  students, the number of social relationships to factor in is  $nn(n-1)$ ). The implication of this is that systems which undertake some of that analytical load using data science techniques such as [clustering, profiling and link reduction](#) to reduce that information to a human comprehensible level and to investigate it in a more targeted fashion than a brute force approach it has the potential to provide insight into the learning of a group which transcends the value offered by the assessment of each student in isolation.

Reciprocal Equilibria Theory has implications in a theoretical sense for the understanding of learning. It raises the spectre of the applicability of Cooperative Game Theory and Economic Theory to the andragogic context to understand learning. If applied understanding of group functioning can inform andragogic practice, then they could provide valuable insight into the functioning of AHE student groups. More specifically, in terms of Game Theory, further exploration of the conditions within which game states are met most effectively such as those Slikker and Nouweland (2001) discuss, have the potential to offer information to the andragogic practitioner about qualities of facilitative learning environments. In terms of economic theory, the Myerson-Shapley principle has not been considered in relation to maximising learning among adult learners in a cooperative social structure, and with the body of work available on the principle, if learning is conceptualised in the way Reciprocal Equilibria theory does, it opens up the opportunity for insight to be gained from this voluminous body of research from the likes of Kirman, Giansante, & Pin (2007) and Khmelnitskaya, et. al. (2016).

#### **6.4. Limitations of This Thesis**

The limitations of this thesis are important to note as they temper the breadth of applicability of its output.

Firstly, this thesis did not set out to make generalisable conclusions about AHE students. However, the [grounded theory which emerged](#) would be strengthened by evidence of causation. In addition, while Reciprocal Equilibria Theory may apply to AHE, this study offers no evidence of a broader applicability to adult education or beyond. In addition, it assumes that children and adult learners are different because of their age rather than because of other factors, an assumption that is borne out by the body of andragogic literature, but raises questions none the less about the way in which the adult learner is conceptualised compared with the child and where common ground can and should be found for the purposes of designing and running effective FE institutions. On the other hand, the work conducted for this thesis offers illustration of the AHE experience in way that a positivist approach with a larger sample size could not have done even notwithstanding resource constraints.

Secondly, the thesis offers principles for design, rather than a set of engineered requirements. The scale of the sample that was drawn upon for data collection will not be conducive to generalisation and neither is this a stated aim of the work: It is exploratory in nature in order that the most important issues may have an opportunity to emerge for future consideration at the requirements engineering stage of development activity.

Another limitation of the thesis is that it doesn't speak to the veracity or morality of the data sources used to create data enriched tools. Given that many of the algorithms to interpret that data will be 'black boxed' (Browniee, 2014), it is difficult or impossible to tell if it is doing what a user anticipates (Knight, 2017). As such, it is imperative that there is an accounting of data sourcing and hygiene, so that causation can be explored, and users may be protected from abusive manipulation. This thesis considers accounting for this to be a part of the requirements engineering activity which would need to take place following the establishment of design principles and as such leaves that accounting up to those building on this work to manage. This is so that the framework developed may be as open as possible to hitherto unconsidered innovation and to reduce the scope of consideration to an appropriate size.

There are also some limiting considerations of the slightly modified Mor et. al. (2015) Data-Informed Andragogy framework this thesis employs for the co-design portion of the ethnographic data collection it undertakes. Firstly, it is not a rigid quantitative structure. This is deliberate, in that it embraces the lack of homogeneity in the diverse range of professionals who would be coming to the work, but provides guidance for others to prioritize research, design and development work. In this way this thesis avoids one of the pitfalls levelled at Knowles' Andragogy by Sandlin (2005) and

at Design-Based Research by Mor et. al. (2015) of being slave to a-priori dogma. However, it is important to consider the bounds that this sets upon the data accrued and analysis completed, nevertheless.

Another critique of the methodology used is that it is reductionist because whenever limitations are placed upon adherents' behaviour in the design process, there is the potential for fidelity to be lost. This is relevant for the work of this thesis in two ways. Firstly, at the point of theoretical application and secondly at the point of design. That said, there are design professionals who argue that there is benefit to this kind of restriction of action that can lead to more effective innovation such as Arrighi, Le Masson, & Weil (2015).

This thesis does not use the second phase of the slightly modified Mor et. al. (2015) Data-Informed Andragogy framework in practice and therefore does not demonstrate its veracity as a design and development tool to the fullest extent. Despite being carefully built upon study of the range of approaches the professionals involved in data-informed andragogy take, it doesn't conclusively demonstrate its implementation. This is partially true for the first phase as well: although it was carried out, it was between the researcher (an educationalist with expertise in data science, research, design and development work) and participants, rather than with a fully multidisciplinary team. Thus, although the method

demonstrated its veracity in terms of producing actionable design and development intelligence through the narrative-pattern-principle process, it does not explore the ability of the participants to converge lexically, share understanding or function optimally in conjunction with one another.

Another limitation of the methodological framework used by this thesis for design principle development is that there is a cost to introducing such a framework into a research and design project. This cost is apparent in terms of the time it takes members to get acquainted with it, and this will be relevant for someone choosing to build upon these design principles. In addition, the reassessment of the success or shortcomings of the methodological approach is an ongoing cost in addition to assessment of the project output that will likewise be placed upon the users of these design principles. As Heidegger (1994) put it, there is a cost of moving a technology 'Forhanden', 'Zuhanden'. It is the contention of the researcher that this cost represents an investment that will pay back dividends as it facilitates multi-disciplinary working in further design and subsequent development work.

## **6.5. Further Work**

Further work that would progress knowledge in the area of enquiry this thesis encompasses includes collecting a sample from a broader range of institutions would better capture the

AHE experience across the gamut of the AHE population. Although this thesis doesn't identify this as a confounding factor as it was outside of the scope of investigation, comparison with an institution in which there is less cohesion among AHE student groups for example, could offer insight into the way in which students' relationships with their peers across their reciprocal social network operate, and consequently could shed further light on Reciprocal Equilibria theory specifically and adult learning more generally.

In order to get a wider view of the AHE population, were this data collection to be carried out again a change could be made to make this wider view possible. Following the observation that students were keen to sign their names to narratives they felt were particularly poignant, the researcher would have asked all participants who reviewed the narratives to do so, and would have used them as a survey tool to reach broader sample of AHE students to learn which they best associate with to establish a more nuanced picture of which narratives participants feel are central and which are more peripheral to the AHE experience.

While this thesis posits Reciprocal Equilibria Theory, there are several aspects of it which would benefit from further confirmation and investigation. For instance, a more detailed exploration of student help-seeking behaviour with co-dependent course mates as opposed to those outside of that social network structure could help to delineate the impact of

the need to balance reciprocal equilibria in comparison with other options. In addition, a wider survey of adult learners could investigate whether this model of co-dependent help-seeking and negotiation is present in other learning populations, making it applicable outside the realm of AHE alone.

Lastly, an area where this work could be built upon is that which studies or tests the implications that Reciprocal Equilibria theory has when modelled with techniques which have not been concertedly applied to an AHE setting before such as Game Theory and economic modelling. Further work would begin by establishing which models best integrate with andragogic theory and then testing the use of these to offer predictive power over student behaviour.

## **6.6. Contribution to Knowledge**

This thesis makes three theoretical and two practical contributions to knowledge detailed below.

Henschke (2013) represents the most thorough accounting of andragogy and hailed the potential for andragogic study to shed light on the tutor-student relationship as a core conclusion. However, this thesis highlights the need to conceive of an andragogy which reaches beyond the proto-pedagogic desire to focus on a single relational axis and towards a view which fully embraces other learners as



legitimate actors in the course of learning, more than Vygotsky's (1978) knowledgeable other facilitating the learners' proximal development, and towards a view of learning as a group activity that is inherently social.

In terms of intellectual development, this thesis demonstrates the application of Demetriou et. al.'s (1993) theory of hypercognition as a way of viewing and comprehending adult learning. Although this has been both conceptualised and applied previously (Demetriou and Bakracevic, 2009 & 2011), it nevertheless adds to the body of evidence that hypercognition is a valuable lens through which to conceptualise adult learning which holds explanatory power.

Philosophically, this thesis addresses Cook's call to action around [Hybrid Social Learning Networks](#) (Cook et. al. 2015) by raising neuroethical questions in in the process of transcending traditional views of learning and in so doing align learning networks with Levy's (2007) 'Ethical Parity Principle (Weak)'. This association shows the value of the Reciprocal Equilibria concept instansiated through grounded theory analysis, as a novel way of conceptualising the learning process which addresses some of the concerns of modern andragogy that the extended mind hypothesis has brought to the fore (such as those discussed in Yacci & Rozanski, 2012). This raises questions relevant to Neuroethicists about the way in which learning should be conceptualised, assessed and its participants protected as their learning, data and

social interaction become less discretely bounded.

Practically, this work provides design principles to guide the design and development of such tools into the AHE context and describes some design and development opportunities, and a theory of adult learning which has classroom-level application for the educationalist who wishes to apply it to learning and curriculum design and delivery.

In addition, this thesis demonstrates the use of a theory-grounded methodological framework designed for the development of data-rich andragogic tools, which allows coherent follow-on activity for the diverse professionals from research, design and development backgrounds who are needed to produce such tools to work together with stakeholders in the educational context to implement real-world innovations in the andragogic space.

## **6.7. Conclusion**

This thesis has identified evidence of a sociodemographic skew in the AHE population compared with others looking to attend university level study. It recognised the differential in achievement and progression experienced by AHE students in relation to their peers too, due to a mismatch between the skills the student values the most and those central to achievement at HE level. This identifies the need for better data collection and reporting from which comparative analyses

may be constructed. This aim was the reason that the study took an exploratory stance and looked to develop design principles to aid in the development of data-informed andragogic tools to address these inequalities. Design principles developed firstly called for design to be undertaken with andragogic intent, as opposed to accepting a one-size-fits-all approach to tools designed in pedagogic environments. In addition, it identified two further design principles with which data-informed andragogic tools could be developed and deployed: '[Design for the Social](#)' and '[Make Thinking Visible](#)'. Design for the Social situates an andragogy in the social network that the learner operates in as a novel way of viewing learning. Make Thinking Visible is based on the value of hypercognitive intellectual development to the student as fundamental to the understanding of their educational experience. Alongside these design principles, the work has identified [design opportunities](#) for the application of data science techniques in what this thesis terms 'Data-Informed Andragogy', which have the potential to address some of the challenges faced during the delivery of AHE. To this end, a [methodological framework](#) was chosen and modified to best facilitate a range of professionals and users to work together in co-design to produce data-rich andragogic tools on the basis of these design principle predicates. Finally, this study instantiates the Grounded Theory '[Reciprocal Equilibria](#)' which developed from the ethnographic

study the thesis undertook. This states that students learn on AHE provision in the context of a co-dependent reciprocal help-seeking social network. This theory has synergy with Hypercognitive theory as well as the data collected for this study and opportunities to further develop this as a framework for andragogic assessment of the learning experience could hold context-sensitive explanatory power.

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# Appendices

## 1. Glossary

**AHE:** Access to Higher Education - A UK based program for predominantly mature learners to gain the requisite qualifications for acceptance to a higher education-based course of undergraduate study.

**A Level:** Alternatively 'Advanced Level', a set of UK qualifications which are typically undertaken by those aged 16-18 years old, which allow progression to employment or university level study. They represent the most popular route to higher education for UK students. See UCAS (2019) for further information

**Data-Analytic Tool:** In the context of education, a device (hardware, software or algorithm) which draws upon sources of data to enhance the user's experience of learning either by visualizing that data in such a way as the user can benefit from it or by employing insight from that data to enhance some area of the user's educational experience.

**Data Science:** The multi-disciplinary study of the collection and analysis of data and data handling techniques which transcends traditional statistical modelling and draws upon related fields such as machine learning and predictive analytics.

**Further Education (FE):** a portion of the UK education sector which incorporates delivery of provision from basic skills for life training through to delivery of university affiliated degree level courses. Most AHE provision is delivered by Further Education organisations called colleges.

**Higher Education (HE):** university level provision (National Qualification Framework Level 5 and greater)

**Hypercognitive Skill Set:** Originally described in Demetriou, Efklides, & Platsidou, (1993), those skills associated with the umbrella 'hypercognitive' system, associated with collecting information from Specific Semantic Systems and synthesizing that such that the person can solve novel problems or plan activity.

**Learning Journey:** In an andragogic context, an adult exploring something new and taking away ideas or knowledge from that experience which changes them. The most measurable manifestation of this process is in the impact factors of the experience which lead to hypercognitive and specific semantic skill development see the [literature review](#) for further discussion.

**Learning Management System (LMS):** See Virtual Learning Environment (VLE).

**MVP:** Minimum Viable Product - in software development parlance this refers to the first delivered iteration of a software product delivered in an agile environment.

**Peripheral Learning Opportunity:** Those learning opportunities which are available but are not central to the AHE curriculum

provision, e.g. the use of a Massive Open Online Course to learn programming, to complete a design module assignment or gaining access to discussion on social media about an experiment's ethical implications.

**PPD:** Patterns of Practice Design Framework, a methodological framework developed by the author of this thesis and used as a basis for the framework developed for AHE provision to develop data rich learning tools.

**Specific Semantic System (SSS):** A construct within Demetriou, Efklides, & Platsidou's (1993) model of intellectual development which deals with a task (for instance forming language or understanding causality). These may be better understood as kernels rather than finite descriptions of entire systems, as while the core of them is highly tailored to that system function, there is some overlap on the periphery of those systems with one another. This overlap is part of what enables people to synthesize information between systems to create novel constructions by means of the hypercognitive system.

**Tool:** In this context, a tool is any product of research, design and development work, be that software, hardware or behavioural intervention that has an impact upon learning.

**UWE:** The University of the West of England, Bristol, the accrediting organisation for this thesis.

**Virtual Learning Environment (VLE):** An online location, usually run on an intranet that is specific to the organisation which contains a repository of course-specific information and allows

for the possibility of collaborative online working.



## 2. Participant Introductory Letter



James Griffin  
University of the West of England  
ACE Department  
E Block  
Frenchay Campus  
Coldharbour Lane  
Bristol  
BS161QY

Dear Student,

I am a student, completing my PhD with the University of the West of England, Bristol from November 2015 to June 2018. As part of this I am looking to recruit students like yourself to participate in my research between November 2017 and January 2018, into the ways that adults learn. The title of my research is:

"Investigating and Facilitating Data-Informed Andragogy to promote Quality and Equality for Digital Learners."

Attached with this letter is a participant information sheet which clarifies what I am looking for participants to do, please read and consider whether or not you would like to participate. Should you be happy to, please sign and complete the form below to confirm your initial consent for participation. Please note that you may withdraw at any time during the study, regardless of signing this form.

Many thanks for your time in reading and reviewing these documents,

Yours Sincerely,

James Griffin

### 3. Participant Consent Form

## Participant Consent Form

I, the undersigned participant, confirm that (please tick box as appropriate):

1.	I have read and understood the information about the project, as provided in the Information Sheet dated _____.	
2.	I have been given the opportunity to ask questions about the project and my participation.	
3.	I voluntarily agree to participate in the project.	
4.	I understand I can withdraw at any time prior to the completion of the data collection phase detailed on the aforementioned information sheet without giving reasons and that I will not be penalised for withdrawing nor will I be questioned on why I have withdrawn.	
5.	The procedures regarding confidentiality have been clearly explained (e.g. use of names, pseudonyms, anonymisation of data, etc.) to me.	
6.	The use of the data gathered as part of this project in research, publications, sharing and archiving has been explained to me.	
7.	The scope of the use of my data obtained online has likewise been explained to me.	
8.	I understand that other researchers will have access to this data only if they agree to preserve the confidentiality of the data and if they agree to the terms I have specified in this form.	

### Participant:

\_\_\_\_\_  
 Name of Participant      Signature                      Date

### Researcher:

\_\_\_\_\_  
 Name of Researcher      Signature                      Date

## 4. Participant Information Sheet

## Participant Information Sheet

### The official title of this study is:

Investigating and Facilitating Data-Informed Andragogy to promote Quality and Equality for Digital Learners.

This simply means that this research wants to understand how the modern student so that we can support that by inventing tools which take away barriers to learning and enable students and tutors to understand their students better.

We would love to have you take part in this research study. Before you decide you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully. Ask questions if anything you read is not clear or would like more information. Take time to decide whether or not to take part.

### What is the purpose of the study?

I am carrying out this research as part of the study towards my doctorate (PhD). More importantly however, the primary purpose of this study is to understand what can be done to help you and others like you to learn better and have a more fulfilling experience as you study. A lot of researchers aren't interested in people like you who are thinking about going to uni but having worked teaching and managing courses like yours for many years, we understand what determination and motivation you need in order to achieve your dreams and goals. We want to make some tools which will help people in your situation to learn better by drawing upon sources of data which aren't currently used such as social media activity and how someone researches an assignment topic online. We can't tell you exactly what those tools will look like yet, that depends upon what we learn from you as to what is needed. We hope that we can work together initially to explore the areas in which you may find barriers to your learning and how you go about studying. Then, once this has been fully assessed, one or more tools will be made, and we will bring prototypes back to show you or have you test and get your feedback on.

### Why have I been invited?

We are interested in you being involved in this study because you are considering attending university in the relatively near future. We hope we can get a range of people of each gender and from a range of ethnic groups: Basically, we want to represent the diversity of people in your position in the study so that as many different perspectives are considered as possible.

### Do I have to take part?

It is up to you to decide. We will describe the study and go through this information sheet. Once we have answered any questions you may have, we will then ask you to sign a consent form to show you agree to take part. You are free to withdraw at any time during the tasks we will do together, without giving a reason: Participation is entirely voluntary. Should you choose to withdraw during the completion of a task then your data from that task will be removed from consideration and disposed of according to the Data Protection Act (1998).

### What will happen to me if I take part?

To begin with you will be involved in some focus group discussions: This is where you speak to a researcher in small groups so that they can ask you some questions about your experience. We will be exploring what barriers you face in your study and what it is like to be on your course, doing what you are doing. If there are particularly important things discussed with you that I think it would help to delve into more deeply, then I may ask you to meet with me for a one-to-one interview. For the focus group and any interviews, I would give you a list of questions in advance, so you aren't blindsided by them and you feel comfortable answering them. Following this, I shall come back to your college to show you a tool that I have made which I think could help you in your study, and either demonstrate it or have you use it to see what you think. How your feedback is collected will depend upon the nature of the tool with which we are working but may involve more focus group work as in the first part of the study, questionnaires or tests to measure the impact of the tool. Of course, the results of any of these things will be kept confidential. I will then use the results of that to improve it until it is something that is genuinely useful to you and others in your position. It might take me several tries to get it right for you, and as such I could bring you prototypes to play with several times. Of course, it remains entirely up to you as to whether you want to participate in any of these short meetings. I will leave you my contact details in case you want to follow up anything with me after we meet.

Each of these meetings will be recorded, and so it is important that you know this. These recordings will only be used by me for the purposes of this thesis work: The recordings will not be made public, published or otherwise distributed beyond those who are a direct part of this thesis study (i.e. my supervisors). I will keep your details on file so that if it would be useful for research

purposes to use this footage anywhere else, I would be able to contact you to gain your specific agreement before doing this. Should that not be possible then any footage will remain unused.

Use the most appropriate format to demonstrate their involvement (diagrams/tables). The detail will depend on the complexity of the study. It may help if the information is displayed in a flow chart or grid indicating what will happen at each visit, where appropriate.

#### **What about money?**

There is no offer of money or goods in exchange for your participation: It is important to me that any involvement you have with me over this study be entirely voluntary. If my research impacts on you in terms of travel arrangements or in some other way, then please make me aware of it so that appropriate and reasonable expenses can be covered.

#### **What are the possible disadvantages and risks of taking part?**

There shouldn't be any negative effects from taking part in the study. It will be carried out in your college environment and should you find yourself concerned in any way about your learning or your experience in the study, then either I or one of your tutors can point you to support that meets your needs.

#### **What are the possible benefits of taking part?**

We cannot promise the study will help you but the information we get from the study will help to increase the understanding of how students like yourself learn, and how we can work to improve that experience. We are carrying out this research ultimately because we want it to help people, and as such we will make sure that any reasonable effort is made to share, any insight or tools created from the study which could help you.

Of course, there is another benefit here: Many of you will be wanting to go on to do some amount of research for your university course, and it has the potential to be a useful learning experience to be a part of a study such as this. Should you like to know more about the research experience, please do ask.

#### **What if there is a problem?**

If you have a concern about any aspect of this study, then in the first instance, you should ask to speak to the researchers who will do their best to answer your questions. They can be reached through [james11.griffin@live.uwe.ac.uk](mailto:james11.griffin@live.uwe.ac.uk)

If you remain unhappy and wish to complain formally you can do this through... *<add appropriate contact details of college at which the primary data collection is taking place in consultation with the relevant student support professionals>*.

#### **Will my taking part in the study be kept confidential?**

The information that comes from this will not be fed back to anyone else at the college, neither will it reflect badly upon you or the institution: We are simply looking to make the best tools possible to help with your learning. Any data produced from this research will be anonymised so that neither you nor any of the participants may be personally identified in any publication associated with the project. We will do this by coding the data with participant numbers known only to the researcher themselves. Any data produced will be handled, processed, stored and destroyed in line with the Data Protection Act (1998). Your contact details will likewise be handled according to the act and will not be passed on to any third parties but stored in an encrypted file by the researcher for three years following the study before being destroyed. This will additionally be password protected and only the researcher will have access to this password.

#### **What will happen to the results of the research study?**

With your permission we will let you know of any results as they are published, so that you can see what effect being a part of the study has had. We always welcome any feedback you may have on these findings should you wish to offer it.

#### **Who is organising or sponsoring the research?**

This is a piece of self-funded research, completed in conjunction with the University of the West of England, Bristol. As such there is no company looking to make a profit from the study: We are doing this simply to help people learn more effectively.

## 5. Accepted Application for Ethical Approval





- The topic merits further research;
- The student has the skills to carry out the research;
- The participant information sheet is appropriate;
- The procedures for recruitment of research participants and obtained informed consent are appropriate.

## PROJECT DETAILS

Project title	Investigating and Facilitating Data-Informed Andragogy to promote Quality and Equality for Digital Learners.		
Is this project externally funded?	No		
If externally funded, please give PASS reference			
Proposed project start date	November 2016	Anticipated project end date	July 2017

## DETAILS OF THE PROPOSED WORK

### 1. Aims, objectives of and background to the research

*This should provide the reviewer of the application with sufficient detail to allow them to understand the nature of the project and its rationale, in terms which are clear to a lay reader. Do not assume that the reader knows you or your area of work. You may provide a copy of your research proposal in addition to completing this section.*

Following a literature review, the following questions appear relevant to the improvement of adult learning in the context of those looking to develop the requisite skillset to progress to higher education. As such they form the principle research questions of this thesis

1. How can we **bridge the gap** between the **skills** learners arrive with and skills students need in order to access higher education?
2. How can we **bridge the gap** between learner **expectations** and provision?
3. What mechanisms can provide effective approaches to addressing the above questions? Specifically, can data gathered from currently untapped sources such as social media and management systems be used to underpin intervention (what I call 'Data-Informed Andragogy') answer the above questions and hence meet the aims of the thesis?

A number of advances have been made in terms of a dramatic increase in the breadth of learning opportunities now available to a learner online (O'Prey, 2013). As such, it is unsurprising that the skill set required to access those learning opportunities has also diversified to include skills such as a predilection towards self-determined intrinsic motivation (Hartnett, St. George, & Dron, 2011), time management (Nawrot & Doucet, 2014) and effective forum use (Milligan, 2015). These research questions aim to explore the extent to which skill development can be built into the student's learning experience using Data-Analytic Thinking. To clarify some of the terms therein: Data-analytic thinking is the process of constructing a view of a phenomenon or context by considering the predictive and descriptive power of the data available which speaks to that phenomenon or context primarily when problem solving or innovating (Provost & Fawcett, 2013) This underpins the concept of 'Data-Informed Andragogy' referenced in research question 3.

As a piece of Design Based Research, the exact form of the design principles produced by the research efforts is determined by the data collected from and with participants. Assuming that the research findings indicate as such, credence may be given to the concept of Data-Informed Andragogy as a broadly applicable source of insight that transcends temporality in the pursuit of quality and equality in andragogy.

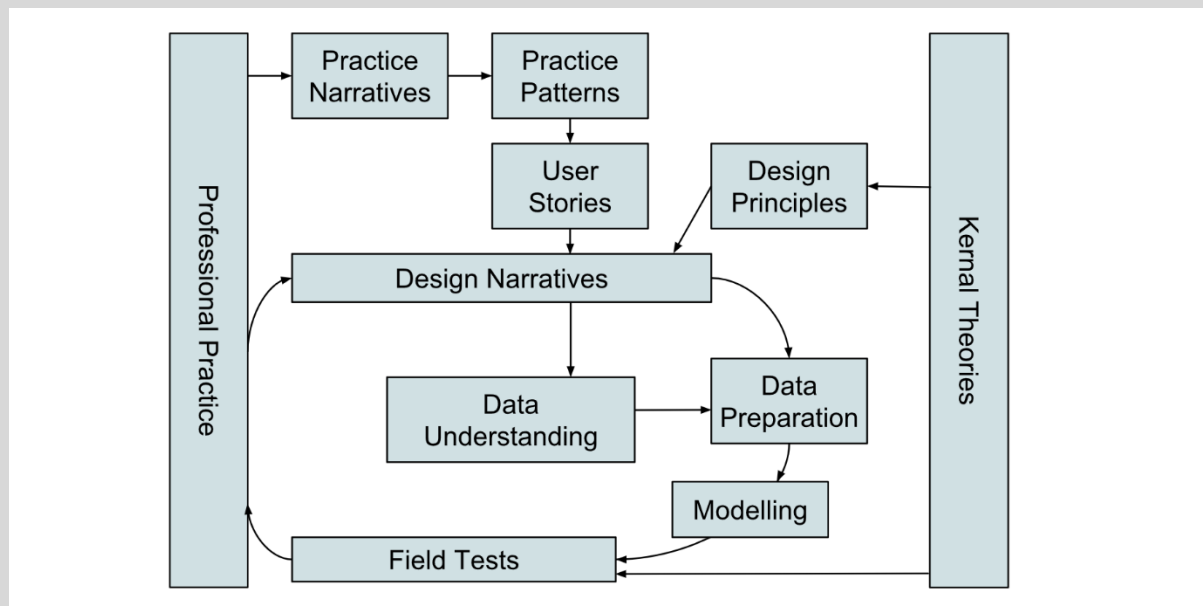
### 2. Research methodology to be used

*You should explain how you plan to undertake your research. A copy of the interview schedule/ questionnaire/observation*

*schedule/focus group topic guide should be attached where applicable.*

This thesis proposes to address the research questions posed through the adaption of an innovative organisational tool called 'Bits and Pieces' (code repository at <https://github.com/learning-layers/BitsAndPieces>) which will draw upon self-report data and data science techniques to inform the design and underpin its function. This will be explored with potential end users to substantiate the development of data-informed design principles. In order to do this, a methodological framework is needed which combines contemporary data science methodology, the hypothetico-deductive tradition and software tool design methodology. It aims to draw on their respective strengths while simultaneously assuring academic rigour and a basis in educational practice. Thus, the methodological framework that this project will use is shown in the diagram below. This methodological construction draws strongly upon the Pattern Based Design Framework for Enquiry (Mor, Cook, Santos, Treasure-Jones, Elferink, Holley and Griffin, 2015), and the predominant methodological model employed in Data Science (the CRISP-DM model, Shearer, 2000).

Framework for Enquiry (Adapted from Mor et al., 2015 and Shearer, 2000)



The exact implementation of each of these stages is expanded upon in the attached Document entitled 'Employment of the Framework'. However, in summary, and for the purposes of assessment of the methodology for ethical rigour, the following primary research techniques will be employed during the project:

Phase One:

1. Practice narratives will be constructed based upon an autoethnographic assessment and focus group meetings.
2. Practice patterns. This is a design activity stage, so there will not be a primary data collection element to it. There needs however to be the opportunity to briefly follow up upon the findings of the focus groups with members of those groups for clarification assuming that they have given their fully informed consent to such activity. This will enable the seven principles of pattern development as laid out by Mor (2013) to be adhered to.
3. User Stories. This stage will involve an in-depth interview with several individuals whose experience can speak to the understanding of the patterns formed in the previous stage. The interview schedule for this will be constructed based upon the results of the pattern development, but the content is not expected to transcend the bounds of the topic guide for the focus groups and autoethnographic activity which is attached to this form.

Phase Two:

This is an iterative loop that mirrors the hypothetico-deductive method and that also draws upon agile principles of rapid prototyping and a workflow which will be familiar to data scientists. There will be some amount of work with participants in terms of demonstrating high fidelity prototype versions of the 'Bits and Pieces' software package. This activity will involve looking at sources of data produced by students (their twitter feeds) and preparing that data along with comparative data collected through an adapted version of the 'Bits and Pieces' software tool for metacognitive organization in order to build a picture of their learning that has the potential to be useful to them. This process of design and testing will iterate as needed in order that this software tool be developed and improved for the target population of this study (students looking to access Higher Education).

## 1. SELECTION OF PARTICIPANTS

You must indicate if any of the participants in your sample group are in the categories listed. Research involving adult participants who might not have the capacity to consent or who fall under the Mental Capacity Act must be reviewed either by an NHS Research Ethics Committee or the [National Social Care Research Ethics Committee](#).

If your proposed research involves contact with children or vulnerable adults, or others of the specified categories below, you may need to hold a valid DBS check. Evidence of a DBS check should take the form of an email from the relevant counter signatory confirming the researcher has a valid DBS check for working with children and/or vulnerable adults. It is the responsibility of the applicant to provide this confirmation.

Members of staff requiring DBS checks should contact Human Resources [hr@uwe.ac.uk](mailto:hr@uwe.ac.uk). DBS checks for students are usually organised through the student's faculty, but students in faculties without a DBS counter signatory should contact Leigh Taylor ([Leigh.Taylor@uwe.ac.uk](mailto:Leigh.Taylor@uwe.ac.uk)).

**Will the participants be from any of the following groups? ('x' as appropriate)**

- Children under 18\*
- Adults who are unable to consent for themselves
- Adults who are unconscious, very severely ill or have a terminal illness
- Adults in emergency situations
- Adults with mental illness (particularly if detained under Mental Health Legislation)
- Prisoners
- Young Offenders
- Healthy Volunteers (where procedures may be adverse or invasive)
- Those who could be considered to have a particularly dependent relationship with the investigator, e.g. those in care homes, medical students
- Other vulnerable groups
- None of the above

\* If you are researching with children please provide details of completed relevant safeguarding training.

**If any of the above applies, please justify their inclusion in this research.**

n/a

**2. Please explain how you will determine your sample size/recruitment strategy, and identify, approach and recruit your participants. Please explain arrangements made for participants who may not adequately understand verbal explanations or written information in English**

*In this section, you should explain the rationale for your sample size and describe how you will identify and approach potential participants and recruit them to your study.*

A combination of opportunity and snowball sampling methods will be used. The author has many contacts in the further education industry and as such the students and staff who will be included in the focus group, chosen for follow-up interview or who will test out the tools developed will be sourced through those contacts. These participants will be volunteers aged 18-65, sourced from a range of local further education establishments and through discussion with APT Awards, an examining body. Those students selected will not be considered at risk or vulnerable by the institutions from which they are recruited and where staff are brought into the study, this will be on a voluntary basis and with full expectation of their right to withdrawal. The initial two focus groups will consist of no more than a dozen students and staff and the software testing process in phase two is expected to draw upon feedback from a wider range of volunteers ;

it is implemented in teaching situations by staff participants.

### **3. What are your arrangements for obtaining informed consent whether written, verbal or other? (where applicable, copies of participant information sheets and consent forms should be provided)**

*Informed consent is an ethical requirement of most research. Applicants should demonstrate that they are conversant with and have given due consideration to the need for informed consent and that any consent forms prepared for the study ensure that potential research participants are given sufficient information about a study, in a format they understand, to enable them to exercise their right to make an informed decision whether or not to participate in a research study.*

*You should describe how you will obtain informed consent from the participants and, where this is written consent, include copies of participant information sheets and consent forms. Where other forms of consent are obtained (e.g. verbal, recorded) you should explain the processes you intend to use. If you do not intend to seek consent or are using covert methods, you need to explain and justify your approach. Please consider carefully whether or not you need to seek consent for archiving or re-use of data.*

All personal and institutional names will be kept confidential. Institutional pseudonyms/numbers will be used. I will provide assurances confidentiality to interviewees both before and after the interview and in the initial correspondence. In recruiting participants, I will first send a formal letter asking for their participation in the study. In order to participate they will need to provide a signed copy of the consent form attached. This details the potential effects of the study, its aims and objectives, participants' unconditional right of withdrawal prior to the completion of the data collection activity, contact details for sources of support or if they wish to feed back on the process and plans for the storage and use of the information collected. As such it provides an opportunity for fully informed consent to be sought.

### **4. What arrangements are in place for participants to withdraw from the study?**

*Consent must be freely given with sufficient detail to indicate what participating in the study will involve and how they may withdraw. There should be no penalty for withdrawing and the participant is not required to provide any reason.*

*Please note: allowing participants to withdraw at any time could prejudice your ability to complete your research. It may be appropriate to set a fixed final withdrawal date.*

Participants will be fully briefed as per the briefing document which can be found in the appendices. Any confusion or concerns over this will be discussed verbally between the participant and the researcher. This document includes detailed information about when a participant may withdraw (at any time or up to the completion of the data collection activity).

Topic guides or Interview questions will be provided to each participant as appropriate several days before each data collection activity to enable each participant to reflect upon his/ her experiences and prepare for it.

Interviews will be approximately 1.5 hours in length and will be conducted in person, on Skype or by telephone depending on feasibility. Permission to digitally record each interview will be sought from each participant. Participants will have completed a fully informed consent form (attached) prior to the beginning of the data collection activity. Each interview will be transcribed after its completion and preliminary analysis will be conducted to understand dynamics and ideas to improve future interviews.

Interview transcripts will be shown to the relevant participant for verification/changes.

Data from the interviews will be analysed using Coding (Gratton & Jones, 2010).

Participants will be fully informed of their right to withdraw prior to the completion of the data collection activity.

### **5. If the research generates personal data, please describe the arrangements for maintaining anonymity and confidentiality (or the reasons for not doing so)**

*You should explain what measures you plan to take to ensure that the information provided by research participants is anonymised/pseudonymised (where appropriate) and how it will be kept confidential. In the event that the data are not be anonymised/pseudonymised, please provide a justification.*

*Personal data is defined as 'personal information about a living person which is being, or which will be processed as part of a relevant filing system. This personal information includes for example, opinions, photographs and voice recordings' (UWE Data Protection Act 1998, Guidance for Employees).*

Participants will be assured of confidentiality throughout their participation in the proposed research. Transcripts will be anonymized/pseudonymised and results of software testing and psychometric testing will likewise be kept confidential in any case where they pertain to identifiable individuals.

**6. Please describe how you will store data collected in the course of your research and maintain data Security and protection.**

*Describe how you will store the data, who will have access to it, and what happens to it at the end of the project, including any arrangements for long-term storage of data and potential re-use. If your research is externally funded, the research sponsors may have specific requirements for retention of records. You should consult the terms and conditions of grant awards for details.*

***It may be appropriate for the research data to be offered to a data archive for re-use. If this is the case, it is important that consent for this is included in the participant consent form.***

*UWE IT Services provides data protection and encryption facilities - see [http://www.uwe.ac.uk/its-staff/corporate/ourpolicies/intranet/encryption\\_facilities\\_provided\\_by\\_uwe\\_itservices.shtml](http://www.uwe.ac.uk/its-staff/corporate/ourpolicies/intranet/encryption_facilities_provided_by_uwe_itservices.shtml)*

The data will be encrypted and stored in a secure digital format within the author's home office. This will be held on an external solid-state drive.

No names will be recorded in the data. ID numbers will be created to represent participants at the data entry stage. No reference to individual participants will be made in any resulting publications without participants' prior specific consent.

**7. What risks (e.g. physical, psychological, social, legal or economic), if any, do the participants face in taking part in this research and how will you Address these risks?**

*Describe ethical issues related to the physical, psychological and emotional wellbeing of the participants, and what you will do to protect their wellbeing. If you do not envisage there being any risks to the participants, please make it clear that you have considered the possibility and justify your approach.*

No perceived harm, risk, or possible hurt is anticipated. In order to avoid negatively impacting upon students' learning experience during the second phase of the primary research, causal findings will only be fed back to students where necessary, and then in conjunction with their tutors so that support can be sought from a trusted, knowledgeable authority. I will ensure that all of my research participants are treated accordingly to the following BERA Guidelines (2011) : 'individuals should be treated fairly, sensitively, with dignity, and with an ethic of respect and freedom from prejudice regardless of age, gender, sexuality, race, ethnicity, class, nationality, cultural identity, partnership status, faith, disability, political belief or any other significant difference. This ethic of respect should apply to both the researchers themselves and any individuals participating in the research either directly or indirectly'.

**8. Are there any potential risks to researchers and any other people impacted by this study as a consequence of undertaking this Research that are greater than those encountered in normal day to day life?**

*Describe any health and safety issues including risks and dangers for both the participants and yourself (if appropriate) and what you will do about them. This might include, for instance, arrangements to ensure that a supervisor or co-researcher has details of your whereabouts and a means of contacting you when you conduct interviews away from your base; or ensuring that a 'chaperone' is available if necessary for one-to-one interviews.*

*Please check to confirm you have carried out a risk assessment for your research*

There are none.

### 9. How will the results of the research be reported and disseminated?

*Please indicate in which forms and formats the results of the research will be communicated.*

**(Select all that apply)**

- Peer reviewed journal
- Conference presentation
- Internal report
- Dissertation/Thesis
- Other publication
- Written feedback to research participants
- Presentation to participants or relevant community groups
- Digital Media
- Other (Please specify below)

### 12. WILL YOUR RESEARCH BE TAKING PLACE OVERSEAS?

*If you intend to undertake research overseas, please provide details of additional issues which this may raise, and describe how you will address these. E.g. language, culture, legal framework, insurance, data protection, political climate, health and safety. Please also clarify whether or not ethics approval will be sought locally in another country.*

No

### 13. Are there any other ethical issues that have not been addressed which you would wish to bring to the attention of the Faculty and/or University Research Ethics Committee?

*This gives the researcher the opportunity to raise any other ethical issues considered in planning the research or which the researcher feels need raising with the Committee.*

None.

## CHECKLIST


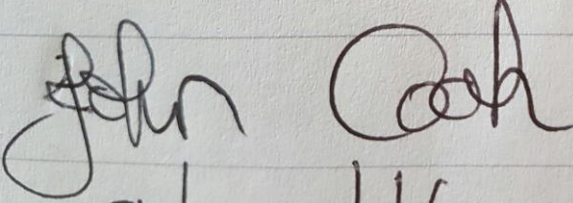
**Please complete before submitting the form**



	<b>Yes/No</b>
Is a copy of the research proposal attached?	No
Have you explained how you will select the participants?	Yes
Is a participant information sheet attached?	Yes
Is a participant consent form attached?	Yes
Is a copy of your questionnaire/topic guide attached?	No
Have you described the ethical issues related to the well-being of participants?	Yes
Have you described fully how you will maintain confidentiality?	Yes
Have you included details of data protection including data storage?	Yes
Where applicable, is evidence of a current DBS (formerly CRB) check attached?	n/a
Is a Risk Assessment form attached? (HAS only)	n/a
Have you considered health and safety issues for the participants and researchers?	Yes

## DECLARATION

The information contained in this application, including any accompanying information, is to the best of my knowledge, complete and correct. I have attempted to identify all risks related to the research that may arise in conducting this research and acknowledge my obligations and the right of the participants.

Principal Investigator name	Mr. James Griffin
Signature	
Date	19/09/16
Supervisor or module leader name (where appropriate)	Professor John Cook
Signature	
Date	19/09/16

The signed form should be submitted electronically to Committee Services: [researchethics@uwe.ac.uk](mailto:researchethics@uwe.ac.uk) and email copied to the Supervisor/Director of Studies where applicable together with all supporting documentation (research proposal, participant information sheet, consent form etc).

For student applications where an electronic signature is not available from the Supervisor, we will require an email from the Supervisor confirming support.

Please provide all the information requested and justify where appropriate.

For further guidance, please see <http://www1.uwe.ac.uk/research/researchethics> (applicants' information)

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## 6. Code List

Each of the codes used for analysis in the course of data collection are presented below for reference. Indentations indicate that the code was ultimately moved to be a child of a parent code listed above it.

Name	Files	References
Agency and Locus of Control	13	22
Approaching AHE	3	3
Differences in experience past and present	8	24
Imposter syndrome	4	4
Entry to AHE	7	12
Expectation coming into AHE	16	52
Time away from Education	2	24
Attention keeping	4	5
Questioning and tangenting in class	4	32
Back door support and work	10	11
Backup strategies	2	2
Honesty markers	7	11
Identity challenge or change	5	13
Importance of specialist subject knowledge	6	10
Independent working	9	12

Panic and Anxiety	11	66
Perception of AHE	1	1
Public Perception of AHE	7	11
Student perception of AHE	13	45
Personalisation of learning	12	42
Privacy expectations	1	1
Skills preparation for University	13	40
Sociodemographic factors	8	14
Study Skills	15	65
Success Markers	12	37
Support	1	20
Establishment support	12	31
Teaching 'style'	10	24
Peer support	17	37
Thinking skills	3	7
Thinking creatively	8	10
Thinking rationally	2	3
Thinking time	10	40
Time management	8	50
Integrating study with life	8	19
Transformative moments	16	26
Unexpected Problems during study	9	12
Value of past experience	10	17
Writing and structuring essays	3	18
Assignment setting and planning	7	10

strategy		
Feedback value	4	17
Reading	6	9
Research tools used	5	8
Sourcing information	7	32

## 7. Practice Narratives

### 12.1: Access Over A Levels Practice Narrative

#### Initial Notes

Smaller units, more structure than exams, lesson taught by specific subject prior to assignment

#### Synopsis

Access is more manageable than a levels with structured tuition per subject criteria. As a result, my ability to remember the specific topic prior to assignment is high, making writing the essay easier

#### Who?

Student [3 names], tutor [name]

#### Where and When?

College

#### What?

Feeling more confidence in my own abilities

#### How?

Support from tutors and peers

#### Results

Distinctions so far says that it is working.

#### Gaps and Tensions

There is a lot of stress and pressure on the course.

#### Notes, Observations and Reflections

I should have done the access course sooner.

## 12.2: Access with Disabilities Practice Narrative

### Initial Notes

Fought for place on a full-time course (Access)

Was told unable to cope due to disabilities

Wouldn't manage time due to disabilities

Further research universities' requirements

Spoke to specialist (discrimination)

### Synopsis

Email from a university to say requirements

Meetings with tutor/tutors

[tutor] was on side and arguing for.

Promise to catch up on what was needed.

Debating/argumentative.

Excelled and submitted on time

Decision to trial for two weeks.

### Who?

[name] (Tutor) PT

[name] (Tutor) FT

[name] (Head of Access)

Specialist (At [hospital name])

[name] (Student, subject of narrative)

### Where and When?

On campus

### What?

After achieving my results on the pre-access course, I was informed that I wouldn't be able to go full time due to grade not achieved and disability (ADHD, Asperger's Syndrome) **<nb. Followed up: Not diagnosed at the time of pre-access completion>**



## How?

Attended meetings, sent emails, took advice from other people and got information off university.  
Agreement made mutually.

## Results

Able to do full time course, not part time. [staff] understood, lenient.

## Gaps and Tensions

Caused stress

Had to catch up as missed few weeks of FT course and re-learn some subjects

## Notes, Observations and Reflections

Persistence, Determination shows passion.

Can't show weakness because of what has happened, I cannot ask for as much help as I otherwise would be able to.

Less discriminated against.

## 12.3: Catching Up Practice Narrative

### Initial Notes

Use Moodle a lot, research books, classmates

### Synopsis

As a student, if I miss a lesson, then there is [virtual learning environment] that has all the information on it. I use the textbooks to help understand what is on [the virtual learning environment] and I talk to classmates so I can catch up on the discussion.

### Who?

[8 students names listed]

### Where and When?

At college or at home after lessons

### What?

Depending what is missed. I signed up to do humanities and didn't like it but still wanted to do law. I rang around the uni and I found I could swap to health and still do law

### How?

I read a lot on the subject of cells which I missed

### Results

I passed

### Gaps and Tensions

### Notes, Observations and Reflections

If you miss anything you can always catch up if you worked hard

## 12.4: Coming to Terms with Study Skills Practice Narrative

### Initial Notes

On starting college – we were given a schedule on what would be expected. One of those things was Study Skills. What?!

### Synopsis

Actually admitting I didn't understand what study skills was to begin with and then coming around to it once I discovered what it included and that I needed time management training.

### Who?

A student on the course

### Where and When?

At college, first week of the access course.

### What?

Later – panic over – time management – how, where and when you can and cannot cope and how to understand this was much more applicable to myself.

### How?

Booklets – leaflets sitting with a tutor and having it fully explained.

### Results

Actually realising you are not stupid if you do not understand something by the way it is written and get extra information from the tutors and the library.

### Gaps and Tensions

Relief to be able to move on and achieve what had been asked of me

### Notes, Observations and Reflections

Do not be afraid – push forward – continue – always ask for help, achieve your goal

## 12.5: Differential Ability Level Practice Narrative

### Initial Notes

### Synopsis

Different levels of knowledge or skills within a lesson at college e.g. maths: some of us are very confident and others are really not.

### Who?

Access group

### Where and When?

College [each campus listed]

### What?

Some people didn't need as many lessons to understand and complete the work whereas others needed extra because we all come from different backgrounds.

### How?

Having extra session times available for those struggling addressed the problem

### Results

Everyone is prepared for maths in university.

### Gaps and Tensions

Finding time for extra sessions

Finding other work for people not struggling to get on with

### Notes, Observations and Reflections

## 12.6: Early Drop Out Practice Narrative

### Initial Notes

### Synopsis

[student] didn't commit [themselves] and didn't really want to be on the course

### Who?

[name] (student)

### Where and When?

At college, September to October

### What?

[student] feels unmotivated and wasn't mentally prepared for the course

### How?

[they] rarely attended due to feeling unmotivated

### Results

Didn't enjoy [their] time on the course

Dropped out

### Gaps and Tensions

### Notes, Observations and Reflections

## 12.7: Emotional Support Practice Narrative

### Initial Notes

One of the group arrives at college very upset, crying <2 narratives produced using this example and amalgamated>

### Synopsis

Student has split from their partner and has had to move back to their parents.

### Who?

[name] - a student

Another [unnamed] student

### Where and When?

At college November [year]

### What?

Another student took [them] away from the group so that it was a more personal interaction, for [their] privacy's sake, sat [them] down, gave [them] tissues and tea and explained to the tutor what was happening

### How?

Just by communicating with [them] and reassuring [them] that we wouldn't leave [them] and send work forward etc.

### Results

After a few days, and allowing the shock to settle down, [student] regained confidence and was able to reattend college with support given from both tutor and other students

### Gaps and Tensions

Worried that others would think that [they] was weak and soft.

Peers speculating, but this is inevitable.

## Notes, Observations and Reflections

Kindness, support and a realistic view of life – understanding others are affected badly by situations where you may not be.

If [they] had not had personal contacts with others in the group through which [they] could discuss this, would [they] be able to continue? Not clear.

## 12.8: English Essay Completion Practice Narrative

### Initial Notes

English essay due in three weeks

### Synopsis

I spent my time while I was driving, eating etc. trying to think of a rough direction for my English essay, specifically a question to answer which would enable me to achieve the criteria.

I'm unable to really ask anyone for help:

- Teachers can't tell me how to write the essay as it is based upon criteria not a specific question
- Other students are as stuck as me

### Who?

19-year-old [gender] Access to Higher Education student on the Social Sciences pathway.

### Where and When?

The latter part of the first term (late November, early December)

Location: Various

### What?

Complete the English essay and submit it on time and with at least a 'merit' grade.

### How?

I think of a general idea and research it online. This leads to a lightbulb moment.

Then I gave it some thinking time

This left me with a few days to write the essay

### Results

Essay submitted on time. Marking not returned so I don't know outcome but feel confident that it was the best I could do and should meet the criteria. I'm happy with it.

### Gaps and Tensions

- How do I address the essay that is criteria not question based?
- How should I be differentiating between the method for completing an English or history essay rather than a biology or psychology one?
- How should I structure my time in thinking about and writing the essay so that it doesn't get left



until the last minute if other things crop up or if I don't have that lightbulb moment?

## Notes, Observations and Reflections

## 12.9: Finding Inspiration for Research Practice Narrative

### Initial Notes

[student a] stuck on finding research project topic

### Synopsis

[student b] and [student c] already have a question for their research project but [student a] has not come up with a title question. They try to find a way to rectify this.

### Who?

[students a, b & c]

### Where and When?

Access Course, Study skills, college.

### What?

[student b] and [student c], ask [student a] what [they're] interested in, what course [they are] taking at uni and discuss relevant topics. Also, they discuss current affairs on the subject.

### How?

Discussing ideas and topics researching

### Results

After discussing a few ideas with [student b] and [student c], [student a] went home and managed to research those ideas further to come up with a question for [their] research project.

### Gaps and Tensions

Not knowing [student a's] interests to give [them] more ideas.

Only having a brief knowledge on the subject.

### Notes, Observations and Reflections

## 12.10: Finding Time with Children Practice Narrative

### Initial Notes

[student] has four children and struggles to find time to read or study.

### Synopsis

[student] struggles to find time to study. [they use] blocks of time to find useful time to concentrate by prioritising evenings and during school hours for study time.

### Who?

[student]

Their children

### Where and When?

Home/College

Evening time

When kids are at school

### What?

Find time to read/study whilst having children/potential distractions.

### How?

[student] needs to time manage effectively using time alone for study/school time/evening time using distractions to extend time

### Results

[student] has more time to study

### Gaps and Tensions

Time is limited due to the responsibility of having four children.

### Notes, Observations and Reflections

## 12.11: Flow Practice Narrative

### Initial Notes

[student] is doing research on bacterial resistance. [they] 'loses time' on reading on the subject.

### Synopsis

[student] regularly loses [themselves] in research and becomes unaware of time. [student] tries to use practical strategies when possible to manage time, including allocating time for longer reading and to print work and to go back to work.

### Who?

[student]

### Where and When?

At home/at college

### What?

[student] needs to avoid being disturbed or arranging alarms etc. to allow for time management.

### How?

Doing practical work in the lab. Allocating research time. Saving links etc. to look back in.

### Results

[student] can use time and use reading effectively

### Gaps and Tensions

[student] doesn't have enough time to lose [themselves] in reading as [they] would like.

### Notes, Observations and Reflections

## 12.12: Group Chat Practice Narrative

### Initial Notes

### Synopsis

To begin with we had a group chat for the entire class... which now I have muted (all 3 subjects have everyone, it was doing my head in) now we have smaller less inclusive groups on WhatsApp

### Who?

WhatsApp group original – [4 students]

WhatsApp group 2 – same as above + [another student]

WhatsApp group 3 – same as above + [two more students]

### Where and When?

Everywhere. That is part of the problem, there is no getting away from it

### What?

Just being overloaded with people's panic and worry when I'm trying to just get on with life.

### How?

### Results

There are groups within groups, and everyone isn't quite sure who is talking to whom.

### Gaps and Tensions

### Notes, Observations and Reflections

It's annoying having so many groups especially when the smaller groups were meant to remain small.

## 12.13: Humour Practice Narrative

### Initial Notes

#### Synopsis

So our tutor was teaching alliteration and got us to draw funny food e.g. curly cottage cheese as a way of us remembering it.

#### Who?

[tutor name] -tutor

English Humanities students

#### Where and When?

[room number], college, 22.9.17

#### What?

We were looking at figurative language and ways to remember it.

#### How?

[tutor] got us to draw in our notepads our favourite facts and describe what was in or on the food using alliteration and got us to share out loud

#### Results

This caused alliteration to be stuck in our heads because it made us laugh

#### Gaps and Tensions

Why is humour or silliness not used more in teaching and learning?

#### Notes, Observations and Reflections

## 12.14: In Class Discussion Practice Narrative

### Initial Notes

### Synopsis

In open discussion

- Ideas being explained
- Certain people don't listen
- Leads to repeated questions
- Time lost as students sit around
- Leads to frustration

This has become a recurring theme in most lessons.

### Who?

a small number of students who slow things down for everyone.

### Where and When?

All the time in class. more in some lessons than others.

### What?

### How?

we will be taught something and then someone will say how that relates to their kids, and then someone else will say how they aren't doing it the same way and then no one is talking about the subject material anymore.

### Results

we don't cover the material we need to

### Gaps and Tensions

### Notes, Observations and Reflections

## 12.15: JStor Practice Narrative

### Initial Notes

### Synopsis

In a psychology class we were given a topic and case studies. We were told to find aims, a method and results using JStor

### Who?

[tutor]-psychology tutor  
students

### Where and When?

Class [number] December 17

### What?

We were given the topic, 'enrichment, deprivation and attachment' and told to find case studies on JStor until finally a method and results and create a table on our findings the three studies

### How?

In class [tutor] sent us away on computers and gave us this to do over the weekend.

### Results

The results were found but not confidently and with a lot of time wasted.

### Gaps and Tensions

This needs to be taught – JStor

JStor can be really daunting if you haven't used it before

### Notes, Observations and Reflections



## 12.16: Little and Often Practice Narrative

### Initial Notes

I prefer to do little and often once I've been given an assignment instead of cramming all near deadline. I manage my time to make this happen.

### Synopsis

#### Who?

[student]

#### Where and When?

Access course

All subjects

All the way through

#### What?

By doing an essay plan, research, introduction

#### How?

I work little and often – when children go to bed, doing a little each evening. So if I need tutor help there is time before deadline to check I'm on the right track

Using E-learning

Text books

WhatsApp group - Fellow students for advice

#### Results

Less stress

Time to change and edit

No rushing

#### Gaps and Tensions

If children get ill on deadline day and I've not done my essay, then I have no one else to blame except myself better to do it over the course of weeks in manageable sections

## Notes, Observations and Reflections

Means I stress less, have more time to plan, if any problems occur in the two weeks prior to deadline  
I still have time to complete my work

## 12.17: Panic Practice Narrative

### Initial Notes

Why do I panic?

What makes me panic?

### Synopsis

I am given an assignment so when I look at it my mind goes blank and I feel overwhelmed.

### Who?

[student]

I'm sure everyone feels it at that point, but they just hide it better.

### Where and When?

On the Access course

In most or all lessons when given an assignment

### What?

### How?

I panic

My mind goes blank, and I don't even know what it means even if I have understood the stuff in class first.

### Results

I am trying to not panic, to realise that I can do this work just break it down into manageable sections

### Gaps and Tensions

The problem is that maybe its confidence but the more of the course I do I do better

### Notes, Observations and Reflections

I am dealing with it better

I am waiting to the lesson is done so I can process it better

## 12.18: Peer Support 1 Practice Narrative

### Initial Notes

Researcher note: <Narrative from a student who didn't interact at all during the group discussion even when directly turned to by peers for input. I also witnessed students trying to make them feel included emotionally. In my presence they made advances which the student rebuffed.>

Life skills

Organisational support

### Synopsis

[student] messages the group chat asking for notes for the lesson [they] missed but no one sent their notes to [them]

### Who?

[student] (student)

Classmates (other students)

Tutor

### Where and When?

Online (fb messenger and email) October 2017

### What?

[student] wants notes, no one answers [them] and offers support

### How?

[student] asked for help for the lesson [they] missed. No-one answered, so [they email their] tutor for support.

### Results

Tutor suggests Moodle and YouTube videos, [student] does this to catch up and feels relieved

### Gaps and Tensions

Alienated feeling from the rest of the group due to the lack of support, stressed.

## Notes, Observations and Reflections

Understand the tutor is a reliable source when you feel behind

## 12.19: Peer Support 2 Practice Narrative

### Initial Notes

Life skills/ organisational support

### Synopsis

[student] feels stressed/under pressure. Meets with [another student] (who can cope with stress better) and learns how to do so

### Who?

[student] (student)

[another student] (student)

### Where and When?

College: Third week into the course

### What?

[student] needs help with pressure/stress

[another student] Teaches methods to help [student] to cope

### How?

[student] is taught how to plan and manage time

### Results

[student] is on top of [their] work and no longer feels stressed

### Gaps and Tensions

[student] having to open up to [another student] and tell [them their] feelings. On the one hand [they] are approaching someone [they] feel comfortable talking to about this stuff. On the other, [they] are not sure what [they] would have done if [they] didn't have this avenue of support.

### Notes, Observations and Reflections

## 12.20: Peer Support 3 Practice Narrative

### Initial Notes

Access course support network enabling students to successfully cope with demands of the course

### Synopsis

All [campus] health students using social media groups and class discussions to encourage and enhance understanding of access course and university requirements

### Who?

Students

### Where and When?

At any time of day, regardless of academic requirements

Usually via WhatsApp in a specially created closed group

### What?

Encouragement given for interviews, essays, presentations

Tips provided in interpretations of learning outcomes shared

Information (links to websites, journals, videos, reports) shared between group

### How?

Student unsure of assignment brief

Asks group for interpretation

Receives the varied responses

Discussion between group

Interpretation applied to assignment

### Results

group receive a greater understanding of subject and variables

### Gaps and Tensions

Sometimes unable to contribute due to other commitments

## Notes, Observations and Reflections



## 12.21: Repetitiveness Practice Narrative

### Initial Notes

Frustration with repetitiveness of lessons

### Synopsis

Study skills tended to be repetitive. Three weeks were spent going over transferable skills. Many students felt that it was not needed as being mature students we were very self-aware and try to voice these opinions to the tutor

### Who?

Students

Tutor

### Where and When?

Study skills lesson on [time]

### What?

Students voice their opinion to the tutor that we were tired of repeating the same thing week after week. The tutor reassured us that it was relevant

### How?

Students voice their opinions the tutor the tutor decided that the repetitiveness of the lesson was relevant

### Results

Transferable skills were still studied, and students' opinions were not accounted for

### Gaps and Tensions

As mature students draw opinions on what we feel is relevant and useful need to be considered more?

### Notes, Observations and Reflections

## 12.22: Safeguarding Practice Narrative

### Initial Notes

Equality and social networking help

Responsible 'Adult' got into trouble because used inappropriate language even though disability was not considered even though the younger people had no repercussions is not equal equality. Support should be given to both.

### Synopsis

Responsible 'adult' = no support

Other younger involved people = no repercussions

This is not equality. Both should have been treated fairly

Social network group support and help each other through hard times

### Who?

Access student

Younger students

[college manager]

Group of other students and possible tutors

### Where and When?

College- talks and facts should have been considered in unpressurised conditions whenever needed

### What?

Students' needs must be considered, and disabilities recognised.

Student has issue with how to do work so ask group to explain or support

### How?

In unpressurised situations supportive

Social media

### Results

All parties treated the same

All students feel supported

## Gaps and Tensions

No account taken into students' needs and assured because adult should know better.

## Notes, Observations and Reflections

## 12.23: Self-Doubt Practice Narrative

### Initial Notes

Self-doubt with own ability to learn and complete work/exams to a good level

### Synopsis

A student has massive confidence issues regarding learning, otherwise very confident. Struggles to believe in [their] ability to gain good grades

### Who?

[student] - A student

Online learning group-support network

### Where and When?

Writing specific assignments-very unsure of [their] own understanding. Spoken to study group (in person and in group chat) about [their] understanding and [their] questions

### What?

Voiced fears within the group, didn't necessarily feel comfortable doing it within lesson. Outlined [their] doubts with [their] ability. Group all supported and helped to alleviate her concerns

### How?

Very supportive group around [them]. All very comfortable with each other. Gave [them] different opinions and ideas. Supporting [them] with [their] work as well as reassuring [them].

### Results

[they] voiced that [they] feels much more confident in [their] ability and ended up getting a distinction in the specific assignment.

### Gaps and Tensions

more support from tutors may be needed.

Really important to have a good support network if possible, specifically people who understand the issues/concerns being voiced

### Notes, Observations and Reflections

## 12.24: Study Skills Value in Course Practice Narrative

### Initial Notes

Study Skills and its usefulness within the course

e.g. time management, referencing and essay writing skills

### Synopsis

Informed of the purpose of study skills and what this aspect of the course consists of, considering that I am coming straight from completing A levels – less relevant for me than some because I've had that recent experience.

### Who?

[student] – Student on the course

[tutor] - Tutor

### Where and When?

In the college, at the beginning of the course 2017, September

### What?

A sense of confusion as to why this is required from me.

Already able and aware of how to write an essay and aware of my own time management techniques

### How?

Speaks to tutor to ask the reasoning and it is explained, may help other students and it is an essential part of the course I'm not aware of how to reference so that could be useful.

### Results

Lack of motivation to complete this aspect but knowing that it is essential. However, aware of its possible importance in the long term

### Gaps and Tensions

Possible lack of attendance for some students

May need to be explained its importance more in relation to university.

## Notes, Observations and Reflections

May not all be essential for everyone. -> Individual differences.

## 12.25: Synthesising New Information Practice Narrative

### Initial Notes

The assignment was on holistic healthcare and documentary was showing an example of personal interest on the type of holistic therapy.

### Synopsis

watching a documentary on war veterans using surfing to help with PTSD, I realised it was relevant to my current assignment I was researching for. It was not the answer to the criteria, but it helped me to think outside the box. Gave me extra points for distinction on here!

### Who?

[student]

### Where and When?

At home, watching a documentary

### What?

[student] watched a documentary-[they] gained extra knowledge without needing a tutor there to gain this knowledge

### How?

By watching a documentary for personal interest

### Results

It gave a boost of confidence to recognise that the Access course is not just learning from a teacher and is about being independent and finding research yourself that is relevant to the current criteria

### Gaps and Tensions

Making access students aware that they can be creative by not just sticking to the criteria and relating outside research into their work (thinking outside the box)

### Notes, Observations and Reflection

## 12.26: Time Management Practice Narrative

### Initial Notes

### Synopsis

Essay due in three weeks. Both students want to do well. Student A decides to research out her ideas, B decides to go out to a party.

### Who?

### Where and When?

### What?

A stays at home mapping out her essay

B goes to friend's for weekend

A plans out her essay in greater detail

B looks at assignment

A asks for advice to ensure essay reads fluidly

B looks at assignment brief and then goes out

A writes and submits essay after many reads and editing

B 3 hours left to plan and write essay, only just submits on time

A gets distinction

B fails

### How?

### Results

### Gaps and Tensions

A has much better time management than B who believes that they can rush it at the last minute.

### Notes, Observations and Reflections



## 12.27: Tutor Support 1 Practice Narrative

### Initial Notes

One of my colleagues was going through a court battle and [they] could not come to lectures for a few days and [they] had to get an extension for her essay. [They] evidenced this to the tutors.

### Synopsis

[student] spoke to [tutor] -> [student] must concentrate on [their] court case -> [tutor] gave [student] an extension and [tutor] authorized [their] absence.

### Who?

[student]: Student

[tutor]: Tutor

### Where and When?

In college, communication between student and tutor, high stress levels, unable to concentrate, student needs to take a leave of absence.

### What?

Student needs support and understanding from tutor

### How?

[student] needs help

[tutor] speaks to tutor

### Results

[student] gets an extension and [their] absence is authorised

### Gaps and Tensions

[student] had to be motivated enough to book a meeting with [their] teacher, attend it and plead her case. What would have happened if that hadn't happened?

### Notes, Observations and Reflections

## 12.28: Tutor Support 2 Practice Narrative

### Initial Notes

Individual AHE student comes into work [college] upset

### Synopsis

Split from partner and has moved back with parents

### Who?

[Student] -> Student within college

[Tutor]

### Where and When?

College, last week (December)

### What?

Informed Tutor provided emotional support (communicated) Sympathised.

### How?

Took away from group so it was more personal interaction and [student] may not have wanted everyone to be informed.

### Results

Emotions of [student] became settled and [they] may be able to continue with the course and can learn effectively. Able to settle back into the class with available support from tutors and peers.

### Gaps and Tensions

Speculation of other peers, but this is inevitable.

### Notes, Observations and Reflections

Understanding and available support where needed; however, others may not feel this if they do not have supporting peers