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# Student Understanding, Participation and Engagement: A Small Scale Quantitative Study

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ABSTRACT

Within the current Higher Education focus on the student experience, this study explores the possible relationship between the three issues of participation, engagement and understanding. The study emerged from a conversation between colleagues about student evaluation of taught sessions. From this, a diagram outlining sectors of participation, engagement and understanding was constructed and a minute paper style instrument developed for easy implementation in large classes. The evaluation instrument was utilised with one class over a period of eight weeks involving four lectures, each utilising think/pair/share exercises to a different degree. The results show different levels of self-reported participation, engagement and understanding related to the frequency and occurrence of the think/pair/share exercises.

**Keywords:** Student engagement; participation; understanding; lectures; active

## Introduction

> *The formal lecture is a refuge for the faint-hearted, both lecturer and student.* (Barnett, 2000, p. 159)

> *The lecture too rarely stimulates thinking or gives students a sense of being part of a community of scholars; it is more likely to promote a view of learning as remembering masses of isolated detail.* (Ramsden, 2003, p. 156)

> *A lecture is where the subject matter expert tells the students about the major topics that make up the discipline … [t]he flow of information is one way and students' contributions usually limited to questions and requests for clarification.* (Biggs & Tang, 2007, p. 107–108)

Whilst discussing the relative merits of different teaching methods, a group of staff undertaking a postgraduate certificate in higher education simultaneously were discussing two aspects of their approach to teaching. The small scale study reported here draws together the two developments into one piece of research examining the impact on students of an overtly active component in lectures. We take as a definition for active learning that provided by Prince (2004): "any instructional method that engages students in the learning process" (p. 223). For the first development, a series of lectures delivered to the same class undertaking the same module with the same teacher are varied by changes to the frequency of use of think/pair/share (TPS), a technique promoting discussion and interaction (Lyman, 1987). For the second one, a variation on a minute paper is implemented to ascertain the students' views in terms of participation, engagement and understanding in relation to the changes made within the lectures. This work is undertaken for two mid-sized classes, and we seek to explore the above quotes via an investigation into the relationship between participation, engagement and understanding as reported by the students.

## Literature review

The review of literature that follows is divided into two sections: minute papers and active learning within lectures.

### Minute papers

A number of studies have been conducted to explore both the use and the value of minute papers as an evaluation technique, most widely linked with the work of Angelo and Cross (1993), who outline the strategy for students to feed back to the tutor their learning from a teaching session. Angelo and Cross suggest that two primary questions be posed at the end of a lecture to which students give a written response. These questions are "What is the most important thing you have learnt today?" and "What is the thing you are still most unclear on?"

A number of critiques have been presented for the minute paper; for example, Nickels (2000) suggests that the second question may be too vague and that what may be needed is a more specific and engaging question. Stead (2005) raised concerns that while the minute paper was a useful tool for both students and tutors, a high level of use could actually reduce its efficacy due to respondent fatigue. More recently, Kwan (2011) conducted an extended critique in which he argued that the one-minute paper did not provide students with the opportunity to critically engage with the material presented in a way that promoted a deep approach to learning. Kwan suggests that, rather, a daily quiz should be used with students which would promote the consolidation of their knowledge. Arguably, however, this misses out the fundamental purpose of the minute paper as a point of dialogue between student and tutor.

Despite the above criticisms, the minute paper is widely used within Higher Education. For example, Becker (2000) used the technique with economics undergraduates. He concluded that while a useful tool, it did not aid students in thinking like economists. Costello, Weldon and Brunner (2002) developed a postcard minute paper on which students wrote questions throughout a lecture, placing the cards anonymously in a box at the end. The authors argue that this approach enabled students to be constantly engaged and thinking of questions, rather than having to rely on material at the end of the session. In another context, McConnell, Steer and Owens (2003) used a minute paper with a large class of undergraduate geology students. Despite initial fears regarding the length of time to assess, evaluate and reflect upon a large number of responses, they found that this form of evaluation was both quick and effective, ensuring that any misconceptions could be addressed quickly in subsequent sessions.

From a longer study, Killeen (2001) argued that, while a useful tool for an immediate discursive and reflective approach to teaching at undergraduate level, the strength of the minute paper lay within the longitudinal data it could provide. The analysis of two years' worth of minute papers for one course revealed that students faced broadly the same issues over the period. Killeen argued that this longitudinal approach can provide sufficient data to warrant change to the content and cadence of lecture materials for future classes. Orr (2005) supports this notion and suggests that such an approach can stop individual lectures being slowed down to accommodate revisiting of materials. A possible solution to this has been demonstrated by Razmov and Anderson (2006) through the use of tablet PCs connected to a central software system from which teachers distribute minute papers in a lecture and receive instant feedback that is displayed to the whole class.

Research suggests, then, that the minute paper is a simple and useful form of evaluation within higher education.

### Active learning in lectures

Revell & Wainwright (2009) provide a useful review of active learning in their article *What makes lectures 'unmissable'?* prior to reporting their research into student and staff perceptions. They note that students only listen actively when lectures are "broken up with multiple rest periods and activities that help lift attention levels back up again" (p. 210). In their own qualitative research into 'unmissable' they find staff (n=10) and students (n=24) noting: participation and interaction; a clear lecture structure; and lecture passion and enthusiasm as key factors. It is not clear if there is any priority accorded to the relative position of an item in the list.

In 2005, Huxham reported research findings from the use of 'interactive windows' (short problem-solving exercises or discussion points) with students (n=515) within lectures with a delivery pattern that allowed a direct comparison with lectures without the windows and the material covered in a traditional, didactic way. Huxham concludes that the windows both were popular, evidenced from student evaluations, and enhanced recall and understanding, evidenced by class test and examination results.

Butler, Phillman and Smart (2001), like Huxham, examined an in-lecture intervention in their research, an in-class writing exercise. Students (n=204) were divided in two groups: those that answered card questions and those that did not. The card group undertook an amalgam of minute papers and think/pair/share activities and returned answers on the supplied cards. Learning, for both groups, was assessed via examination by multiple-choice questions (MCQs), with higher correct answers recorded for four of the questions by the 'card' group compared with one for the 'non-card', and seven showing no difference. The authors attribute the card benefit to students having practised their recall of the material. In addition, students reported higher motivation to attend if "having to turn in a card" (p. 258) was required.

Students' experiences of lectures with opportunities for active engagement are reported by Cavanagh (2011) from a study with Maths students (n=147). A five-item questionnaire was used to collect data about the 'lectorials', "a combination of lecture and tutorial" (p. 25) which included sections of lecture interspersed with learning activities to aid the processing of ideas. From an analysis of the free text responses, 94 students agreed that the 'lectorials' helped with understanding and learning due to the opportunity to actively participate. Cavanagh notes that respondents frequently negatively referenced lectures as boring, against the 'lectorials' which were engaging and involving.

In their article *Presentation vs performance*, Short & Martin (2011) consider the effect of lecturing style on student learning. The study involved large numbers of psychology undergraduate students (n=484), and the authors broadly conclude that 'performance' (including interaction and activities) compared with 'presentation' engenders greater retention and understanding with students assessed via work grading.

An alternative to 'activity' within the lecture is activity supplemental to the lecture. Zorn and Kumler (2003) report on the creation of small discussion groups to supplement lecturers. Free text responses from the student evaluations highlighted the opportunity to exchange views and the activities were perceived to be effective, although this is not defined.

In some cases, unusual interventions become 'active' for the students simply because of their strangeness; take for example 'Harry Houdini and the Enteric Jazz band' (Forgie, 2007). Here, a five-minute film story within a lecture enhanced with music was used with students (n=161), with 130 reporting it as a "useful learning adjunct." In tests of content, 98.9% of students were correct when responding to a single question related to the story compared with 52% responding to a single question about other material in the lecture.

In another large study of psychology students (n=1091), Smith and Cardaciotto (2011) tested student-reported material retention, course engagement and attitudes to course material under two conditions that supplemented lectures; one 'active' and the other 'review'. The results showed, for the active condition, greater retention across the majority of course topics, great engagement but not more positive attitudes. The authors suggest that this could be due to the "intellectual effort" (p. 56) required from students for the active condition. In relation to the article's intriguing title, *Is active learning like broccoli?*, the conclusion notes: "It appears that active learning may indeed be like broccoli: although it is good for students intellectually, their overall impression of it may not be completely positive" (Smith & Cardaciotto, 2011, p. 56).

The above study used a lecture supplement as the active/passive condition, whilst in an earlier study, Omelicheva and Avdeyeva (2008) utilised two different methods to teach a range of political science topics (n=60). Here, the active classes were debates and the passive ones lectures. A range of learning outcomes, knowledge, comprehension, application and critical evaluation were tested along with students' self-reported level of interest. Higher, statistically significant results were found for all four learning outcomes of the study for the active group, with non-significant results for levels of interest.

In reading the literature around active learning in lectures, it is interesting to note material offering advice and methods on how to make student learning more active. These can range from descriptions of presentation ideas to changes in modes of delivery. An example of the former is Cohen (2005), who outlines a magnetic induction class where students are prompted to ask questions and develop explanations during demonstrations. Cohen, as an aside, notes "students get a kick out of seeing their professor on top of a table" (p. 285). The latter is exemplified by Buckley, Bain, April, Luginbuhl and Dyer (2004), who discuss the practicalities and financial implications of moving from four hours of lectures per week to a model of three hours of lectures with bi-weekly discussion sessions. The main conclusion was that the people (in this case graduate teaching assistants) need to be "involved at every stage of the planning" (p. 236).

For both the Cohen and Forgie examples above, it is interesting to note the theatrical dimension is something considered by Andresen (1984), who noted the potential of lecture refinement as either an "augmentation [in the] direction of pure pedagogy (lecture as engagement between minds)" or "refinement [in the] direction of pure theatre." Augmentation, he proposed, took the form of activity, feedback and dialogue, whilst refinement was an enhancement of style, technique and presentation skills.

Elliot (2005) notes the time consuming nature of active learning within lectures and the tension this creates with "the need to transmit the required information" (p. 54). Whilst learning is not a corollary of transmission such coverage pressures are felt by lecturers. Elliot also notes issues with students asking and responding to questions in lectures with audience size and time of day of the lecture influencing active participation. He researched students' (n=55) opinion about these factors via a questionnaire, finding that students were statistically significantly "less comfortable asking or answering questions in large groups" (p. 57), that large classes were detrimental to learning quality and that students are more likely to contribute when lectures are mid-morning.

Technology also features in promoting student-centred active learning in lectures. In a particularly extensive piece of work, Gauci, Dantas, Williams and Kemm (2009) examined questions within lectures that were addressed via a personal response system (PRS). The authors note, from questionnaire responses, that the students felt "more engaged, intellectually stimulated and motivated to think through the use of PRS" (p. 63). However, it is worth noting that the PRS was simply the vehicle to address questions posed in the lecture that students were then expected to answer. The PRS then, as a mechanism, demanded of the lecturer the posing of

questions and of the students an answer, presumably involving 'active' processing of presented material. All six lecturers involved in the study were interviewed, and post PRS use noted student excitement at the use of the clickers (PRS) but also lecture flow disruption; indeed, the authors note their intervention as an 'interrupted mode' compared with traditional lectures. They also note the limitation due to lack of expertise with the PRS meant lecturers tended to ask multiple choice questions. Students interviewed (n=9) claimed that the PRS promoted engagement and motivated them to study afterwards. Analysis of examination results for cohorts prior to and post PRS use showed significant improvement with no variation for the two prior cohorts.

Also, in 2009, PowerPoint featured as an active intervention in lectures when used as a method of incorporating 'content based questions' (CBQs) (Gier & Kreiner, 2009). In this work, CBQs were used within lectures in one class whilst the other had group discussions at the end of lectures. Students in the lecture and CBQ group outperformed in the in-class tests and examinations the lecture and discussion group, with the authors claiming that "the CBQs appear to augment students' learning" (p. 137) and that the outperformance could be attributed to "the increased level of active learning involved in the CBQ method" (p. 137).

We conclude this review with one further study that used a quasi-experimental design, with students (n=503) allocated to either an 'active section' or a 'traditional section' (Walker, Cotner, Baepler, & Decker, 2005). This study is included here because of the direct comparison between the two teaching modes, students in the 'active' performing marginally, but statistically significantly, better than the 'traditional'. The authors also noted that the students at the lower end of the ability spectrum "appear to have benefited most" (p. 363). In addition, their reported confidence (about science), when compared with the traditional section, was significantly higher, as was their attendance. Evaluation data, however, showed significantly that students rated their instructors more highly in the traditional section. Further depth was provided by an open-ended questionnaire to students (n=150), with five reported themes emerging: greater praise for lecturers in the traditional; praise for the class in the active; criticism of the active because it "did not always eventuate in [students] being told what the truth is" (p. 365); alienation in large classes; and that learning, reported by both groups, was "the accumulation of unambiguous facts" (p. 365). The truth point seems to suggest something about students and their stage of epistemological development, which may need to be overtly addressed for students to understand why active sessions are used by teachers.

The following study varies from the above as it compares 'active' with 'traditional' by varying with the same group of students the extent of activity.

## Data collection, results and analysis

For this study, a minute paper format was used to collect data from two groups of undergraduate students: first year undergraduate criminal justice and first year undergraduate psychology (n=48, group A and n=31, group B respectively). The minute paper used incorporated five prompts; three were seven-point Likert scale statement responses ('very strongly agree' (+3) through a mid-point 'neither' (0) to 'very strongly disagree' (-3)) and two questions. The statements were; 'I was engaged with learning in today's session'; 'I understood the topic(s) in today's session' and 'I participated in today's session'. This format was developed after piloting a diagrammatic response on which students marked their 'position' with an X. This proved to be unwieldy and the above streamlined method refined from the pilot. Future research might seek to develop an insight into what these terms might mean to students. For the purposes of this paper, the definition was left to the individual respondent.

The statements were followed by a forced choice question between: 'for the majority of the session I have been told information about the subject by the teacher' and 'for the majority of the session I have been involved in activities to learn about the concepts of the subject'. The question aimed to ascertain the students' views on the active/passive nature of the lecture.

The two student groups were both undertaking traditional lecture-delivered modules in the first year and first semester of their programmes. With each group, the lecturer introduced think/pair/share active discussion prompts and varied the frequency of their use (see Table 1 and Table 2 below). The data were analysed by the SPSS statistical package, using the frequency and ANOVA routines to compare the students' responses (the detail of this analysis is included in appendix one).

The mean scores for the three statements are also shown in Table 1 below, with mean 'engagement' scores for group A ranging from +1.4 to +2.15 and for group B from +1.29 to +1.86. All positive scores indicating some degree of 'agreement' with the 'engagement' prompt as a mean score of 0 would indicate a mid-point on the possible +3 to -3 range. It is worth noting that the think/pair/share frequencies between the two groups were reversed from a higher frequency in week 2 (5) to a lower frequency (2) the following week for group A compared with group B in week 2 (2) and week 3 (5). See Table 1 and Table 2 below.

**Table 1** Group A Session weeks, think/pair/share frequency and mean scores for each session for each of the statements

| | | Session 1 | Session 2 | Session 3 | Session 4 |
|---|---|---|---|---|---|
| | | Wk 2 | Wk 3 | Wk 5 | Wk 6 |
| Number of respondents | | 48 | 44 | 41 | 47 |
| Number of Think/pair/share activities | | 5 | 2 | 6 | 2 |
| | | 'passive' | 'active' | 'passive' | 'active' |
| Engagement | Mean | 2.15 | 1.30 | 1.71 | 1.40 |
| | (Standard deviation) | (0.65) | (1.25) | (1.12) | (1.25) |
| Understanding | Mean | 2.46 | 1.64 | 2.1 | 1.91 |
| | (Standard deviation) | (0.65) | (1.21) | (1.02) | (1.06) |
| Participation | Mean | 1.69 | 1.02 | 1.22 | 1.42 |
| | (Standard deviation) | (0.85) | (1.39) | (1.13) | (1.23) |

Table 1 provides the mean scores for each of the sessions in terms of 'engagement', 'understanding' and 'participation' as defined personally by each respondent. It can be seen that the differences between the mean scores for the two active sessions (week 2 – session 1 and week 5 – session 3), for engagement, understanding and participation, are higher than the mean scores for the passive sessions (week 3 – session 2 and week 6 – session 4), with the exception of 'participation' between weeks 5 and 6, with session 1 'active' having the highest mean scores for all three variables and session two 'passive' the lowest.

For group B (Table 2 below), the differences between the mean scores for the two active sessions (week 3 – session 2 and week 6 – session 4) are higher for engagement and participation than the mean scores for the passive sessions (week 2 – session 1 and week 5 – session 3), whilst for understanding the figures are reversed.

**Table 2** Group B Session weeks, think/pair/share frequency and mean scores for each session for each of the statements

| | | Session 1 | Session 2 | Session 3 | Session 4 |
|---|---|---|---|---|---|
| | | Wk 2 | Wk 3 | Wk 5 | Wk 6 |
| Number of respondents | | 31 | 29 | 23 | 26 |
| Number of Think/pair/share activities | | 2 | 5 | 3 | 5 |
| | | 'passive' | 'active' | 'passive' | 'active' |
| Engagement | Mean | 1.29 | 1.86 | 1.30 | 1.35 |
| | (Standard deviation) | (0.58) | (0.69) | (0.92) | (0.75) |
| Understanding | Mean | 2.06 | 1.86 | 1.43 | 1.31 |
| | (Standard deviation) | (0.73) | (0.63) | (0.84) | (0.93) |
| Participation | Mean | 0.58 | 1.90 | 0.83 | 1.19 |
| | (Standard deviation) | (1.31) | (0.72) | (0.94) | (0.94) |

The table also shows that session 2 'active' has the highest mean score for engagement and participation ('understanding' is higher for S1). For session 1 'passive', the lowest mean scores for engagement and participation are recorded, whilst understanding is highest. When an analysis of the differences (see Appendix 1) between the mean scores for sessions and the responses to the statements is undertaken the results reveal that there are statistically significant differences between the four Group A sessions for 'engagement' and 'understanding' but not for 'participation'. For the four group B sessions, statistically significant differences are reported for all four sessions for all three variables (engagement, understanding and participation). In other words, the differences in the means reported here are not due to chance, and we argue that they are due to the number of think/pair/share activities undertaken.

In addition to the three variables above, respondents also identified if the session, for them, was active or passive.

**Table 3** Active/Passive summary table

| | | Session 1 | Session 2 | Session 3 | Session 4 |
|---|---|---|---|---|---|
| Mean scores | | Wk 2 | Wk 3 | Wk 5 | Wk 6 |
| Group A | Mean score | 2.13 | 1.77 | 2.02 | 1.78 |
| | Session type | 'active' | 'passive' | 'active' | 'passive' |
| Group B | Mean score | 1.13 | 2.76 | 1.22 | 2.46 |
| | Session type | 'passive' | 'active' | 'passive' | 'active' |
| Note: Respondents selected from two options 'told/passive' and 'involved/active', which were scored 1 and 3 respectively. For the few respondents that identified both, these were scored 2. | | | | | |

As can be seen from the table, the mean scores for the active sessions for each group were higher, and the differences between weeks for both groups were statistically significant, again, we argue, due to the number of think/pair/share activities within the session.

The final aspect to report from the minute paper is the number of questions respondents had from the sessions. For both groups, the frequency of lecture content specific questions (Table 4), as opposed to a general comment (for example, "any questions I had were answered during the session") rapidly declined from the first session to the second and then on.

**Table 4** Question frequency groups A and B (three variables)

| Group A<br>Question areas | 'active' | 'passive' | 'active' | 'passive' |
|---|---|---|---|---|
| Specific lecture topic content questions | 11 | 1 | 3 | 1 |
| Student general comments | 7 | 5 | 4 | 5 |

| Group B<br>Question areas | 'passive' | 'active' | 'passive' | 'active' |
|---|---|---|---|---|
| Specific lecture topic content questions | 6 | 0 | 0 | 1 |
| Student general comments | 20 | 20 | 14 | 11 |

## Discussion and conclusion

The results reported here support broadly the findings from earlier research (Huxham, 2005; Revell & Wainwright, 2009), which report participation within lectures as a key feature in attention, recall and understanding. In this study, two of the variables, 'engagement' and 'participation', are reportedly higher for both groups for the 'active' sessions, with the exception of group A 'participation' between weeks 5 and 6. In addition, group A also rated their 'understanding' as higher. However, over the period of the research, the difference in variables between the mean scores for the active and passive sessions in all cases declined. The active aspect seems initially to have an effect in 'engagement' and 'participation' terms for both groups, but this positive impact declines

with repeated use of the TPS technique, i.e. from week 1 to 2 and from 5 to 6. Further research could be undertaken into the habituation effect, on the three variables, if a range of active techniques was utilised by a lecturer. This suggests that a more active teaching style may not have what we might term temporal stability in relation to students' levels of engagement, understanding and participation. Arguably, there is an habituation effect illustrated within this data.

It is also worth repeating that the questions asked on the minute paper, whilst apparently straightforward, were not tested in terms of a shared understanding of the concept. What students might understand to be 'engagement' or another of the terms might well vary between individuals. This in itself is worthy of further investigation. We also acknowledge that we have not investigated student 'learning'; this could be further researched via examination essay selection choices and student performance, although of course such a measure of 'learning' is open to debate. In the light of the recent government proposal in regard to a teaching excellence framework, work of this nature might be considered urgent. Perhaps we present a simple link here and that is that greater 'engagement', 'participation' and 'understanding' are 'good things' that can positively impact on learning. Of course, this viewpoint can be debated philosophically, from the point of view of both the teacher and the learner.

The students are able to identify high frequency use of TPS as 'active'; however, we suggest that exposure to a technique like TPS reduces student 'activity' as the novelty wears off – an example of the law of diminishing returns. There seem to be parallels here with Cohen's (2005) students 'getting a kick' and Andresen's (1984) refinement of lectures as theatre. The reasons for this decline could simply be familiarity or they could be more negative in the sense of students beginning to reduce 'engagement' and 'understanding' as effort is required of them.

The minute paper completions took place at the end of each session, and variations, particularly in relation to 'understanding' from a session, may vary as students reflect upon and think about material they have engaged with. Clearly the response to a statement like 'I understood the topic(s) in today's session' will vary with time, hopefully with a deepening as time on a programme passes.

An alternative explanation to the decline in mean scores could be that greater familiarity with an activity like TPS could lead to a declining recognition of the activity as being 'active' in the sense of being a change from 'normal'. There are also links here with Hativa and Birenbaum (2000), who note that students prefer a "clear and interesting lecturer" (who is broadly content-orientated and teacher-centred) over a "providing instructor" (who is broadly learning-orientated and student-centred). To term sessions taught by such teachers as 'active' or 'passive' might be a step too far. The work here reveals a greater 'participation', engagement' and 'understanding' when a session is active (that is having a higher TPS frequency). We might research here a teacher-centred or student-centred lecture series to see if student-reported 'engagement', 'participation' and 'understanding' decline during a module/unit and to what extent.

Another possible aspect of lecturing worthy of research is whether it is simply the content of the lecture itself that prompts greater student 'engagement', 'understanding' and 'participation'. However, it is clearly problematic to identify 'dull' or 'exciting' topics, as these will obviously vary between individuals, lecturers and students alike.

The research findings here are congruent with earlier work. We have found that an active and novel component either within a lecture (or supporting it – see literature above) enhances, at least temporarily, 'engagement' and 'participation' (group A) and, for some, also 'understanding' (group B). The increase in these as reported by the students must be considered to be a good thing, but further work is required around its capacity in relation to impact upon learning. As Revell and Wainwright (2009) note:

> *If the goal of education is ultimately to enable students to think critically and creatively, to formulate their own ideas, to challenge accepted wisdoms, and most of all to become impassioned and inspired by what they are learning, then scholars are right to emphasise the centrality of subjective experience and active learning in education.* (Revell & Wainwright, 2009, p. 221)

We have shown here that active lectures (i.e. greater TPS frequency) can promote greater student-reported 'engagement', 'participation' and 'understanding', but that this technique seems to need to be used sparingly in order to maintain the impact; variety, it seems, is the 'spice of life'.

### *Biographies*

*Dr Peter Gossman* is a Principal Lecturer in Academic CPD. He has worked in a range of FE and HE institutions in the UK and NZ in both Education and Academic Development roles. He has worked on a large NZ project investigating the Scholarship of Teaching and Learning as well as publishing on a variety of subjects.

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*Dr Caroline Gorden* completed her PhD *Making Sense of Sex Offenders and the Internet* in 2006. Since joining Glyndŵr University in 2009, she has been involved in a project on a national evaluation in the prevention of opioid medicines overdose; research about prescription drug misuse; and research on understanding doorstep crime.

*Dr Emyr Williams* completed his higher education at the University of Wales, Bangor with a specialism in the psychology of religion, culminating with him being awarded his PhD in 2008. In 2009, Emyr moved to Glyndŵr University to become a lecturer in psychology and before that was a research fellow at the University of Warwick.

*Sarah Evans* has a background in theatre and performance and has experience in theatre in the community. She was employed at Glyndŵr University to provide maternity cover in drama. She is currently undertaking postgraduate study at MMU.

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## Appendix 1 – Data analysis details

In order to test for the statistical power of the differences between each group and the 'engagement', 'understanding' and 'participation' mean scores (Table 1 and Table 2), a one-way ANOVA was conducted utilising the Bonferroni post-hoc test.

**ANOVA Group A and B (three variables)**

| Group A | Sum of squares (DF) | F | p< |
|---|---|---|---|
| Engagement | 20.28 (3) | 5.70 | 0.001 |
| Understanding | 18.10 (3) | 6.04 | 0.001 |
| Participation | 9.89 (3) | 2.43 | NS |
| Group B | Sum of Squares (DF) | F | p< |
| Engagement | 6.48 (3) | 4.00 | 0.01 |
| Understanding | 10.49 (3) | 5.69 | 0.001 |
| Participation | 28.62 (3) | 9.31 | 0.001 |

The table above presents the results of the ANOVA, which demonstrates that there are statistically significant differences between the four Group A sessions for 'engagement' and 'understanding' but not for 'participation'. For the four group B sessions, statistically significant differences are reported for all four sessions for all three variables (engagement, understanding and participation).

When the post-hoc test for group A is considered (table below), it is demonstrated that there are significant differences between session 1 and session 2 for 'engagement' and 'understanding'; however, no differences are demonstrated between session 1 and session 2 for 'participation' or between sessions 3 and 4 for each of the three variables. For group B (table below), the post-hoc demonstrates significant differences between session 1 and 2 for engagement and participation but no differences between sessions for any other variables.

**Bonferroni posthoc test groups A and B (three variables)**

| Group A | | | Mean difference | p< |
|---|---|---|---|---|
| Engagement | Session 1 | Session 2 | 0.85 | 0.001 |
| | Session 3 | Session 4 | 0.24 | NS |
| Understanding | Session 1 | Session 2 | 0.87 | 0.001 |
| | Session 3 | Session 4 | 0.19 | NS |
| Participation | Session 1 | Session 2 | 0.62 | NS |
| | Session 3 | Session 4 | -0.20 | NS |

| Group B | | | Mean difference | p< |
|---|---|---|---|---|
| Engagement | Session 1 | Session 2 | -0.57 | 0.05 |
| | Session 3 | Session 4 | -0.04 | NS |
| Understanding | Session 1 | Session 2 | 0.20 | NS |
| | Session 3 | Session 4 | 0.13 | NS |
| Participation | Session 1 | Session 2 | -1.32 | 0.001 |
| | Session 3 | Session 4 | -0.37 | NS |

**ANOVA Group A and B (active/passive)**

| | Sum of squares (DF) | F | p< |
|---|---|---|---|
| Group A: active/passive | 4.32 (3) | 4.06 | 0.01 |
| Group B: active/passive | 58.72 (3) | 47.61 | 0.001 |

The table above presents the results of the ANOVA, which demonstrates that there is statistically significant difference between the four group A sessions as well as for the four group B.

The post-hoc test for group A (Table below), demonstrates a significant difference between session 1 and session 2 but no significant difference between sessions 3 and 4. The same results are returned for group B.

**Bonferroni posthoc test groups A and B (three variables)**

| | | | Mean difference | p< |
|---|---|---|---|---|
| Group A: active/passive | Session 1 | Session 2 | 0.35 | 0.05 |
| | Session 3 | Session 4 | 0.25 | NS |
| Group B: active/passive | Session 1 | Session 2 | -1.63 | 0.001 |
| | Session 3 | Session 4 | 0.08 | NS |