

# Technology Enhanced Learning in Psychology: Current Directions and Perspectives

Sarah K Davis, Daniel Farrelly, Kate Muse and Elaine Walklet

(University of Worcester)

(corresponding author: sarah.davis@worc.ac.uk)

**Keywords:** Technology enhanced learning; virtual learning environment; personal response systems; blended learning; engagement; large group teaching; Psychology.

## Introduction

Contemporary use of digital technologies has rapidly transformed the learning and teaching environment within higher education (Beetham and White, 2013; Jordan, 2013). When used effectively, technology can improve the usefulness and quality of feedback to support learning and create unique opportunities for active, independent learning (Trapp et al., 2011; Higher Education Academy, 2012; UoW, 2015).

However, identifying appropriate technology and effectively embedding this within teaching practices can be challenging. Here we outline the way in which Psychology staff at the University of Worcester have used technology to enhance the student learning experience in four key areas: promoting engagement in large groups, enhancing participation in research, teaching via blended learning and fostering a learning community. We hope that sharing our experiences will be of value to colleagues interested in using technology for similar purposes.

## Promoting engagement in large groups

Undergraduate Psychology modules are typically delivered to large groups of 100-200 students. To promote engagement in such settings, student response systems such as TurningPoint 'clickers' and Poll Everywhere<sup>1</sup> can be used. 'Clickers' are hand-held devices often used in combination with multiple choice questions (MCQ).

---

<sup>1</sup> <https://www.polleverywhere.com/>

Responses are electronically transmitted to software which collates the results to present back to the audience. As with clickers, Poll Everywhere retrieves, organises and visually represents responses. However, in contrast, responses can be sent via any device with Internet access (e.g. mobile phones or laptops), thus removing some common barriers associated with 'clickers' such as high cost and set-up time (Kay and LeSage, 2009). Both systems enable students in large group settings to anonymously interact, check their understanding, and obtain real-time formative feedback. Furthermore, they enable staff to monitor and respond to the progress of students (Poirier and Feldman, 2007).

In Psychology we have used 'clickers' to deliver in-class formative MCQ tests and Poll Everywhere to facilitate a small number of open-ended and/or fixed-choice response questions (see Figure 1 & 2 for examples). We have observed many benefits from using these technologies, such as students' perceptions of increased engagement and active participation in learning. However, we have also identified a number of factors that can hinder effectiveness, such as a lack of staff training and connectivity issues (e.g., problems with Internet access; mobile phone signal). Additionally, in the case of clickers, participation is limited by the number of handsets available for use in a given teaching session. If using the free version of Poll Everywhere, the maximum number of respondents is capped to 40. Whilst peer discussion and pair/group responding is valued by many students, the option to respond individually is preferred by some. Due to the increased set-up time, we have found 'clickers' to be most beneficial for structured in-class tests. In contrast, we have found Poll Everywhere to be particularly beneficial for facilitating interaction via discussion and debate (Walklet et al., in press).

## **Enhancing participation with research**

A key component of a Psychology degree is an emphasis that the graduate will be a capable researcher. This is firmly embedded in the programme through distinct research modules, as well as being emphasised in the teaching of core subjects. However, students' attitudes and perceptions of research can be negative. Reasons for this include difficulty with applying statistical analysis, designing research and engaging with the full research process. To counter this, the teaching of psychological research has adopted a range of technologies to increase engagement, accessibility and clarity.

Psychological experiments often involve relatively complex procedures. To encourage engagement with the programming and design of experimental procedures we have asked students to use open access experimental design software (Open Sesame) in core modules. Students are also encouraged to conduct their individual research online, which is a growing and valuable arena for data collection (Gosling and Mason, 2015). To do this, students use online survey building websites (e.g. [www.esurveycreeator.co.uk](http://www.esurveycreeator.co.uk)). Finally, research participation is vital to allow students to gain direct experience of research as well producing large sample sizes. This is a complex logistical operation, which we have simplified by using a specialised research participation system ([www.sona-systems.com](http://www.sona-systems.com)) to facilitate this. Overall, the use of these three key tools have increased engagement and understanding, reduced student anxiety and contributed to a strong research environment within psychology.

### **Teaching via blended learning**

E-learning refers to the delivery of teaching via an electronic medium such as the internet. E-learning resources provide a number of benefits, allowing students to complete activities at a time and location of their choosing, progress at their own pace, engage in repeated practice, and make mistakes in private (Bull and McKenna,

2000; Bull and Danson, 2004; Miller, 2008). Within psychology, we have developed e-learning materials which we have used to enhance our traditional teaching methods through a 'blended learning' approach (Bonk and Graham 2005; Boyle, 2005).

In research methods teaching we have used Articulate Storyline<sup>2</sup> software to create interactive e-learning activities to teach students how to conduct, interpret, and report statistical analysis (see Figure 3). As well as providing instructional guidelines, these activities provided opportunity for formative feedback on progress outside of classes, through the use of embedded short answer and MCQs and interactive software simulations with real-time responses. This also allowed students more time within seminars to build on this by applying the skills they learnt within interactive, problem-based learning exercises.

Camtasia has also been used to provide students with videos of tutorials and lectures delivered by teaching staff. These videos have been used as an alternative method of delivering traditional lectures, therefore freeing up time within lectures to complete interactive activities. They have also been used to deliver additional content to challenge and stretch students' learning and to provide standalone instructional videos (e.g. how to use Mendeley referencing software).

These e-learning activities have encouraged students to participate in independent and peer learning beyond the classroom. We have found that the most effective resources were those that regularly embedded a range of interactive activities, as these promoted engagement and facilitated a more active approach to learning. Another essential element to the success of these strategies has been the provision

---

<sup>2</sup> <https://www.articulate.com>

of on-going tutor support, either through face-to-face drop in sessions or through online discussion forums. Finally, it was noticeable that participation in the e-learning activities was much higher when these activities were directly linked to taught sessions, thus highlighting the need to effectively integrate e-learning with traditional classroom methods.

### **Fostering a learning community**

National guidance suggests that methods to improve the learning experience should foster student 'belonging', achieved through developing 'supportive peer relations; meaningful interaction between staff and students; developing knowledge, confidence and identity as successful learners; [and] an experience relevant to students' interests and future goals' (Thomas, 2012: 7). Cultivating communities of confident learners is difficult in large lectures where the scope of group-based activities is often restricted. In an effort to mitigate this, we have utilized tools from the virtual learning environment (Blackboard) to provide extended learning support to students and foster a sense of community.

Modules now routinely use discussion boards where students are encouraged to post any course related queries they may have. Posts can be responded to by staff or fellow students and individuals can post 'anonymously' to encourage participation in a public forum. Discussion boards therefore serve as an information repository and sharing service, strengthening collaborative working practices across staff and students. Module feedback consistently shows that students value the tool as an informal feedback mechanism and a preferable method for contacting tutors. From a staff perspective, the ease of responding to discussion board posts vs. personal emails for large cohorts has meant that this is now encouraged as the primary means of contact across Psychology modules.

The Blackboard 'blog' facility has also been used effectively to promote collaborative working. For instance, in a mandatory level 5 module, students are asked to select one of four possible essay questions and carry out a literature search to support their response. By signing up to an 'essay question group blog', students post preliminary findings and gain peer and tutor-led feedback (by posting a 'comment' to the blog post). They are also asked to reflect on their assessment work as this develops and use a blog entry to record this. This method has proven effective for learning, as evidenced through student reflections and achievement in the summative assessment.

## **Conclusion**

We have found these technology enhanced learning initiatives to be beneficial in promoting engagement and learning support for large group teaching. Successful implementation of these approaches depends upon sharing best practice amongst colleagues and utilising IT support services to develop knowledge and confidence in the use of such technologies. Moreover, it is vital that integration of these technologies is undertaken in collaboration with students. Although there exist some limitations as discussed above, it is clear that the 'winds of change' are blowing through higher education in the UK with regards to Technology Enhanced Learning. It will therefore be vital that teaching staff embrace this with foresight and knowledge. We hope that psychology here at the University of Worcester is well on the way to doing just that, and we are grateful to be able to share our experiences.

## **References**

Beetham, H. & White, D. (2013) *Students' expectations and experiences of the digital environment*, JISC [Online], Available from:  
[http://repository.jisc.ac.uk/5572/1/JR0006\\_STUDENTS\\_EXPECTATIONS\\_EXEC\\_SUMMARY\\_v2.pdf](http://repository.jisc.ac.uk/5572/1/JR0006_STUDENTS_EXPECTATIONS_EXEC_SUMMARY_v2.pdf) [accessed 01/02/2016].

Bonk, C., & Graham, C. (Eds.). (2005) *The handbook of blended learning: Global perspectives, local designs*. San. Francisco, CA: Pfeiffer Publishing.

Boyle, T. (2005) A dynamic, systematic method for developing blended learning. *Education, Communication and Information*, Vol. 5(3), pp. 221–232.

Bull, J. & Danson, M. (2004) *Computer-aided assessment (CAA)*. York: LTSN Generic Centre.

Bull, J. & McKenna, C. (2000) Quality assurance of computer-aided assessment: Practical and strategic issues. *Quality Assurance in Education* Vol. 8(1), pp. 24–31.

Cormack, S., Bourne, V., Deuker, C., Norton, L., O'Siochuru, C. & Watling, R. (2014) The future of pedagogical action research in psychology. *Psychology Teaching Review*, Vol. 20(2), pp. 95-109.

Gosling, S. D. & Mason, W. (2015) Internet research in psychology. *Annual Review of Psychology*, Vol. 66, pp. 877-902.

Higher Education Academy. (2012) *Feedback Toolkit: 10 Strategies to Engage Students with Feedback*. Higher Education Academy [Online]. Available from: [http://www.heacademy.ac.uk/sites/default/files/resources/10\\_strategies\\_to\\_engage\\_students\\_with\\_feedback.pdf](http://www.heacademy.ac.uk/sites/default/files/resources/10_strategies_to_engage_students_with_feedback.pdf) [accessed 03/01/15].

Jordan, S. (2013) E-assessment: Past, present and future. *The Higher Education Academy*. Vol. 9(1), pp. 87 – 106.

Kay, R. H. & LeSage, A. (2009) Examining the benefits and challenges of using audience response systems: A review of the literature. *Computers & Education*. Vol. 53(3), pp. 819-827. doi: <http://dx.doi.org/10.1016/j.compedu.2009.05.001>

Miller, T. (2008) Formative computer-based assessment in higher education: the effectiveness of feedback in supporting student learning. *Assessment & Evaluation in Higher Education*. Vol. 34(2), pp. 181–192.

Poirier, C. R. & Feldman, R. S. (2001) Promoting active learning using individual psychology classes. *Technology and Teaching*. Vol. 34, pp. 194–197.

Thomas, L. (2012) *Building student engagement and belonging in Higher Education at a time of change: A summary of findings and recommendations from the What Works? Student Retention & Success Programme*. UK: Higher Education Academy. [Online] Available from: [https://www.heacademy.ac.uk/sites/default/files/What\\_works\\_summary\\_report\\_1.pdf](https://www.heacademy.ac.uk/sites/default/files/What_works_summary_report_1.pdf) (accessed 18/06/15).

Trapp, A., Banister, P., Ellis, J., Latto, R., Miell, D. & Upton, D. (2011) *The Future of Undergraduate Psychology in the United Kingdom*. York: The Higher Education Psychology Network. [Online]. Available from: <http://www.heacademy.ac.uk/resources/detail/subjects/psychology/Future-undergrad-psych-uk> (accessed 01/04/15).

University of Worcester (2015) *Technology Enhanced Learning Strategy*. University of Worcester [Online]. Available from: <http://www.worc.ac.uk/edu/1256.htm> [accessed 03/01/15].

Walklet, E., Davis, S., Farrelly, D. & Muse, K. (in press). The impact of Student Response Systems on the learning experience of undergraduate psychology students. *Psychology Teaching Review*.

## **Biographies**

**Dr Sarah K Davis** is a Senior Lecturer in Applied Psychology at University of Worcester. Her research interests focus on individual differences in development and she is particularly interested in emotional intelligence; adolescent mental health; stress and coping; resilience.

**Dr Daniel Farrelly** is a Senior Lecturer in Psychology at University of Worcester. His main interests are in the empirical and theoretical application of evolutionary theory to explain human behaviour and psychological processes. This includes areas such as how cooperation has evolved in humans, particularly in response to different social situations and pressures. He is also interested in how social factors, including different life-history variables such as relationship status, influence male competitive behaviour and also levels of circulating testosterone. Daniel is also interested in emotional intelligence, including its links with other personality traits and its application to different occupational and health settings.

**Dr Kate Muse** is a Senior Lecturer in Psychology at University of Worcester. Her research interests focus on understanding factors that trigger and maintain mental health disorders and developing and disseminating effective treatments to alleviate psychological distress. In particular, her research focuses on the training and dissemination of cognitive behavioural therapy (CBT) and methods of assessing the competence with which CBT is delivered. She has also conducted research investigating factors that maintain health anxiety, the efficacy of mindfulness-based

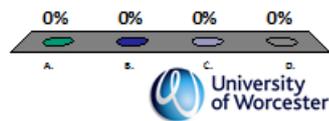
cognitive therapy interventions for anxiety and depression, and the role of intrusive imagery in anxiety disorders.

**Elaine Walklet** is a Lecturer in Health Psychology. Her experience in clinical practice has influenced her research interests, which include the relationship between physical and mental health, CBT and self-management approaches for long-term conditions, the experience of invisible illness and stress in healthcare staff. Elaine currently leads the undergraduate Health Psychology and Introduction to Psychology modules. In addition, she leads Health Psychology Interventions and The Psychology of Mental Health modules on the MSc Applied Psychology.

Figure 1: Example 'TurningPoint' clicker questions

'People help other because it makes them feel good' is an example of what level of causality (Tinbergen's four Why's)

- A. Proximate
- B. Ontogenetic
- C. Phylogenetic
- D. Ultimate



**An example of an implicit memory is:**

- A. How to ride a bike
- B. Your name
- C. Your first day at school
- D. A memory from childhood

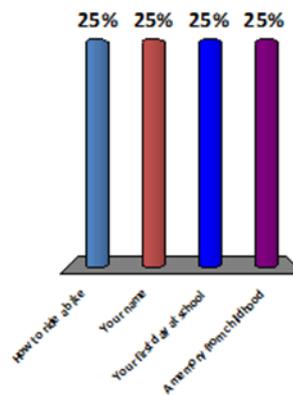
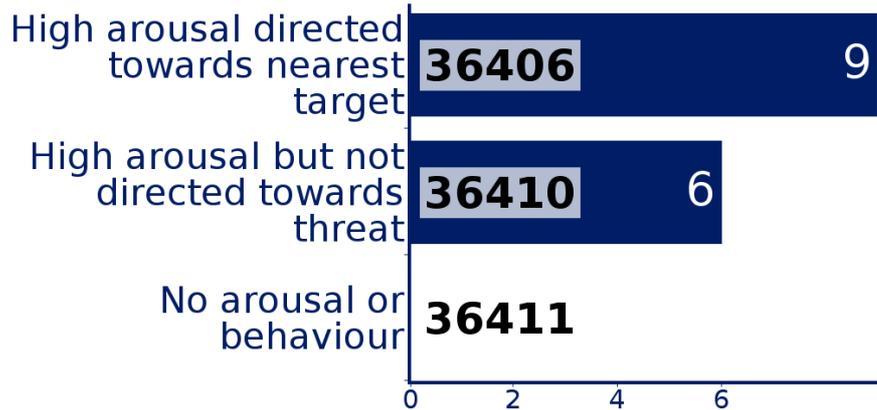


Figure 2: Example 'Poll Everywhere' questions

1. Example fixed-choice, knowledge-checking question

**What characterises the 'affective defensive reaction' seen in animals receiving DBS to the medial hypothalamus?**

When poll is active, respond at [PolleEv.com/katemuse439](https://PolleEv.com/katemuse439)  
Text a **CODE** to **020 3322 5822** Tweet **@poll** and a **CODE**



2. Example open-ended/free text discussion question

**What are the methodological or theoretical limitations associated with Piaget's theory?**

When poll is active, respond at [PolleEv.com/katemuse439](https://PolleEv.com/katemuse439)  
Text **136053** and your message to **020 3322 5822**  
Tweet **@poll 136053** and your message

"Tasks lack ecological validity"  
5 days ago

"cultural differences"  
5 days ago

"individual differences"  
5 days ago

"Wide gap between 2 & 7 years - more changes go on within those years which could contribute to cognitive development"  
5 days ago

Figure 3: Examples of research methods e-learning activities

Return to home | Exit

## Walkthrough session

This walkthrough session has 3 key sections:

1. Knowledge check quiz
2. Conducting T-tests for independent samples 
3. Conducting T-tests

Choose a section to complete

**What are independent samples?**  
Independent samples are when you have two independent (i.e. separate) groups of people. Each group participates in one condition only.

Return to home | Exit

## In order to use a t-test, you must have \_\_\_\_\_ ?



One continuous IV 

One categorical IV 

**What is a continuous variable?**  
A continuous variable gives a score for each person across a measurement scale. Some examples of continuous variables are age (e.g. number of years), time (e.g. number of seconds), scores on a depression scale (e.g. 0 - 40).

Submit Answer

< PREV    NEXT >

Return to home | Exit

## Conducting T-tests for independent samples in SPSS

On completion you should be able to:

- Conduct assumption checking to determine whether it would be appropriate to use a t-test.
- Conduct and interpret the results of an independent samples t-test using SPSS.
- Report the results of an independent samples t-test in APA style.



 Watch the guide

 Try it for yourself

 Return to home

First we need to look at the results of the **Levene's Test**. This test checks the assumption of the equality of variances.



**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Grade	Equal variances assumed	1.445	.237	-6.627	38	.000	-2.952	.490	-3.944	-1.961
	Equal variances not assumed			-6.104	37.190	.000	-2.952	.484	-3.932	-1.973

If the value in the Levene's test "Sig." column is less than .05 (i.e. significant), this tells us that the variance of scores for the two groups *is* significantly different and we *have* violated the assumption. If the value is higher than .05 (i.e. is *not* significant), this tells us the variance of scores for the two groups is *not* significantly different and we *have not* violated the assumption.