



Innovative teaching and learning: Engaging students in web-based constructivist learning in a Malaysian classroom

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This paper focusses on web-based applications created within a Constructivist learning experience using a web-based project given to undergraduate multimedia design students enrolled in a web-based course. Students were required to reconstruct any existing website of their choice in the Internet which they thought were flawed in design and use web-based multimedia authoring tools, Macromedia Dreamweaver and Flash, to accomplish the project. The course was structured in the Constructivist learning mode whereby the students constructed their own knowledge of the project and determined their own learning outcomes, worked in a collaborative and cooperative manner, thus taking an active part in their own learning process, while the lecturer acted as 'a guide on the side' to support their learning and project development.

Keywords Teaching & Learning; Web-based education; onstructivist learning; web authoring

1. Introduction

In recent years, many institutions of higher learning including those in Malaysia are rapidly moving towards integrating the Information and Communication Technology (ICT), particularly multimedia technology, into the classroom [1], [2]. With this emerging trend, it is now feasible and affordable to integrate multimedia technology into the teaching and learning process. This permeation of multimedia technologies into the educational field is currently transforming the scenario in our educational institutions, particularly in higher education, resulting in a change in the teaching and learning environment.

The Internet, in particular, has become a special focus in this area. The Internet is now a popular educational and informational medium for this Net generation. [3], [4], [5]. Its adoption has changed considerably the landscape in the educational field. The Web has increasingly become a powerful educational medium for communication and delivery of instructional materials. [6] states that, "as an information and retrieval system, it [the Web] is a very well-designed medium." The Web represents a new way of presenting information and its support for various media elements such as text, graphics, sound, animation and even, in a limited extent, digital video, is exciting and challenging to the user.

[7] add to this with their suggestions that the Web be used to support traditional on-site learning and that the creation of a Web site is a necessary skill for creating knowledge workers for the 21st century. As stated by [8], "*modern education theory is moving beyond the recall of facts, principles, or correct procedures and into the areas of creativity, problem-solving, analysis, or evaluation (the very skills needed in the workplace in a knowledge-based economy, not to mention in life in general). Learners need the opportunity to communicate with one another as well as with their teachers. This of course includes the opportunity to question, challenge and discuss issues. Learning is as much a social as an individual activity*". This shift in focus has enabled educators to widen their scope and flexibility in delivering educational content to the learners who will experience innovative ways of learning. In this context, learning is moving away from the traditional behaviourist perspective where students are passive rote-learners to the modern constructivist-based paradigm, where students are active learners involving in their own learning process.

2. The constructivist learning perspective

The constructivist learning perspective can be described as a learning process in which students are actively engaged in seeking knowledge and information in their learning process either individually or in small groups. The learning model is based on the concept that knowledge is constructed by an individual based on his prior experience rather than processed from information received from an external source. In this process, the student assumes the role of the producer rather than the consumer of information. The teacher becomes the guide and facilitator of learning and a member of a learning community rather than the director of instruction. The students are given significant freedom to set their own learning goals and in how to attain these goals themselves.

The constructivist learning mode emphasizes active learning rather than teaching. Hence, the teacher is no longer perceived as the sole authority of learning, but, rather, as the person to facilitate learning, guiding and supporting learners' own construction of knowledge [9]. No more "sage on the stage, but a guide on the side", so to speak. In this learning mode, the focus is on the learning process rather than on the content i.e. learning 'how to learn' rather than 'how much is learned' [10]. Constructivist learning emphasized learning as a social and collaborative endeavour as well as problem-solving of realistic and authentic tasks. The learning approach supports learner ownership of learning and activities. This research seeks to incorporate such a constructivist learning approach in the classroom via the web project, to explore students' attitude towards a more active learning environment, which takes place in a meaningful, authentic context and is a social, collaborative activity, where peers play an important role in encouraging learning and in developing critical thinking skills, problem-solving and team skills.

3. The web-based constructivist learning environment

In this research, undergraduate multimedia design students enrolled in web-based class were given a web-based project to develop over a period of 14 weeks. The core problem that students needed to address was to re-design a badly designed web-site on the Internet. Since most web-sites are becoming more multimedia-oriented, students had to incorporate more than text and graphics into their web-sites to enhance them. This project thus required interdisciplinary skills involving multimedia technology and Internet design knowledge.

The students were given the autonomy to choose their own group members, and were divided into groups of 5. Collaboration was integral in this project as these teams had to work with one another to complete this task. As a team, students had to decide on the concept of the presentation, the design of the presentation interface and navigation, and the appropriate digital multimedia elements and interactive features to use to best convey their topic of interest. Students could use a suite of multimedia tools, particularly Macromedia Dreamweaver and Flash to design and reconstruct a website of their own choice. To do so, they had to use their prior knowledge that was taught to them about multimedia and Internet technology, design principles as well as the authoring techniques that were shown to them during their tutorials and in their other classes. There were no restrictions to what they can do as long as they used Dreamweaver and Flash to enhance the overall message of the chosen web-site. Other supporting software such as Adobe PhotoShop, Adobe Premiere, Sonic Foundry's Sound Forge and other editing software were also permitted. For this, students were encouraged to get ideas and solutions by looking at other web-sites. Then the group had to delegate the different areas of the project to each member according to what they saw as component tasks and to implement their suggestions. To complete the project, they had to use the prior knowledge that was taught to them about multimedia and Internet technology, design principles as well as the authoring techniques that were shown to them during their tutorials. The students were given 14 weeks to complete their task.

1 In terms of facilitation, the lecturer conducted consultations during the course of the project. Students
2 could communicate with the lecturer via face-to-face appointments or via the Internet to chat. Most of
3 the students decided to use the Internet to communicate with the lecturer and to ask for help and
4 guidance. The Internet tool that was used to provide this type of communication was the Yahoo!
5 Messenger chat service. It provided convenience for the students as the lecturer could provide answers
6 and guidance over the Net very easily at anytime. When the project was completed, each group was to
7 have a working prototype of their newly improved and enhanced web-site. At the end of the project, these
8 student groups were required to give an in-class presentation of their work and solicit feedback and
9 comments from the class. The rationale for this was to allow students to authenticate their performances
10 and reflect on their understanding of the project. Once the presentation was completed, each group had
11 to turn in their work either on CD or Zip disks to the lecturer.
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14 4. Students' project outcomes

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16 The following is an example of one group of student's work. This group had chosen to re-design an
17 clothing site called Pronto (([http:// www.pronto.com.co](http://www.pronto.com.co))). Figure 1 shows the screenshot of the original
18 website and Figure 2 shows the improved website.
19



33
34 **Fig. 1** The original homepage of the website



51
52 **Fig. 2** The modified homepage of the website

As can be seen from the new modified homepage, the group made significant changes to the website's layout, colour, navigation, and composition. The project outcomes were assessed on the students' ability to identify the shortcomings of the web-site, their ability to work collaboratively as a group, organise the reconstruction of the web-site, and properly delegate work to each member in the team, creativity with web-authoring tools and use of effective design principles, user-friendliness of the graphical user interface, and students' ability to make an effective presentation of their work.

5. Student survey

The students were also given a survey to assess their attitudes and perceptions toward doing this project. The survey was measured on a 5-point Likert scale ranging from 1=Strongly Disagree to 5=Strongly Agree. A sample of 102 students (N=102) participated in the survey and the results are shown in Table 1. The means represent the overall means for the survey items, and the percentage responses represent the percentage of students who responded favourably in the survey.

Table 1 The overall means and percentage of favourable responses from the student survey.

Survey Item.	Mean (m)	% (p)
1. Enjoyed project	3.71	66.7
2. Critical thinking	3.77	75.5
3. Enhanced understanding	3.77	75.5
4. Challenging	3.79	73.3
5. Creative thinking	3.89	82.4
6. Team role	3.91	83.2

As can be seen in Table 1, over 65% of the students had a positive and favourable perception to doing the project. Teamwork was the highest ranking item in the survey, with 83.2% of students reporting an increase in their teamwork experience (m=3.91). The second highest survey item was creative thinking (m=3.89), with 82.4% of students reporting that they were able to be creative in their thinking when doing this project. In support of the requirements in creating a constructivist-based learning environment, the students reported that they found the project challenging yet they enjoyed doing it (m=3.79, p = 73.3 and m=3.71, p=66.7, respectively). The project also allowed students to exercise their critical thinking skills, with 75.5% students reporting favourably (m=3.77). And finally, 75.5% of students reported that doing the project enhanced their understanding of project development and of their subject matter (m=3.77). These results were very encouraging to further developments in creating other web-based constructivist learning environments.

6. Discussion

From these results, we observed the following:

1. Students found teamwork to be a very integral component to the success of their project. Having to work together in team allowed them to create a community of consensus and compromise, and enabled them to take advantage of each other's strengths.
2. The authenticity of the project allowed students to make relevant connections to the expectations of project development and management in the real-world, gave them real-life experiences and increased their understanding of their coursework.
3. Students were also able to solve problems, evidenced by the completion of their project, as well as in their group. One of the main problems was scheduling meetings, and students solved this problem of face-to-face meetings by conducting meetings over the Web using Yahoo! Messenger, and instant messaging and chat programme.

- 1 4. By dividing them into groups, they learned to work together as a team and to learn from one another. Through this collaborative learning, they helped motivate one another and worked as
2 team players to share ideas through inquiry and dialogue to improve their thinking and social
3 skills.
4
- 5 5. The dynamics of the class changed. The roles of the teacher, student and technology changed to
6 accommodate this innovative learning environment. The teacher was no longer an expert in the
7 class, and the sole authority of the knowledge. Instead, the teacher became a consultant, a
8 guide, a technical advisor and a facilitator. The students became autonomous decision-makers
9 and constructed their own learning goals and learning paths. Active learning took place and
10 students were very much responsible for their learning process. Technology became an enabler,
11 and allowed students to become creative developers. Web-authoring tools provided them the
12 resources to implement their creative ideas and present them in unique way.
13

14 7. Conclusion

15 As a whole, the results obtained from this project were positive and encouraging. Students exhibited
16 many constructivist learning attributes upon completion of the project and course, where they
17 demonstrated analytical and critical thinking skills, problem-solving and creative-thinking skills, were
18 more apt to seek information, and were more motivated in their learning processes. These results lend
19 further encouragement to the development of innovative teaching and learning strategies via
20 constructivist-based learning environments for educators to enhance their classroom and to effective
21 impact the student learning process using ICT.
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