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## **A theoretical framework for research and development into sound online learning in higher education**

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### **Abstract**

The development of sound instructional design principles for online learning in higher education needs to draw from the vast body of literature which reports on the findings of research into instructional technologies, cognitive learning theories and adult education (Reeves & Reeves, 1997). A recent study by Siragusa (2005) examined the body of literature which was derived from three main discipline areas that provide a theoretical framework for the potential development of a model for online learning in higher education. From these three main discipline areas, seven distinct focus areas have been identified as having direct influence on the research, design and delivery of effective online learning environments. This paper outlines each of these focus areas and argues the importance of this theoretical base for research and development into pedagogically effective online learning environments in higher education.

### **Introduction**

Development in information communication technologies (ICT) have been rapid in recent years and have promised improved education and training to an increasingly diverse cohort of students. As the move towards online learning in higher education continues to grow unabated, the more important it becomes to examine the effectiveness of placing learning materials on the Internet. Educators need to focus more clearly on what processes are used for the development of instructional materials for online delivery, and the learning strategies that students are being encouraged to use to assist them to succeed in this environment. Those who are new to online learning delivery are often misled into believing that placing units on the Internet involves saving lecture notes as HTML files and then uploading them into an online learning management system such as WebCT. The creation of an effective online learning environment requires thoughtful and appropriate design of the content materials (Siragusa & Dixon, 2005). There are, therefore, specific instructional design issues that need to be addressed when creating HTML pages. There has been recognition for the need to publicise instructional design guidelines, based upon a sound theoretical framework, to increase student confidence and participation in online courses (Bennett, Priest, & Macpherson, 1999).

### **Theoretical framework**

Instructional design is concerned with the promotion of processes that lead to successful learning regardless of the delivery medium being used and needs to be based upon appropriate learning theories (Smith & Ragan, 1999, p. 18). The theoretical framework upon which a recent study into online learning in higher education (Siragusa, 2005) was based was derived from the following three main discipline areas.

1. Learning theories, learning philosophies and instructional design principles;
2. Research into student learning in higher education; and,
3. Online learning technologies in higher education.

### **Learning theories, learning philosophies and instructional design**

The literature highlights a major shift from early behaviourism through to cognitive learning theories. Cognitivism is revealed as having the greatest influence on the development of

instructional design theories and models (Smith & Ragan, 1999, p. 20; Venezky & Osin, 1991, p. 76). The contemporary influence of constructivism has also significantly impacted upon instructional design (Smith & Ragan, 1999, p. 14). This has meant a shift from teacher-centred instruction to student-centred instruction. Earlier editions of instructional design models, such as those presented by Dick, Carey, & Carey (2001) and Gagné et al. (1992) were based upon a behaviourist approach which included the basic conceptualisation that learning has taken place when learners are observed providing an appropriate response to a particular stimulus, analogous to Pavlov's and Skinners' classical and operant conditioning theories (Smith & Ragan, 1999, p. 19). Later editions of these models incorporated findings from cognitive based studies which acknowledge the importance of learner analysis, cognitive strategies, motivational strategies and information presentation strategies (Gagné et al., 1992).

Instructional design promotes processes which lead to successful learning (Smith & Ragan, 1999, p. 18). Gagné (1985) described learning as "... *a change in human disposition or capability that persists over a period of time and is not simply ascribable to processes of growth*" (p. 2, original italics). Mayer (1982, p. 1040) elaborated on this concept by postulating that learning creates a permanent change in a learner's knowledge or behaviour, including change in the content and structure of knowledge in the learner's memory. Learning theories describe how learning takes place without directly suggesting what kinds of instructional intervention should be employed to support learning (Reigeluth, 1999b, p. 12; Smith & Ragan, 1999, p. 19).

### **Research into student learning in higher education**

The focus of research for many educators who teach in higher education has been the processes that students engage in while learning. Universities today are under increasing pressure to reduce public expenditure and to increase the numbers and diversity of their student population (Boud, Solomon, & Symes, 2001, p. 3). This presents challenges for university lecturers as they are now forced to accommodate students who demand flexible, targeted, accessible learning methods (Ryan, Scott, Freeman, & Patel, 2000, p. 12). While it is increasingly important for universities to implement a growing array of online courses in order to remain economically competitive, questions remain regarding pedagogical issues, economic costs and philosophical issues such as equity and access. The design of instruction for higher education courses needs to be responsive to the students' needs regardless of the delivery medium to be utilised. Students' prior knowledge and experience have been found to affect how they process new knowledge being taught (Laurillard, 1993, p. 30).

Researchers have identified various approaches students have demonstrated towards a learning task including *deep approach* (obtain a deeper understanding of the content), *surface approach* (memorise facts and complete assessment tasks without a deep understanding of the content) and *strategic approach* (develop an alertness towards marking schemes for obtaining the highest possible grades) (Entwistle, 1987, p. 60). Students are capable of varying their approach to a learning task according to their interpretation of the demands of the learning situation (Laurillard, 1993, p. 32). Research has demonstrated, however, that students should be encouraged to adopt a deep approach towards the learning tasks they encounter for effective learning to take place (e.g., Biggs, 1987, 1999; Entwistle, 1987; Entwistle, Hanley, & Hounsell, 1979; Laurillard, 1993; Ramsden, 1992; Weigel, 2002). A number of models have been put forward to describe ways in which instruction can be designed to encourage students to adopt a deep approach to learning tasks. For example, Biggs' (1999) Presage, Process, Product (3P) model of student learning takes into account interrelated features of the learning experience, which include: *student factors* (prior knowledge, ability, motivation), *the teaching context* (objectives, assessment, teaching), *learning focused activities* (appropriate deep approaches), and *learning outcomes* (facts, skills, transfer). Designers of instruction need to consider such models of student learning when designing for higher education courses regardless of the delivery medium.

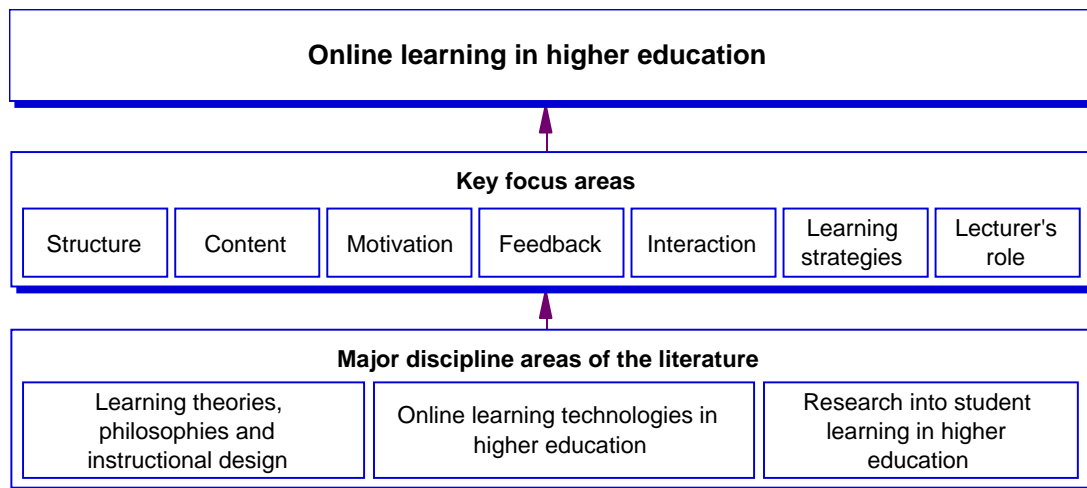
### **Online learning technologies in higher education**

The introduction of the use of the Internet for learning in higher education has been justified by its proponents for its potential to provide cost-effective flexible learning for a diverse student population (Ryan et al., 2000, p. 13). However, evidence has suggested that the expansion of some university courses to allow for a more diverse range of students using online technological solutions "... has led to a move from small group teaching to large group teaching, and from individual supervision to group supervision, with 'inevitable loss of quality of learning experience for students' " (Ryan et al., 2000, p. 14). Although online learning technologies may not have lived up to all of their promises, there have been situations where they have been put into practice to provide satisfactory solutions to particular problems. The World Bank-funded African Virtual University, for example, has utilised online learning technologies to provide an infrastructure for delivering education and training to less well-developed regions of Africa (Barjis, 2003, pp. 16-7; Ryan et al., 2000, p. 17). According to Choy, McNickle and Clayton (2002), the growth of online technologies has resulted in the development of online social network and the ability to communicate with others on a regular basis. Students are able to overcome feelings of isolation and disengagement with the learning experience as they create their own communities both within the confines of the learning materials and beyond.

Online learning has undoubtedly altered the way courses are being delivered in many universities. However, we are only just beginning to explore the possibilities of online learning and coming to recognise its strengths and limitations (Ryan et al., 2000, p. 28). While issues relating to the cost of online learning development are not the focus of this enquiry, it is clear that online learning technologies do not provide the complete cost-effective solutions once hoped for by earlier advocates of the use of this medium for learning. If students are expected to experience successful learning through the use of the Internet, as with the use of any other medium, the design of instruction must consider the learners' needs and how they will interact within this environment. The designer of online learning environments needs to fully utilise the potential of online technologies and hypertext's ability to organise (structure) and retrieve (display) learning materials to students in a manner that enhances, rather than hinders, the learning experience (Greening, 1998; Weigel, 2002). Hence, it is important to close the void between the focus on advances in online technologies and the design of educationally effective learning environments through appropriate and sound instructional design principles.

### **Key focus areas**

The literature would suggest that there are gaps between the bodies of knowledge relating to learning theories, instructional design principles and research into student learning in higher education, and the application of this body of knowledge to the use of online learning technologies (Siragusa & Dixon, 2005). A recent enquiry (Siragusa, 2005) examined how these bodies of knowledge may be tied together to provide a sound theoretical framework which can effectively promote the development and delivery of online learning. From the literature relating to discussions and research findings concerning the three main discipline areas acknowledged above, seven distinct focus areas have been identified as having direct influence on the design of effective online learning environments. These seven key focus areas have been categorised as: *Structure*, *Content*, *Motivation*, *Feedback/Help*, *Interaction*, *Learning Strategies*, and *Lecturer's Role*, as illustrated in Figure 1.1.



**Figure 1.1** An illustration showing the seven focus areas derived from the literature which contribute towards online learning in higher education.

The following will provide a summary of some of the literature within these key focus areas which provides a theoretical framework for research and development of online learning environments.

### **Structure**

The way in which instructional information is structured and displayed to the learners can be interpreted in different ways by each learner in accordance with their own cognitive structure (Laurillard, 1993, p. 51). Most disciplines in higher education require students to remember large bodies of knowledge. The knowledge needs to be organised in such a way that it can be easily retrieved (Gagné et al., 1992, p. 83). Instructional theories, such as Reigeluth's elaboration theory (Reigeluth, 1999a), have attempted to prescribe how content should be structured. The structure of an online learning environment should also follow these principles to assist with student learning.

### **Content**

The instructional designer's task is to determine the most appropriate way of delivering the unit's content to students. Laurillard (1993) argued that effective teaching requires educators to know more than just the subject content; "They need to know the ways it can come to be understood, the ways it can be misunderstood, ... how individuals experience the subject" (p. 3). Instructional models, such as the systematic instructional design model developed by (Dick et al., 2001), describe in detail how to conduct an instructional goal analysis and a subordinate skills analysis in order to determine which content is relevant for the instructional goal and in what sequence it should follow. Instructional design of online learning materials needs to ensure that the content provided complements the intended learning outcomes and is appropriately selected and presented to students in an online learning environment.

### **Motivation**

The learners' will to sustain learning can only be achieved through intrinsic motivation (Bruner, 1966, p. 40). Ralph (1998, pp. 2-6) provided strategies which educators can employ to assist their students develop intrinsic motivation including developing positive relationships, attracting learners' attention, enhancing subject-matter relevance, building learner confidence and promoting learner satisfaction. In addition to appropriately designed content, the enthusiasm and effectiveness of the lecturer has been attributed to the students' levels of motivation when using online learning environments (Agarwal & Day, 1998, p. 106; Foley & Schuck, 1998). How students cope with using the Internet for learning depends upon

how well they are encouraged to participate in course activities, how they are encouraged to ask questions, the type of help available to students and students being able to keep to a schedule (Mory, Gambill, & Browning, 1998). There are a number of factors that contribute to making a Web site pleasing to use such as the appearance of the Web site, the use of text and graphics, and the amount of materials presented on each page (Summerville, 1998, pp. 431-7). How students persevere with technical problems and how these problems are resolved also contributes to students' levels of motivation (Everett, 1998; Mory et al., 1998).

### **Feedback/Help**

Numerous instructional design theories and models emphasise the importance of providing clear, timely and informative feedback to students about their performance while assisting them to proceed more effectively (Gagné et al., 1992, p. 196; Reigeluth, 1999a, p. 6). Web-based learning environments are able to provide students with mechanisms that allow for submission of assignments, receiving prompt feedback, seeking help with technical problems, and for seeking help with coursework matters (Thomas, Carswell, Price, & Petre, 1998). Evaluation and feedback must be perceived by students to be fair and authentic for students to continue their desire to accomplish a learning goal (Ralph, 1998, pp. 5-6). Online learning management systems (such as WebCT) have facilities for students and lecturers to be able to send and receive assignments and feedback. How effectively these facilities are utilised will affect the quality of the help and feedback that students receive.

### **Interaction**

Learners need to be encouraged to contribute to their own learning through their interaction with not only the course materials, but also with their peers and their lecturer (Bandura, 1977). Interaction between peers may include describing, explaining, questioning, discussing, defending, encouraging, supporting and assessing each other's work (Ralph, 1998, p. 145). The use of interaction between students and their lecturer in Web-based learning environments has often been described as the most important feature of a Web-based learning environment (Forsyth, 1996; Wagner, 1998). According to Nnazor (1998), students involved in a university case study perceived they had attained comparable academic achievement via online course delivery and believed that teachers who were involved in flexible delivery of materials were more inclined to encourage student participation and teacher-student, student-student interaction than those in more traditional modes.

### **Learning strategies**

According to Piaget and Inhelder (1969), students in higher education should have obtained the formal-operational stage of cognitive development where they are generally able to be more plan-full, strategic and efficient in their organisation and manipulation of the available information (Flavell, 1977, pp. 102-12). Assisting students to become more aware of their own learning strategies contributes to developing deep approaches to learning (Entwistle, 1987). Through the process of thoughtful instructional design, effective learning strategies for the students to adopt can be developed (Smith & Ragan, 1999). Finding effective learning strategies for students to use has been the subject of investigation by educators working with online learning (e.g., Bull, Kimball, & Stansberry, 1998, pp. 40-1; Hawkes, Cambre, & Lewis, 1998; Shih, Ingebritsen, Pleasants, Flickinger, & Brown, 1998, p. 363). When students are observed using successful learning strategies, they should be encouraged to continue using them (Smith & Ragan, 1999). Students, for example, have been observed responding positively about taking a more active role in dealing with the course content and, therefore, were favourable towards the learning environment (Oliver & Omari, 1999).

### **Lecturer's role**

While the focus of the literature presented in the preceding is on elements relating to the design of effective instruction, the role of the lecturer is also examined. The lecturer's willingness to participate in online learning can influence students' motivation to successfully

learn with this medium (Weller, 2002, p. 51). A comprehensive study into online learning in schools by Ravitz (1998, pp. 323-32) asked teachers questions relating to the conditions in which they facilitated online learning and how they perceived their roles and skills while teaching with this medium. The following outlines some of the findings from Ravitz's study which relate to lecturers in higher education facilitation of online learning as well as findings from other studies conducted in higher educational institutions.

1. **Importance.** The teachers' perception of the importance of the use of the Internet for student learning was examined by Ravitz. The teacher respondents overwhelmingly agreed that all students benefit from knowing how to use the Internet for searching for relevant information and for communicating via email. Other studies into online learning in higher education have also report on lecturers' perception of the importance of online learning for activities such as searching relevant information on the Internet, for online communication and collaboration, and for access to unit information (e.g., Keppell et al., 2004; Markland, 2003; McMurray & Dunlop, 1999).
2. **Ability.** Ravitz's study asked teachers' to indicate their skills and ability to utilise the online learning technologies. The most prevalent of the "Internet skills" included using a search engine and sending email. The most prevailing of the "classroom skills" involved finding and downloading relevant information found online and their awareness of what the Internet can do. While Keppell et al. (2004) found that participants in their study of lecturers in higher education were comfortable with finding online information and using the online communication facilities, several had difficulties with moderating meaningful online discussions with students.
3. **Support.** In Ravitz's study, teachers were asked to identify the support provided to teachers and students in the way of technical support and incentives for incorporating online learning into the teaching programme. The teachers generally reported that technical support and training opportunities were sufficiently present. Computers and related equipment were generally available to teachers who were interested in the Internet. Release time, reimbursement for inservice courses and public recognition were reported in approximately half of the cases. However, resources for Internet use in the curriculum and help for integrating online activities into the curriculum were most often reported as being insufficiently present. The majority of participating teachers indicated that rewards and incentives were not available. McMurray and Dunlop (1999) reported lecturers' perceptions that development of units in higher education for online delivery was labour intensive and resource heavy, and that lecturers believed that more time was needed for training and development in this area.
4. **Decision making.** The decision making process within the teaching area relating to online learning development and implementation issues was investigated by Ravitz. In regards to direct involvement in the decision making process, the teacher respondents were most likely to report having a trusted colleague to who they could voice their concerns. However, fewer reported having their input directly sought by decision makers prior to any decisions being made. McMurray and Dunlop (1999) found that lecturers were accustomed to exercising autonomy in regards to the development of learning materials and, therefore, resisted the decision making process in their university's Information Technology department which were perceived as having pedagogical implications.
5. **Development activities.** The study conducted by Ravitz asked teachers to report on their involvement in development activities including design and development of online learning environments, and the development of online learning strategies for students. Of the activities in which teachers might participate, those reported most frequently included selection of hardware and software, providing support to other teachers, and working on curriculum integration. However, regarding other activities including developing products and policies relating to Internet-based learning, attending school board meetings to discuss Internet use, half or more reported that they were not at all involved. Jones, Atkinson, & Toohey (2002) explained how, in several institutions of higher education, the development of units for online delivery shifted from early

adopters who pioneered online learning within their institutions to a centralised online support development department. McMurray and Dunlop (1999) pointed out that academic staff were concerned with this centralisation in regards to the issues of “ownership” and felt that they had lost their autonomy with online learning development activities.

The preceding has provided a brief overview of the literature which has provided a theoretical framework for a recent enquiry into online learning (Siragusa, 2005). This theoretical framework has the potential to underpin the development of survey instruments for research into examining the pedagogical effectiveness of online learning systems. Such research may lead to the emergence of an instructional design model for online learning in higher education for instructional designers and educators interested in developing online learning environments.

## Conclusion

The literature summarised in this paper assisted with the development of a recent study into online learning in higher education (Siragusa, 2005). The study identified gaps between the bodies of knowledge relating to learning theories, instructional design principles and research into student learning in higher education, and the application of this body of knowledge to the development and use of online learning technologies. Through an examination of learning theories, learning philosophies, instruction design principles, student learning in higher education and online learning technologies, it has become clear that research into online learning needs to involve more than just an examination of an online LMS such as WebCT. Sound instruction design practices and the development of effective online teaching and learning strategies, based upon a sound theoretical framework can contribute towards students’ successful online learning experiences. Ongoing evidence from the literature suggests that the maturation of online delivery will be realised once innovators develop appropriate models for instructional design and realistic strategic and pedagogical approaches as we move further into the twenty first century.

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