DESIGNING FOR DIVERSITY WITHIN ONLINE LEARNING ENVIRONMENTS

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Abstract

This paper describes a model for the design of online constructivist learning environments for tertiary education. A major benefit of this model is that it encourages diversity among students by valuing the different perspectives they bring to an issue rather than trying to change their perspective to accept a single "right answer" to every question.

Keywords

Diversity, online learning environments, social constructivism, situated cognition, situated learning.

Introduction

In recent years, the concept of diversity in higher education has become associated with issues of racism and multiculturalism at both the national and international level. As a result of this perspective the impact of diversity on curriculum development has concentrated on the addition of new subjects or the adoption of a multicultural perspective on existing subjects. Examples of this approach can be seen in US colleges and universities with the introduction of courses and programs such as: Pluralism and social justice; Women's Studies; US Ethnic Studies; Black Studies; Latino/Latina Studies and Class Studies. Within these courses, and as part of the broader curriculum, students are learning, "valuable skills they will need to function in a diverse world – listening, empathy, fairness, dialogue, intercultural communication, conflict resolution, and collaborative problem solving" (Humphreys, 1997)

This paper approaches the issue of diversity in higher education in a much broader context. It will address the increasing diversity in the student body in general, irrespective of the reasons for those differences. They may be based on gender, age, religion, sexual orientation, ethnic background, language, country of origin, socio-economic status, disabilities, etc. This also includes the traditional reasons for differences within a group of students such as prior knowledge and experience, preferred learning style and intellectual ability. The impact of diversity within this broader context needs to be taken into account as part of the process of educational design particularly when it is applied to online learning.

Diversity and educational design

Coping with diversity among students has always been an issue for educational designers although in the higher education sector it was more a matter of designing for different learning styles within a reasonably homogeneous group, rather than other factors such as age and ethnic background. Within most models of educational design there is an initial step such as a needs analysis in which the needs and characteristics

of the students are identified and analysed. The purpose of this step was usually intended to find out what category the majority of students fitted into so their needs could be met within the design of the program. If a student happened to fall outside of the major category then they were considered to be a problem. Unfortunately, it was usually a problem which was ignored in the hope it would go away.

In cases where diversity is confined to matters of prior knowledge and experience, ability or different learning styles, some interventions may be designed into the learning program. They include strategies such as pre-tests, remediation, bridging courses, and individualised coaching. The issue of different learning styles has been addressed by the use of instruments (Felder, 1996) designed to diagnose an individual's learning style. Despite these efforts, the traditional teaching methods employed in higher education have never been flexible enough to cope with different learning styles even if someone took the trouble to identify what they were.

This also raises a whole range of other issues such as whether a student's preferred learning style was the best for them and whether we, as educational designers and/or teachers, should be trying to change an individual's learning style to one which conforms with the majority or to one that was deemed to be more appropriate to a "self-directed, life-long learner".

Impact of information technology

The early signs of the so-called, "information and communications revolutions" in teaching and learning in higher education was the use of computer assisted learning (CAL) and computer managed learning (CML) programs. These were designed within a highly structured, behaviourist learning model which made very limited provision for diversity in the form of different levels of knowledge and experience. This was usually achieved by a form of "programmed learning" in which a pretest was administered and, depending on your results you went forward or were directed to "remediation" or back to an earlier module if you failed the test. The entire program followed this sequence of testing and branching back or forward. Some programs even had an "enhancement" option where you were fast-tracked if you did particularly well in a test. As far as different learning styles were concerned there were some programs which purported to incorporate, "learner control" in which the user could choose to "browse" through the program or follow a set route through the materials.

With the advent of interactive multimedia, the concept of learner control was developed even further with the user of the program being given greater choice in where to go and what to learn with a more constructivist learning model (Lebow, 1993) being employed. Although they were designed primarily for secondary students the programs "Investigating Lake Illuka" and "Exploring the Nardoo" (Hedberg and Harper, 1996) were excellent examples of this approach. These programs were certainly more able to cope with some dimensions of diversity better than the old CAL and CML material, however, they were not designed to address other dimensions of diversity such as cultural differences. This aspect of diversity is quite important as there is an expectation that educational designers can produce

online materials for Australian students and can then export them directly to Asia where they will be effortlessly accepted into their culture.

Within higher education, we are experiencing the next phase of the "information and communications revolution" which involves the design and delivery of interactive multimedia over the World Wide Web. At the same time, there is an increasing use of communications technologies such as email, bulleting boards, chat groups etc to enhance student/teacher and student/student interactions. Fortunately, we are also seeing some attempts by educational designers to break away from their "roots" in the form of behaviourist learning models and adopt more constructivist approaches to designing interactive multimedia materials for the web. A review of past ASCILITE and other conference proceedings reveals an increasing interest in the concept of constructivist learning environments (Lefoe, 1998; Walker and Lambert, 1996) and the underlying theoretical frameworks such as Social Constructivism (McMahon, 1997) and Situated Learning/Cognition (Standen and Herrington, 1997).

As an educational designer who cut his teeth on behaviourism and a systems approach to instructional design (Dick and Carey, 1985), I am now a strong supporter of online constructivist learning environments as the best model for higher education. It just so happens that I also believe that the use of this leaning model provides the answer to the question of, "How do we cope with increasing levels of diversity among students in higher education?"

Online constructivist learning environments

The major reason for using online constructivist learning environments as a means of coping with student diversity is that the issue of diversity no longer becomes a problem to be solved but an opportunity to be exploited. This is supported by the key "design goals of a constructivist learning environment" as espoused by the following writers:

- Provide experience in and appreciation of multiple perspectives. (Cunningham et al, 1993)
- Encourage testing ideas against alternative views and alternative contexts. (Savery and Duffy, 1995) and
- Many world views can be constructed: hence there will be multiple perspectives. (Duffy and Cunningham, 1996)

In order for these goals to be achieved, however, it is necessary to examine the design process in some detail to identify and discuss potential problem areas. For the purposes of this discussion I will be using Jonassen's (1998) model of an online constructivist learning environment which consists of the following components:

1. The Question/Case/Problem/Project/Issue.
2. Related Cases.
3. Information Resources
4. Cognitive (Knowledge–Construction) Tools.
5. Conversation and Collaboration Tools and
6. Social/Contextual Support

The question/case/problem/project/issue

In the tradition of problem-based learning, the question/case/problem/project/ issue drives the learning, rather than acting as an example of the concepts and principles previously taught. Students are motivated to learn domain content in order to solve the problem or answer the question, rather than solving the problem as an application of the learning. If we wish to truly exploit the diversity in our students then we need to choose a question, case, problem, project or issue which will draw out the multiple perspectives that we want our students to bring to any discussion of the issues. This approach can also create problems which need to be addressed in order to bring some form of closure to the question/case/problem etc and avoid a situation of "paralysis by analysis". On the one hand we are trying to create and promote differences of opinion but at the same time we are also trying to encourage, "communities of learners to negotiate and co-construct meaning for the problem" (Jonassen, 1998).

Problem context

When we are dealing with students from a variety of cultures e.g. containing both Australian and overseas students we are faced with another dilemma. How do we frame a series of questions/cases/problems etc which are consistent with the different cultures? After all, our theoretical framework of social constructivism and situated cognition (Brown, Collins and Duguid, 1989) views learning as a process of enculturation into a community of practice. In order for students to gain ownership of the problem the problem has to be seen as being set in an "authentic context". I believe this creates a real dilemma and I do not have any solutions only suggestions. One approach could be to develop a bank of questions/cases/ problems etc. which address the same concepts/issues but are based in different cultural contexts depending on the students. The students could then be grouped by cultural background and consider the relevant question/case/problem. The multiple perspectives would then emerge when the group presented their findings/solutions/ recommendations to other groups of different cultural backgrounds.

Related cases

Another approach would be to ensure that the "Related Cases" which make up the learning environment are based in a variety of cultural contexts to match the backgrounds of the student body. Each of the solutions/findings of these cases would reflect the particular cultural perspective in which it is set. In this situation students would be allocated to groups to ensure a mix of different cultural backgrounds and they would be presented with questions/cases/problems from a variety of contexts. The multiple perspectives would then arise both within the group and in the group findings/solutions. The purpose of related cases is twofold. First they are designed to "scaffold student memory" by providing a, "rich set of related cases that will help learners solve the current one." Second they help to "enhance cognitive flexibility" by,"providing multiple perspectives, themes, or interpretations on the problems or issues being examined by the learners" (Jonassen, 1998).

Cognitive flexibility theory

Another theoretical framework which supports the concept of multiple perspectives is cognitive flexibility theory (Jonassen, 1993; Spiro et al, 1987). It advocates, "multiple representations of content in order to convey complexity that is inherent in

the knowledge domain" (Jonassen, 1998). This theory strongly supports the view that diversity among students is a positive. It encourages the use of related cases that, "provide a variety of viewpoints and perspectives on the case or project being solved. For instance, if resolving ethical dilemmas, provide divergent personal interpretations of the dilemma as well as interpretations of similar ethical conundrums, in order to convey thematic perspectives." The outcome for the student is to construct their own interpretations by contrasting the different, but related cases.

Information resources

Within this component of the learning environment, Jonassen (1998) recommends that the designer, "should determine what kinds of information the learner will need in order to understand the problem." and, "Other relevant information banks and repositories should be linked to the environment. These may include text documents, graphics, sound resources, video, and animations that are appropriate for helping learners comprehend the problem and its principles." He sees the primary storage medium for this information as the World Wide Web but warns against simply providing links to other sites without evaluating the information for its relevance and, "organising it for ready access in ways that support the kind of thinking that you want the learners to do." The reason given for this is that, "learners do not possess sophisticated literacy skills for evaluating the quality of, and filtering, the information provided."

I do not entirely agree with Jonassen on this issue as we need to be encouraging students to become more "information literate" so they can find, evaluate and retrieve their own information resources rather than depending on those which we provide and filter for them. This creates another dilemma for we need to be aware that we run the risk of imposing our own cultural perspective on information resources through the selection and filtering process. We should really be encouraging students to find and introduce information resources that support their own cultural perspectives. Perhaps a suitable compromise would be for the environment to provide some "core" information resources selected by the designer and/or the subject matter expert while students are required to use the search capabilities of the Web with links to their own library resources to find, evaluate, and justify their own resources. If students do not have the necessary literacy skills then additional training needs to be provided to help them acquire them.

Cognitive tools

Cognitive tools within online learning environments are described as, "generalizable computer tools that are intended to engage and facilitate specific kinds of cognitive processing" (Kommers, Jonassen and Mayes, 1992). Jonassen (1998) categorises these tools as follows:

- Problem/Task Representation Tools such as graphical user interfaces (GUIs) which represent files and applications to be manipulated.
- Static and Dynamic Knowledge Modeling Tools such as databases, spreadsheets, semantic networks, expert systems and hypermedia construction.
- Performance Support Tools such as calculators or database shells which may be embedded to help learners organise information they collect.

- Information Gathering Tools such as the search engines on the WWW.

The potential impact of student diversity on the selection and use of cognitive tools would require further investigation and would probably depend on the particular tool chosen. My initial reaction would be that most cognitive tools are fairly culturally neutral, much like the language of mathematics, and should not create too much of a problem within a culturally diverse group. It is more likely that all of the students would be equally uncomfortable with the use of these cognitive tools and would require some additional training in how to use them.

Conversation and collaboration tools

In an online environment, these tools would include email, bulletin boards, computer conferencing and chat groups etc. Within a diverse group, the use of these tools can sometimes be more effective than face to face communications because some of the barriers to communication are removed. These barriers include making judgements about a person because of their gender, race or appearance which colour the way their opinions are received and judged by their peers. For students from a non English speaking background (NESB) it is sometimes easier for them to participate in an online discussion because they can read and write English easier than they can speak and understand different accents. In an online discussion it is also easier for a facilitator/moderator to make sure that certain individuals do not dominate, while at the same time assisting the more reticent to be given "equal time". This capability would be particularly useful in ensuring that overseas students, who are often withdrawn during face to face discussions, are encouraged to participate in discussion on an equal footing.

Social/contextual support

This aspect of online learning environments relates to the social/contextual support received within the organisation in which it is to be implemented rather than a physical component of the learning environment itself. Jonassen (1998) believes that this support, "is important to successful implementation. It is also necessary to train the teachers and personnel who will be supporting the learning and to train the students who will be learning from the online environments." If such a learning environment is to be designed for a culturally diverse group then the training would need to include some of the skills referred to earlier as part of programs in US colleges and universities. They include: – listening, empathy, fairness, dialogue, intercultural communication, conflict resolution, and collaborative problem solving.

In addition to these skills, some teachers and students will need to undergo a dramatic attitude adjustment so they can cope with an environment in which there is no right answer to be memorised and regurgitated during exams. Students will be required to engage in critical thinking, conflict resolution, negotiation of meaning and justification of their findings to their teachers and their peers. This may be particularly difficult for students from some Asian cultures where they are used to being given the right answer by their teacher and of not challenging the wisdom of their teachers. It may also be necessary to change the thinking of some Australian

students who have recently completed high school where a “transmission” learning model has been employed.

Practical examples

Despite the increasing levels of interest in, and support for, online constructivist learning environments in Australia and overseas, I am not aware of many practical examples which are designed specifically for diversity among the students. I have found at least two examples, however, which contain many of the components identified by Jonassen (1998). One of these is designed to support a number of management subjects at Deakin University (Drennan et al, 1997) and the other is described as, “a course of study in forensic science” for Years 9 and 10 students at the Kilvington Baptist Girls Grammar School in Victoria (Akyalcin, 1997). Both of these examples create online constructivist learning environments incorporating some features which cater for cultural diversity. In order to illustrate how the principles described above could be applied to the design of an online environment in higher education, I shall use the Deakin University example, “Southern Brakes and Plastics” to identify what features need to be enhanced to better address issues of diversity.

Southern brakes and plastics

The Deakin University example (Drennan et al, 1997) is set in a company known as “Southern Brakes and Plastics”. The students are presented with a range of cases and are asked to answer a number of questions about these cases. The cases, and related questions, appear to be designed to support a number of different subjects and courses. In order to be able to discuss and answer these questions the students can visit different parts of the site to obtain information and engage in conversation and collaboration via a bulletin board/Chat group. The site uses an office building as a design metaphor in which the student enters through a “foyer” (See Figure 1.

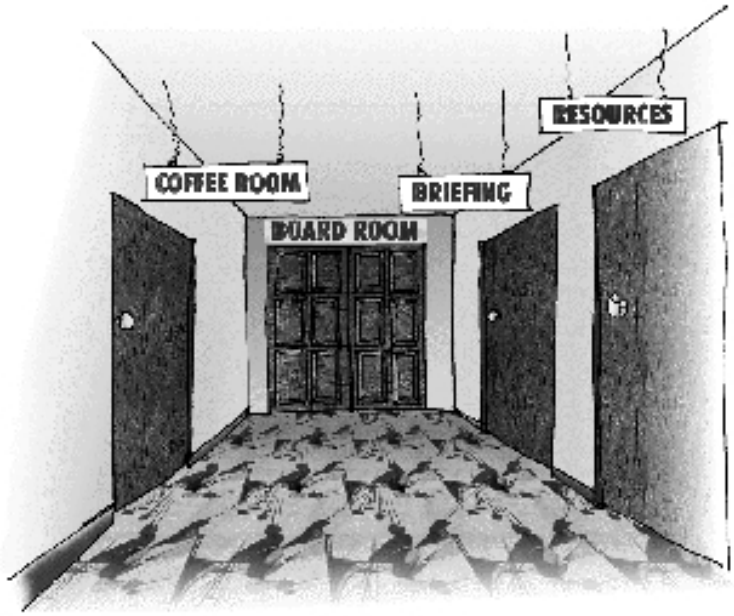

Figure 1: The Foyer

The student can then choose to visit four separate rooms which serve the following functions:

- The Briefing Room (Figure 2) which contains details of the tasks to be completed and information on how to navigate the site and set up links for handling Word and Excel files. There are also hints on getting help, working with others, staff contacts and taking notes.

Figure 2: Briefing Room

- The Board Room (Figure 3) consists of a graphic showing nine board members sitting around a table in a conference room. This graphic has a number of hot spots which link to information about the individual members, the meeting agenda and minutes, financial statements (in Excel format) and a "CEOs Options Paper".

Figure 3: Board Room

- The Resource Room (Figure 4) is another graphic of an office with a computer on the desk and a filing cabinet which provides access to additional information which students need to complete the tasks.

Figure 4: Resource Room

- The Coffee Room (Figure 5) allows students to read the company notice board for more information while another graphic links to a bulletin board/chat group which allows students to discuss issues with each other and the teaching staff.

Figure 5: Coffee Room

In its current configuration, this site already contains most of the elements recommended above. The description of the company refers to branch offices in other countries such as Malaysia and China and one of the board members was born in Malaysia. With a minimum of effort the cultural diversity of the board members could be increased and the cases and tasks to be considered by the students could be set in other countries. These case studies could be specifically designed to encourage multiple perspectives from the students, especially from those students from different cultural backgrounds. It may even be possible to develop a pool of "board members" and case studies which can be inserted, when required to match the cultural backgrounds of the students. More advanced students could even be given a project to produce new scenarios for board members and cases which reflect their cultural diversity.

Conclusion

The central proposition of this paper is that online constructivist learning environments are an ideal learning model for coping with increasing diversity among students in higher education. This is irrespective of whether the causes of this diversity arise from the increasing numbers of mature age students, or students from different ethnic backgrounds. The major advantage of this learning model is that one of its key design goals is to encourage students to bring multiple perspectives to questions/cases/problems/issues and projects as part of their learning. This approach to learning views diversity as a strength to be exploited rather than a problem to be solved. The purpose of this paper is to put forward an idea which sounds good in theory but needs to be tested in practice. The challenge which lays ahead is to put the theory into practice and start designing and implementing online constructivist learning environments which take account of the issues addressed in this paper.

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