A real experience with a virtual learning guide instructional design

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Abstract

At the Swinburne University of Technology, Lilydale (SUTL) campus, within the ITSM Discipline, I have collected all the elements for a virtual learning guide (VLG) and virtual lectures that take advantage of simple course development and delivery on an any-time, any-place basis. This paper firstly reports this success, the systems and survey results from the first three semesters of operation.

While the technologies work well and are appreciated by significant numbers of students, the overall learning deficiencies and motivation of students mitigate against their efficacious use. The SUTL campus philosophy is tied to a constructivist paradigm of learner-centric, self-directed learning. However, this is not what I am observing. In fact, the opposite seems to be the case. Therefore, secondly I introduce in this paper research designed to investigate issues between technology and learning-centricity where these could be seen as a dichotomy between fully structured and agency based learner action.

At some point students can move from a teaching-centric to a learning-centric paradigm and vis-à-vis. By analysing these relationships offers opportunity for SUTL campus to identify elements that mitigate in favour of against self-directed, learner-centric learning.

Introduction

The research and evaluation reported is the result of changes at the Swinburne University of Technology, Lilydale campus (SUTL campus), Information Technology, Systems and Multimedia Discipline (ITSM Discipline). Foremost in this change was an institutional imperative for increased flexible and web-based learning. The study data collection was initially provided through various methods including quasi-experimentation, surveys, interviews and focus groups, and content analysis of historical materials.

Throughout the research I argue that neither the traditional instruction design nor the virtual learning environment (VLE) instruction, as reported in literature, provides the self-organising, motivated learning, as a social construction desired for computer-assisted constructivist learning. In part this is due to instructional assumptions, where:

- VLE instruction assumes a learner is motivated at the point of entry to the learning materials and that this is maintained via interface with the learning resources;
- Whereas, traditional instruction assumes a learner may not be motivated at the point of entry to the learning materials and therefore is taught regardless of any desire or learning motivation.
Conceptually the overarching research, of which this report is part, develops a tripartite relationship between Structuration (e.g. Giddens, 1976, 1979, 1984), Constructivism (e.g. Mayer, 1999; Olsen, 1999) and Systems theories (e.g. Checkland, 1981; Banathy, 1992, 1995; Romiszowski, 1977) as they relate to education as a human activity system. Such a relationship envisages a pedagogy that assumes a duality between learner and learning, agent and structure, and knowledge and data. Overall the research is informed by these theories within a conceptual investigation of the nature of human action, social institution and the interrelations of both where the resulting theories can be expressed though a virtual learning space pedagogy.

Technologies that allow the development of virtual environments or spaces within which humans may interact are now proliferating (at the start of the 21C). Education is not immune from this onslaught. Peters and Roberts (1998) have pointed out that many university organisations, and to an extent governments, are adopting strategies for encouraging the use of virtual technologies. Advances in telecommunications and computing technologies are sufficient to allow many re-definitions of instructional technology and instructional design. Often there is the claim that telecommunications and information technology will have a revolutionary effect upon tertiary education. These changes, combined with globalisation, are most likely to be observed in changes to conventional instruction, content management and distribution, course organisation and learning. However, it must be noted that such changes are not always celebrated and seen as positive.

Within the context of higher education, ‘virtualism’ is typically directed at the content component in the form of online lectures, eModerating and eCoaching and other forms of tutoring. Titles like Virtual University, Virtual Classroom, Virtual Lecture, and eTutor now seem common place among tertiary institutes and research literature. However, there is one title that seems to have extremely widespread use, namely, Virtual Learning. Unfortunately the emphasis is more often placed on the virtual (the technology) at the expense of the learning or for that matter the learner.

Computing and telecommunications technologies, as mentioned, allow for realities that are commonly used in our tertiary education community, to be replicated as virtual realities. Such virtual realities must be investigated both at the point of conceptualising and through implementation and usage. While there may well be ‘no significant difference’ on the user relative to the learning outcomes as a reality – one must ask ‘is there a difference’ culturally, socially, politically, geographically, psychologically, etc, or perhaps more importantly, what will make a difference?

At no point should it be assumed there is a one-to-one benign relationship between the extant reality and the virtual equivalent. Nor should it be assumed that the extant reality is optimum, it could be that bad habits are entrenched and institutionalised. Much research and evaluation is required both intrinsic and extrinsic over an extended period of time, and notice should be taken of the warnings emanating from reported research.

**Background**

In 1994 Swinburne University of Technology, Mooroolbark campus (now Lilydale campus) purposed to create a policy for the development and presentation of learning materials in a
flexible and multi-modal form. The policy resulted in the development of the ‘Learning Materials Specification’ (LMS) (Paterson and Weal, 1995) subsequently used as the basis for the development of a structured and print-based ‘Learning Guide’. Underpinning the LMS was a constructivist paradigm (ie. Self-directed learner-centric learning) for SUTL campus student and staff participation.

The LMS changed academics and student practices at the SUTL campus. Unfortunately, no systematic follow-up research or evaluation has transpired to investigate the veracity of the model as a learning framework or a subject delivery tool; other than to note that students are progressing at rates similar to others at the city campuses of the university. This framework has been the operational prerequisite to this day with the majority of subjects producing a published (printed) subject learning guide with associated learning materials. The exception being the ITSM Discipline where the subject learning guides are not printed but are entirely web-based. An extensive review of the printed resources was commissioned in 1999 and revealed varying degrees of compliance and quality.

Since 1998, it has been my role to implement the LMS through computer-assisted technologies as a ‘Virtual Learning Guide’ (VLG). The learning guide, as a learning technology, was experimentally implemented as a VLG late in 1998, with the development of a web-based subject template (Figures 1 and 2). During the ensuing three years since 1998, I have observed the use of the virtual learning guide: that given a learning environment like VLG or VLE SUTL campus students will not intuitively action ‘learning’ as a cognitive, knowledge and self-directed process. Rather it is more likely they will be information and just-in-time learners, performance motivated ‘outcomes focused’.
During my time as the ITSM Discipline Leader and leader of this innovation I have witnessed, as I developed and implemented the VLG, the outcomes focused scenario persists. Equally, although many online and resource-based learning trials have been carried out over several decades and in spite of following constructivist (e.g. Brooks and Brooks, 1993; Mergel, 1998; Mayer, 1999; Olsen, 1999) and instructional design recommendations (e.g. Johnson and Foa, 1989; Keller and Suzuki, 1988; Laurillard, 1993; Merrill, 1997, 2000), ITSM Discipline students remain reluctant to become independent learners even when offered the freedom of the virtual learning environment. This represents a gap in knowledge required for intuitive, self-motivated, learning-centric use of virtual learning environments and specifically virtual learning guides as a learning technology and pedagogy.

It seems to me that issues that emerge here are not to do with the capabilities of the technology, but rather how individuals (educators or students) socially construct learning in their study environment. In spite of initial evaluation and insights (Calway 1999, 2000, 2001) it is unclear as to ‘what’, ‘how’ or ‘why’ this may be the case.

**Instructional design**

Even the most cursory review of instructional design literature reveals an overwhelming number of informing theories, strategies and opinions on the manner in which instructional design should be undertaken, the outcomes to be sought and the reasons why one should begin the process. Instructional design is not a simple field. It is not defined or described with ease and it does not produce quick, elegant, unanimously agreed upon solutions to the complex problems produced by the educational realm. Different learners, educators, subject matter, learning environments, technologies all play their part in adding layers of intrigue to the process of instructional design.

Instructional designers balance the needs, desires and expectations of the learner with the limitations resulting from the applicable technology, the timeframes imposed and the
outcomes desired by the educating party. In essence, instructional design is a process of instructional improvement, that 'involves organizing and using tools of the mind and tools of learning to improve the conduct of education and training... In its most essential form, however, instructional design involves thinking creatively about teaching and learning' (Johnson and Foa, 1989:3).

Johnson and Foa argue that effective instructional design incorporates three components:

- Instructional Theory, drawn from behavioural, developmental, social and cognitive psychology;
- Instructional Technology, consisting of communications, audio-visual media, information management and computer science; and
- Instructional Management, founded in systems analysis, organisational development, operations research and project management (Johnson and Foa, 1989).

**Instructional theory**

Instructional theories and learning theories seek to capture the way in which people learn so as to be able to aid the learning process most effectively. Instructional theories consider both the form and method of the instruction and also the learning style and motivation of the learner, in an effort to produce the most efficient and effective learning strategies.

Increasingly it appears that there is an unavoidable link between theories of learning style and motivational concepts. The ARCS (Attention, Relevance, Confidence, Satisfaction) Motivation Model proposed by Keller and Suzuki (1988) recognises that students approach learning with a variety of motivations and that the personality or learning style of the individual has a significant effect on the factors by which they are motivated. Keller and Suzuki (1988) argue that no one particular motivational strategy is likely to cater for the wide range of learners undertaking a course of study. Cotton (1997) agrees that different methods of motivation will have varying levels of efficacy with different students.

A wide range of authors supports the notion that motivation strategy should be a major component of instructional design (eg. Klien, 1999; Keller and Suzuki, 1988; Small, 1997; Warren 1999.) Keller and Suzuki (1988:402) contend that, 'If the instruction is not well designed, or lacks motivational appeal beyond the novelty level, then learner involvement wanes'. Constructivist theorists contend that learners construct knowledge from experience, and that 'learning occurs when learners actively create their own knowledge by trying to make sense out of the material that is presented to them.' (Mayer 1999:143)

Tam (2000) draws heavily on Lebow’s ‘Five Principles toward a New Mindset’ to argue the importance of contextualising the learning process and promoting self-regulated learning. However, despite his enthusiasm for Lebow’s model, Tam does not provide a practical guide as to how this should be achieved.

Constructivist models of instruction strive to create environments where learners actively participate in the environment in ways that are intended to help them construct their own knowledge, rather than having the teacher interpret the world and insure that students
understand the world as they have told them. (Jonassen, 2000:4) However, constructivists also warn that the design produced must not prohibit the learner from being able to direct (at least at some level) the pace and objectives of their own learning.

**Instructional technology**

According to Johnson and Foa (1989), the Instructional Technology component of Instructional Design originates from Information Science, and from Information Science "...gains insights into the structure, organisation and management of information" (1989:10). They suggest that the development of an understanding of the concepts and processes required for most efficient information sequencing and assembly is more significant than other technological advances. Johnson and Foa suggest that instructional design, taking into account these factors and the intelligent selection of emerging new media, results in a more reasoned and effective use of technology within the learning environment. To this end they believe that the development of information technology has provided a greater range of more flexible technologies for use as learning tools.

Jonassen (2000:2) argues that technologies should be applied "...as cognitive learning tools rather than as instructional media..." and that they should be used by the learners (rather than by the instructional designers) as tools to construct knowledge. The core proposition here is that technologies should be used as supporting cognitive tools across a wide variety of disciplines in order to produce higher order learning rather than as media by which information can be transferred to learners.

Carrier and Jonassen (1988:203) suggest that 'The widespread use of microcomputers and other new technologies for the delivery of instruction heightens educators' interest in the possibilities for individualised instruction.' Their argument is based on the propositions that the new technologies are '...oriented towards individuals rather than large groups, ...provide maximum flexibility, ...are becoming multi-modal, and ...provide management systems which automate the monitoring of students’ progress throughout the instructional process.' (1988:204). While technologies may indeed provide new opportunities, many factors outside the technologies themselves will impact on the effectiveness of their implementation into the learning environment. (See, Grasha and Yangarber-Hicks, 2000; Sanford and Richardson; 1997; Romiszowski, 1987)

What emerges from this literature is a view that whilst instructional technology is a powerful and empowering tool for both students and teachers, it is not an end in itself, and does not necessarily lead to improved learning outcomes. The application of instructional technology should be investigated and encouraged, however it must be considered within the context of a well defined and understood learning paradigm. Like all tools, instructional technology can have a significant, positive impact when it is used wisely, with the benefit of experience and training, however it can also have a detrimental effect which must be considered in any instructional design.
**Instructional management**

Johnson and Foa (1989) propose that the third aspect of instructional design is instructional management, derived from the fields of Management Science including Systems Analysis. Banathy (1995:5) contends that,

> Only if we individually and collectively learn to understand and apply the systems view shall we be able to 'see the world anew,' and only then will we be able to see, reconceptualize and redefine education as a social system. Only then can we engage in the design of systems that will nurture learning and enable the development of the fullness of human potential.

Banathy (1992:4) outlines the need in the field of education for a paradigm shift from mindsets of the previous era, which she calls the 'industrial machine age,' to a new type of thinking ‘...that is based on the new world view.’ Her argument for this shift to a systems view is the necessity to underpin recognition of the changed social patterns and conditions ushered in by the so-called ‘post modern turn’.

Banathy distinguishes between the old and new mindsets by claiming that the old mindset focused on how to 'manage things' (1992:3) and the new mindset is focused on enabling us to 'manage complexity' (1992:3). She emphasises that a systems view of education proposes an integration rather than separation of subject areas and that a systems view should be applied to 'BOTH educational scholarship and educational practice.' (1992:8, her emphasis)

**VLG pedagogy**

Using these three elements I will describe the SUTL campus ITSM Discipline VLG pedagogy and while the VLG tries to incorporate all that was discussed above the learning outcome suggests that one or more areas are not working in accord with the theory.

Within the VLG template (Figure 2) there are three learning approaches, as instructional theory, considered:

1. **Assessment** – (task,) all material provided is connected with assessment ‘what do I need to do’. The learning modules and sessions above are all linked to two types of assessment, graded assessment and hurdle assessment. Graded assessment certainly forms a significant part of the VLG but more important is the use of learning directive questioning (hurdle assessment) that occurs both pre and post entry to a learning module or session. Students will come to the materials and be guided into those things, which they do not know while reinforcing materials and information abstractions that they do know, without disengaging students through repetition. Students are guided through a series of reinforcing activities that also enables the educators to view the degree of learning taking place. The approach further enables the student to grasp early on the extent of learning required and to adjust within the assessment criteria the best approach to learning management.

2. **Sessional** – (temporal, ‘what do I need to know’), where the learning is dissected into sessions with each session having intrinsic content and activities such as lectures, summaries, case studies, story boards, etc. Each session is in length and structure similar to all other sessions however, each session is also dynamically linked with the learning modules. Each lecture has video support, full audio and related transcripts and slides.
3. Informational – (topical, ‘what is worth knowing’), all material is described primarily as ‘learning modules’ with each module consisting of one or more ‘Information Objects’ (eg. Merrill, 1997, 2000). The information objects in turn consist of content, contextual and conceptual materials. The ideal I sought was that students completing a learning module will take a path of collecting data, contextualising that as information moving to then conceptual abstraction of information in order to produce knowledge, and finally enacting that knowledge to engender understanding. All learning modules are dynamically linked to sessions and assessment.

The technology has been invoked to provide maximum access for the learner in an intuitive and seamless web-based structure. While the SUTL campus has a very high student home computer ratio (85+%) and Internet access (70+%), most students are only marginally computer literate in that they know how to browse the world wide web (WWW) and to produce word processed documents, but little else.

Lectures are captured as digital format in order to be streamed as mp4 files via the WWW any time any place. This technology has also provided the opportunity of audio clips that can be directly attached to lecture slides that are created using PowerPoint 97 or 2000. Distribution of the materials on the WWW is managed through a home grown product (Elegant Solutions) but this is to be transferred to one of the currently available subject management software packages.

In terms of management, all materials within the VLG are multiply recorded. By that I mean that lectures are captured as video on demand, full audio and audio transcripts. This enables multiple learning styles and more importantly sight or hearing impaired students learning access. Learning is managed through staged assessment as a series of hurdle (ie. not for credit) assessments aligned with credit based submissions.

Unfortunately there remains the obstacle of performance based degree structures, where each student must complete a certain number of subjects in a certain order and time with examination periods marking the so called completion point of learning. While this regime may suit administration it inevitably fails the student because life does not come in convenient slices.

In summary

All the above discussion is premised upon being able to take advantaged of the technology and learning management. Students may work at their own pace (within the assessment parameters), progress feedback can be provided, and learning materials and resources can be re-used efficiently. However, such a paradigm requires students to be well-motivated and self-directed learners, and that educators provide pedagogically sound learning modules. The ITSM Discipline example to date is showing that it is difficult and expensive to provide these learning modules and that students are in the main not self-directed in spite of best efforts.

This brings us back to the theoretical construct of virtual learning that dominates the literature that is of the cognitive viewpoint which is often proffered by open learning proponents (Ryan Calway, A real experience with a virtual learning guide instructional design 85
et al, 2000; Laurillard, 1996). Clift and Chambers (1994) while drawing on a range of commentators, surmise that the learning process should view learners as:

- having individual cognitive strategies for using, managing, eliciting and constructing individual meaning and understanding (Wittrock, 1977);
- being capable of deriving information, evaluating and judging, and justifying propositions for any particular problem-solving scenario (Eisner, 1993);
- being problem solvers rather than operational and content oriented (Gibbs, 1991)
- having the capacity to exhibit generic skills such as problem solving, creative, holistic thinkers, information literate, (Chambers, Clift and Sissons, 1995).

The above are equally categorised as pertaining to learning technologies when discussing open learning, flexible learning and/or student-centred learning. This can best be seen in the dichotomy between traditional instruction models and resource-based instruction models. While simplistic answers may be proposed a far more holistic approach is required. This scenario is problematic and provides the basis for the wider research project alluded to earlier in this paper.

References


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