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Flipping the IS Classroom: Technology Exclusion in a Digital Age

Research-in-Progress

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Abstract

Recent advances in technology and in ideology have provided new opportunities in pedagogic science however there is an increasing belief, amongst many educators, that certain technologies can also demotivate and distract from learning. This paper looks at a work in progress case study of Information System teaching where technology is excluded from physical classrooms. Students are not allowed to use mobile phone devices or indeed any internet connected devices. Taking a flipped classroom approach the researchers discuss the early, but favourable, results from their study. Qualitative results show that the new teaching style is more popular as well as preferable to the common 'sage on the stage' lecturing approach. Early indicators suggest an improvement in student performance and an increased motivation in classroom engagement.

Keywords: Action research, E-learning, Experience, Exploratory research, IS curriculum, IS education, Learner-centered design

Introduction

Students' approaches to learning can be broadly categorized as either surface or deep (Ramsden, 1992). Education research is replete with examples of optimized student learning. The term "flipped classroom" has been in use since 2007 and has been used by numerous academics as one approach for encouraging peer learning and in class discussions. Staehr & Byrne (2011) in their work in progress paper look at teamwork and peer learning as a method for improving student learning experience and depth of learning. A commonly noted problem amongst lecturers is that poor concentration in a large, lecture setting will often cause students to disengage after a short period of time when there is lack of variety in the presentation (Yaverbaum, 1993). A number of authors such as Zack (1995) and Gleason et al. (2011) argue that activity based learning is in fact key to relieving these problems in lack of concentration and that an activity based approach encourages higher level thinking. Most recently Chen and Yan (2016) discuss the negative effects of wireless technology and learning whilst multitasking amongst students during lectures. It was the reviewing of these materials coupled with a discussion with students studying on the IS course the authors were teaching that formed the basis for this review of the pedagogy behind our teaching strategy. The motivation to overhaul our teaching mechanisms to give students a contemporary and enriched learning experience was a paramount driver in our approach. This involved creating a flipped classroom, excluding technology in the physical classroom and reflection in action teaching. The approaches and rationale for this will be discussed throughout this paper, an insight into the methodology used given and the results of the study presented and discussed.

One Size Fits All Curriculum

Coady, Berg & Pooley (2013) reported, there have been a number of attempts to define standard IS syllabi and curricula, however it is their belief that there should not be a “one size fits all” approach to IS curriculum and a tailoring of several approaches is more justifiable. The approaches range from The IS 97 report, Gorgone et al (1997), The IS 2002 report Gorgone et al (2002) and Turner & Lowry (2003). Also worth considering is BISD (2007) based on the Dublin descriptors of Carlsson, Hedman & Steen (2007) and most recently the IS 2010 report. Researchers in the field of IS have been debating the idea of centering the subject since at least the first ICIS in 1980, and yet consensus still has to be reached. However one key issue that has been agreed on is the idea that to remain successful the IS discipline needed intellectual discipline and the ability to span boundaries across a number of ideas concerning application of IT in human enterprise.

Student satisfaction tends to be one of the common leading factors in various metrics used to measure the standing of Universities irrespective of which one you choose. It is therefore imperative that students be engaged as a stakeholder in the organisation during any reflection in action which occurs. Stefanidis and Fitzgerald (2010) argue that academics should be given the responsibility of designing courses which are industry relevant. Graduate employability is another of the measurements of success in the National Student Survey (NSS) each year; therefore focus must be on ensuring students of a Programme are relevant for the Industrial Sector they expect to enter.

Reflection in Action

Action research methodology offers a systematic approach to introducing innovations in teaching and learning (Riding, Fowel and Levy, 1995). It does this by putting the lecturer in the dual role of producer of educational theory, and user of that theory. This can be used as a way of both producing knowledge about higher education learning and teaching, and as a way of improving the learning and teaching practice through reflection. No separation need be made between the design and delivery of teaching, and the process of researching these activities, thereby bringing theory and practice closer together.

Growing evidence shows that teacher quality and teachers’ ability to reflect on their instructional practice critically affects students’ learning outcomes (Darling-Hammond, 2006). Clegg, Stevenson and Burke (2016) have been critical of the extent to which teachers can exercise their powers in changing their pedagogic practice; however they do note that this does not mean that they have no scope for practising in more careful and attentive ways. The UK Higher Education Authority (HEA) under - takes and commissions research which ‘inspires and supports effective practice in learning and teaching [and] influences policy, future-thinking and change’ (HEA, 2014a). The HEA as a leading Educational Institution is thus positioned as an organisation to aid in making a difference through providing practitioners with the ideas to change pedagogic practice in the interests of students.

Whitehead (2000) proposes that reflective practice in teacher education allows teacher educators to explore how teachers learn by including “I” in an epistemology of reflective practice. Reflective pedagogy should be used to help teachers examine current practice and encourage change. Swinglehurst, Russell, and Greenhalgh (2008) in their paper rationalise that education settings as complex social situations are ideal for using action research, as the focus is on both inquiry and improvement.

Stop/Start/Continue forms have been used for a number of years in the English as a Foreign Language (EFL) Toolset as an easy quick mechanism for reflective practice by the lecturer. The forms require the students to list aspects of the course or techniques they wish would be stopped, ones they wish to be continued, that they enjoy or find they learn from and then also any techniques or aspects they wish could be started in a particular course. These forms enable the lecturer to get a snapshot of the views of the class at a particular point in the course, and create any necessary modifications in order to enhance the student experience and their learning.

Technology Enhanced Teaching – necessary or a distraction?

The trend toward technology enhanced classes has escalated quickly over the last number of years. According to Roblyer (2002), technology may enable the learner to be more actively involved in his or her

own learning. While technology may enhance the classroom and engage today's student more effectively, most do not believe it replaces the need for a structured, content-driving learning process that is grounded in theory. To be effective, technology-based tools must accompany appropriate pedagogy (Laurillard, 2002). Indeed the very idea of the flipped classroom, as discussed previously, has at its very core a reliance on technology tools to enable the revision of materials prior to the physical classroom experience. Chen and Yen (2016) note the distraction of the mobile phone in the classroom setting and discuss learning and interacting with a mobile phone through text email or social media is a form of multitasking whilst learning that reduces academic performance. Laptop note-taking has been rapidly increasing in prevalence across college campuses (Fried, 2008). Whereas previous studies have shown that laptops (especially with access to the Internet) can distract students, the present studies are the first to show detriments due to differences in note-taking behaviour.

In the last decade a backlash against laptops has begun to surface. The number of students using technology in class to access materials other than those required for the class has increased. Schwartz (2003) reported on certain professors so frustrated by students surfing other materials during lectures that the professor resorted to disabling the internet connection within the classroom. There have been a number of other studies through both academic papers and the popular press about the use of technology in classrooms, and the distractions and frustrations caused by their use. An online discussion group has even formed to air concerns about laptops and discuss the pros and cons of banning laptops in the classroom (Young, 2006). A number of American Institutions in 2006 reported efforts to ban / block laptop use in classrooms (Fried, 2008). However this was never fully followed through.

Fried's (2008) study itself did raise serious concerns about the use of laptops in the classroom. Students admit to spending considerable time during lectures using their laptops for things other than taking notes. More importantly, the use of laptops was negatively related to several measures of learning. More recently Salter, (2010) reported in many universities it has become a common scene that students take out and use their own digital devices for various purposes in the classroom, this in itself is another form of distraction and example of technology not being used for educational purposes. Muller (2009) suggests that the misuse of technology in class affects not only those individuals who engaged in unrelated activities but those people around that individual and it was in fact this issue which caused the researcher in conjunction with discussion with the class rep and student society representative in the class to issue a technology ban in the courses being looked at in this study.

Cooperative Learning is another term used for this focus of drawing students away from the traditional classroom environment and involving them in their learning. Ronfeldt et al (2015) in their study of over nine thousand teachers found that when teachers are involved in cooperative learning their students benefit. Through this interaction meaningful sense can be made of complex topics and cases. This sense making ties back to the very heart of systems thinking (Checkland & Howell, 1997). Active participation of the stake holders also lies at the very heart of systems thinking; therefore the argument must be made to purposefully include the engagement of students as stakeholders in an active learning fashion in their learning of systems.

The Study – Rationale and Methodology

The rationale behind this study was an ever more increasingly frustrated lecturer at the lack of class engagement, and the sea of blank faces staring at screens during class and the non-participation during questions and activities within the class. As course leader on the course in Semester One that the students were studying a group of students expressed their dismay to the researcher at three of their fellow classmates playing various games and watching YouTube during class time which they felt was distracting them from learning fully and being involved. The two courses being taught were specific Undergraduate Information Systems based courses (Knowledge Management and Sociotechnical & Soft Systems Methodologies) and the class size had increased from eight students in academic year 2014-15 to twenty seven in 2015-16. In previous years a more action in learning based approach had been taken, smaller class sizes tend to be more conducive to exercises, worked examples and responses however in a larger class students seemed afraid to give their thoughts and ideas to the wider audience.

Several of the students came to discuss with the researcher after class about 3 weeks into semester as to how they were becoming increasingly more frustrated with a small number of their classmates distracting

the class by either playing on laptops, being on Facebook / YouTube or Whatsapping on their phones. Thus, upon reflection and class discussion, an agreement was made that technology, namely mobile phones and laptops, would be excluded within the classroom environment. It was to become a more interactive classroom, and having researched the idea of a flipped classroom and putting it to the class it was agreed that on their part they would read lecture notes / materials provided before class and come armed with pen and paper and in return the lectures would not be “death by PowerPoint” but more interactive worked examples and cases of the topics they were covering in class. Guest lecturers were also drafted in as specialists in certain areas. The students took case studies and presented to the class as peer learning but also as part of formative assessment.

Any students with disabilities were allowed to record lectures in order to ensure they were not being disadvantaged or missing discussions which might not have been easily audible, although every effort was made by the lecturer to repeat questions or contributions from the class in a louder fashion to ensure everyone could hear.

The study was initiated in Semester One but continued into a follow on course in Semester Two. Action Research was used throughout this study by encompassing a number of feedback mechanisms to aid reflective practice. These were implemented throughout the study to check on the students buy-in to the ideas including Stop / Start / Continue forms mid semester, Students' Evaluation of Educational Quality (SEEQ) forms at the end of the course and general conversations through student meetings with the class representative and the Information Systems Society President, who was a class member. In effect the researcher was respectfully testing the new approach but in the full knowledge that this must be implemented over time and not too extensively. As educational reformer Joseph Payne would say “continually pulling up the plants to see the condition of the roots, the consequence of which was that all good natural growth was stopped” (Claxton,2008)

Results and Findings

Early indications from observations and comparisons of preliminary grades indicate that when compared to the smaller class size of the previous year, students in the cohort this year tended to do as well if not better than their smaller cohort counterparts. In semester one, class average was in line with their counterparts in the previous small cohort. Eagan et al. (2014) in the 2013–2014 Higher Education Research Institute (HERI) national faculty survey found 50.6% of faculty respondents across all disciplines use extensive lecturing in all or most of their courses, this is often the easiest option in large classes. However it is worth noting that students in these passive learning environments are 1.5 times more likely to fail compared to students in active learning environments (Freemana et al., 2014).

By semester two students had bought into the idea of the blended flipped classroom, and became more enthusiastic in their involvement in class. Stakeholder buy in is key in systems development ergo the researchers believed that it should also be key to the education methods for the Information Systems specialists of the future. Students who maybe had not spoken as much in semester one felt more at ease discussing and contributing to class and being more involved. In a comparison of the preliminary grades from this cohort to the previous year’s cohort class average was up by 4% and all students within the class passing the final exam.

The stop/start/continue forms distributed in week 6 of both semesters unanimously had as their continue point “Interactive classes / Interaction with class”. This was also followed up with continue “student engagement”, and surprisingly to “continue with the technology ban”. Students in the start section requested that “more worked examples be given” and this was further explained by them wanting to learn more and apply their knowledge to other scenarios. In the stop section “Nothing” or “N/A” was the most appearing answer.

SEEQ forms distributed at equal points in the year showed student satisfaction to be at a higher level than in the previous number of years, when compared with previous years forms words such as “active”, “enthusiasm”, “peer learning”, “no death by powerpoint” appeared regularly in the positive comments section and whilst enthusiasm had been highlighted as an issue the previous year, it was clear that the more active participation of this year was key to student learning.

When investigated further through the use of an informal focus group, students had a number of opinions about the flipped classroom emerged. On the whole these opinions were positive, one student declared

“By removing the teaching approach of reading words simply from a pre-created slide and breaking them down into easy to understand definitions, along with examples made it easier to retain the information. In-class discussions and debates between students and the lecturer allowed each individual to state their ideas to a problem, providing a larger insight to what was being discussed, this also gave other students the ability to hear information from the other students that they may not have thought about originally, gathering a completely different viewpoint of the situation.”

Another student reported

“The flipped classroom approach on the whole helped me sort of critically think about what you were actually teaching us, and come up with other ideas and relate it to your own working life. Reading your notes prior to the lecture also helped, as it gave a base knowledge going into the lecture. Reading Case Studies was helpful as it allowed us to see what the real world applications of the methodologies for example.”

Whilst a further student did have an alternative belief that

“for me traditional lectures work better because I am being given content directly, and solely, from the lecturer. I do find this easier to soak up information.”

This student was in the minority and this researcher still believes this further highlighted the researchers beliefs that the days of chalk and talk specifically in the IS classroom should be long gone, and that active learning, cooperative learning, flipped classrooms, irrespective of what title one wishes to put on it, should be encouraged and not seen as a daunting task. In terms of forbidding the use of laptops and phones within the classroom environment the majority of students saw this as a positive. One of the students in the group discussed how

“The technology ban that was incorporated removed the external distractions that most students face when sitting in long, tedious classes that consist of just reading from Powerpoints.”

This is in agreement with the original literature as detailed out above that technology can often impede and distract student performance within the classroom environment. Another student was along the same vein suggesting that

“it stopped others distracting others with what was on their screens, and actually forced people to contribute to the discussion - which was good. With further contributions to the class it allowed the lectures to be much more interactive than other classes I've had at University. This interaction also allowed us to learn other ideas from our peers.”

It is therefore the opinion of the authors that whilst technology obviously has a certain place within systems teaching, circumstances i.e. in courses with considerable practical components that require technology, perhaps it's not appropriate in all and should not always be at the forefront of teaching.

Conclusion

The flipped classroom approach used in this study sought to cultivate successful learners by facilitating students to develop their own potential through discussion and debate in a permissive classroom environment. Removing the technology in class encourages students to engage and participate in activities rather than be distracted by their phones and laptops. We fully acknowledge that digital tools do have massive potential in pedagogic science however they can also create a non-inclusionary classroom atmosphere which can create a non-learning environment. Further research in this area could be undertaken in order to establish whether the flipped approach or the technology ban if used in isolation, would have the same results as this early study has indicated.

This study is in its infancy and only time will really tell if excluding technology provides improved motivation in classroom activity. Early results suggest that grades do not diminish and to some degree are improved. The limitations of this study are that whilst Interactive classes are an ideal scenario in many

teaching environments, they are time demanding on already pressurised staff. If this can be achieved through these simple mechanisms then it is worthy of further study, irrespective of the discipline. The purpose of education is to prepare students for the future and equip them with relevant tools so as they can be active and engaged in all aspects of life. Reliance on technology can hinder such engagement and thus it is imperative to encourage students to be engaged in real world active and collaborative learning. If we can educate IS students in line with system thinking then these researchers believe it has to be a win win situation for the industry.

References

- Carlsson, S., Hedman, J. and Steen, O., 2007. Model Curriculum for a Bachelor of Science Programme in Business Information Systems Design (BISD 2007).
- Checkland, P. and Howell, S., 1998. Information, Systems and Information Systems: Making sense of the field. John Wiley & Sons. *New York*.
- Chen, Q. and Yan, Z., 2016. Does multitasking with mobile phones affect learning? A review. *Computers in Human Behavior*, 54, pp.34-42.
- Claxton, G., 2013. *What's the point of school?: Rediscovering the heart of education*. Oneworld Publications.
- Clegg, S., Stevenson, J. and Burke, P.J., 2016. Translating close-up research into action: a critical reflection. *Reflective Practice*, pp.1-12.
- Coady, J, T Berg, and R Pooley., 2013. "IS Degrees: Sociotechnical or Technosocial? A Reflective Analysis." In *Building Sustainable Information Systems*, pp. 219-231. Springer US.
- Darling-Hammond, L., 2006. Constructing 21st-century teacher education. *Journal of teacher education*, 57(3), pp.300-314.
- Eagan, K., Stolzenberg, E.B., Lozano, J.B., Aragon, M.C., Suchard, M.R. and Hurtado, S., 2014. Undergraduate Teaching Faculty: The 2013–2014 HERI Faculty Survey. *The Higher Education Research Institute*.
- Freeman, S., Eddy, S.L., McDonough, M., Smith, M.K., Okoroafor, N., Jordt, H. and Wenderoth, M.P., 2014. Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, 111(23), pp.8410-8415.
- Fried, C.B., 2008. In-class laptop use and its effects on student learning. *Computers & Education*, 50(3), pp.906-914.
- Gleason, B.L., Peeters, M.J., Resman-Targoff, B.H., Karr, S., McBane, S., Kelley, K., Thomas, T. and Denetclaw, T.H., 2011. An active-learning strategies primer for achieving ability-based educational outcomes. *American Journal of Pharmaceutical Education*, 75(9).
- Gorgone, J.T., Davis, G.B., Valacich, J.S., Topi, H., Feinstein, D.L. and Longenecker Jr, H.E., 2002. Model curriculum and guidelines for undergraduate degree programs in information systems. *Association for Computing Machinery (ACM), Association for Information Systems (AIS), Association of Information Technology Professionals (AITP)*.
- Laurillard, D., 2002. *Rethinking University Teaching: A Conversational Framework for the Effective Use of Learning Technologies* (London: RoutledgeFalmer).
- Mueller, D.N., 2009. Digital underlife in the networked writing classroom. *Computers and Composition*, 26(4), pp.240-250.
- Ramsden, P., 2003. *Learning to teach in higher education*. Routledge.
- Riding, P., Fowell, S. and Levy, P., 1995. An action research approach to curriculum development. *Information research*, 1(1), pp.1-1.
- Roblyer, M.D., Edwards, J. and Havriluk, M.A., 2002. Integrating educational technology into teaching.
- Ronfeldt, M., Farmer, S.O., McQueen, K. and Grissom, J.A., 2015. Teacher collaboration in instructional teams and student achievement. *American Educational Research Journal*, 52(3), pp.475-514.
- Salter, D. and Lam, J.L.K., 2010. Approaches to teaching and technology use among international. *e Learning*, 8(2), pp.161-173.
- Schwartz, J., 2003. Professors vie with Web for class's attention. *New York Times*, 2.
- Staehr, J. and Byrne, J.G., 2011. Improving teaching and learning in an information systems subject: A work in progress. *Issues in Informing Science and Information Technology*, 8, pp.13-23.

- Stefanidis, A. and Fitzgerald, G., 2010. Information Systems curricula in the UK: A Survey of Undergraduate Courses (research-in-progress). *Innovation in Teaching and Learning in Information and Computer Sciences*, 9(1), pp.87-99.
- Swinglehurst, D., Russell, J. and Greenhalgh, T., 2008. Peer observation of teaching in the online environment: an action research approach. *Journal of Computer Assisted Learning*, 24(5), pp.383-393.
- Turner, R. and Lowry, G., 2003. Education for a Technology-Based Profession: Softening the Information. *Current issues in IT education*, p.153.
- Whitehead, J., 2000. How do I improve my practice? Creating and legitimating an epistemology of practice. *Reflective Practice*, 1(1), pp.91-104.
- Yaverbaum, G.J., 1993. Working towards a multimedia learning environment: experiences in the classroom. *Journal of information systems education*, 5(2).
- Young, J.R., 2006. The fight for classroom attention: Professor vs. laptop. *Chronicle of Higher Education*, 52(39), p.A27.
- Zack, M.H., 1995. Using electronic messaging to improve the quality of instruction. *Journal of Education for Business*, 70(4), pp.202-206.