Student Engagement in Virtual Space

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Abstract

In this paper, a university course (subject or unit of study) that currently enjoys positive formal student reviews is used as a case study to demonstrate how theoretical knowledge about student engagement is effectively put into practice. This investigation identifies key aspects that have contributed to the positive student feedback with particular emphasis on student engagement online, or in virtual space.

The investigation involves identifying what is considered good practice with respect to student engagement and then benchmarking the case study course against this. A key contribution of this paper is the presentation of practical examples demonstrating how the current theory is effectively realised in practice.

The conclusion was that the course complied with key elements of what is considered good practice and successfully engaged students. Other practitioners may use the examples in their own context to help inform the practice of engaging students when teaching in virtual space.

Introduction

There is a general acceptance today that online instruction needs to be well designed in order to engage learners. This means that it must be more sophisticated than simply presenting information in a digital format in an online platform such as the Internet or a Learning Management System (LMS). For example, a study by Ellis, Marcus, and Taylor (2005) concluded that the manner in which online materials are designed and presented, and how students approach learning, can both have an impact on student learning outcomes and contribute to the overall student experience. So, rather than just being about content, for online

instruction to be effective there needs to be careful consideration of educational design, instructional design, the general online learning environment, and pedagogy.

Further, a key aspect of social cognition (or social constructivism (Vygotsky, 1978)) demands consideration of how learners can work collaboratively in the online context to create knowledge. Therefore, an important element of any online instruction, designed in accordance with constructivist theory, is a mechanism to facilitate interaction with others (peers and teachers) to gain different opinions and standpoints, and for students to test and explore their own perspectives on what they are learning (Anderson, 2004). For a long time now there has been acceptance that this type of collaboration can foster reflective thought and dialogue, and thereby significantly improve the educational experiences of learners in virtual space (Brodie & Gibbings, 2007; Gibbings & Brodie, 2008a; Reushle, 2005).

A significant body of contemporary literature reports strong correlations between student engagement and student success, development, satisfaction, persistence, academic achievement, social engagement, and student retention (for example Cheong & Ong, 2016; De Villiers & Werner, 2018; Korobova & Starobin, 2015). The importance of student engagement is based on the constructivist assumption that learning is influenced by how students participate in educationally-purposeful activities, and is therefore one of the better predictors of motivation to learn.

Research Question

The proposition underpinning this paper is that if online instruction is designed in accordance with generally accepted e-learning principles so it is meaningful and engaging, and it is delivered through an appropriately designed LMS, it should facilitate effective student

engagement in virtual space. To verify this, the online instruction in a specific case study is assessed against accepted online engagement frameworks, and the student experience outcomes are assessed through student feedback.

Background and Context

The University of Southern Queensland (USQ) was established as an Institute of Technology in 1967 and has enjoyed Australian University status since 1992. It has over 27,500 students and at the time of writing was ranked number one in Australia for graduate starting salaries. It has three campuses with the main administrative hub located in Toowoomba, which is Australia's second largest inland City (second only to Canberra, the nation's capital) located approximately 110 kilometres west of Brisbane, Queensland. As well as traditional on-campus study, USQ has built a formidable reputation over 40 years as a provider of distance education that is now delivered online, or in virtual space. Institution wide, approximately 67% of USQ's students study fully online, both within Australia and overseas, and courses (subject or unit of study) are required to have an online presence through the LMS.

The LMS used at USQ is called StudyDesk and is powered by Moodle. StudyDesk is used to host all online content (textual and recorded) and includes: text-based online discussion forums; synchronous online video discussions; email; notifications; study schedules and reminders; progress reporting; assessment submission; and useful links to components such as course specifications and self-help resources.

For the past two decades the author has been examiner for a course called Geodetic Surveying B (SVY3107). The course, SVY3107, is part of a Surveying program at USQ. This is a highly technical course dealing with the science of measuring and representing the earth's surface

while taking its curvature into account, and includes mathematical modelling of the earth, ellipsoidal geometry, study and modelling of gravity fields, and global navigation satellite systems (GNSS). Anecdotal evidence from discussions with senior members of the surveying profession indicates that Geodetic Surveying (or Geodesy), when they studied it, was remembered as being somewhat dry, boring, and uninspiring. Engaging students in the content of SVY3107 is fundamentally difficult simply because of the technical nature of the subject matter being covered. This engagement task is made even more difficult because in SVY3107 there are generally around 85% of the 100 to 150 students studying entirely online, significantly above the USQ average of 67%.

Given the strong correlations between student engagement and student success, and its acceptance as a predictor of motivation to learn, this paper benchmarks SVY3107 against current good practice to ensure students are provided the best opportunity to be effectively engaged in learning in virtual space.

Literature Review

General e-learning principles

Early researchers established guiding principles for the online learning environments to be effective, and guiding principles to underpin effective online pedagogy. For example, by reviewing previous research activity, and by reflecting on her own experience and practice in higher education, Reushle (2005) arrived at 10 guiding principles to underpin effective transformative online pedagogy. Three of these principles (Reushle, 2005, p. 125) summarised below are important to later benchmarking of SVY3107 in this paper:

- *Critical reflection, and dialogue with others to relate concepts to their own context, are essential to transformative online learning.*

- *Learning in a transformative online environment must be recognised as a community activity, and consequently dialogue (learners to learners; learners to facilitator/s) is vital to sustaining the learning community and maintaining a social presence.*
- *A successful online learning environment needs to be built, managed, and nurtured.*

These ideas are consistent with the work of Gibbings and Brodie (2008b) who described how sound pedagogical approaches presented through a well-designed LMS, helped to develop effective online learning communities that encouraged reflective thought and active dialogue with others (Gibbings & Brodie, 2008b). More recently, Veeramani (2010) also recognised the importance of 'sharing among groups' to what was termed 'e-learning' in an LMS. Again, similar to Reushle, Veeramani (2010, p. 24) acknowledged the importance of the creation of 'online learning communities'. Later Gibbings and Brodie (2012) recognised that educational approaches at that time were starting to place greater emphasis on collaborative learning in virtual learning communities. They pointed out the need for: students to take ownership of their learning; the importance of allowing students to explore multiple perspectives through social interaction (such as can be facilitated thorough the LMS); and supporting students to focus on awareness of their own learning.

Appropriate LMS

Successful online learning environments, and particularly their social aspects, logically need to be flexible enough to engage learners '*anytime, anywhere*' Veeramani (2010, p. 21), and Moodle is recognised as one of the open-source examples of LMS software that can achieve this. Of course, Moodle has many more useful features (for example see Rai et al., 2013), but in the context of this paper we don't need an entire college management tool, just an LMS with the basic functionality to support student engagement. Having a functional LMS, with well

managed collaboration tools may be sufficient to engage learners, but they need more than this to facilitate learning – they need those tools to be used in meaningful instruction.

Meaningful and engaging instruction

For the purposes of this paper, the advice of Gagné, Briggs, and Wager (1992) and Bloom (1956), or perhaps more correctly, Anderson (2000) will be combined in the form of Gagné's nine events of instruction. These events are based on behavourist learning theory, which provides a framework to facilitate easy assessment of the case study course against the suggested instructional design process. Whilst all of the events are present in SVY3107, of prime importance in this case are the follow events:

- *Gain attention of the students.*
- *Provide learning guidance - particularly through examples and contrasts*
- *Elicit performance (practice) – particularly through elaboration and increasing complexity*
- *Provide feedback – as soon as possible*

Online engagement framework

The literature on student engagement does not seem to provide any universally accepted definition, nor method of measuring, student engagement. Nevertheless, some authors have developed detailed conceptual frameworks to unravel the complexities of engagement. One in particular has been selected due to it being specifically focussed on online student engagement. researchers from USQ, acknowledging that the literature related to online engagement up until that time generally recognized the three elements of behavioural, emotional, and cognitive engagement, expanded this to five key elements (Redmond et al., 2018). The five online engagement elements were presented with example indicators, which is useful for easy benchmarking of the case study course, SVY3107. The first four elements

(social engagement, cognitive engagement, behavioural engagement, and collaborative engagement), and their indictors are used in this case – the last element of emotional engagement is not considered in this paper due to the difficulty of assessing the case study course against suitable indicators.

Educational Approach

The educational approach taken in SVY3107 is now benchmarked against the good practice detailed in the literature review.

In SVY3107, cognitive engagement is facilitated through the provision of significant content-based materials and activities on the LMS, with links to outside materials and key sites to provide efficient gateways to the vast amount of online content available. Technical content includes a comprehensive text-based study book, PowerPoint slides in .pdf format, .mp4 studio recordings of key concepts, podcasts usually from 10 to 20 minute duration, interactive applets, past examinations, question and answer summaries, and online quizzes. Specific learning activities are provided that lead students to fully focus on important elements and make connections and properly process new information (for a discussion on how cognitive psychology has influenced thinking on making these connections see (Gibbings & Brodie, 2012)).

All students bring with them to their learning a set of existing knowledge, skills, expectations and past experiences (Hughes, 2004). Particularly in the case of those who cannot be considered ‘digital natives’, some of these past experiences might cause some initial tentativeness and even fear of the technology being used for learning activities (Hurst & Thomas, 2004). To help overcome this, social interaction and ice-breaking activities are

critical activities to be undertaken early in online courses to encourage participation and gain confidence with the online learning environment. It is also important to get students engaged early in the online environment to help them make connections to existing knowledge and relate to some earlier experiences. Key threads on forums on the StudyDesk are established to help manage the discussions and enable easy searching. Introductions and social interaction are encouraged through a 'Coffee Shop' forum that is separate from the main technical content forums. In addition there is a 'news and announcements' forum to provide important alerts when necessary (for example to announce the release of examination timetable).

In SVY3107 the initial session, which is presented in a recording for online students, sets out course learning objectives, general expectations in the course, and makes explicit links to current professional context. This is facilitated by long industry/professional experience of the author and keeping up to date with current knowledge through regular consulting opportunities in the profession. These links to industry contexts certainly gains the attention of the students and is a catalyst to further dialogue on what students have experienced themselves.

Learning activities, whether face-to-face, synchronous online, or recorded, are generally structured in the following manner:

- A link is made to program learning objectives that are stated in the course specification
- Revision to link to previous learning – for example, '*In the last recorded session on the ellipsoid we look at …*'. In a face-to-face, synchronous online, this would normally be followed by a request for student input to gauge understanding, '*Can someone now please explain, in their own words, a definition of …*'.
- The general approach is explained, outlining what will be learnt and why. For example, '*During this session we are going to discuss how to develop a session and mission plan*

for a control survey using GNSS to comply with international standards. All control surveys should be carried out in accordance with these standards. This provides you with evidence that you have exercised a duty of care and can help demonstrate legal traceability of the results'.

- Statement of learning objectives for this specific session. This is used to set a learning target, stated in terms of what students will be expected to do after the learning activity. For example, '*At the end of this lecture you should be able to plan a control survey by GNSS to comply with relevant international standards.*'.
- The content to be covered is divided into discrete stages (normally between four and six key points). Each stage is then introduced (often by linking to previous stages), covered as appropriate, the stage is formally closed to let students know we are progressing, and a discrete link is made to the next stage. Of course, the participation is encouraged, prompts are made for engagement, context is reinforced (usually through professional experiences), and examples or modelling are provided to reinforce the context and to demonstrate the practical usefulness of the content. Student feedback is important wherever possible to check understanding, though this is difficult in the asynchronous online environment – this is a key reason for using the course discussion forums.
- Clear up any doubtful points and final questions (online chat is useful for this when using synchronous online instruction).
- Assessment based on instructional objectives of this specific session – this is an important step to help students recognize if they have reached the desired level of understanding. It can be through a self-assessment instruction if it is an asynchronous session. Of course, simple questioning in synchronous sessions is easier, for example,

'Who can tell me why we need to know …', 'Can someone give me a definition of …', 'What type of observation would be best for …', 'What is your opinion of …'.

- Summary to consolidate all new information contained in the key points.
- Statement of relevance to reinforce earlier statements.
- Prelude of what is to come next to signpost for students the direction that is being taken and to give them an opportunity to do some preliminary study to better engage with the coming sessions.

One of the first activities on the technical discussion forums is to ask students to share any recent issues they might have experienced at their work (most students are also employed in the profession) so they can be used for critical analysis and debate. An example posting is:

'It will not be a great surprise that we are concentrating on geodetic concepts in the first part of this course, and we are going to concentrate on GNSS in the latter parts. I am interested in any burning GNSS/Geodetic issues that you may have encountered, or that regularly crop up (particularly in the work environment). Let us know about them and we can discuss and maybe suggest some solutions? We might also be able to try out a few ideas and do a bit of general research on these'.

This inspires students to find personal relevance in the course and encourages engagement because students are informed that some of these issues may later be developed into short answer questions on the final examination.

This emotional and cognitive engagement is further encouraged throughout the course by posting (at least) weekly 'discussion starters' on forums to persuade students to participate in shared discussions (social constructivism) and critical thinking. These are often about some current issues in the profession that are relevant to the course content, or thought provoking

problems to discuss, which lead to higher order understanding of threshold learning elements. This leads students to explore multiple perspectives on issues through social interaction to give them an awareness of their own learning approaches and processes, and also help foster a sense of belonging to a profession.

Some discussions also relate to what is occurring in the authentic practical activities undertaken by the on-campus students. For example, one practical activity is for students to plan, measure, and adjust a network of surveying control points to assign accurate horizontal and vertical coordinates to ground marks. In this case, a network adjustment report might be posted on the discussion forum for critical analysis. In this way, discussions keep pace with the course, they help relate theory to practical applications, and they necessarily increase in complexity as the course progresses building on previous knowledge and reinforcing earlier concepts.

In some cases, intentionally misleading questions or contentious statements are posted to further encourage discussion and in some cases to demonstrate incorrect ways of approaching problems. This contrast (or variation) is important to student learning (Marton, 2002; Marton & Pang, 2006) and has received positive feedback from students. In the previous example, the network report that is posted may be from an interim step where the adjustment has not been completed properly, or questions might be asked about the report that rely on incorrect assumptions. An example of a contentious issue, '*And now for my final two contentious issues: RTK GNSS should not be used for lines where the calculated ground distance will be less than about 300m; and all recovery marks at any particular corner should be measured with a total station and tape and not rely solely on RTK observations. Confirmed/plausible/busted?*'.

Clearly, numerous opportunities are provided for focussed student-to-student and student-to-staff dialogue-facilitated activities to help develop online (virtual) learning communities – an engagement behaviour that is consistent with findings of Brodie and Gibbings (2011). In recognition that these discussion forums need to be nurtured and managed in such a manner that they can engage learners anytime and anywhere, a great deal of effort is made to be responsive and present. Forums are normally checked and responses and feedback posted at least twice daily and this includes weekends and public holidays. It is seen as very important to be present during these holiday periods since these are the times when online students, most of whom are also working in full-time employment, can reasonably make time to study and engage in the forums.

Results and Outcomes

Students are clearly happy with the course and how it is conducted, and there is no evidence to suggest they find it dry, boring, or uninspiring. Scores on the student evaluations, on a scale of 0 to 5, were 4.53 for overall student satisfaction and 4.71 for teaching in semester two, 2019, and similar results have been achieved consistently for many years. This compares favourably with university averages, being approximately half a point above in both scores.

Unsolicited student comments from students indicate: an awareness of the teaching philosophy used; an appreciation of how well the pedagogical approach worked for them; and an appreciation of the engaging online discussions. Whilst direct student quotations are not possible due to ethical considerations, the following two summaries are worthy of mention:

- Many students made comment about how well the teaching methods worked for them because revision for the examination was not their normal last-minute attempt to seemingly learn content for the first time. This clearly speaks to knowledge retention.

- Many positive student comments centred on the interaction in the course, largely through the discussion, and several referred to this as a discussion ‘spider's web’ or similar terms.

Engagement analytics reports from the LMS in 2019 indicates on average 73 uses of the discussion forums per students, which is a 50% increase on the course which is a precursor to SVY3107. This students attendance or engagement with learning activities (on time), complying with deadlines, submitting assessments on time, participating in discussions (social constructivism) and critical thinking on issues I raise as discussion starters and ‘intentionally misleading’ questions is taken as an indication of positive student engagement behaviour.

Students show a genuine interest in what is happening in the course and in their profession in general, indicating a sense of belonging to a profession and my course in particular. This coupled with the fact that they are happy about the course are indicators of positive social engagement.

In the discussions, students show a desire to be challenged, and many are proactive in asking for such challenges evidenced by seeking additional conversations with course teaching staff or other students to explore topics or activities further. This is a manifestation of deep thinking and learning. Anecdotal evidence suggests that encouraging each student to reflect on the content so they can see personal relevance seems to be one of the most powerful tools in the pedagogical toolbox to foster this level of cognitive engagement.

Conclusion

The initial proposition was that if online instruction is designed in line with generally accepted e-learning principles so it is meaningful and engaging, and it is delivered through an appropriately designed LMS, it should facilitate effective student engagement in virtual space. Based on results from 2019, students were genuinely engaged in Geodetic Surveying B (SVY3107) and so it is concluded that, at least in this iteration, the proposition is upheld.

References

Anderson, L. W. (2000). *A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Allyn & Bacon.

Anderson, T. (2004). Towards a Theory of Online Learning. In T. Anderson & F. Elloumi (Eds.), *Theory and Practice of Online Learning* (pp. 33-60). Athabasca University. http://cde.athabascau.ca/online_book/pdf/TPOL_book.pdf

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). Taxonomy of Educational Objectives. In *Handbook 1: Cognitive Domain*. Longman.

Brodie, L., & Gibbings, P. (2011). Connecting learners in virtual space: forming learning communities. In L. Abawi, J. M. Conway, & R. Henderson (Eds.), *Creating connections in teaching and learning. Research on Teaching and Learning* (pp. 233-248). Information Age Publishing.

Brodie, L. M., & Gibbings, P. D. (2007). Developing Problem Based Learning Communities in Virtual Space. Connected International Conference on Design Education, University of New South Wales, Sydney, Australia.

Cheong, K. C., & Ong, B. (2016). An Evaluation of the Relationship Between Student Engagement, Academic Achievement, and Satisfaction. In S. F. Tang & L. Logonnathan (Eds.), *Assessment for Learning Within and Beyond the Classroom* (pp. 409-416). Springer Science+Business Media. https://doi.org/DOI: 10.1007/978-981-10-0908-2_34

De Villiers, B., & Werner, A. (2018). The relationship between student engagement and academic success. *Journal for New Generation Sciences, 14*(1), 36-50. https://www.researchgate.net/publication/328829992_The_relationship_between_student_engagement_and_academic_success

Ellis, R. A., Marcus, G., & Taylor, R. (2005, August). Learning through inquiry: student difficulties with online course-based material *Journal of Computer Assisted Learning, 21*(4), 239-252. http://www.ingentaconnect.com/content/bsc/jcal/2005/00000021/00000004/art00001

Gagné, R. M., Briggs, L. J., & Wager, W. W. (1992). *Principles of instructional design* (4th ed.). Harcourt Brace Jovanovich College.

Gibbings, P. D., & Brodie, L. M. (2008a). Assessment Strategy for an Engineering Problem Solving Course. *International Journal of Engineering Education, 24*(1), 153-161.

Gibbings, P. D., & Brodie, L. M. (2008b). Team-Based Learning Communities in Virtual Space. *International Journal of Engineering Education, 24*(6), 1119-1129.

Gibbings, P. D., & Brodie, L. M. (2012). The Importance of Focal Awareness to Learning in Virtual Communities. In H. Li (Ed.), *Virtual Community Participation and Motivation: Cross-Disciplinary Theories*. Information Science Reference (an imprint of IGI Global).

Hughes, J. A. (2004). Supporting the Online Learner. In T. Anderson & F. Elloumi (Eds.), *Theory and Practice of Online Learning* (pp. 367-384). Athabasca University. http://cde.athabascau.ca/online_book/pdf/TPOL_book.pdf

Hurst, D. C., & Thomas, J. (2004). Developing Team Skills and Accomplishing Team Projects Online. In T. Anderson & F. Elloumi (Eds.), *Theory and Practice of Online Learning* (pp. 195-239). Athabasca University. http://cde.athabascau.ca/online_book/pdf/TPOL_book.pdf

Korobova, N., & Starobin, S. S. (2015). A Comparative Study of Student Engagement, Satisfaction, and Academic Success among International and American Students *Journal of International Students, 5*(1), 72-85. https://files.eric.ed.gov/fulltext/EJ1052833.pdf

Marton, F. (2002, 27-30 November). Phenomenography and "variation theory": On continuity and change. Current Issues in Phenomenography, Australian National University (ANU), Canberra Australia.

Marton, F., & Pang, M. F. (2006). On Some Necessary Conditions of Learning. *The Journal of the Learning Sciences, 15*(2), 193-220.

Rai, A., Yadav, A., Yadav, D., & Prasad, R. (2013, December 2013). *A Conceptual Framework for E-learning* IEEE international conference on MOOC, Innovation and Technology in Education, Jaipur.

Redmond, P., Heffernan, A., Abawi, L., Brown, A., & Henderson, R. (2018). An online engagement framework for higher education. *Online Learning, 22*(1), 183-204. https://doi.org/10.24059/olj.v22i1.1175

Reushle, S. E. (2005). *Inquiry into a transformative approach to professional development for online educators* [Doctoral, University Southern Queensland, Toowoomba]. Toowoomba.

Veeramani, M. (2010, December 2010). E-Learning: A Conceptual Framework. *International Journal of Educational Research and Technology, 1*(2), 20-24.

Vygotsky, L. S. (1978). *Mind in society*. Harvard University Press.