

An experiment worth repeating: the convergence of pedagogy and IT

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In an evaluation and investigation into instructional technologies, we recognised a paradigm shift in the utilisation of established theories when incorporating Information Technology into education delivery. Many teachers and lecturers are actively combining various instructivist and constructivist theories in the delivery of their material. Is this a deliberate move or is it what achieves the learning outcomes? Bearing in mind the varied modes of delivery in the modern world, does it really work for the students?

We decided to conduct an experiment to explore the student experience in different environments, i.e. simulated distance learning vs traditional tutor-led IT lab, and incorporating both instructivist and constructivist methods of delivery.

The sessions were designed to meet three objectives, with feedback from the students providing qualitative results.

The feedback confirmed what most tutors suspect already, that the tutor-led group progressed through the learning of new skills faster and accomplished more complete learning outcomes than the group of distance learners. This distance group indicated that they enjoyed moving at their own pace even faced with technical frustrations.

This initial experiment was made up of a small, relatively IT-literate group of students. A second experiment involved a lengthier session and a larger, more diverse group of students. As we had hypothesised, the longer session highlighted differences in student experiences for the two learning environments.

Keywords

Learning theories, pedagogy, information technology, distance learning, student-centred learning, tutor-directed learning.

1. INTRODUCTION/ RATIONALE

In a typical teaching laboratory tutors may be observed unconsciously using a hybrid of instructional technologies. Many may not be aware that they are following long-established academic principles from Gagné, Wager, and Rojas and applying Gagné's Events of Instruction when they employ drill-and-practice routines. Certainly, when subsequent exercises are set in order to extend the stu-

dent's competency and group activities planned to enhance the learning experience, how many tutors are deliberately practicing constructivist beliefs such as those espoused by theorists like Papert and Spiro?

But does this approach really work for the students?

We believe that most students nowadays experience teaching sessions that combine both instructivist and constructivist methods. To test the applicability of learning theories to teaching with Information Technology, we conducted an experiment. We wished to explore the student experience and feelings when faced with learning a new skill and facing an advanced challenge based on that skill in one session. This session comprised a tutor-led segment and student-centred segment. The same learning outcomes were delivered to a second group of simulated distance learners via a multimedia CBT written by the authors.

Feedback from the students in both learning sessions was collated, analysed and reported in the final section of this paper. Our conclusion notes that the blending of the learning methods is appropriate in education delivered using technology.

2. THE EXPERIMENT

Objective 1:

To explore the student experience and feelings when a new skill and advanced challenge based on that skill is combined into one lesson comprising directed instruction and a student-centred segment.

This objective was applied to Group 1. The goal of this objective was to identify the advantages of

combining two modes of delivery, instructivist and constructivist, when learning a new skill or process then applying that later to a problem. The technologies used in this segment of our lesson were the genealogy application, Family Tree Maker, and a PowerPoint presentation.

Family Tree Maker, the world's leading genealogical application, is very user-friendly and readily produces reports in varying formats displaying the family's genealogy line. The students were required to complete a personal family tree using the teaching aids provided (handout, PowerPoint) and assisted by the tutor where necessary.

Task 2 required the students to form pairs to complete the Challenge exercise – a genealogy report from a provided in-depth family scenario. This quite complex scenario incorporated features and reports not used in Task 1 such as the insertion of photos, medical records etc. It was hoped that within the pairs the students would allocate tasks in order to complete this exercise to its full potential within the time allowed.

Task 2 of the session was designed to incorporate constructivist theories of group collaboration and student-centred activities. The students were asked to extend their knowledge of the program into unknown areas. In addition, the collaboration of the group should further enhance the task outcomes via distribution of tasks, exploration of program's advanced features, etc.

Objective 2:

Examine the experience of a distance learner without tutor or peer contact when using a multimedia presentation to learn a specific skill and applying new knowledge to a lateral problem.

This objective was applied to Group 2. The goal of this objective was to investigate the success of multimedia in terms of enrichment and effectiveness to the learning experience. The prevalence of multimedia applications has increased with the advent of distance learning programmes offered by global institutions, whether delivered via newly efficient Internet connections on a website or in the form of a CBT package.

Group 2 became simulated distance learners, spaced well apart in an adjacent computer studio. This group received the same tasks as Group 1, but this time incorporated into a CBT package created

by the authors in the multimedia authoring program – Matchware Mediator Pro. The CBT became a tutorial which took the students through the basic elements of Family Tree Maker, including videos of the data entry process as demonstration, then step-by-step instructions in the operations of Family Tree Maker. The last screen of the CBT set out the requirements of Task 2 together with the linked files and facts required.

Objective 3:

The experiences and feedback from both groups of students will be compared and analysed to identify if there are greater benefits gained in either of the two methods, and if so, what those advantages are.

The combined summary session was designed to foster discussion from each session. In the absence of summative assessment of the students, it was hoped that student discussion would allow an evaluation of the delivery and the experiences of the learners.

The third objective requires combined reflection and analysis of the learning experience. Conclusions posed in a collaborative manner are the result of high-order thinking, as various opinions are presented, discussed and evaluated for 'fit'.

3. METHODOLOGY SELECTED

The progressive nature of the first two tasks from the initial learning of a new concept, familiarisation then construction of a project applying the new skills with advanced analysis and/or collaboration follows accepted behavioural and then, cognitive, theories and finally constructivist ideals.

In Roblyer and Edwards (2000), it was noted that theorists termed the gaining of pre-requisite skills for more advanced activities as "automaticity of skills" (Gagné, 1982 and Bloom, 1986), and fluency or proficiency (Hasselbring and Goin, 1993).

While constructivists such as Papert and Spiro may not agree on how pre-requisite knowledge is obtained, they all advocate the advantage of some acquisition of specific skills and information. (Roblyer and Edwards, 2000)

Here the knowledge of a learner proceeds through levels of maturation, in combination with integration

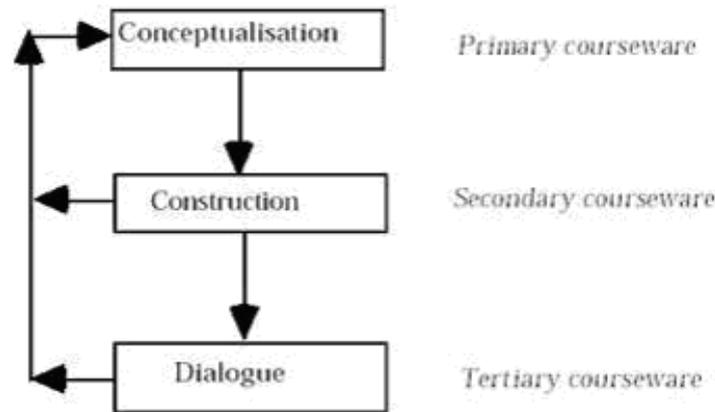


Figure 1: The (re)conceptualisation or learning cycle (Mayes, 2000)

of IT, and is best demonstrated by Professor Terry Mayes learning cycle.

Professor Terry Mayes presents the learning cycle (Figure 1) in his journal article “Pedagogy, Life-long Learning and ICT” (2000) as a framework for mapping different types of learning onto different kinds of learning technology. This methodology was applied to the objectives of our experiment.

The conceptualisation stage involves the learner gathering knowledge while being guided by the tutor with the Primary courseware referring to handouts and learning material.

The construction stage sees the learner applying the new skills and concepts to meaningful tasks, with the secondary courseware being the learner’s environment, tools and tasks.

The dialogue stage encompasses the reflection and discussion aspects of the learning, and often involves participation in learning communities. The tertiary courseware refers to the output of these discussions and learning.

4. RESULTS

We had theorised that students in the traditional classroom setting may complete the first exercise on average in a shorter space of time than their distance learning counterparts. This “lead” would then follow through to the second exercise. Reasons for this we hypothesised were:

- Delay in receiving feedback via email from their facilitator (although our simulated delay of a couple of minutes in most cases could be hours or days in reality)

- The unfamiliarity of using a CBT package compared with traditional classroom delivery

- System and technical issues that may occur in use of the technology.

Although technical difficulties were encountered by our distance learners they paled into insignificance with those encountered by true distance learners. For example, the wide variety of hardware platforms, operating systems and internet access speeds to name a few.

The first group that we trialed were our fellow Masters students and as such all had excellent computing skills. We had approximately 40 minutes to deliver the session to this group and it was evident that, on average, the tutor led group were 20 percent further through the second exercise than the distance group.

The second group trialed were volunteers from staff and students at UCOL Wairarapa from a variety of courses and areas of the Polytechnic. This gave us a much broader sample, although the numbers taking part were only slightly larger.

We gave both groups of students a full 60 minutes and the groups were determined by students choosing which they wished to join. This resulted in the tutor-led group being students from very diverse

courses such as Visual Arts right through to Business Administration, while the distance learner group were predominately staff, many with good IT skills and one or two with limited IT skills.

The results of this second experiment were more clear cut; by the hour's end the distance learners on average had completed about 70% of the second exercise, whereas the tutor-led group had finished all of exercise two taking about 50 minutes.

5. FEEDBACK

The feedback from the students was invaluable, confirming that the tutor-led students progressed with their uptake of skills faster and on average completed more of the tasks required in the timeframe allowed.

A number of distance learners commented on "working in a vacuum", "no immediate feedback" and "delayed and unemotive feedback" being cited. Technical challenges faced by some students from Group 2 mirrored what could be expected 'in the wild' for distance learning students, and their comments also indicated that they enjoyed the freedom of "moving at their own pace" and "having to work out more for themselves".

Tutor-led students commented on the benefits in being able to work in groups for the second exercise and in having a tutor "on call" at all times.

In analysis of the feedback we recognised a confirmation of our expectations, in that results we experience with our classes on a daily basis were articulated and substantiated by both Group 1 students.

6. CONCLUSION

From our study of learning theories and typical IT lesson planning we find that it is common and accepted for aspects of the contrasting instructivist and constructivist methods to be incorporated. This hybrid is, in fact, encouraged and nurtured in distance learning with the fostering of blackboards, discussion lists and learning communities.

Our research has highlighted the gulf that still exists in student experience between tutor-led delivery and distance education. The limits of available technology are made obvious in distance learning situations. However, this appears to be compounded by our conditioning of education in a pre-

dominately tutor-led environment, rather than the technology itself. A virtual holographic tutor, packed with loads of AI to foresee and cater to students individual learning needs may be the answer. Until then, the value of tutor-led real time classes cannot be under estimated.

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