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A comparison of the effectiveness of a game informed online learning activity and face to face teaching in increasing knowledge about managing aggression in health settings.

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Abstract

The present study compared the impact of face to face teaching with a short online game informed learning activity on health participants' knowledge about, and confidence in, managing aggressive situations. Both forms of teaching resulted in a significant increase in participants' knowledge and confidence. Face to face training led to significantly greater increases in knowledge but was equivalent in terms of confidence. Both forms of teaching were rated positively, but face to face teaching received significantly higher ratings than the online activity. The study suggests that short online game informed learning activities may offer an effective alternative for health professional training where face to face training is not possible. Further research is needed on the longer term impact of both types of training on practice.

Keywords: Health; online education; aggression, practice-based learning

Introduction

There is increasing involvement of higher education in the United Kingdom (UK) in the postgraduate training of a range of health professionals (Burton and Jackson, 2003), resulting in the need for good quality learning that is relevant to practice and which promotes the skills and knowledge base of the profession (Hardacre and Schneider, 2007). Higher education establishments have also begun to offer post-qualification educational opportunities for health staff, through continuing professional development (CPD) courses and activities. Providing CPD in a traditional face to face format can require considerable resources, both in terms of freeing up staff to attend and providing replacements for them while they are away from work, as well as the financial costs such as travel and accommodation.

These disadvantages have led to an interest in online education, and in particular, game-informed learning (GIL) activities, as a means of educating health professionals (Gee, 2003; de Freitas, 2006; McKenzie et al., 2008). GIL approaches differ from game based approaches in that the latter use established principles to develop engaging and entertaining games, whereas the former include game derived elements with the essential aim of developing engaging learning activities (Begg, n/d). GIL approaches are also based on the belief that ‘the activities of learning and playing are often very similar’ (Begg, 2008, p8).

Online learning activities have the potential advantages of being able to be delivered more flexibly and of being accessed in the workplace as and when required. They also offer a means of bridging the gap between academic and practice based settings, allowing students and qualified staff to develop and practice skills in a virtual environment where the mistakes they make do not have real life consequences (Gee, 2003; Begg et al., 2005; McKenzie et al., 2008). This delivery method is also compatible with the conclusion that practice based

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training which combines both in-service and on the job training represents the most effective format for staff learning (van Oorsouw et al., 2009).

One area of training, where this model of teaching could usefully be tested is in the successful and safe management of aggression. A number of patient groups, such as those with mental health problems (Moss et al., 2000) and intellectual disability (Emerson et al., 2001), may display aggression and it is frequently the reason for referral or admission to specialist services (McKenzie et al., 2000a; Broadhurst and Mansell, 2007). In order to safely manage aggressive situations health staff must have an understanding of the individual, environmental and staff factors that might escalate or deescalate the situation (Maier, 1996; Black et al., 1997) and of best practice in this area (Kaplan and Wheeler, 1983; Ball et al., 2004; Brosnan and Healey, 2011). Staff education, therefore, must include a number of components including proactive, reactive, behavioural and positive programming approaches (Ball et al., 2004). For aggression, in particular, an awareness of the assault cycle can be crucial in knowing when and how to implement these approaches. Kaplan and Wheeler (1983) outline the stages that an individual goes through, physiologically and psychologically while moving towards assaultative behaviour and the type of intervention that may be helpful at each stage. This model has been found to be applicable to a range of patient groups (Smith cited in Kaplan and Wheeler, 1983; McKenzie et al., 2003) and is particularly useful in highlighting that secondary assaults may occur for up to 90 minutes after an assault has taken place.

It has been argued that training in the management of aggression can help reduce the likelihood of staff inadvertently perpetuating aggressive situations (McDonnell and Sturmeay, 1997), and reduce the risk of secondary assault (McKenzie et al., 2003), however for many years limited training was provided to staff in this area (The Royal College of Nursing, 1994). Research has shown that face to face training can increase staff knowledge in this

area (McKenzie et al., 2003) but the extent to which online GIL activities can also do so is unknown. One previous study which examined the impact of an online learning activity on health staff knowledge did not have a comparison group (McKenzie et al., 2008) and so the specific effect of this form of education was unknown. Aggression training, therefore, offers a useful means to explore the potential of online GIL as a model for health professional education.

In order to be successful, online GIL activities must encompass a number of key principles (Gee, 2003). These include factors such as fantasy (Malone, 1982), which will engage the participants and allow them to create an identity which will serve as a bridge between their real-life identity and the virtual identity adopted in the online activity (Gee, 2003); a back story (Begg et al., 2005) which indicates the constraints and culture of the activity; situated learning, whereby the activity is embedded in the practice of those it relates to (Gee, 2003; de Fritas, 2006) and authentic professionalism i.e. in order to successfully navigate the learning activity the participant must act in accordance with best practice (Gee, 2003).

Research into the benefits of GIL indicates that it can be effective in increasing staff knowledge and is generally rated as interesting, enjoyable and engaging, particularly if the learning activities are situated in the professional practice context (Begg et al., 2005; Mitchell and Savill-Smith 2005; McKenzie et al., 2008). The present study, will therefore explore the use of GIL as a learning activity, using aggression management training as an exemplar.

Aims and hypotheses

The aim of the present study was to evaluate whether an online GIL activity would result in a significant increase in participants' knowledge about and confidence in, managing

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aggression, as compared to those undergoing face to face teaching. In addition, the study aimed to measure the extent to which both groups evaluated the type of teaching input they received as interesting, easy to follow and helpful as a learning activity. It was hypothesised that there would be a significant increase in knowledge scores and confidence ratings for both groups following the teaching input but the scores of the 'face to face' group would increase significantly more than the 'online quandary' group following teaching input.

Method

Ethics

Ethical approval for the study was obtained from the author's educational establishment.

Participants

Two groups participated. The first were trainee clinical psychologists. In the UK clinical psychology training is a post graduate doctoral qualification. It is common for successful applicants to have had previous relevant experience working in a health setting and some may also hold a professional health qualification, such as in nursing. The training programme that the participants were enrolled in comprises a three year full time programme or four or five year part time programme of formal teaching and three clinical placements, each lasting six months. All trainees undergo a common first year of formal teaching and clinical placements in relation to adult mental health and intellectual disability specialties. The participants in the present study were all in their first year of training and had just begun their formal intellectual disability teaching block (n= 31).

The second group (n=35) consisted of students undertaking an applied psychology masters qualification or psychology degree (n= 24) and health staff (n=11). As with group

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one, those undertaking the master qualification often have relevant experience in health settings. As only a limited number of applied psychology students are trained each year, there was an insufficient number of participants to allow the results for this group to be analysed separately. As the training of the master's students involved clinical practice placements in health settings and the psychology students had worked, or were currently working, with patient groups in a health or social care setting, it was considered reasonable to combine the groups for the purposes of the study. Table one provides demographic information and statistical comparisons between the two groups. No significant differences were found between the two groups in terms of previous experience of assault or previous training, however, group one had significantly more female participants than group two.

INSERT TABLE 1 ABOUT HERE

Procedure

In order to compare the two training methods, an existing face to face training session provided to group one participants (trainee clinical psychologists) was used. As a result randomisation of the participants to the two different conditions or self-selection by the participants was not possible. None of the participants received any form of incentive or reward for participation.

Face to face teaching

The face to face teaching group received a 90 minute teaching session on the assault cycle and reactive strategies. This was part of a one day introductory session which formed part of the standard curriculum, on assessing and developing interventions for people with an intellectual disability who display challenging behaviour, such as aggression and self-injury.

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The session was provided by two clinical psychologists who had previously developed and evaluated the training (McKenzie et al., 2000b) and consisted of didactic teaching, group tasks and discussion. Prior to the session the participants were asked to complete a questionnaire (see section 2.4.2) based around a vignette. Following the session they were asked to complete the same questionnaire and to provide an evaluation of the session in terms of interest, extent to which it was easy to follow and helpfulness as a learning activity. This type of information is routinely collected about different aspects of the teaching to ensure that it is meeting the learning objectives. All responses were anonymous. The participants were asked to generate their own code number on both questionnaires by providing the first two letters of their mother's name and month of birth to allow for matching.

Online teaching activity

This group were recruited in two ways: the students were recruited by an email sent via the university programme secretary. The health staff were recruited by email which was sent to staff who were due to attend a training event held in a Scottish NHS Health Board area. The email provided information about the study and a link to the online site. The site provided an initial questionnaire, identical to that provided to group one. On completion of the questionnaire the participants were able to access a link to the online GIL activity (see section 2.4.1). They were able to work through the activity at their own pace. This is likely to have varied from individual to individual, depending on the path taken through the activity. In general, the time required to complete the activity from start to finish is likely to have ranged between 45 and 90 minutes. At the end of the activity, participants were provided with a link to the second questionnaire, which was also identical to that completed by group one. On completion of the questionnaire, participants were free to use the activity again. All responses were anonymous and questionnaires were matched as for group one.

Materials

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Online game informed learning activity

The online learning activity was designed using software called 'Quandary Action Mazes' (<http://www.halfbakedsoftware.com/quandary.php>) taking into account the good practice guidelines and principles for designing a good GIL activity outlined in the introduction. This software provides a structure that allows the trainer to design a GIL activity that presents the participant with a scenario about which he/she must make a decision. Every decision has particular consequences and results in a development of the scenario and the creation of a situation about which the participant must make a further decision. This continues until the participant successfully negotiates through the 'quandaries', becomes stuck in a quandary loop following a series of poor decisions or has to start again. For example the participant may be in a situation where he/she is faced with an upset service user at the same time as she is expecting an important phone call. In this scenario, the phone rings and the participant must decide whether to ignore it or answer. Each decision will have subsequent consequences. The software allows for additional material to be inserted or linked to e.g. video clips, external websites, as is relevant to the learning objectives of the activity. For more information about the activity please contact the author.

The learning activity was developed by the author and the content was also reviewed by the training department of the local NHS Health Board, who provided training on managing aggression and assault, as well as being piloted with three health staff who worked in intellectual disability services. Following the pilot minor changes were made to the activity, including correcting spelling mistakes and changing the order of two options.

Vignette based questionnaires

Questionnaire one was adapted from that which had been previously used to assess the impact of face to face training on managing assault (McKenzie et al., 2003). It requested basic demographic information including gender, occupation, whether the participant had

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previously been assaulted at work, whether he/she had previously received training in managing aggression. It also asked the participant to rate his/her confidence in managing an aggressive situation with 0 indicating no confidence and 5 indicating complete confidence. A second section asked about the person's understanding of what the assault cycle was and the final section presented a brief vignette of an individual (John) attempting to hit another person, then overturning a table before angrily leaving the room. The participant was asked to choose from a range of options as to what they would do next and to give a reason for their answer. They were then asked to choose the best time to talk to 'John' about the incident (e.g. immediately, after 30 minutes, after 90 minutes, never) and to provide a reason for their answer. A copy of the questionnaire is available from the author. Questionnaire two was identical except it did not request demographic information and it included a section which asked participants to rate the following on a likert scale:

- How easy was the activity to follow (1= very easy, 5= very difficult)
- How interesting was the activity? (1= very interesting, 5= very boring)
- How helpful was the activity in learning about the assault cycle? (1= very helpful, 5= not helpful at all)

Participants were also given the option of providing any other comments.

Scoring

Responses were scored by the author according to absence or presence of key pieces of information relating to the successful management of aggression. These were determined from professional good practice guidelines (e.g. Ball et al., 2004) and from published research specifically relating to the assault cycle (e.g. Kaplan and Wheeler, 1983). For example a participant might score points in relation to their understanding of the assault cycle for each of the stages that they correctly identified and for indicating that it was a model of psychological and physiological arousal. Participants were given scores for each question and

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these were combined to provide a total score (maximum 20). The ratings of the teaching activities were analysed to give mean scores and standard deviations.

Power analysis and sample size

A power calculation was carried out to determine the number of participants required for each group. Power was set at .80 and alpha level at 0.05. The one previous study into the impact of an online learning activity on staff knowledge found medium- large effect sizes depending on the area of knowledge being assessed (McKenzie et al., 2008). In addition, a previous study which examined the impact of training on staff knowledge in relation to challenging behaviour (McKenzie et al., 2000b) found a large effect size. A large effect size was, therefore, assumed for the present study. On this basis and following Clark-Carter (2010) for a split plot ANOVA with two independent variables: type of training (face to face versus online learning activity) and time (before and after training), a total sample size of 52 was required. For between subjects t-tests, 20 participants were required in each group. The present study had a total of 66 participants with 31 in group one and 35 in group two.

Results

Prior to undertaking the analyses the data were examined for skew, kurtosis and homogeneity. No significant skew or kurtosis was found for any of the variables, however the knowledge scores after the learning input were found to have significantly different variances which were not resolved by any of the available transformations. Parametric data analysis was still undertaken because many parametric tests, including ANOVA are known to be robust to some violations of their assumptions (Field, 2009). Table two illustrates the mean scores, standard deviations and range for knowledge, confidence and ratings of the teaching input for the 'face to face' and 'online quandary' teaching groups.

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INSERT TABLE 2 ABOUT HERE

Knowledge scores

Paired samples t-test illustrated that the scores of both the quandary group ($t=-5.564$, $df=34$, $p<0.001$) and the face to face groups ($t=-9.13$, $df=30$, $p<0.001$) increased significantly following training. A split plot ANOVA illustrated a significant interaction effect between group and time: $F(1,64)=11.11$, $p=.001$, $\eta^2=.148$, large effect size. This indicated that the scores for the face to face group increased significantly more after teaching than the scores for the online quandary group.

Confidence scores

Paired samples t-test illustrated that the scores of both the quandary group ($t=-4.346$, $df=34$, $p<0.001$) and the face to face groups ($t=-4.642$, $df=30$, $p<0.001$) increased significantly following training. A split plot ANOVA illustrated no significant interaction effect between group and time. This indicated that there was no significant impact of type of training on confidence scores over time.

Ratings of educational activity

A series of unrelated t-tests indicated that, while the mean scores for both groups were positive, the face to face group had significantly more positive scores than the online quandary group in relation to the extent to which the learning was perceived to be: interesting, ($t=3.654$, $df=41.88$, $p<.001$) easy to follow ($t= 4.08$, $df= 31.14$, $p<.001$) and helpful as a learning activity ($t=3.14$, $df =37.12$, $p=.003$).

Discussion

Knowledge and confidence

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It is crucial that health professionals have the skills, knowledge and confidence to deal effectively with a range of clinical situations, including managing aggressive situations safely. Education that fails to equip the student or staff member for clinical practice can prove costly in terms of resources such as time and money, but also in respect of the potential negative impact on the individual and patients. Online GIL activities offer a number of potential benefits in terms of flexible delivery of training; however, there have only been a few studies which have evaluated their use. These studies have not always been shown to be successful (de Freitas, 2006) or have not been compared with alternative teaching methods (e.g. McKenzie et al., 2008), although more research has been conducted evaluating online learning in general (see US Department of Education, 2010 for a review).

The present study aimed to assess the impact of an online learning activity on knowledge about and confidence in managing aggression, as compared with face to face teaching, as well as comparing participant' views about each form of teaching. It was hypothesized that both forms of teaching would result in significant increases in knowledge and confidence, but that face to face teaching would result in significantly greater increases than the online activity.

It was found, in line with the hypotheses, that both the teaching approaches resulted in significantly higher knowledge and confidence scores about key factors in managing aggression after training, compared with before. In addition, the face to face teaching was found to result in significantly higher knowledge scores compared with the online learning activity, although no significant interaction effect was found for confidence ratings. These results are encouraging, suggesting that even a short stand alone online learning activity can result in significant changes in knowledge and confidence.

There is, however, no guarantee that changes in knowledge and confidence will translate to long term changes in practice (Baker, 1988). Previous research suggests that unless

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changes resulting from training are supported in practice they are unlikely to be sustained (Harper, 1994). Other factors, such as the extent to which the training is seen as relevant, applicable and of good quality also impact on how successful the outcome of it is (Harper, 1994). The present study, therefore, also evaluated some aspects of relevance, applicability and quality by assessing participants' perceptions of how interesting, easy to follow and useful as a learning activity the two forms of teaching were.

Participant evaluations of the learning activity

The importance of including participant evaluations of teaching methods, including GIL activities has been noted by a number of authors (de Freitas, 2006; Begg et al., 2007) and the present study asked participants to evaluate their particular teaching method on three dimensions: interest, usefulness as a learning activity and how easy it was to follow. The results indicated that both teaching methods received mean scores indicating that participants viewed them positively on all three dimensions, although the face to face teaching received significantly higher ratings. There may be a number of reasons for this latter finding. The complexity of the online activity was constrained by the software on which it was based and the skills of the author in designing it. As a result it was a relatively straightforward, narrative based activity and was limited in the extent to which it could reflect the dynamic and complex nature of work-based practice compared with both more complex game based activities (Gee, 2003; Rouse, 2005; de Freitas, 2006;) and face to face teaching. It is also important (de Freitas and Oliver, 2006) but more difficult to take account of individual learning characteristics in a flexible way in an online learning activity. Despite this, both the online activity and the face to face teaching were designed to take account of good learning principles, such as providing challenge, the opportunity to learn through experimentation and experience, rather than through the rote learning of facts, and surprising feedback, i.e. setting up a learning activity such that it challenges participants' assumptions and gives the

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opportunity to provide feedback that makes this challenge explicit (e.g. Gee, 2003; Rouse, 2005; de Fritas, 2006). It is likely that these shared characteristics led to both teaching methods being rated positively.

Limitations

The present study, while offering some support for the effectiveness of short, online learning activities in increasing knowledge and confidence, did have a number of limitations. Firstly, the scoring of the questionnaires was completed by the author, and while the scoring criteria were applied uniformly, there is still the possibility of unconscious bias which may have influenced the results. Secondly, the study did not examine the impact of either form of training on practice and did not explore whether the positive changes which were found immediately after training were sustained in the longer term. It is important that future training addresses both of these questions in order to ensure that professional education is cost effective in terms of having a sustained positive impact on practice.

A third limitation relates to the generalisability of the results. While the sample size was sufficient to achieve statistical power and yielded large effect sizes, it was drawn from one geographical area in Scotland and the extent to which it is representative of the population of staff and students who manage aggressive situations in health settings is unknown. The two samples may also have differed to some extent in the proportion that held a health qualification. Those receiving the online training included some qualified health staff, however, information about any existing health qualifications held by the trainee clinical psychologists in group one or the applied psychologists in group two was not recorded, making comparison on this factor impossible. In addition, while the study took account of previous training and experience of assault, it did not account for individual factors such as gender or age. Previous research suggests that training in relation to aggression may have a differential impact on confidence depending on gender (Murray et al.,

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1999) and may eliminate pre-training gender differences in confidence (McKenzie et al., 2004). The two groups in the present study differed in the proportion of males and females they contained and this may have impacted on the results relating to participant confidence.

Finally, while the study examined some aspects of participants' perceptions of the different learning approaches, i.e. interest, ease of use and usefulness as a learning activity, there are a number of additional aspects of relevance, applicability and quality that could have been measured.

Conclusion

The present study found that a short online GIL activity led to a significant increase in participants' knowledge and confidence, suggesting that it may offer a cost effective means of training professional staff. Face to face training led to significantly greater increases in knowledge but was equivalent in terms of confidence. Both forms of teaching were rated positively, but face to face teaching received significantly higher ratings than the online activity. As the study did not, however, directly compare both methods of teaching in terms of the financial cost or time involved, further research is needed to explore the relative cost effectiveness, as well as the longer term impact of both types of training on practice.

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Table 1: Demographic information and statistical comparisons between the two groups

	Group 1		Group 2		Chi square value	P value
Gender	Male	Female	Male	Female	6.752	.009
	3	28	13	22		
Previous experience of assault	Yes	No	Yes	No	1.323	.516
	8	22*	11	24		
Previous training	Yes	No	Yes	No	5.952	.051
	21	9*	15	20		

Table 2: Mean, standard deviation and p values for knowledge scores, confidence ratings and educational activity ratings for the ‘face to face’ and ‘online quandary’ groups

	Group					P value
	Face to face teaching		P value	Online Quandary		
Knowledge Score	Mean	SD			Mean	SD
Baseline	4.1	3.2	0.001	4.1	3.4	0.001
After teaching	11.1	3.1		7.7	4.6	
Confidence Score						
Baseline	1.9	.89	0.001	2.7	1.1	0.001
After teaching	2.5	.76		3.3	.99	
Ratings of educational activity						
Interesting	1.44	.56		2.24	1.06	0.001
Easy to follow	1.19	.31		2.17	1.26	0.001
Helpful	1.22	.45		1.89	1.08	.003