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Use of E-Portfolios in Higher Education: Application of Constructivist Theory for Effective Learning

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Abstract—*An e-portfoliois an electronic collection of evidence that shows a student's learning and accomplishments over time. The portfolio may include writing samples, photos, videos, research projects, and observations by mentors and peers. The student's reflection on the artifacts, and what he had learnt from the process of developing the e-portfolio are also included.*
According to the constructivist theory students learn from being active learners in collaborative settings; and from constructing new ideas and concepts based on their prior knowledge and experiences. In a constructivist, technology-integrated classroom the activities are interactive and the learning is student centered.
E-portfolios are being touted as the next biggest innovation in educational technology. They indeed have the potential to become lifelong learning tools.In this paper we look at how e-portfolio integrates the principles of constructivism and can be an extremely effective tool for learning and assessment in higher education.

1. HOW DO WE LEARN?

There are myriad ways in which people learn. This is what the philosophers have called epistemology-the theory of knowledge and learning. The earliest ideas about how humans learn came from the ancient Greeks about two thousand four hundred years ago. Psychologists have been studying the nature of learning for more than a century. In the process they have taken a variety of theoretical perspectives. The general theoretical approaches to the study of learning are behaviorism, social learning theory, information-processing theory, constructivism and sociocultural theory.

The predominant theory on which most of the teaching and learning processes since 1960s have been based is behaviorism developed by J.B. Watson and B. F. Skinner. Behaviorists argue that because thought processes cannot be directly observed and measured, it is difficult to study thinking objectively and scientifically. Instead, they focus on two things that researchers *can* observe and measure: people's behaviors (responses) and the environmental events (stimuli, reinforcement) that precede and follow those responses.

Watson andSkinner sought to prove that behavior could be predicted and controlled. They were only concerned with how behavior is affected by external forces. Skinner believed that everything human beings do is controlled by their experience [18]. They concluded that given the right environmental influences, all learners acquire identical understanding and that all students can learn. The implications of this for instruction and learning have been emphasis on repetitions and rote learning [20].

2. WHAT IS THE CONSTRUCTIVE APPROACH?

Unlike behaviourists, constructivists concern themselves with internal aspects of learning that is explained by cognitive learning theory. The latter explains how the brain forms the most incredible network of information processing and interpretation as we learn things. According to this theory mental processes are influenced by both internal and external factors. Cognitive learning theory posits that with effective cognitive processes, learning is easier and new information can be stored in the memory for a long time[7].

Jean Piaget and Lev Vygotsky are two eminent figures in the development of constructivist theories. Constructivist learning theory says that all knowledge is constructed from a base of prior knowledge and people are better able to understand the information that they have constructed by themselves. People, or even children, are not a blank slate and knowledge cannot be imparted without the child making sense of it according to his or her current conceptions.

According to constructivism, knowledge is constructed from (and shaped by) experiences and learning is an active process and a personal interpretation of the world.The implications of constructivism for instruction are: (1) Teaching is not merely transmitting knowledge and information such as facts, concepts and principles. Rather it should provide students with relevant experiences from which they can construct their own meaning. (2) Constructivism is anchored on the assumption

that the assimilation of knowledge is personal and therefore no two learners can build up the same meaning out of a given situation.

Thus the constructivist approach shifts emphasis from teaching to learning, individualizes and contextualizes students' learning experiences, helps students develop processes, skills and attitudes, and focuses on knowledge construction, not reproduction. Whereas in traditional classrooms knowledge is inert, in constructivist classrooms it is dynamic and changes with experiences [9].

In the constructivist classroom, students work primarily in groups and learning and knowledge are dynamic and interactive. There is a great focus and emphasis on social and communication skills, as well as collaboration and exchange of ideas. This is contrary to the traditional classroom in which students work primarily alone, learning is achieved through repetition, and the subjects are strictly adhered to and are guided by a textbook. Some activities encouraged in constructivist classrooms are: (1) Experimentation where students individually perform an experiment and then come together as a class to discuss the results. (2) Field trips allow students to put the concepts and ideas discussed in class in a real-world context. (3) Research projects in which students research a topic and can present their findings to the class. (4) Filmsprovide visual context and thus bring another dimension into the learning experience. (5) Class discussions are used in all of the methods described above. It is one of the most important aspects of constructivist teaching methods [10].

Traditional pedagogical approaches often may not be the best way to cater for the specific needs of learners in higher education settings, particularly those of university students with special expectations and professional prospects.Traditionally, assessment in the classrooms is based on testing. In this it is important for the student to produce the correct answers. However, in constructivist teaching, the process of gaining knowledge is viewed as being just as important as the product. Thus, assessment is based not only on tests, but also on observation of the student, the student's work, and the student's points of view. Some assessment strategies include oral discussions, mind-mapping, hands-on activities and pre-testing [13].

Constructivist philosophy now has a reasonably long history of application in education programs for young children in the western world, but is used less frequently in adult learning environments.

Learning environments for adults based on constructivist philosophy include opportunities for students to make meaningful connections between new material and previous experience, through discovery. The importance of using these types of strategies with adults contributes to critical learning environments where instructors "embed" the skills they are teaching in "authentic tasks that will arouse curiosity, challenge students to rethink assumptions and examine their mental modes of reality"[12].

3. WEB-BASED INSTRUCTION IN HIGHER EDUCATION

There has been a widespread increase in the use of web-based instruction in universities across the world but there is doubt about the quality of instruction they impart. For example, Boshier et al.[4] examined 127 courses and expressed concern that many web-based subjects have not utilised the full capability of the available technology and some sites actually emulated the worst of face-to-face courses where learners are constructed as passive recipients of information.

Behaviourist instructional strategies, with their inherent limitations, and which rely on the development of a set of instructional sequences with predetermined outcomes, have also been followed in the designing ofmost of the web-based instruction. There is a need for a shift in approaches to pedagogy as well as a way of supporting alternate frameworks for instruction within a web-based environment.Current instructional design models do not provide effective strategies for designing constructivist learning environments. In a web-based environment this proves to be even more challenging [11].

However, with advancing technologies many web-based courses have moved to increasingly providing scope for communication and interaction, through synchronous and asynchronous discussion. Through the provision of real world contexts and opportunity for collaboration, the learning experience can be designed to provide opportunity for students to take control of their own learning.

Studies have shown that educational institutions that have embraced technology as part of their curriculum have experienced an increase in student performance and academic achievement. Learning 'with' technology is the aim for successful integration of technology. Technology supports exactly the kinds of changes in content, roles, and organizational climate that are at the heart of constructivist educational reform movements [17].

4. WHAT ISAN E-PORTFOLIOS?

An e-portfolio, basically an electronic or digital portfolio, is an electronic collection of evidence that shows a student's learning and accomplishments over time. Evidence may include writing samples, photos, videos, research projects, observations by mentors and peers, the student's reflection on the artifacts, and what the student learned from the process of developing the e-portfolio.

The term portfolio has long been associated with artists who gather examples of their work together for exhibition or to gain commissions. The term is also associated with financial portfolios which can be a collection of investments or assets. Similarly, an educational portfolio documents the learning achieved by a student. E-portfolios first made an appearance in the 1990s.

The e-portfolio is an adaptation of the original paper-based portfolio in digital format, is a more recent phenomenon that not only provides students with a repository for collection and presentation of their work but also a mechanism for documenting growth and achievement of professional knowledge and skills. Educators, especially in the USA, are showing increasing interest in portfolios for assessment of learning. The subject area has grown enormously in recent times and has a huge potential to impact on higher education [8].

There is a significant amount of learning that can take place through the creation of e-portfolio. There is high student involvement in putting together the contents of a portfolio, often through discussion or negotiation with an academic tutor. This is perhaps the most attractive feature of a portfolio, from the point of view of an educator. The portfolio also provides a more rounded and reliable assessment of learning achieved than written examinations or essay assignments alone. The emphasis on assessment still drives the curriculum and dictates teaching methods at most places. Outdated tools are still used to assess and measure student performance. Educational institutions have yet to recognize and utilize technology as an effective form of assessment in schools.Because of the ownership of the portfolio by the student, each portfolio is individual and unique. Teachers are looking at e-portfolios as an alternative form of assessment in which both standards and student performance are used. .

One of the most attractive features of e-portfolios is the diversity and richness of artifacts that can be associated with learning. Examples of such materials include word or text documents; PowerPoint presentations; web-pages with hyperlinks; Excel spreadsheets and graphs; scanned images; digital photographs; multimedia audio and video files; and results from interactive computer-assessment programs.

The pedagogy of e-portfolios has been studied and reviewed by Barrett & Wilkerson [3]. An e-portfolio should provide a dynamic environment for learners to document and celebrate learning they have achieved.

E-portfolio development also about the “interactions” of learning. Knowledge is distributed among people and artefacts which is also an important aspect of learning in this networking age. Most of the present day e-portfolio platforms provide the option for inclusion of peer review, feedback and discussion. Therefore e-portfolios have the potential to become lifelong learning tools.

E-portfolios have a number of advantages over print based portfolios including portability, the ability to store, organise and reorder contents quickly and easily; provide opportunities to integrate student course work; their ability to form the basis for collaboration; the potential for development of information management, self-organisation, planning, and presentation skills. Some of the publicly available electronic portfolio platforms are: Foliotek, LiveText, ePortfolio, TaskStream, Tk20, TrueOutcomes and so on. These platforms support student portfolios, faculty-controlled assessments, curriculum records, and surveys, lesson plan building, and the delivery of learning materials and resources.

E-portfolio has been used successfully for both learning and assessment in a number of disciplines including the Arts, Humanities and Social Sciences. In last few years computer science and engineering education faculty and students have been introduced to the concept of e-portfolios. Students have found the advantages of e-portfolio to showcase their work particularly for employment purposes.

A constructivist classroom using technology-based projects provides authentic evidence of assessment as proof of student learning. The very essence of constructivism, that learning takes place in contexts where learners are engaged in critical and reflective thinking, working in a collaborative and cooperative environment intertwines with the implementation of the e-portfolio system in higher education.E-portfolios have been found to foster active learning, motivate learning and empower students, which support the constructivist theory of learning [15].

5. ISSUES IN THE IMPLEMENTATION OF E-PORTFOLIOS

E -portfolios are not without their challenges. There are a number of issues that include the time intensive nature of their development; difficulties in mastering the use of the software; and issues of privacy. Even more importantly, without a central focus on reflection, e-portfolios may end up becoming simply a collection of information rather than a mechanism for the development of meaningful knowledge. Collaborative activities and peer feedback should be made as integral part of the e-portfolio.

Another challenge is to find e-portfolio strategies that meet the needs of both the students, to support deep learning, and to give the institution the information they need for grading and accreditation purposes. Any assessment process requires the aggregation of data for determining student quality, program quality and continuous improvement. Since the fundamental principle of a student-centered portfolio is to allow choice by

the student in the collection of artifacts, aggregation of data could be very difficult.

The difficulty lies on how to combine standards based assessment with individualized assessment. According to Ahn [1] e-portfolios do possess the potential to bridge these conflictinggoals. The contents of the student's portfolio can demonstrate how the student has met the standards by using hypertext links to connect the work to the standards it meets. One of the critical aspects in this process is also the design and development of the rubric for evaluation of e-portfolios [2].

Other issues facing schools or teachers who want to implement portfolios are lack of availability of computers in classrooms, blocked websites, software and hardware problems, and time management.

When computers are not in the classroom the educational institutions have computer labs to accommodate the needs of the entire campus. The problems encountered when depending on computer labs are availability, flexibility, and dependability.

A number of technological barriers can also affect the successful implementation of the electronic portfolio. E-portfolios depend on the use of technology to contain its contents and before beginning the portfolio process the method of storage has to be considered. The issues with integrating technology in an academic setting such as accessibility and permission to enter certain websites and adequate software and hardware can make things difficult for the student and teacher [14].

6. CONCLUSION

An electronic portfolio is an extraordinary way for students to learn technological skills, develop deep learning that requires both critical and higher order thinking, with evidence of learning through self-reflection. These are the valuable skills sought after by universities and the workforce.

In the 21 century, e-Portfolios are becoming a prevalent way to allow students to combine text, graphics, sound and video to create a powerful multimedia demonstration of their accomplishments [16]. Web-based e-Portfolios fit well with the constructivist philosophy of education where students can create their own meaning using platforms for student-authored content and without being restricted by organizational boundaries.

As the web-based e-portfolio are student-owned their usefulness is expanded to include lifelong and life-wide learning [6]. This career connection is also echoed in the literature; for instance, the e-portfolio building process was found to encourage students to think about their professional knowledge, skills and abilities [5]. It would not be difficult to believe that e-portfolio could someday be a requirement for admission into a university and for getting a job.

E-portfolios are being touted as the biggest innovation in educational technology since the introduction of course management systems. Literature shows that electronic portfolios, if done right can lead students to be life-long, reflective and responsible learners [14].

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