Who-Wants-An-Interactive-Lecture: Embedding Use of Personal Response Systems to Enhance the Student Learning Experience

Final Report to the Higher Education Psychology Network Departmental Teaching Enhancement Scheme

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Aim of Project

The aim of this project was to embed the use of a Personal Response System (PRS), also known as an Audience Response System (ARS) or ‘clickers’ (wireless electronic handheld keypads) across modules in the department to improve the student learning experience. The response system purchased for use in the Department of Psychology at Glasgow Caledonian University was the TurningPoint system made by Turning Technologies (see http://www.turningtechnologies.com/). We already had 160 handsets available for use in departmental teaching; however despite staff interest and attendance at demo sessions, they were not being used regularly within modules. Extra handsets were required before the PRS could be used in large lectures (with up to 500 students), which is where we initially saw the most potential for improving the student learning experience.

Funding from the Higher Education Academy Psychology Network Departmental Teaching Enhancement Scheme allowed us to purchase 277 additional handsets. Informal feedback suggested a perception amongst staff that such systems are useful for modules using multiple choice assessments; however this reflected a limited view of how such systems can be used. This may have been due to the lack of pedagogical guidelines for how staff can make use of these systems, as well as concern over technical and aspects of embedding regular use of the PRS in their teaching.

Therefore the specific objectives of the project were as follows:

- Combine use of the PRS with pedagogical methods that will impact on student attendance, level of interactivity, engagement and immediacy of feedback in lectures
- Investigate potential barriers and enablers to the use of PRS from both staff and student perspectives
- Produce examples of how PRS can be used effectively in a variety of ways to enhance undergraduate psychology teaching and learning

The aim of this report is to demonstrate how these objectives were met and outline the stages and findings of the project. The full literature review, data and the resulting Clicker Attitudes Scale for Students (CASS) instrument will appear in a forthcoming journal publication.
Outline of Project Stages and Work Conducted

Phase 1 (September-December 2009)

- Piloting of the PRS in large lectures on the first-year Psychology: An Introduction module for a variety of module activities and formative assessments.
- Evaluation was conducted through student reflective diaries (N = 19) and an online questionnaire (N = 24).

Phase 2 (February 2010 – present)

- Changes were made to PRS activities on Psychology: An Introduction as a result of Phase 1.
- Project findings from Phase 1 were presented at Psychology Learning and Teaching (PLAT) 2010.

Phase 3 (September – December 2010)

- The PRS was used on second-year module Brain, Behaviour and Experience for student evaluation of the implementation of a new module feature and the honours-level Cyberpsychology module to facilitate a scenario-based session on ethics and online research.

Phase 4 (November 2010)

- An opinion survey was conducted with staff using SurveyMonkey and the results were used to tailor a workshop to meet departmental staff needs regarding future use of PRS.

Phase 5 (December 2010)

- The results from Phase 1 were used to construct an instrument to measure student attitudes towards use of a PRS for teaching and learning activities – ‘Clicker Attitudes Scale for Students’ (CASS).
- The scale was administered to a self-selecting sample of first-year students and analyses were conducted to establish reliability.
Phase 1

In 2009, the PRS was used with up to 116 students on the introductory psychology module in 9 of their 24 hourly lecture slots. It was observed that attendance at these lecture slots varied substantially, with the majority of students attending at the very beginning and the very end of the module. A breakdown of the nature of these sessions with regards to PRS usage is shown in Table 1. Reports were generated through the TurningPoint software. These reports could be reviewed at a later stage in order to ascertain which concepts students struggled most with over the semester and plan the final revision session.

<table>
<thead>
<tr>
<th>Session number</th>
<th>Date conducted</th>
<th>Session topic</th>
<th>PRS activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15/10/2009</td>
<td>Brain and behaviour</td>
<td>Pre-topic questions to test students’ prior knowledge and understanding of popular misconceptions concerning the brain</td>
</tr>
<tr>
<td>2</td>
<td>22/10/2009</td>
<td>Brain and behaviour</td>
<td>Post-topic revision session using conceptual inventories for formative assessment</td>
</tr>
<tr>
<td>3</td>
<td>29/10/2009</td>
<td>Learning</td>
<td>Post-topic revision session using conceptual inventories for formative assessment</td>
</tr>
<tr>
<td>4</td>
<td>12/11/2009</td>
<td>Social influence</td>
<td>Post-topic questions to test students’ understanding of the results of Milgram’s work and the ethical issues</td>
</tr>
<tr>
<td>5</td>
<td>16/11/2009</td>
<td>Group behaviour</td>
<td>Review questions from previous Milgram lecture. Students then responded to pictorial stimuli regarding ‘what is a group?’ and the ‘Who am I?’ test in which participants reported back their ratios of personal: social identities for comparison with published research.</td>
</tr>
<tr>
<td>6</td>
<td>19/11/2009</td>
<td>Personality assessment</td>
<td>Students explored projective personality testing by responding to stimuli from the Thematic Apperception Test and the Rorschach inkblot test.</td>
</tr>
<tr>
<td>7</td>
<td>26/11/2009</td>
<td>Intelligence and IQ testing</td>
<td>Students attempted three questions and were asked which one they thought was a better predictor of IQ score and then presented with research findings.</td>
</tr>
<tr>
<td>8</td>
<td>30/11/2009</td>
<td>Consciousness</td>
<td>Participants responded to questions about what and why they dream and compared their responses to published research. Also completed a dream interpretation activity in which they were exposed to a case study and asked to vote on its authenticity.</td>
</tr>
<tr>
<td>9</td>
<td>10/12/2009</td>
<td>Revision</td>
<td>Students completed some practice multiple-choice questions for revision and were given feedback on their understanding of core concepts. They also responded to questions relating to module feedback, including what they liked most about the module and their preferred topics.</td>
</tr>
</tbody>
</table>

Table 1: Breakdown of PRS sessions conducted in Phase 1
**Project Methodology**

As the aim of this phase was to investigate the processes relating to learning using the PRS in large lectures from the student perspective, it was decided that data would be collected from students using *reflective diaries* and also *evaluation questionnaires* utilising open-ended questions. Norton (2009) noted that qualitative analysis can be useful in research studies where there is a need for more in-depth information. This includes the richer detail that can result from open-ended questions. However, the evaluation questionnaire did include a series of Likert-type statements that resulted in some quantitative data.

**Data collection**

At the start of the semester beginning in September 2009, introductory psychology students were invited to participate in research involving their use of the PRS in large lectures following ethical clearance by the Psychology Ethics Sub-Committee. A total of 19 students volunteered to participate in the first part of the research by keeping reflective diaries. The diary consisted of nine pages containing the same five open-ended questions in order to investigate their experience of using the clickers following each PRS session.

*Question 1: Description of activity in which PRS was used*

*Question 2: Do you think that using the PRS added to your enjoyment of the class today? Why?*

*Question 3: Do you think that using the PRS added to your understanding of the material covered in class today? Why?*

*Question 4: At what point did you feel most engaged with the class today? Why?*

*Question 5: Are there any ways in which today’s activity with the PRS could have been improved?*

An evaluation questionnaire was constructed in order to gather student views regarding the use of clickers in their lectures (see Appendix 1). This questionnaire was deployed through the university Virtual Learning Environment (VLE), Blackboard, at the end of the semester. A link was placed on the course page and there were 24 complete attempts at this survey. The quantitative responses were summarised and the qualitative data was analysed using the Atlas Qualitative Data Analysis software, along with the diary entries.
Thematic analysis

Thematic analysis is a process for coding and analysing qualitative information (Boyatzis, 1998). It was selected as a suitable method to draw out the themes from the reflective diaries and the student responses to the open-ended questions in the evaluation questionnaire. Thematic analysis involves recognising themes in data, consistent coding and development of codes and the interpretation of themes in the context of theory and/or a conceptual framework. There are six stages in a thematic analysis (see Boyatzis, 1998; Braun & Clarke, 2006; Norton, 2009). The first stage is immersion; the second stage is the generation of categories; the third stage is the removal of underused categories; stage four is the merging of categories; stage five is the checking of themes and stage six is the linking of themes.

Findings from Phase 1

Quantitative data

A total of 24 students (21 female, 3 male) responded to the clicker evaluation questionnaire in Blackboard. Their ages ranged from 18-40 years; however the majority (55%) were 18 years old. Only three of the students reported having used a PRS before in an educational setting. Two students had used it in school and one student had used it in college for multiple-choice question practice. One of the students who had used it in school for maths lessons added that they found it ‘useful, but preferred the anonymity’.

Table 2 shows that students were on the whole very positive about the use of the PRS in large lectures. This is consistent with previous research findings outlined in the literature review regarding the tendency of most students to view the use of the PRS in positive terms, particularly relating to its perceived ability to help students maintain attention during lectures, make lectures more enjoyable and fun and promoting engagement. However, the usefulness of self-report data of this nature is limited, although it is helpful in giving a flavour of student attitudes towards use of the PRS.
<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using the PRS in the lecture helps me develop a better understanding of the content when compared to traditional lecture based classes.</td>
<td>42%</td>
<td>54%</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>I prefer practicing multiple-choice questions myself in Blackboard than in the lecture with the PRS.</td>
<td>0%</td>
<td>8%</td>
<td>33%</td>
<td>46%</td>
<td>13%</td>
</tr>
<tr>
<td>I am more engaged during PRS classes than traditional classes.</td>
<td>54%</td>
<td>46%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Using the PRS helps me pay attention in class.</td>
<td>42%</td>
<td>58%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Being able to see the class response histogram and compare my answers with other students increases my confidence.</td>
<td>38%</td>
<td>58%</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Using the PRS helps the lecturer become more aware of student difficulties with the content and take action to address these.</td>
<td>42%</td>
<td>50%</td>
<td>4%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>I did not find using the PRS fun or enjoyable.</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
<td>38%</td>
<td>58%</td>
</tr>
<tr>
<td>I would be more likely to attend lectures that I knew were going to make use of the PRS.</td>
<td>17%</td>
<td>46%</td>
<td>33%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>I would like to use the PRS regularly in my other modules.</td>
<td>42%</td>
<td>54%</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>I do not think that using the PRS had any positive effect on my understanding or learning of the material we covered in this module.</td>
<td>0%</td>
<td>4%</td>
<td>4%</td>
<td>50%</td>
<td>42%</td>
</tr>
</tbody>
</table>

Table 2: Percentages of student responses to the Likert-type statements in the clicker evaluation questionnaire (N = 24)
Qualitative data

A total of 19 students submitted their reflective diaries at the end of the semester. The diary entries were typed up as Word documents, one for each participant (see Appendix 2 for an example), and uploaded to Atlas for thematic analysis along with the qualitative data from the evaluation questionnaires. This resulted in nine themes emerging from the data as follows:

- The Novelty Effect
- Keeps My Attention
- Makes Lectures Fun
- More Active and Involved in Lectures
- Promotes Interaction with Peers
- Social Comparison
- Feelings of Confidence
- Immediate Feedback
- Enhancing Learning and Understanding

These themes and the associated quotes from students (including responses to open-ended questions in the evaluation questionnaire) were used to construct an 18-item scale for measuring student attitudes towards the use of the PRS, the Clicker Attitudes Scale for Students (CASS). Ethical approval was sought to pilot this instrument with a sample of first-year students in the fifth and final phase of the project.

Reflections on Phase 1

The students seemed very enthusiastic and engaged when using the clickers. They were visibly reactive when the class responses and correct answers were displayed. This is supported by the primary data, which suggested that students were positive about their use and valued the psychological aspects of learning including motivation, enjoyment and engagement, which the PRS appeared to facilitate in the teaching environment. However, there is an important limitation here in that it can be difficult to precisely capture exactly what is going on at a psychological and cognitive level and measure the subsequent effects on student learning. Furthermore, students were critical if they did not feel that use of the PRS
added much to the particular activity. They also noted that technical hitches, errors on the part of the lecturer and problems with connectivity of the handsets to the receiver could be very frustrating at times.

Relatively few technical or practical difficulties arose, although time was an issue in some lectures due to setting up and using the PRS (even with two of us to help manage the distribution and collection of the handsets). Delays could occur if a student had been given a handset which had low battery level or was set on the wrong channel. The lecturer also made some errors and there were power glitches which caused the system to crash and it had to be rebooted, which could cut into valuable teaching time.

Although the activities could have been conducted without use of an electronic tool such as a PRS, there appeared to be clear advantages in being able to encourage participation and active engagement from all students in a large lecture, instantly gather class responses and display them immediately for discussion. If there was a high proportion of incorrect responses indicating misunderstanding corrective action could be taken immediately. This contingent teaching approach advocated by Draper & Brown (2004) appears to have major learning gains for students. Furthermore, this process led to the identification of student misconceptions that otherwise may have gone unnoticed. For example, the majority of students confused negative reinforcement and punishment. In-class replication of known research findings and the demonstration of uniformity of response seemed an effective method of illustrating and ‘bringing to life’ the content being presented and discussed in the lecture.

Some of the activities and PRS sessions seemed to work better than others in terms of the coherence of the lecture as a whole. On reflection, the apparent learning gains did not outweigh the time to distribute handsets in some of the activities (e.g. dream interpretation). This was an issue when thinking about the larger, future cohort of students taking the introductory psychology module in the following semester. Practical considerations including how to transport 437 clickers to the lecture theatre and distribute and collect the handsets as quickly as possible shaped the plans for the following semester.

The original aim to use the PRS to improve the extent and quality of module feedback was revised. Although the use of the PRS for collating feedback in the final lecture in Phase 1 was successful in terms of response rate, as attendance at the final lecture was very good, and the tailoring of questions was useful as compared to the standard online module evaluation
questionnaire, the nature of the feedback was limited. As others have suggested, the most useful form of student feedback is qualitative data, not Likert-type ratings. Furthermore, in 2010 the Psychology: An Introduction module was selected internally to pilot a new system called Questback, which offered more flexibility in terms of question-types and student responses than the PRS.

**Phase 2**

It was decided that use of the PRS with such a large cohort of students would be better deployed in a reduced number of sessions. The student feedback obtained from Phase 1 was used to identify the PRS activities that students reported that they found most useful. However, for consistency throughout the academic year, all of the activities were retained in Semester B, but the PRS was not used for the activities which the students said that the PRS did not add much. This allowed an informal comparison to be made in terms of using the PRS versus not using the PRS for the same activities. Using the PRS clearly increased interactivity and participation from all students as asking the same questions of the students without the PRS led to (usually the same) individuals making responses. It was much more difficult to gauge the opinions and understanding of the class as a whole without the PRS.

**Phase 3**

Following successful integration of the PRS into our large introductory psychology module, Phase 3 involved extending use of the PRS to other modules in the department and to explore other potential uses of the system on smaller modules.

*Evaluation of a new module implementation*

The PRS was used to quickly and efficiently collate student feedback in a lecture on a new module implementation on the second-year Brain, Behaviour and Experience module. About 60 students were asked to respond to a series of questions regarding their experience of using a new feature in Blackboard, allowing the instructor to gather a significant number of student responses without cutting too much into teaching and learning time.
Facilitation of a scenario-based discussion session
The PRS was used to facilitate a teaching session on ethics and internet research as part of a final-year Cyberpsychology module. Ten students were presented with four ethical scenarios concerning internet-based research projects and were asked to take on the role of a member of a psychology ethics committee with a remit to review and approve research. They used the keypads to make decisions regarding the ethics of a variety of online research scenarios and identify five key ethical issues arising in each scenario and place them in order of importance. They submitted their responses individually and then broke into small groups for discussion and were given the opportunity to revote using the keypads. Informal feedback indicated that the students enjoyed using the keypads to submit their responses and being able to immediately view the group responses clearly in the displayed histograms. As students were indicating their choice of 5 key ethical issues out of a possible 10, and placing them in a particular order, this would have been more time consuming to collate and display if using paper versions or a show of hands. The student also valued the anonymity that the PRS offers.

Data collection for student projects
It was also intended that the PRS would be used to facilitate data collection for third and fourth year projects; however this has not yet been conducted due to queries arising over copyright issues. However, it is still our intention to be able to do this soon.

Combining the PRS with the PeerWise system
Use of the PRS has also been linked with the PeerWise system, which is an online repository of multiple-choice questions built solely by students. They create, upload, rate, discuss and answer each other’s questions and the best questions are selected and used in the final lecture with the clickers. An article on this appeared in the December 2010 HEAPN newsletter available at http://www.psychology.heacademy.ac.uk/docs/pdf/Newsletter_issue_58.pdf.

Phase 4
The next phase of the project involved gathering data from departmental staff on their perceptions of using the PRS in their departmental teaching, using an online survey to
identify their needs and design a future departmental teaching and learning workshop. Ethical approval was sought to administer an email request to staff for the completion of an anonymous online survey in SurveyMonkey link. A total of 19 members of staff (about half of the departmental teaching staff) completed the survey.

**Question 1: Are you interested in using the Personal Response System (PRS) or 'clickers' in your teaching?**

The majority (74%) responded ‘yes’ (N = 14) and 26% (N = 5) responded ‘no’. Ten members of staff identified a wide range of modules, at various levels, on which they would be interested in using the PRS. Of the five members of staff who had indicated that they were not interested in using the PRS, four completed an additional question to stipulate their reasons for this. Three members of staff selected the response ‘I am not sure what I would use them for’; two indicated that they ‘cannot see how they are useful beyond multiple-choice testing’ and one staff member chose the response ‘I am wary of relying on use of technology in my teaching’ and one respondent selected the option ‘I do not have time to develop use of this tool in my teaching’. None of the respondents selected ‘I have tried them before and did not find them useful’ and one member of staff selected ‘other’ and entered their response that the PRS ‘does not fit in with the type of teaching that I do’.

**Question 2: Which activities are you interested in using 'clickers' for in your teaching? (Please check all that apply)**

Respondents were asked to indicate which activities they were interested in using the PRS in their teaching and 12 members of staff completed this part of the survey.
Table 3: Staff interest in conducting types of teaching activities with the PRS

<table>
<thead>
<tr>
<th>Type of Activity</th>
<th>% selecting this response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gauging student opinion, prior knowledge, misconceptions and/or understanding of content</td>
<td>100% (N = 12)</td>
</tr>
<tr>
<td>Formative assessment and provision of immediate feedback</td>
<td>67% (N = 8)</td>
</tr>
<tr>
<td>Student feedback on module content, activities and implementations</td>
<td>58% (N = 7)</td>
</tr>
<tr>
<td>Data collection for student projects</td>
<td>58% (N = 7)</td>
</tr>
<tr>
<td>Facilitation of peer discussion in lectures (e.g. vote - discuss with peers - revote)</td>
<td>58% (N = 7)</td>
</tr>
<tr>
<td>Demonstrating psychological phenomena/in-class replication of research findings</td>
<td>42% (N = 5)</td>
</tr>
<tr>
<td>Peer assessment (e.g. oral and poster presentations)</td>
<td>25% (N = 3)</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>0% (N = 0)</td>
</tr>
</tbody>
</table>

Finally, respondents were asked if they would be interested in attending a forthcoming session in which the researchers could show examples of the different ways in which the clickers had been used successfully on a departmental module and the associated student feedback. A total of 17 respondents completed this question, 65% (N = 11) indicating ‘yes’, 17.6% indicating ‘no’ (N = 3) and 17.6% selecting ‘maybe’ (N = 3). Respondents were given the opportunity to add further comments and interestingly one respondent wrote ‘attendance at lectures is not compulsory nor an effective way of communicating’. This perhaps suggests a perception that use of the PRS is limited to the lecture environment, which could be due to the initial focus of the project despite the variety of potential uses described above. However, lectures are still the predominant teaching and learning environment in the department, especially with such large numbers of students, and the PRS is being used to improve the level of interaction and student-lecturer and student-student communication in such an environment.

**Phase 5**

The final phase of the project culminated in the construction of an attitude scale, termed the Clicker Attitudes Scale for Students (CASS). The themes identified through the student reflective diaries and the responses to the open-ended questions in the evaluation
questionnaire in Phase 1 were used to create 18 attitude statements. An equal number of positive and negative items about use of the clickers were produced. An example is shown below for each one of the nine themes:

**The Novelty Effect**
“My enjoyment of using the clickers is confined to the start of the course simply because it was something new.”

**Keeps My Attention**
“Using the clickers does not help me pay attention and stay focused throughout the lecture.”

**Makes Lectures Fun**
“Using the clickers adds an element of fun to the class.”

**More Active and Involved in Lectures**
“Using the clickers does not make me feel more active and involved in the lecture.”

**Promotes Interaction with Peers**
“Clickers can be a good way to facilitate interaction with other students during a lecture.”

**Social Comparison**
“I feel reassured when I see that most of my classmates are answering the same way that I am.”

**Feelings of Confidence**
“I do not like using the clickers as it makes me feel less confident when I get answers wrong.”

**Immediate Feedback**
“I do not feel that I benefit from receiving immediate feedback in class through use of the clickers.”

**Enhancing Learning and Understanding**
“Questions and activities with the clickers help me to see how complex theory can be applied to real world scenarios and problems.”

Introductory psychology students were invited to participate in the final part of the study in December 2010 by responding to the 18-item instrument through Blackboard. They were also asked to provide their sex and age categories (21 and under; 22 and over). Students responded to the statements using a five-point Likert-type scale (ranging from strongly disagree to strongly agree). Negative statements were reverse-scored so that high scores indicated a positive attitude and low scores indicated a negative attitude. There were 29 complete attempts (6 males and 23 females; 23 students in the 21 and under category and 6 in the 22
and over category) at the attitude scale, which represented a 25% response rate. Cronbach’s alpha coefficient was calculated in order to assess the internal reliability and found to be good (0.831). Scores ranged from 65 to 90 (M = 75.48, SD = 6.28) indicating, on the whole, positive student attitudes towards the use of the clickers for teaching activities. No significant differences were found for sex (F = 4.38, d.f = 1, p = .05) or age (F = .53, d.f = 1, p = .47). The CASS will be administered to another sample of students in March 2011 and further analyses will be able to be conducted regarding the reliability of the scale.

Conclusions and Recommendations

This project has evaluated a way to promote student engagement and interaction, particularly in large lectures, using a PRS system. Table 4 summarises the potential barriers and enablers to using the PRS for teaching and learning activities from both the student and staff perspective. The disadvantages to using the PRS can be mostly overcome through careful planning, consultation with students and trial and error learning on the part of the lecturer.

<table>
<thead>
<tr>
<th>Enablers</th>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staff</strong></td>
<td><strong>Support for pedagogical development and practical and technical aspects</strong>&lt;br&gt;<strong>Range of examples illustrating effective use</strong></td>
</tr>
<tr>
<td><strong>Student</strong></td>
<td><strong>Receiving immediate feedback</strong>&lt;br&gt;<strong>Anonymous and active participation</strong></td>
</tr>
</tbody>
</table>

Table 4: Staff and Student Enablers and Barriers to Use of a PRS in Teaching Activities

The outcomes of this project have prompted a dynamic change in the format of future planned lectures on the Psychology: An Introduction module. With the help of timetabling, we have changed the lectures from two one-hour lectures to a double slot. This allows for cycles of information-giving, activities, peer-based and class-wide discussion during the double lecture. Nicholls (2002) states that the ‘essence of exposition is to strike a balance between information giving, asking questions, and encouraging discussion and problem solving, with reinforcement and motivation and attention gaining activities’ (p. 18).

However, as Simpson & Oliver (2007) note, the PRS is a tool, not a teaching approach. In order to use the PRS effectively and for students to value its use, a significant amount of
work must be devoted to planning and preparing for sessions to integrate the PRS successfully to the teaching system. Through the staff evaluation aspect of this project, it was confirmed that staff are open to using the PRS but are unsure as to how to embed usage in their teaching activities. This project has identified and evaluated a range of uses, which students were positive about in terms of the impact on their learning experiences. The most valued uses of the PRS were deemed to be activities which involve formative assessment and providing immediate feedback to students, addressing misconceptions in student knowledge and understanding, demonstrating psychological phenomena and facilitating peer discussion through individual, anonymous voting followed by small-group discussion and possibly a revote and then class-wide discussion. We will continue to explore other potential uses of the PRS and are committed to continuing to support staff in their use of the PRS and will be offering sessions at upcoming departmental and School-wide teaching and learning events. We will also continue to analyse and develop the CASS instrument through obtaining a larger sample on which to conduct further reliability assessment of the scale.

**Dissemination and Future Work**


A tailored workshop for departmental staff has been prepared using the results from the staff opinion survey but has been postponed until Spring 2011.

An abstract will also be submitted for a paper presentation at the Third International Conference on the Teaching of Psychology, Vancouver, July 2011.

Finally, we are also in the process of investigating the possibility of holding a one-day event in conjunction with TurningPoint here at Glasgow Caledonian University in Summer 2011, which would bring together educators and researchers who are using the TurningPoint PRS and identify and share instances of best practice in the use of PRS for enhancing teaching and learning practice.
References


Appendix 1 - Evaluation Questionnaire

Gender:

Age:

Main course of study:

Have you ever used a PRS system or similar before in an educational setting? If yes, please describe what for.

Please indicate the extent to which you agree with the following statements:

(1 = Strongly agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly disagree)

1. Using the PRS in the lecture helps me develop a better understanding of the content when compared to traditional lecture based classes.

2. I prefer practicing multiple-choice questions myself in Blackboard than in the lecture with the PRS.

3. I am more engaged during PRS classes than traditional classes.

4. Using the PRS helps me pay attention in class.

5. Being able to see the class response histogram and compare my answers with other students increases my confidence.

6. Using the PRS helps the lecturer become more aware of student difficulties with the content and take action to address these.

7. I would like to use the PRS regularly in my other modules.

8. I did not find using the PRS fun or enjoyable.

9. I would be more likely to attend lectures that I knew were going to make use of the PRS.

10. I do not think that using the PRS had any positive effect on my understanding or learning of the material we covered in this module.

Please write your response to the open-ended questions in the boxes below:

11. What did you like using the PRS most for? Why?

12. Are there any improvements you can suggest for future use of PRS in modules?
Appendix 2 – Example of reflective diary from a participant

Participant 5, Female, 18, Psychology

Reflective Diary Entry 1 – 15/10/2009

**Description of activity in which PRS was used**

Multiple choice questions to see how to work the PRS

**Do you think that using the PRS added to your enjoyment of the class today? Why?**

Yes it was something different from listening to someone speak for an hour and this made it more interesting

**Do you think that using the PRS added to your understanding of the material covered in class today? Why?**

It was a good way to see quickly if I was understanding the course material quickly

**At what point today did you feel most engaged with the class? Why?**

When we were first given the PRS because it was something new and exciting which I looked forward to using

**Are there any ways in which the activity with the PRS could have been improved?**

Better information on how to use the PRS as soon something happened and the machine stopped responding. As I didn’t know how to fix it I felt isolated from the lesson.

Reflective Diary Entry 2 – 22/10/09

**Description of activity in which PRS was used**

Mock multiple choice questions

**Do you think that using the PRS added to your enjoyment of the class today? Why?**

It broke the lecture up which kept my attention longer so yes.

**Do you think that using the PRS added to your understanding of the material covered in class today? Why?**

Yes because it allowed me to see how well I understood some parts of the course.

**At what point today did you feel most engaged with the class? Why?**

After the class had responded to the questions because I was eager to see how well I had done in answering the questions
Are there any ways in which the activity with the PRS could have been improved?

More questions to answer as I feel I was only able to answer a few questions and if I was given more it would give me better feedback on my progress

Reflective Diary Entry 3 – 29/10/09

Description of activity in which PRS was used

Multiple choice questions

Do you think that using the PRS added to your enjoyment of the class today? Why?

No, I feel it has become repetitive and so I did not enjoy using it today

Do you think that using the PRS added to your understanding of the material covered in class today? Why?

Perhaps a little as I was able to see my progress but this could have been done without using PRS

At what point today did you feel most engaged with the class? Why?

At the beginning because it was something different

Are there any ways in which the activity with the PRS could have been improved?

Less questions to answer, or less of an interval between questions

Reflective Diary Entry 4 – 12/11/2009

Description of activity in which PRS was used

Multiple choice on opinions

Do you think that using the PRS added to your enjoyment of the class today? Why?

Yes it was different from what we had used them for before

Do you think that using the PRS added to your understanding of the material covered in class today? Why?

Yes it allowed me to become involved in the lesson and showed me a better example

At what point today did you feel most engaged with the class? Why?

When we were told that it would be different from previous times we had used PRS
Are there any ways in which the activity with the PRS could have been improved?
No I really enjoyed today’s lesson

Reflective Diary Entry 5 – 16/11/2009

Description of activity in which PRS was used
Opinions on situations

Do you think that using the PRS added to your enjoyment of the class today? Why?
Yes, it was early morning and helped me pay more attention that just listening to lecturer speak

Do you think that using the PRS added to your understanding of the material covered in class today? Why?
It gave me a better understanding because it allowed me to get directly involved

At what point today did you feel most engaged with the class? Why?
When results were shown because I was interested to see if my choice was in the majority

Are there any ways in which the activity with the PRS could have been improved?
Would have been interesting to see the class results compared to others who had done the multiple choice test

Reflective Diary Entry 6 – 19/11/2009

Description of activity in which PRS was used
Multiple-choice questions

Do you think that using the PRS added to your enjoyment of the class today? Why?
No. Again I feel that it has become routine and an expected part of a Thursday lecture

Do you think that using the PRS added to your understanding of the material covered in class today? Why?
Yes. It allowed me to see the example put into practice.

At what point today did you feel most engaged with the class? Why?
At the end because I understood the context the best
Are there any ways in which the activity with the PRS could have been improved?
Using it less as it would make it more exciting

Reflective Diary Entry 7 – 20/11/2009

Description of activity in which PRS was used
Questions on opinions and experiences

Do you think that using the PRS added to your enjoyment of the class today? Why?
Yes it was interesting to see how my result compared with others

Do you think that using the PRS added to your understanding of the material covered in class today? Why?
No it only gave an idea on it but did not explain anything

At what point today did you feel most engaged with the class? Why?
Waiting to answer the question because we were able to discuss it with others

Are there any ways in which the activity with the PRS could have been improved?
No, I enjoyed it very much today

Reflective Diary Entry 8 – 10/12/09

Description of activity in which PRS was used
Revision questions

Do you think that using the PRS added to your enjoyment of the class today? Why?
Yes it broke the lesson up from reading slides and making notes

Do you think that using the PRS added to your understanding of the material covered in class today? Why?
Yes it made it easy to see my progress

At what point today did you feel most engaged with the class? Why?
When the clickers began to work because we had been waiting

Are there any ways in which the activity with the PRS could have been improved?
More questions if there had been time