Student-centered learning with technology

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Abstract

This paper reports the research related to student-centered learning with technology which enables students to take ownership of their learning through project-based, problem-based and challenge-based learning approaches which will make learning more active, inside and outside the classroom. Student-centered learning entrusts students to engage actively as doers in an education environment. By engaging, students are empowered to decide when, where, and how learning will take place. This scholastic context will engage students in collaboration, critical thinking, problem-solving, and self-directed learning which is connected to real-life applications. The purpose of this study is to research how technology facilitates student-centered learning.

Keywords: Student-centered learning, student empowerment, project-based, problem-based, challenged-based

Introduction

The traditional, teaching and learning process that is directed by an instructor or teacher is now replaced by student-centered learning (SCL) (Hairullia, & Noraidah 2013). In this modern era, technology has made an extraordinary influence on teaching and learning. In an SCL environment, the student plays a more active role in obtaining knowledge by retrieving essential materials and resources for the learning process. This shows a significant turn over from teaching to a learning environment. In SCL the instructor plays a role as a learning facilitator instead of a learning organizer and gives close attention to each student's interests, abilities and learning preferences. The students actively engage as doers in the education environment and are empowered to decide on what, when, where and how to learn. The object of this paper is to identify how SCL plays within the tool of technology, student empowerment by engaging in critical thinking, problem-solving, collaboration, and self-directed learning through technology. The three research questions raised in the study are the following:

1. Will technology play a major role in a student-centered learning environment?
2. How will the project-base and problem-based effect in a student-centered learning technology environment?
3. How will students be challenged in a student-centered learning technology environment?

Review of the Literature

Student-Centered learning with technology

In a student-centered learning environment, (Hairullia & Noraidah, 2013) the student or the individual takes the responsibility for deciding their own learning goals, examining progress towards meeting those goals by either adjusting or adapting as necessary and determines that these goals have been addressed satisfactorily. For effective student-centered learning and personal productivity enhancement, information technologies promote student learning and higher-order thinking. By these learners can use a selection of technologies to explore ideas, ask questions, gather and distribute information and support each other in learning. This promotes adaptability and fosters individual growth and development of the learner.

Accessing information for SCL with technology

Instructional technology today is extremely active and forever evolves to strengthen education learning to impact the students and educators. (Hirumi, 2002) To promote SCL within the technological environment, educators actively seek information from a variety of sources (e.g. online databases, the Internet, colleagues, journals) to encourage and improves personalize the student learning process. The careful integration of technology into the classroom provides educational resources that transform learning, by inspiring creativity, collaboration, and critical thinking. Educators also use technology for their professional growth, enhance their productivity and facilitate communication.

Problem-based and Problem-based learning

In this learning approach the students identify what and how to learn in order to solve a problem and work collaboratively in groups (Utecht, 2003). They learn in a self-directed manner, formulate and test a probable solution by reflecting what they have learned and the effectiveness of their solution. Students sometimes spend extensive time working on computers, conducting researching and examining and evaluating with one another. Technology allows the advancement of SCL to gain access to an almost unlimited amounts of data and information. They can be active learners by gaining access to the internet and research software. Technology is taught as a support tool or creation of the student project and helps the problem-based lesson as the computer becomes a powerful tool in solving realistic problems.

In project-based learning, students are involved and engaged in a challenging, complex project, which is similar to what they might encounter in the real world (Gubacs, 2004). With the integration of technology, the appropriate tasks a student takes part in will be beyond the simple "drill and practice" but into complex thinking around the academic context. on a project-based learning environment, student has the flexibility to direct their individual progress often collaborative inquiry process structured around complex, authentic questions and carefully design projects and tasks (Moeller & Reitzes,2011). Technology serves an important role in project-based learning by enabling to access information, collaborating with others and sharing and presenting the outcomes of the project.

Challenges between SCL and technology

Challenged-based learning promotes on a longstanding stream of solid educational thinking. With billions of technology resources were available for a variety of needs, SCL can sometimes be challenging for learners to identify which tools and resources are available for their learning and whether it will be appropriate for the learning goals (Hannafin, Hannafin, & Gabbitas, 2009).

Significance of the study

The finding of this study will significantly contribute to the society where technology plays a greater role in student-centered learning. The student-centered learning approach is constructivist in nature where learners construct knowledge for themselves, this enables the students to visualize a problem with multiple angles which guides them in their own learning process (Saxena, 2013). Students are challenged to develop skills through problem-solving, creative thinking, as well as being creative. This allows students to learn and excel in a variety of subjects. This also paves the way for the teachers to adapt and create a curriculum that promotions the pedagogical benefits of technology has towards assisting students to meet the desired learning outcomes. The students to take possession of their ideas which encourages creativity, originality, and responsibility from their learning experience and find what they are passionate about (Graaf, 2017).

Hypothesis

1. Will technology play a major role in a student-centered learning environment?
2. How will project-based and problem-based learning effect in a student-centered technology learning environment?
3. How will students be challenged in a student-centered learning technology environment?

Method

- **Quantitative**

  Procedures: In order to answer the proposed research questions a mixed method of research design data is used that can explore and enhance the quantitative and qualitative method. This will explore student engagement with the facilitation of technology in a student-centered learning environment where students take ownership of their learning

through either project-based and problem-based, learning approaches which will make learning more active, inside and outside the classroom. The study investigates the teacher-centered (TC) verses student-centered (SC) technology-enhanced learning classrooms.

Principle: This study attempts to explore the interactive perspective effects of ninth graders' cognitive, emotional, and behavioral engagement in teacher-centered (TC) and student-centered (SC) exploration. The student engagement in technology enhance classroom with the involvement of learning activities that could understand and predict students' learning performance. In addition, the computer simulations to learn concepts about force and motion and the conceptual understanding and student's achievement level.

Type of Design: The teacher initially used mini-lectures and class discussions to present key ideas about force and motion. At the computer laboratory, students used computers to manipulate simulations and worked in pairs to complete the learning tasks. While learning the tasks each student pair could have different learning progress and take different approaches. The teacher offered support and guidance when noticed for students having difficulty carrying on the task or when students ask for help. The learning activities were designed to encourage manipulation rather than simple acquisition of knowledge.

Independent Variables: Instructional approach and choice of opportunities

Dependent Variables: Students emotional engagement in technology-enhanced classroom

Factors Jeopardizing Internal Validity: Although intelligent computer tools are offered in partnership with the potential to extend the user's intellectual performance to what degree this has been used it will greatly depend on the user's choice on the decision making and be mindful of the engagement.

Sample: The participant's population pool was a classroom of 54 students from two science classes in Taiwan participated in the study (Varelas, 2007). The study was based on random sample elements, the student-centered class involved 25 students, 11 males,

and 14 females and Teacher centered class were with 29 students with 15 females and 14 males.

Data Collection: Students' engagement was recorded by multiple sources of data that was collected during the 3-week instructional unit through classroom observation, informal interview and through focus groups for qualitative findings and carried out experiments and tests to quantitative findings (Varelas, 2007). The instruction unit was designed to engage students in constructing understanding about motion and force. Nine units of the 45-minute class period and 11 learning activities were used. In the student-centered class used questions to formulated hypotheses through group work or class discussion and manipulated simulations by themselves. Computer activity recordings were captured on a computer screen and conversations of focus student pairs. Screen capturing tools, Camtasia studio in students' computers to record their learning processes. The recording was saved as video files that allowed detailed analysis of students' conversations and the use of computer simulations. In the end, a self-report questionnaire was used to measure the emotional engagement to check students' emotions, anxiety, and interest to technology-based learning activities

Data Analysis Procedures: The achievement test and questionnaire were analyzed by SPSS. Other analyses contained emotional engagement, have used paired *t*- tests to determine whether there is a difference between the means of the two classes, the two instructional approaches and achievement levels. The analysis was done on the qualitative data which includes classroom video recording, field noted, computer activity recordings. The video recording where transcribed to text format and class period to episodes. The transcripts were imported to the database and organized by NVivo analysis software.

The results will be organized by achievement tests to inquire into the quantitative inquiry of research which will highlight the pretest/posttest of achievements (Varelas, 2007).

TABLE 4
Descriptive Statistics of Students' Scores on the Achievement Tests

	Pretest (A)		Posttest (B)		Delayed Posttest (C)					
	TC Mean (*SD*)	SC Mean (*SD*)	TC Mean (*SD*)	SC Mean (*SD*)	TC Mean (*SD*)	SC Mean (*SD*)	Gain 1 (B−A)		Gain 2 (C−A)	
							TC	SC	TC	SC
Achievement (Total)	60.8 (11.9)	58.5 (12.5)	80.3 (11.3)	77.4 (17.2)	77.1 (11.2)	74.5 (16.9)	19.5	18.9	16.3	16.0
High achiever	64.5 (6.4)	67.3 (9.0)	86.6 (9.3)	87.6 (8.0)	83.5 (7.8)	82.6 (16.3)	22.1	20.3	19.0	15.3
Medium achiever	64.9 (11.3)	51.5 (12.1)	79.1 (8.2)a	75.6 (7.5)	77.3 (6.7)	71.3 (12.8)	14.2	24.1	12.4	19.8
Low achiever	48.5 (3.6)	48.8 (4.8)	71.0 (10.1)	60.4 (10.1)	65.8 (9.2)	55.8 (11.6)	22.5	11.6	17.3	7.0

Although the mean shows less in student-centered learning than the teacher-centered calculations above. This could be due to the lesser no of students participated in the Student-centered than Teacher-centered environment when statistics were examined. As there seems to be not much of a difference between the two standard deviation calculations.

- **Qualitative**

Strategy of inquiry: On the project-based, the study attempts to identify the understanding of a nontraditional innovative teaching methodology in SCL in the technology environment. The students will be researched on project-based and problem-based, in student-centered learning through technology. The main focus will be on student engagement (Gubacs, 2004), Engagement signifies that students meaningfully partake in learning activities within a nurturing and supportive environment that is student-centered and involves cooperation and active learning which has an end product that can be achieved through student mastery of specific knowledge and skills, research about the project, create a plan to manage achievement, resolve problems and achieve outcomes.

While exploring the problem-based it is a specific problem for students to solve in a relatively unstructured environment. The defined problem will involve many different courses of action and a driving force behind learning. The challenge inquiry research challenges the students letting them choose their own path to an understanding allowing them to come up with both questions and answers as they direct the course of their own learning.

Research Settings: Class instructions involved 70% of lectures, recitation, and guided discussions (Varelas, 2007). In a teacher-centered class, the students did not have the opportunity to use computers instead of the teacher used a projector linked to the laptop

to demonstrate and simulation the guided students to complete a series of learning activities. Although the teacher was an authority the focus of attention. Students actively participated in the teacher-guided discussion, volunteered and gave ideas to questions and questioned about the content.

On the project-based study, the research was introduced to two game modules known as skills and activity courses which combine three games module into one module and the students had to do one project. Students are able to research the area of challenge, events taking place around the world and strengthening the connection between what they learn in school and outside, they work as teams of co-learners to further increase their interest in gaining valuable experience in team dynamics and collaboration work teachers as coaches to the student-centered communities of practice, addressing individual concerns and stepping to help then the problem seems large to handle. Access to technology as challenged-based learning overcomes the constraints to problem-based learning.

Participants: The project-based sample lacked information indicating how many students participated in the research, although a time of 15-20 minutes segment record time is indicated in the research paper (Gubacs, 2004). On the challenged-based research, six schools participated, fully 97% of the 321 students were involved and found the experience worthwhile. 29 teachers worked with the visionary team of seven from Apple Inc (Johnson, Smith, Smythe, Troy, Varon, 2009).

Data Generation/Collection: On the project-based research technology integration was based on three sources of author's observation note-takers written commentaries made during the course of the project and feedback of each student participation

Students' journal entries were collected for analysis, most students were interviewed about their project, four schools were captured by video. Each group was to create a video or a website and describe the results of the challenge. More than 1200 journal entries were collected (Johnson, Smith, Smythe, Troy, Varon, 2009).

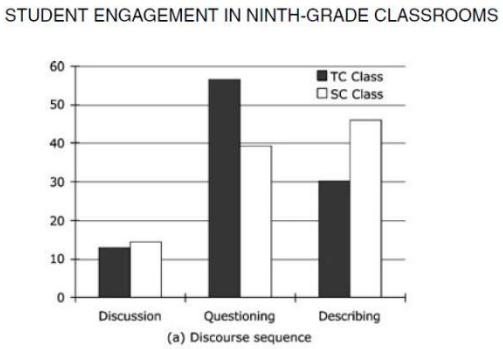
Data Analysis: The project-based analysis was based on the note-takers' journals and personal observations the author found that there were frequent discussions,

disagreements. The student's collaboration was involved for complete the project of movie editing and some students were challenged to help each other to finalize the project. Student's real experience provided insight help for teachers on how to use video projects in real-life.

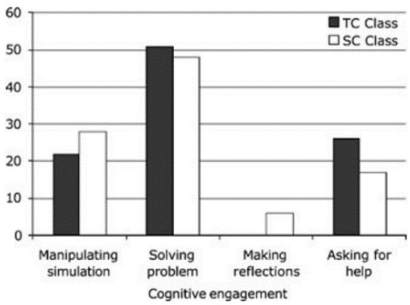
Students journal entries were collected for analysis, most students were interviewed about the project along with the pre and post data on the impressions of all participants

Study Report Type:

With this report it shows that there is a significant increase in how student-centered learning had an effect on student discussions and description and a lower figure on questioning as student-centered learners are doers and engage in their own learning by critical thinking and problem-solving, (Varelas, 2007).

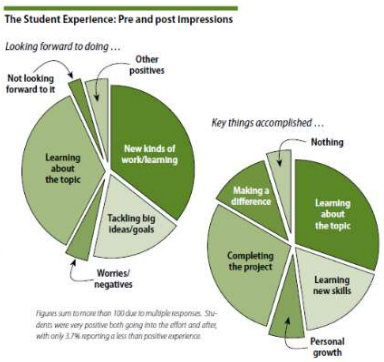


The below reports show the most engaging activity in the two classes. When compared the TC class asked more questions from the teacher than the SC class (Varelas, 2007). This is because in the TC class teacher was the main focus and, in the SC, ideas were shared and generated answers through group discussions.



The project-based did not identify any reports which have been generated and lacked valid documentation with regard to the research.

The challenged-based identified working in teams, collaborating with other students, working with their computers, learning on their own, thinking creatively teaching with their peers and working on a challenged-based project was stimulating (Johnson, Smith, Smythe, Troy, Varon, 2009)



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Rigor and Trustworthiness: The study engaged in a series of technology-enhanced learning activities to examine students' emotional engagement in technology-enhanced classrooms and statistical results strengthened by collecting data and using different methods from multiple sources (triangulation).

The research on project-based was identified as having many steps to determine the results although the document indicated that the total pages were missing which led to believe that proper identification of the research could not be generated. The study on challenge-based was conducted by 29 teachers and 7 professional staff of Apple. 17 disciplines were represented among the teachers (Johnson, Smith, Smythe, Troy, Varon, 2009). The teachers were trained by Apple. And test results on the student experience shows an increase from pre-project to the post-project.

Anticipated Results: The study will examine the student's emotional engagement in the technology-enhanced classroom. Different instructional methods provide students with different opportunities to engage in learning. Student-centered class with technology will extensively have higher emotional engagement, with a reflection about what they did and centered their discussions on the content of simulations. The instructional approach will shape students the learning experience and allow them to engage in different learning activities. Generating thoughtful discussions about the content learned they will be able to make reflections, hold a positive attitude towards learning and would raise concrete questions.

The project-based and problem-based research study provides a student-centered context for meaningful, mutual engagement in learning activities through participation. This mostly encourages the teacher to learn how to use technology in complex ways while mastering the subject matter and innovative, tactical teaching strategies. Challenge-based learning motivates students to present in class and do well, as the technology tools influence the students to gain experience in their education (Johnson, Smith, Smythe, Troy, Varon, 2009). And with much participation with enthusiasm, the results will show a 100% student satisfaction rate.

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