Exploring the Potential of a Pronunciation Guide App to Support Non-Native Speaking Students in Higher Education

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Non-native speaking (NNS) students form an important part of the student population in the UK and many other countries' higher education sectors. They face numerous additional challenges compared with their native speaking counterparts. Computer-assisted language learning (CALL) tools, including computer-assisted pronunciation training (CAPT) to support language skill development among these students could be an important way to offer a more equitable university experience. This study evaluates the potential of a mobile pronunciation guide app for this purpose, based on a survey that captured perceptions of 96 non-native English speaking students at a UK university. The results indicate demand and promise for such a tool to support NNS students and thus provide greater equality of education experience.

1 INTRODUCTION

Non-native English speakers (NNS) have come to represent a substantial portion of the UK student body. Over 19 percent of students in UK higher education (HE) institutions are from 'overseas' [5]. Although data on HE students' native languages are not routinely captured [13], it is reasonable to assume the majority of these international students are NNS.

This section of the student body makes important contributions to the cultural and intellectual richness of UK HE [8], as well as its economic viability. Hence UK HE institutions are incentivised by ethics and pragmatism to ensure that these students are not disadvantaged by choosing to study in English. It is natural to assume that English language abilities - reading, writing, speaking, and listening - influence students' ability and confidence to participate in learning activities, interact socially, and carry out other essential activities of daily life. The Quality Assurance Agency [11] explicitly expects that each UK HE provider "supports all students to achieve successful academic and professional outcomes." Hence it is important to consider English-language support as a practical means of ensuring NNS students get value-for-money and a positive, enriching experience from their time at UK HE institutions.

This report considers the potential of a computer-assisted pronunciation training (CAPT) tool to reduce attainment and wellbeing gaps in NNS students. More specifically, I focus on student perceptions of the potential benefits of *Say It: English Pronunciation*®, a smartphone app for improving pronunciation through self-study, assisted by inter- active audio-visual feedback. In the remainder of the report, I firstly outline the evidence for the existence of these

wellbeing/attainment gaps and the importance of pronunciation skills. I then present the results of a survey of 95 students from the University of the West of England (UWE Bristol), designed to answer the following questions:

(1) What are NNS students' perceptions of the usefulness of various features of a pronunciation guide app?
(2) How much do they use the Say It app if it is made available to them?
(3) How do they perceive extended use would affect their…
- confidence in social settings? In academic settings?
- level of engagement in these settings?
- sense of wellbeing?
- ability to succeed academically?

2 RATIONALE AND SUPPORTING RESEARCH

The motivation, concept, and design of this study were informed by prior investigations into the nature of wellbeing and attainment gaps for NNS students, and into the use of technology to support the acquisition of language skills, as detailed in the following sections.

2.1 Wellbeing and Attainment Gaps

Wellbeing and attainment are both complex terms encapsulating numerous factors.

Students' attainment may be more specifically defined in terms of learning, academic results (e.g. degree classifications), (non)continuation, future employment/earnings, or more subjective (perhaps highly individual) criteria. All are naturally of interest to the students and, therefore, to the overarching aims of this research. However, to pragmatically limit its scope, the present study focusses on students' perceptions of the app's potential impact on (ease of) learning, academic performance, and continuation.

Attainment Gaps. Prior research into the nature and extent of attainment gaps associated with language ability or nationality reveals a complex scenario. The attainment of international students has variously been found to be higher than, lower than, or indistinct from that of home students, as reviewed by Andrade [1] and collectively examined across the UK by Morrison et al. [9]. These studies highlight numerous confounding factors including the attainment metric used, student nationality, subject studied, full-time *vs.* part-time enrolment, entry requirements, and interactions between these factors. Nonetheless, nationwide data from the UK Higher Education Statistics Agency indicates that in 1995 and 2000, "UK-domiciled students did significantly better than overseas-domiciled students" in terms of degree classes awarded [9].

Wellbeing Gaps. Wellbeing can include both physical and mental state, which are not independent of one another, and can variously influence and/or be influenced by factors such as socio-economic circumstances, the availability of emotional support, and the weather. In particular, NNS students' language difficulties can impact wellbeing via misunderstandings, anxiety, struggles with coursework and course content, and isolation [4]. According to analysis by the UK Equality and Human Rights Commission [3] of a recent nationwide survey:

> From international students there was a strong theme of feeling unwelcome, isolated and vulnerable. Some described feeling like commodities: only wanted by universities for the fees they bring. They wanted to engage with a more diverse group of students but felt 'forced' to stay in their 'own' groups because of negative experiences.

Despite the complexities of defining and measuring attainment and wellbeing, it is clear that gaps in favour of native English speakers exist, at least in comparison to substantial subsets of NNS students.

2.2 The Importance of Pronunciation for Wellbeing and Attainment

In the preceding sections, English-language abilities have been discussed without special reference to pronunciation, the focus of the present study. Specific language skills are commonly categorised into four separate constructs: reading, writing, listening, and speech [1, 2]. Pronunciation is obviously a major component of speech and listening comprehension, but also impacts reading skills [14].

In a survey of 139 international undergraduates at Plymouth Business School [6], English language (academic and social) and mixing with UK students were the three most commonly expressed concerns about studying in the UK. Speech and listening are likely to be particularly important for social communication and mixing with UK students.

Academic communication requires a combination of all language skills, although their relative importance - and indeed the level of dependence on any verbal language - will vary for different educational methods and subjects. In a cohort of 186 first-year undergraduate and master's students at an English-speaking Canadian university, Berman and Cheng [2] found that, overall, students clearly identified speaking as the language construct that presented the greatest difficulty. Furthermore, while difficulty in each of the four constructs presented a significant negative correlation with the student's final grade point average (GPA), the strongest correlation was with perceived difficulty in speaking. [10] found among Turkish students in the USA that proficiency in speaking and reading, but not writing or listening, were positively correlated with GPA. As Berman and Cheng [2] conclude, "It seems clear that universities should make available courses in oral proficiency to all NNS students."

2.3 Technology-Enhanced Learning for Language

Having established a strong case for providing support in speech skills for NNS students, one must consider how this might be achieved. Technology-enabled self-study approaches are attractive for numerous reasons. Compared with classroom-based learning, for example, they can remove constraints of timing, geography, and human resources, while reducing costs and introducing audio-visual enhancements to reinforce learning.

Timing. Support for students to develop their speech skills would ideally begin before their chosen programme of study, in order to maximise their confidence and ability to learn in English from the start, and to avoid burdening them with additional work in parallel with the core learning activities of their course.

Geography. Many NNS students will be outside the UK until their programme of study begins, and for some periods during the programme (even outside of global pandemics). Digital technologies provide a convenient means of supporting students at a distance.

Anxiety. Another important consideration for any learning among NNS students is 'language anxiety'; a student's confidence in their English speaking ability can be a significant determinant of their willingness to engage in oral learning activities as well as practical use of the language. Lee [7] found that corrective feedback delivered in English-as-a-second-language (ESL) classrooms could have a positive or negative impact on students' language anxiety depending on how it was delivered. If designed appropriately, software for automated feedback could reliably incorporate best-practice guidelines to reduce this risk of negative impacts that exacerbate language anxieties before the student's

programme starts. The concept of automated feedback on pronunciation also introduces the possibility of practising in private, thus potentially eliminating language anxiety from the process of improving pronunciation skills.

. In recent years there has been a proliferation of computer-assisted pronunciation training (CAPT) tools and resources, including prominent examples such as ELSA Speak (https://elsaspeak.com/), Duolingo (http://duolingo.com), Power Pronunciation (https://eenglish.com), and *Say It: English Pronunciation*® (https://phona.co.uk). As summarised by Rogerson-Revell [12], various studies have demonstrated efficacy of such approaches, but many design challenges remain. For example, many implementations attempt automated assessment, but these assessments are often unreliable. Furthermore, while the potential benefits of CAPT tools are entirely plausible and largely evidenced, there is a need to evaluate emerging CAPT apps from the learner viewpoint. Student perceptions are relatively understudied, particularly among university NNS cohorts, but must be catered to in order for the intended benefits to be attained.

2.4 The *Say It: English Pronunciation*® App

This study focusses on the evaluation of a single tool, to avoid excessive complexity. The *Say It: English Pronunciation*® app was chosen owing to two distinctive features: it offers content in British (not only American) English accents as appropriate to our focus on UK HE, and it primarily provides feedback in the form of visualisations rather than automated assessments, thus avoiding concerns about the reliability of these assessments. *Say It: English Pronunciation*® is developed and published by Phona Ltd, using content from Oxford University Press, for Android and iOS platforms. It may be downloaded for free with a limited selection of words (140, British and American English) covering all 44 phonemic sounds in standard English, while more extensive libraries of words are available through individual purchaser subscriptions or license agreements with organisations. It allows users to make audio recordings of their attempts at pronouncing particular words. Interactive visualisations of the recording enable them to compare their own attempt with a 'standard' pronunciation. Syllable breakdowns, stress indicators and individual phoneme audio allow users to precisely identify discrepancies.

Fig. 1. Annotated screenshot of the *Say It: English Pronunciation*® app.

3 METHODS

Ethical Approval. Ethical approval for this study was granted by UWE Bristol's University Research Ethics Committee (Ref UREC20.02.18).

Recruitment. An invitation-to-participate email was delivered to students on a broad selection of programmes across UWE's faculties. The email included a link to the survey's 'Welcome' page, thus enabling students to privately consider whether to participate, and to remain anonymous throughout the survey sequence, which is depicted in Fig. 2.

Study Sequence and Design. The survey was conducted across two online questionnaires. Completion of a short demographic questionnaire was incentivised by subsequent provision of a promo code unlocking the most essential feature of the app: the British English word pack containing over 20,000 example words. Two weeks after completing the first questionnaire (and in subsequent reminders), respondents were invited via email to complete the second questionnaire, incentivised by promo codes to unlock the remaining in-app purchases. The second questionnaire focussed on the respondents' perceptions of the app and its potential impact.
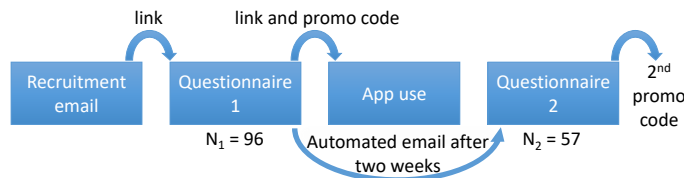

Fig. 2. Sequence of study events followed by each participant. N_x values indicate the number of responses acquired at each stage of the survey.

Across the two questionnaires, the majority of the data collected was quantitative (e.g. Likert scale scores) to enable simplified analysis across a wide cohort. However, these were supplemented with qualitative data, where subjects were invited to give further comments on key topics raised within the survey.

3.1 Post-hoc statistical analyses

This study is intended as an exploratory analysis without prior hypotheses. To assess perceived differences in the data, ordinal values were compared using the Mann-Whitney U test. However, it is important to note that the statistical significance implied by such tests is exagerrated by pre-selection among multiple hypotheses.

4 RESULTS AND DISCUSSION

As depicted in Fig. 2, 57 of the original 96 respondents completed the second questionnaire at least partially, while 51 completed it fully.

4.1 Perceptions prior to app use

Fig. 3 shows a wide range of confidence in speaking among the NNS students recruited to this survey. Notably, confidence was lower in environments with native speakers than with non-native speakers, both in classrooms (Mann-Whitney $U = 2756.5$, $p < 0.0005$) and social settings ($U = 3048.5$, $p < 0.0005$). This observation suggests that NNS students

Table 1. Summary of the 57 subjects who responded to both surveys.

Age (years)	min=18, median=23, max=43
Gender	31 Female, 24 Male, 1 Non-Binary
Native languages	28
Days between survey responses	min=14, median=31, max=198

face an additional challenge in native speaking environments, which is likely to yield a disadvantage in their learning experience in such environments, compared with native speaking peers.
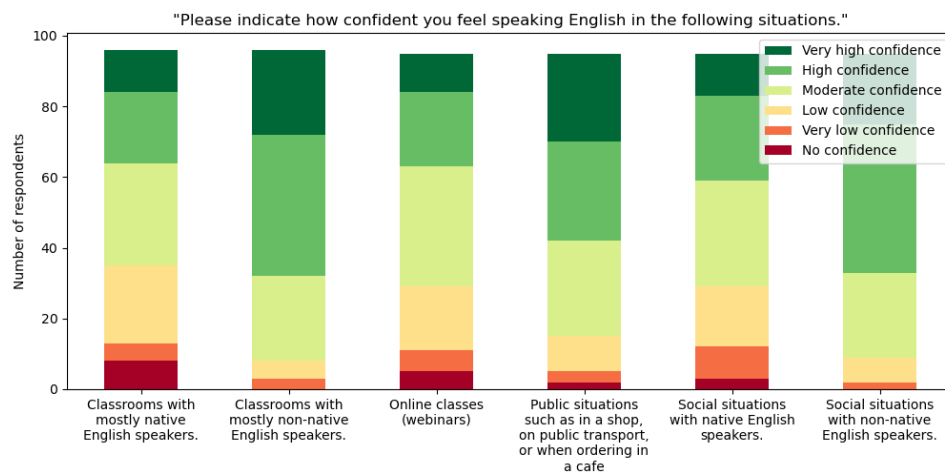

Fig. 3. Respondents' confidence related to the use of language in a variety of settings. These responses were provided in Questionnaire 1, prior to app use.

The impact of language anxiety for NNS students may be compounded by an interaction with other social concerns, as noted in the following quoted text responses from the survey:

> I feel like my knowledge of language is better than I give myself credit for but I also have a lot of social anxiety that makes everything harder. The social anxiety gets amplified by speaking in non-native language.

> My English is good on a technical level but I am experiencing a lot of difficulty with conveying myself and my personality in English. People are not forgiving to accents in social situations, it seems, and that can feel very alienating. Low confidence is ruining a lot for me.

Fig. 4 indicates that NNS students broadly tend to believe that improving their English speaking and listening skills would positively influence their academic attainment and wellbeing.
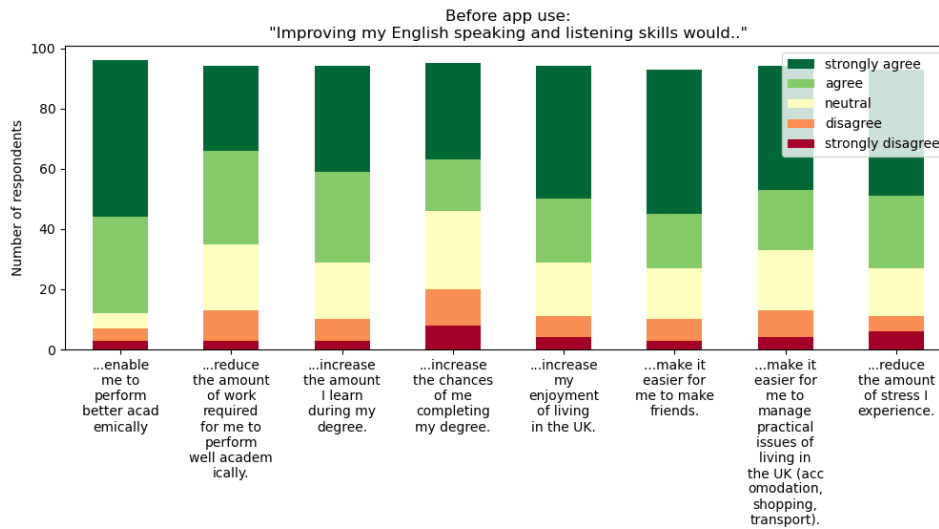
Fig. 4. Perceived potential benefits of language skills improvement on wellbeing and attainment. These responses were provided in Questionnaire 1, prior to app use.

4.2 What are NNS students' perceptions of the usefulness of various features of a pronunciation guide app?

As shown in Fig. 5, all of the listed features of the *Say It: English Pronunciation*® app were broadly perceived to be useful. These results support a key assumption motivating this study: that the distintive features of *Say It: English Pronunciation*® make it a promising example of a pronunciation guide app and, therefore, a suitable case against which to evaluate the possible benefits of such tools.

The positive perception of the app's features was further evidenced by free text comments, such as the following.

> The interactive soundware with stressed syllable markers seems awesome! No other app / translator offers this feature, that I know of.

Free text comments were not universally positive. One respondent commented that the app was difficult to use, and another noted that some words they wanted to practice were not included. And a related point was made about the specific vocabulary needed for students in HE rather than the general population:

> The initiative is really interesting but for people at University it is needed highest level of complexity in order to be more confident in English environments.

Overall the quantitative and qualitative results related to the app's feature set suggest that the core features are attractive to NNS students, although the user experience could be improved through further design refinement.
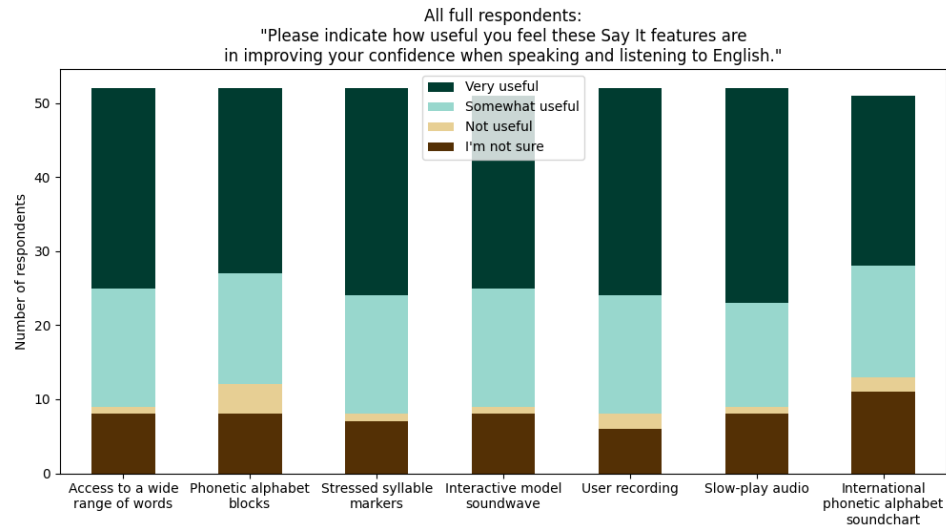
Fig. 5. Bar chart depicting students' perceptions of the usefulness of specific features of *Say It: English Pronunciation*®.

4.3 How much do they use the Say It app if it is made available to them?

Fig. 6 depicts the extent to which the full respondents to the survey made use of the app once it was available to them. It should be noted, however, that this cohort has self-selected for engagement with the survey. Spontaneous usage may be lower among a more general population of NNS students.
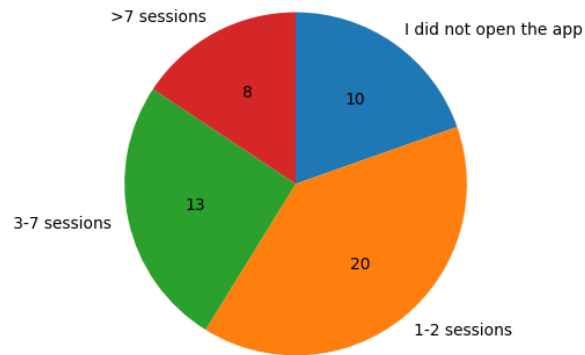

Fig. 6. Pie chart depicting the distribution of answers among full respondents to the question: 'How many times did you use the *Say It: English Pronunciation*® app since completing Part 1 of the survey?".

4.4 Perceived benefits of extended use

Fig. 7 depicts respondents' perceptions of the benefits they would anticipate if they used the app for a longer period of time. This figure shows a broad range of opinions. Nonetheless, for each category, a substantial proportion of respondents agreed that extended use of the app would yield that benefit.

It is reasonable to expect that perceived benefits will be dependent on the level of need for support. Hence Fig. 8 presents the same analysis for students with known overall IELTS scores of 7 or lower (upper panel) or above 7 (lower panel). Note that this figure excludes 17 full respondents who did not provide IELTS scores.

Overall IELTS scores were used rather than Speaking scores because a larger number of respondents was able to provide overall scores. It can be seen that those with lower IELTS scores present a similar distribution of perceptions to the wider cohort portrayed in Fig. 7. Those with known higher IELTS scores (Fig. 8, lower panel) were slightly less positive about the potential benefits. This observation supports the intuitive expectation that those with more scope for improvement in their language skills are more likely to see a supportive tool as useful.

Though broadly positive, the anticipated benefits of further app use (Fig. 7 and Fig. 8) are less positive than the anticipated benefits of tool-agnostic, general improvement in speaking and listening skills (Fig. 4). However, within each figure the relative differences between columns are similar (e.g. the anticipation of benefit for "chances of me completing my degree" is less than that of "increas my enjoyment of living in the UK". Combined, these observations suggest that the app is seen to be contributing to the broader aims of language improvement even if it is, unsurprisingly, not a complete solution.
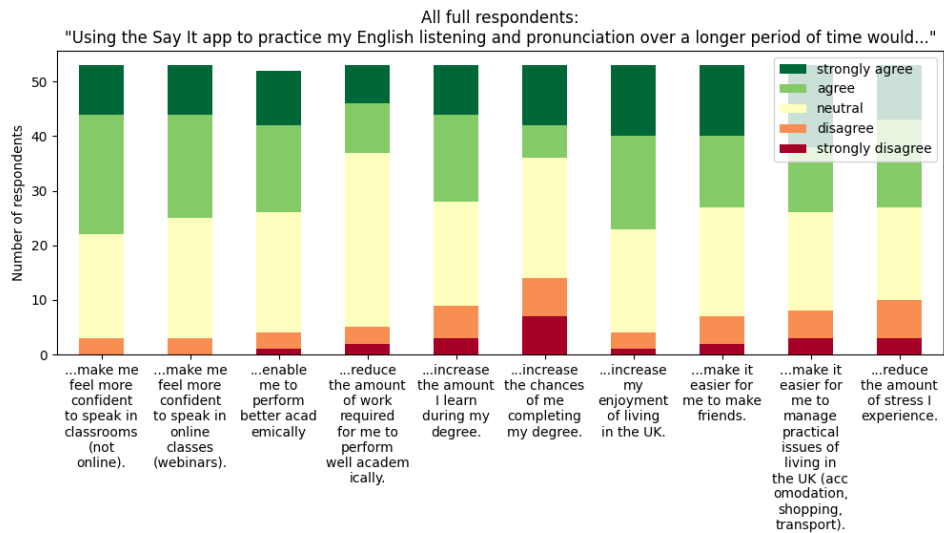

Fig. 7. Perceptions of benefits of extended use of *Say It: English Pronunciation*®.

4.5 Conclusion

This study has shown that a substantial subset of NNS students use the *Say It: English Pronunciation*® app when it is available to them and believe that it would yield various benefits of relevance to the wellbeing and attainment gaps and challenges experienced by NNS students. Although many other students are not disposed towards using the app, this study indicates that it could be a useful tool to support those students with the greatest need for language support. In doing so, it could play an important role in enabling HE institutions to address inequalities faced by this important section of their educational communities.
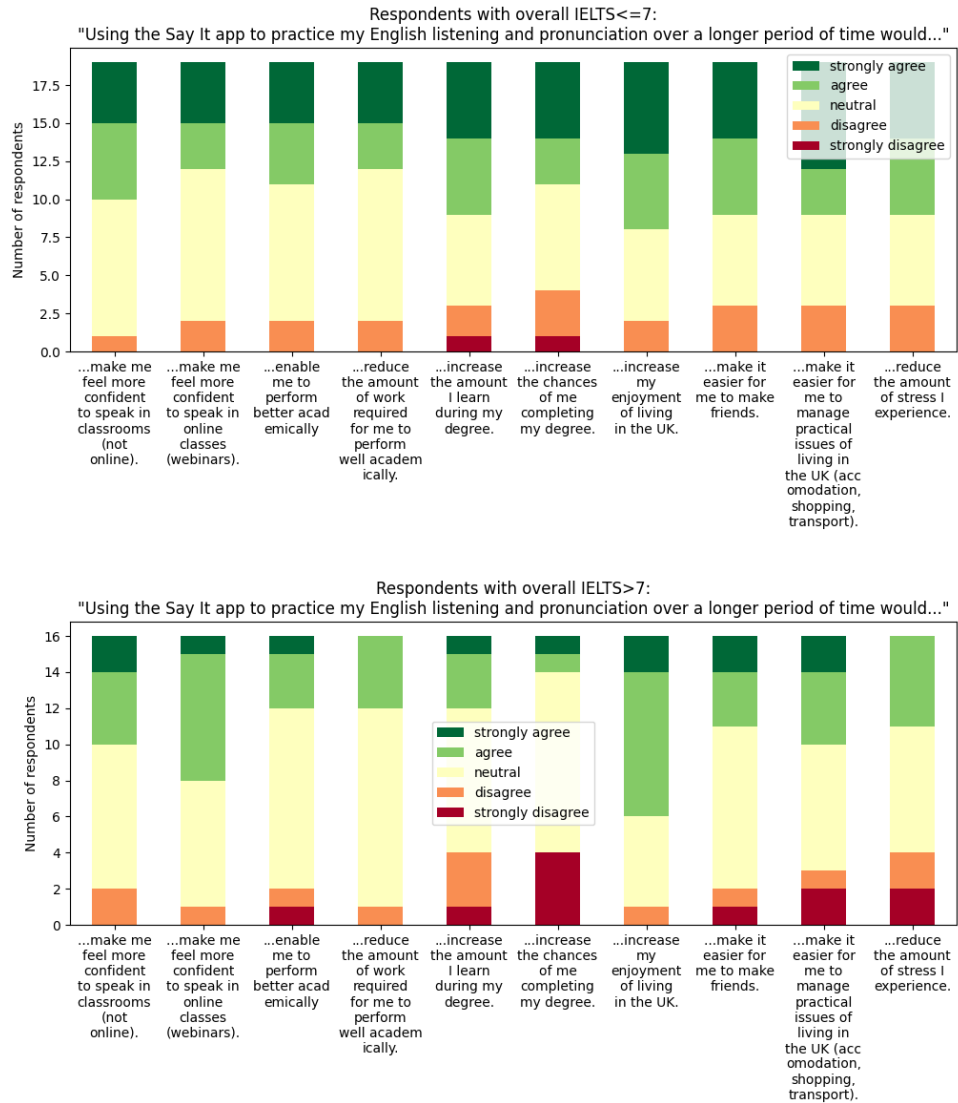
Fig. 8. Perceptions of benefits of extended use of *Say It: English Pronunciation*®, analysed separately for respondents with lower and higher overall IELTS scores (or equivalents). Such scores were not available for all respondents.

ACKNOWLEDGMENTS

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