Using virtual online simulations in Second Life® to engage undergraduate psychology students with employability issues.

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Abstract.

This study compares online simulation in Second Life® with equivalent face to face activities for three scenarios. The intention was that the three sets of activities would increase participant awareness of how psychology is applied in relation to work based contexts. These were a Dragon's Den style activity to increase awareness of entrepreneurialism, a supermarket based activity based on consumer and work psychology and a counselling agency. After engaging in the activities participants completed various measures, including a satisfaction questionnaire. In the supermarket scenario, Second Life® was rated significantly better in terms of student satisfaction and the extent to which awareness of the application of psychology in this context had increased. For the other scenarios, Second Life® and face to face activities were largely equivalent on the various measures. The exception was that in the online counselling scenario participants did not indicate to a significant degree they were now more aware of how psychology was applied in this setting. This might be linked to the perceived quality of interaction with the chatbot avatars. It is suggested that the overall superiority of the online supermarket scenario is because this complex problem-based activity achieved greater immersion in the online version.

What is already known.

Online simulations are being increasingly used in higher education (Gregory et al, 2010, Savin-Baden, 2010). Possible advantages of such approaches are that they can bring a game like quality to learning and immerse students in complex scenarios which could not otherwise be achieved in a standard classroom. Downsides include the costs of developing scenarios and the time cost to students of learning to operate within the simulation environment.

What this paper adds.

This paper evaluated three different simulation scenarios. Its shows that across the three, Second Life® and face to face simulations were largely equivalent in terms of satisfaction and learning outcomes. However, the immersive environment significantly adds to complex problem-based scenarios in simulated complex environments such as supermarkets. These do not lend themselves to classroom activities. On the other hand, the quality of avatar interaction may detract from simulated counselling scenarios.

Implications for practice and / or policy.

Second Life® is a useful medium for simulating complex problem-based scenarios, where the simulation of a rich environment can significantly add to student's sense of immersion. It may be less useful in activities such as counselling, where the quality of avatar interaction can detract from the student experience. Even then though, Second Life® activities are judged largely equivalent to face to face, and could be useful in a distance learning setting. Careful evaluation of the cost of setting up simulations vs. the likely benefit to students and the frequency of future use should be considered in thinking about this approach.

Introduction.

Simulations in online virtual environments are being used increasingly in higher education. This can be seen in many published case studies of how to use this technology (for example Jarmon et al, 2009, Okutsu et al, 2013). The trend is international in dimension (Gregory et al, 2010). The growing maturity of this field is further reflected in the several dedicated texts for practitioners wishing to explore this medium (Savin Baden, 2010, Wankel and Kingsley, 2009).

A number of reviews attempt to marshal the available evidence about the advantages and disadvantages of the approach (Dalgarno, 2010, Dalgarno and Lee, 2010, Hew and Cheung, 2010, Falloon, 2010, Kamel-Boulos, Hetherington and Wheeler, 2007, Salmon, 2009, Twining, 2009, Warburton, 2009). Several of these authors point out the potential barriers which might make adoption of the technology difficult. Warburton (2009) suggests that scenarios can be time-consuming and costly to develop. Furthermore, students might have to invest considerable time in learning to use and interact with these environments. On the other hand online activities can lend a game like quality to learning which can be highly motivating (Grimley et al, 2011, Gee, 2004). The structure behind the learning units can be complex, immersing students in a simulated environment that allows them to engage in convincing problem-based scenarios (Duggan and Adcock, 2007). Such simulations are by their nature immersive and add a social dimension to learning (Johnson and Levine, 2008). However, it has been noted that there are limitations in the nature of the interaction between avatars, for example the lack of facial expression and limited gestures (Hew and Cheung, 2010).

The ability of online simulations to mimic real-world environments and thereby expose students (and clients) to experiences which would be difficult to provide otherwise has begun to be recognised within the fields of health and psychology. For example in the treatment of many anxiety disorders it is desirable to expose people to a particular situation or object. This can be quite readily done within a simulated

environment (Gorini et al, 2008, Pull, 2005, Wiederhold and Wiederhold, 2004). Students often have trouble appreciating what the actual experience might be like for patients with some psychiatric conditions. Attempts have been made to simulate the experience of clients, in particular those with schizophrenia (Yellowlees and Cook, 2006). Other possibilities might include exposing students to three-dimensional representations of the brain, or to virtual brain scanning facilities (Kamel-Boulos, Hetherington and Wheeler, 2007). Within psychotherapy there have been attempts to consider the medium both from a therapeutic perspective of working with clients, and from a training perspective of allowing trainees to practice their therapy skills online (Glanz and Rizzo, 2009).

In relation to the undergraduate psychology curriculum, one of the main initiatives has come from Bignell and colleagues (Bignell and Parson, 2010). This has involved creating a “problem house”, which students can visit and interrogate various family members. The object is to find out what common psychological problems are being presented by the various characters.

Online simulations therefore appear to be becoming part of the higher education landscape. Their use within mainstream undergraduate psychology teaching has however been limited, with few thorough evaluations. This study therefore set out to evaluate the use of online simulations in Second Life® to engage undergraduate psychology students with issues around employability, i.e. being aware of how psychology can be applied in real world work based contexts. A number of previous studies have suggested that online simulations can engage students with employability issues and develop their professional awareness and skills (Lucas, Cruz-Benito, Gonzalo, 2013, Minocha and Morse, 2010, Stokes-Thompson, Wood and Scutter, 1010). The study took place in a large modern university. It was part of an initiative to enhance the employability skills of undergraduate psychology students. It was decided to do this through the development of three scenarios which could be used with students across the three years of the program. It was predicted that student satisfaction with online activities would be better than for equivalent face to face activities. It was also predicted that Second Life® would produce better learning outcomes in terms of applying relevant theory based concepts. Finally, we

predicted that a Second Life® activity designed around the popular “Dragon’s Den” activity would produce greater interest and openness to entrepreneurial activity in psychology.

Research questions.

The research questions this study set out to address were:

- How do equivalent activities designed to be delivered in face to face classroom activities vs through an online simulated environment in Second Life® compare in terms of student rated satisfaction?
- How do activities designed to raise student’s awareness of the entrepreneurial applications of psychology compare in raising student awareness of this issue when delivered in a face to face vs. online simulated environment?
- For scenarios requiring student to apply previously presented knowledge, will online simulation result in an advantage compared to face to face activities?
- What feedback do students provide when considering their experiences of these different types of activity?

Methods.

Design and analysis.

This study evaluated three scenarios. These were:

- a Dragon's Den (this is based on a popular television format in which entrepreneurs pitch to investors to try and secure funding for their ideas)
- a supermarket
- and a Counselling Agency.

For each scenario, there was an online and face to face version.

A satisfaction scale was administered. Scores were compared between the online and face to face conditions for each scenario. Similarly, two analogue rating scales were used. The first was to assess the extent to which students felt the simulations helped them learn about psychology in the real world. The second was to assess the extent to which the students felt they had learned about the application of psychology within that particular scenario.

Similarly, an entrepreneurial awareness scale was administered in the Dragon's den scenario, and scores compared across online and face to face conditions.

In the Supermarket and Counselling Agency scenarios, quizzes were administered at the end, to judge students learning of key points.

One sample t-tests were used for all questionnaire items, to judge the extent to which ratings differed from the neutral mid-point, in either a positive or negative direction.

Finally, students were also invited to give qualitative feedback at the end of each scenario, and this data was thematically analysed (Braun and Clarke, 2006). The qualitative comments were collated, and thematically coded independently by three of the researchers. The researchers then compared their versions and agreed a final version of the analysis.

Ethics.

This study was approved by the Faculty Research Ethics Committee.

Participants.

186 students participated in the evaluation, of whom 35 were male and 151 female. The students were all undergraduates on a single honours psychology degree. They completed the activities as part of their normal scheduled teaching, but were given the option of not taking part. No students opted out of the activities. The Dragon's Den and Supermarket scenarios were evaluated with first year undergraduate psychology students as part of a professional skills module. Half the students were assigned to do the face to face supermarket simulation, and half assigned to do the online supermarket simulation, by randomly allocating tutorial groups to the conditions. Students then did the opposite condition for the Dragon's Den simulation, i.e. those that had been face to face in the supermarket became online, and vice versa. Details of the numbers doing each condition are shown in table 1. The counselling centre was used with final year (i.e. year 3) students on an introduction to counselling module. Students opted for face to face or online according to personal preference and their schedule restrictions. Again, the numbers doing each are shown in table 1.

The numbers of students in each condition and descriptive data can be found in table 1.

Table 1 about here.

Measures.

Two short measures were devised specifically for this study.

The first was an eight item questionnaire designed to assess student satisfaction with particular activities. The questions are shown in table 2. The wording of

statement six varied depending upon the activity. Participants rated each item on a 5 point scale, where 1 was strongly disagree, and 5 was strongly agree.

The student satisfaction scale was evaluated for test-retest reliability by asking 28 students to complete it twice, one week apart. The Pearson correlation co-efficient was 0.84 ($p<0.05$), suggesting that test-retest reliability was satisfactory. Cronbach's Alpha was computed across all 186 participants, giving a value of 0.9, suggesting the scale has good internal consistency.

A measure of entrepreneurial awareness (i.e. the extent to which students feel they are aware of how psychology can be used to develop business ideas) was also devised. The questions are shown in table 3. This consisted of 5 items. Each item was rated on a 5 point scale, as described above.

The entrepreneurial awareness scale was also evaluated for test-retest reliability across 28 students, giving a Pearson correlation co-efficient of 0.81 ($p<0.05$). Cronbach's Alpha over 53 sets of participant data was 0.9. Therefore this scale can also be judged to have acceptable psychometric qualities.

Tables 2 and 3 about here.

In addition, two analogue ratings were included, where participants rated by marking on a 10cm line how much they agreed or disagreed with the statements "I learnt a lot about how psychology is applied in the real world" and "I learnt a lot about how psychology is applied in this particular context".

Procedure.

Three scenarios were developed for evaluation in this study. Each scenario was timed for delivery alongside lectures which presented relevant knowledge and theory. The scenarios were developed as follows:

Scenario 1. Dragons' Den pitch to develop entrepreneurial thinking skills.

This simulation provided a realistic recreation of the environment portrayed in the popular television programme "Dragons' Den". Teams of three to four students pitched entrepreneurial ideas based on psychology to a panel of three venture capitalists. As in the well-known television format, the dragons were seated in a row, and the students appeared before them to pitch their ideas. The dragons offered to invest a certain amount of capital to the various ideas, and the team attracting the most investment was declared the winner. The tutor then debriefed the groups at the end.

In the online version, the panel was played by psychology lecturers, in the guise of famous psychologists i.e. Sigmund Freud and Aaron Beck, with one judge in the guise of a dragon, to add a further game-like quality. Students worked in teams to operate an avatar and bring their avatars into the den to pitch their ideas. The teams had worked on their ideas previously.

The face to face equivalent activity was identical to the above, except it took place face to face in a classroom. All the roles were played by students.

At the end of both the online and face to face activities, the students completed a short 8 item satisfaction scale, designed for the purpose, plus a 5 item entrepreneurial awareness scale. They were invited to give qualitative comments on the forms as well.

Scenario 2. Simulated supermarket with interactive activities.

In this scenario groups of three to four students entered a simulated supermarket. The intention was to try and illustrate to students how work based learning in general work places could be relevant to psychology. This would then help orientate them to the wider possibilities available as they look for a work placement in their second year. A further goal was to engage students with relevant concepts from both the employee motivation as well as the consumer psychology literature.

In the simulation, groups of students worked through the supermarket work-based learning scenario. The scenario requires the students to navigate the simulated environment and interact with a number of people. The various activities are designed to require the student to apply their knowledge of both business and consumer psychology. Initially, they met with the director of personnel, who gave them a task to do around interviewing a supermarket worker about their morale at work. They then went to be briefed by the marketing manager, who gave them a second task which involved interviewing a customer on the shop floor about their preferences for tuna, as part of a research project prior to the launch of a new brand of tuna. They then interviewed a customer in the canned fish aisle, which facilitated the discussion of some existing brands on the shelves.

After completing the two tasks, the students made their way to the supermarket administrative room, where they were able to sit at a computer and answer a quiz about what they had discovered from the two tasks, and what they might now recommend to head office.

In the online version, the supermarket personnel and the customer were all implemented using chatbot technology (i.e. avatars that have been programmed to automatically interact via chat, using a set of pre-set responses to key words). . Students worked in small groups to steer their avatar around the simulation. The simulated environment consisted of a shop floor, plus additional offices for personnel and administration.

A face to face equivalent to the scenario was designed, and took place in a classroom environment. Again, groups of students worked together in the role of placement student, but this time the people they interviewed were role played by students from the other groups. The students moved around the classroom to simulate the same range of activities included in the online version. At the end a paper based version of the quiz was completed.

All students at the end of both the online and face to face activities completed a short eight item satisfaction scale designed for this purpose. They were invited to give qualitative comments on the forms as well.

Scenario 3. Simulation of psychological workplace.

In this scenario groups of three to four students were invited to come into a counselling psychology agency. In the online version they were initially briefed by the centre manager chatbot. They then went to observe a therapy session, simulated by two chatbots. This was loosely based on a published case of Carl Rogers (Farber, Brink and Raskin, 1996). The chatbots interacted with each other, simulating the classic case, whilst students observed the interaction, and noted the interactions and interventions being used by the therapist. Finally, they went to a different room and were invited to interview a new client and try to come up with an assessment of the client's issues. All of the centre personnel were implemented using chatbot technology. At the end of the activity, the students directed their avatar to the agency administrative area, where they were able to complete an online quiz about the therapy session they had observed, and the client they had interviewed.

In the face to face equivalent, again the students worked in teams, but the simulated therapy and new client were role played by students from the other groups. The centre was simulated by moving around different areas of the classroom. At the end the students completed a paper based version of the quiz.

At the end of the activities, each student completed a short 8 item satisfaction questionnaire designed for the purpose. They were invited to give qualitative comments on the forms as well.

Results.

Satisfaction and entrepreneurial awareness.

For each scale item, as well as the scale totals, an independent t-test was used to see if the Second Life® condition differed significantly from the face to face condition. Each condition was also evaluated using a single sample t-test, to see if the scores differed from the neutral mid-point of the scale, i.e. three.

The results are shown in tables 4-6.

Tables 4-6 about here.

Looking at tables 4-6, it can be seen that the only significant differences in student satisfaction between Second Life® and face to face conditions was for the supermarket scenario (table 4). There were significant differences for items 4 and 5 and the total. Item four relates to wanting to see more of this kind of activity, and five is about finding the activity non-threatening.

Looking at the one sample t-test results, it can be seen across tables 4-6 that many items in both conditions were rated in a positive direction, and none were rated in a negative direction. All of the scale totals were rated as significantly more positive than the neutral midpoint scores (24 for the satisfaction scale and 15 for the entrepreneurial awareness scale).

From table 5, it can be seen that all items on the entrepreneurial awareness scale produced results which were significantly elevated above the neutral mid-point, except for item 4. This item is about whether students are now more likely to consider entrepreneurial activities when they graduate.

Analogue ratings.

Participants rated by drawing a line along a 10cm line, how much they thought they had learned about psychology applied to the real world and psychology applied within the particular scenario (i.e. supermarket, counselling agency, or

entrepreneurialism). The data for these two measures are shown in tables 4-6 as items 9 and 10.

For the supermarket scenario, only the Second Life® simulation was rated as significantly above the neutral mid-point on these two items. For the enterprise simulation, both Second Life® and face to face produced ratings for both items significantly above the mid-point. For the counselling centre scenario, the Second Life® version did not produce ratings significantly above the mid-point on the "learning about how psychology applies in that scenario" dimension.

Quiz scores.

For the counselling scenario, the mean scores were for 93.1 (sd 5.6) face to face, and 96.8 (sd 6.2) for Second Life®. This was across eight vs. fifteen groups respectively.

For the supermarket scenario, the mean scores were for 94.0 (sd 8.4) face to face, and 93.1 (sd 7.3) for Second Life®. This was across nine vs. twenty two groups respectively.

There were no significant differences between the scores for Second Life® vs. face to face in either scenario.

Thematic analysis.

Qualitative comments were received from 87% of participants, and were evenly spread across the various conditions of the study. The thematic analysis resulted in three themes as follows. Quotes from student comments are given in italics.

Theme 1 – Characteristics of the virtual world

Quality of interaction with avatars.

Students made various comments about the avatar chatbots, for example the fact that they would sometimes stand up during a conversation, or that interaction was via text boxes. Several students commented on the lack of non-verbal cues, for example the lack of facial expression or gestures.

"*The conversation with the client in the counselling centre used a text box, which made it seem less real".*

Repertoire of chatbots.

The repertoire of the chatbots was quite limited, and there were a few glitches in the chatbot scripts which some students found very annoying. For example in the supermarket, the customer would not recognise the term "sustainability", and in the counselling scenario, the centre manager would not understand the abbreviation "OCD".

"It was very frustrating that the customer on the shop floor would not recognise the word "sustainability" – in the end we had to find another way of asking the question."

Novelty

The novel nature of the Second Life® simulations was commented on a number of times. However, being interesting and motivating was also mentioned in relation to the face to face activities.

"This [the Second Life® simulation] *was very different to the kinds of activities we have done on other modules –it would be nice to see more of it.".*

Immersion in the simulation environment.

Students commented that they enjoyed the immersive nature of the Second Life® environment, and that this brought the simulations to life.

"The online activity made it feel like you were very involved in the task, like you were in a real counselling centre".

Problem-based scenarios.

Related to the above, students commented that the immersive environment made the simulation scenarios more believable, and this was especially the case for the supermarket scenario.

"The mock supermarket made the task seem very real, much more than would be possible in a classroom activity".

Theme 2 – Social demands of the activities.

Social demands of face to face vs online.

Many students found the face to face activities to be very challenging in that they place social demands on them, which some students find uncomfortable or anxiety provoking. The Second Life® scenarios in contrast were found to remove this aspect, and many students commented that they very much welcomed this.

"I found the Second Life® *version of Dragons Den to be much less daunting than it would have been if we had done this in a classroom – in* Second Life® *you don't have to stand up in front of all the other students".*

Theme 3. Reflection on the value of the activities.

Link to the theory?

A few students commented that the link to relevant theory in the scenarios was not obvious. However, we did not check whether students had attended the associated lectures where this was covered.

"it would have been better if the relevant theory had also been covered at some point."

Need for debriefing.

Some students commented it would have been helpful if there had been further debriefing at the end, to consolidate their learning.

"Further follow up and discussion at the end would have helped us to get more from the exercises".

Discussion.

The initial hypothesis was that online activities would achieve significantly greater satisfaction scores compared to face to face. There were no significant differences between Second Life® and face to face for the counselling centre scenario or the Dragon's Den scenario. However, there were significant differences in favour of Second Life® for the supermarket scenario. The total satisfaction score was significantly greater (26.13 vs. 29.96, $p<0.05$), and individual items were significantly more positive for both wanting more of this kind of activity (item 4, 2.97 vs. 3.77, $p<0.05$) and decreased social anxiety (item 5, 3.91 vs. 4.50, $p<0.05$). These significant differences in favour of the online version of the supermarket scenario support previous researchers who have suggested there can be significant advantages for online simulations dues to their games like, immersive and social nature (Dalgarno and Lee, 2010, Johnson and Levine, 2008, Falloon, 2010).

The Counselling Centre and Supermarket scenarios both included brief quizzes, to check that students had achieved key learning objectives. For example in the supermarket scenario they should have worked out that the checkout operative was stressed and felt they had little control over their work. In the counselling centre scenario they should have realised that the assessment client they interviewed had difficulties consistent with obsessive compulsive disorder. There were no significant differences between Second Life® and face to face on the total quiz scores in either of the scenarios. However, participants in the Second Life® condition did not rate the counselling centre scenario as having given them insight into the application of psychology within this context. From the qualitative comments, it seems this is likely to have been due to the perceived quality of the interaction with avatars.

Participants in the Dragons' Den scenario also completed an entrepreneurial awareness scale. There were no significant differences between Second Life® and face to face on this measure, but in both conditions virtually all items were rated significantly above the neutral mid-point. The exception was item 4, about how likely participants were to engage in entrepreneurial activities in the future. Lack of

endorsement of this item is consistent with the notion that there are other factors which are more influential than awareness, for example access to investment capital.

In terms of the qualitative feedback, there are two key points to note. First of all, where scenarios use chatbots, the quality of the interaction is very noticeable. Participants found the text box interaction to be very artificial, and the chatbots were very limited in terms of non-verbal communication. Text chat does not include intonation, there is no facial expression, and very limited gestures. Secondly, face to face simulations are very challenging for some students, who experience considerable social anxiety. Second Life® is undoubtedly preferred by these students. However, one might debate the wisdom of allowing such students to avoid rather than deal with their anxieties. These results would suggest that virtual world simulations could be used as an effective scaffold to help students explore and learn to manage their social anxieties.

Previous commentators (for example Warburton, 2009) have pointed out the negative side of Second Life® in terms of the initial learning overhead. In other words, students have to learn to use and navigate their way around their environment before they engage with the learning activity. We had no comments on this from our participants, who were all provided with ready-made avatars which were already positioned in the right place to engage in the simulations. Similarly, student mentors were on hand to facilitate and help in case any issues arose with the technology. There were several glitches where Second Life® froze or chatbots misbehaved (for example by repeating the same response over and over again), but the impact of these was minimised by the presence of the trained student facilitators. One further point to make about the technology is that there are significant costs to developing online scenarios (approximately £29,000 for the three described in this study). This cost needs to be weighed against the value to students, and likely future utilisation. For example, if these three scenarios were used with all psychology cohorts at this university for the next five years, the cost per head would be approximately £22 (and this is allowing for the fact that the cost of maintaining a Second Life® presence is already borne by the university).

This study has a number of limitations. It was limited in terms of the three scenarios evaluated. Given time constraints, the three scenarios developed were quite limited in their scope. Obviously this study only involved psychology undergraduates, and the issues could be very different with other student populations both in terms of discipline and level of education. It would be interesting to explore in more depth what features make an online simulation likely to be successful. It would also be interesting to explore to what extent simulation can be used to deliver other aspects of the psychology curriculum, for example developing students consultancy skills, perhaps by having them visit a virtual organisation.

In conclusion, there is no evidence from this study that Second Life® is any better or worse than face to face as a way of carrying out learning simulation activities. However, it seems that for some complex problem-based scenarios, Second Life® may be better in terms of student satisfaction and enhanced insight. Participants felt that the Second Life® supermarket scenario enabled them to become immersed in the scenario environment, in a way that was not possible in a classroom. This signals significant opportunities in terms of the flexibility that using virtual worlds' technology could add to the curriculum (without detriment to student satisfaction or attainment), and also in terms of the variety of complex real-world scenarios that could be developed to provide students with further opportunities to apply theory to practice. However, in terms of simulating counselling type activities such as assessing a new client, students seem to have perceived some significant disadvantages in terms of the quality of interaction with chatbots. This has reduced their rating of the overall insights they can gain into the application of psychology within this setting.

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Table 1. Participant details.

Condition	n	male	female	Mean age	SD
Dragons Den (year 1 students)					
F2F	31	5	26	19.1	1.2
SL	22	3	19	19.9	3.4
Supermarket (year 1 students)					
F2f	32	10	22	19.7	1.1
SL	26	6	20	18.8	2.9
Counselling (year 3 students)					
F2F	31	7	24	22.3	4.9
SL	44	4	40	22.9	5.3

Key – F2F = face to face, SL= second life.

Table 2. The student satisfaction questionnaire.

Item No.	
1	This activity has helped me to understand the related theory better.
2	I found the activity stimulating and engaging.
3	This was an interesting and novel activity.
4	I would like to see more of this kind of activity on the course.
5	I found the activity easy and non-threatening to engage in.
6	The activity gave me insight into how (entrepreneurial / counselling / consumer) psychology works.
7	I enjoyed taking part in the activity.
8	I felt I learned a lot from the activity.

Table 3. The psychology enterprise awareness scale.

Item no.	
1	This activity has helped me to appreciate how Psychology can lend itself to business start-ups.
2	Ideas from Psychology can lend themselves to entrepreneurialism.
3	This activity has given me a new appreciation of how Psychology could be used in the real world.
4	I am more likely to consider psychology applications in business when I graduate.
5	This was an interesting opportunity to reflect in a different way about how Psychology can be applied.

Table 4. Means, standard deviations and comparisons across groups for the supermarket scenario.

Item	f2f/sl	N	Mean	Std. Deviation	Gp1 vs. Gp2	One Sample t
q1	1	32	2.88	.751	1.55	0.94
	2	26	3.23	.992		1.18
q2	1	32	3.03	1.092	1.57	0.16
	2	26	3.54	1.363		**2.01**
q3	1	32	3.38	.976	1.45	**2.17**
	2	26	3.81	1.297		**3.17**
q4	1	32	2.97	1.121	**2.84**	0.15
	2	26	3.77	.992		**3.95**
q5	1	32	3.91	.995	**2.62**	**5.15**
	2	26	4.50	.648		**11.80**
q6	1	32	3.56	.801	1.96	**3.97**
	2	26	3.96	.774		**6.53**
q7	1	32	3.56	.914	1.28	**3.48**
	2	26	3.88	.993		**4.54**
q8	1	32	2.84	.723	1.71	1.22
	2	26	3.27	1.151		1.14
total	1	32	26.13	5.129	**2.40**	**2.34**
	2	26	29.96	7.034		**4.32**
q9	1	32	55.31	15.237	1.29	1.97
	2	26	61.73	22.313		**2.68**
q10	1	32	62.34	17.551	1.87	3.97
	2	26	71.54	19.838		**5.54**

Notes: f2f – face to face sl – second life

GP1 vs. GP2 – independent t test comparing face to face vs. second life

One sample t – one sample t test, comparing scores to scale mid-point.

Q1-Q8 are from the activity rating scale, Q9 and Q10 are analogue items.

For all figures in bold, $p<0.05$.

Table 5. Means, standard deviations and comparisons across groups for the enterprise scenario.

Item	f2f/sl	N	Mean	Std. Deviation	Gp1 vs. Gp2	One Sample t
q1	1	31	3.39	0.80	1.47	**2.68**
	2	22	3.00	1.11		0.00
q2	1	31	4.10	0.97	1.23	**6.24**
	2	22	3.73	1.20		**2.83**
q3	1	31	3.97	0.94	.05	**5.68**
	2	22	3.95	0.95		**4.71**
q4	1	31	3.68	1.13	1.04	**3.31**
	2	22	4.00	1.06		**4.38**
q5	1	31	3.65	0.98	1.32	**3.64**
	2	22	4.05	1.21		**4.04**
q6	1	31	3.55	1.06	0.62	**2.88**
	2	22	3.73	0.98		**3.46**
q7	1	31	3.97	0.87	0.12	**6.15**
	2	22	4.00	1.02		**4.58**
q8	1	31	2.74	0.96	1.66	1.48
	2	22	3.23	1.15		0.93
total	1	31	29.03	4.78	0.37	**5.85**
	2	22	29.68	7.13		**3.76**
q9	1	31	59.84	20.55	0.50	**2.66**
	2	22	62.68	19.35		**3.07**
q10	1	31	67.10	16.72	0.37	**5.69**
	2	22	68.95	19.23		**5.42**
E1	1	31	3.77	0.99	0.17	**4.35**
	2	22	3.82	0.79		**4.83**
E2	1	31	3.90	0.94	0.57	**5.33**
	2	22	4.05	0.78		**6.24**
E3	1	31	3.71	0.93	0.60	**4.21**
	2	22	3.86	0.88		**4.56**
E4	1	31	3.23	1.17	0.84	1.07
	2	22	3.50	1.14		2.05
E5	1	31	3.84	1.09	1.13	**4.25**
	2	22	4.14	0.64		**8.33**
Total	1	31	18.45	4.47	0.77	**4.29**
	2	22	19.36	3.77		**5.42**

Notes: f2f – face to face, sl – second life

GP1 vs. GP2 – independent t test comparing face to face vs. second life

One sample t – one sample t test, comparing scores to scale mid-point.

Q1-Q8 are from the activity rating scale, Q9 and Q10 are analogue items.

E1 – E5 are from the entrepreneurial efficacy scale.

For all figures in bold, $p<0.05$.

Table 6. Means, standard deviations and comparisons across groups for the counselling scenario.

Item	ff/sl	N	Mean	Std. Deviation	Gp1 vs. Gp2	One sample t
q1	1	31	3.71	1.10	0.45	**3.58**
	2	44	3.59	1.12		**3.48**
q2	1	31	3.74	0.93	0.96	**4.44**
	2	44	3.50	1.15		**2.88**
q3	1	31	3.81	1.04	0.60	**4.29**
	2	44	3.95	1.03		**6.12**
q4	1	31	3.68	1.30	0.19	**2.89**
	2	44	3.61	1.41		**2.87**
q5	1	31	4.06	1.12	1.30	**5.27**
	2	44	4.39	0.99		**9.26**
q6	1	31	3.84	0.96	0.10	**4.81**
	2	44	3.86	1.04		**5.47**
q7	1	31	3.90	1.01	0.52	**4.97**
	2	44	3.77	1.09		**7.67**
q8	1	31	3.68	1.07	1.45	**3.50**
	2	44	3.30	1.15		1.70
q9	1	31	66.94	20.50	0.43	**4.59**
	2	44	64.73	22.43		**4.33**
q10	1	31	63.61	24.82	1.36	**3.05**
	2	44	55.52	25.53		1.43
total	1	31	30.42	6.28	0.26	**5.69**
	2	44	29.98	7.47		**5.33**

Notes: f2f – face to face, sl – second life

GP1 vs. GP2 – independent t test comparing face to face vs. second life

One sample t – one sample t test, comparing scores to scale mid-point.

Q1-Q8 are from the activity rating scale, Q9 and Q10 are analogue items.

For all figures in bold, $p<0.05$.