

ASOCSA2014-ICE5

Collaboration as a Strategy of Student-Centered Learning in Construction Technology

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ABSTRACT

Purpose: Student centered learning has been deemed to be a catalyst for students to generate knowledge in different disciplines in comparison to lecturer/teacher centered learning process. The main objective of this paper was to observe the collaboration of students towards learning construction technology 3 at the University of Johannesburg via group work.

Research methodology: Observation was undertaken as a means of gathering data in during construction technology group work/assignment presentation. A total of ten groups were formed from the class register. A common group work was posted to the students via their ulink, an online technology for lecturers to communicate academic information with students at the University of Johannesburg. The information consisted of students' instructions, the questions, date and venue for the presentation.

Findings: The students asked questions to the groups that had presented their group work. Furthermore, working in groups led to class involvement of the students.

Limitations: The use of observation in this study was a limitation.

Practical implication: This research study provides the basis of understanding that collaboration via group work would influence the students to be involved and understand their academic work.

Value: The findings indicate that students were involved in learning as they asked questions after the group discussions. However, the strategy is time consuming especially with large classes.

Keywords: Collaboration, construction technology, student centered-learning,

1. INTRODUCTION

Lectures originated as a necessary component of the oral tradition. Even when the printing press made it possible to collect information within bound volumes, these books were rare, precious, and expensive items well beyond the access of most students. When printing and copying techniques became more accessible and affordable in the 20th century, information rapidly became more accessible to students, yet was rarely sufficient without an instructor's guidance. The deployment of the internet in the late 20th century dramatically expanded both the amount and types of information readily accessible to both students and faculty. This effectively reduced the information divide between lecturers and students (Lom, 2012).

Even with this evolution of information access, instructors continue to be necessary components of the learning process by organizing, explaining, and contextualizing relevant information. Technology has increased lecturer's delivery options to make images, animations, and videos common in today's lectures (Craig and Amemic, 2006). At some institutions lectures are routinely recorded and then subsequently made available as podcasts and/or videos so that students have the opportunity to review the lecture (Owston et al., 2011; Vajoczki et al., 2011). Consequently, experiences that were traditionally ephemeral can now be recorded and stored in perpetuity. Not only has technology made information more available, it has also made people to be more available. Students in a lecture hall can interact with guests via videoconferencing, Skype, and other technologies. Inviting an expert to class, interviewing a scholar, or collaborating with students at another institution, greatly expands the walls of modern classrooms in exciting new ways (Lom, 2012).

For centuries, professors appropriately taught through traditional lectures because students could not practically obtain full access to content central to the course. Today information is rarely the limiting factor in a student's education. Thus, modern pedagogy is gradually shifting the professor's role from "*sage on the stage*" to "*guide on the side*" where helping students manage their information is critical to learning (King, 1993; Saulnier, 2009).

In addition to the evolution in information access and delivery, in recent years numerous studies have demonstrated that traditional lectures that rely

on passive learning are not as effective as active, student-centered learning strategies (Tanner, 2009).

2. STUDENT-CENTERED LEARNING vs TRADITIONAL APPROACH

Student-centered approaches are often defined by contrasting them with traditional instructional approaches characterized by greater teacher direction (Cuban, 1983). Key differences between the two approaches include goals, roles, motivational orientations, assessments, and student interactions, as discussed hereto:

The goal of student activity: In teacher-directed instruction, students work to meet the objectives set by the lecturer/teacher. In contrast, in student-centered learning, students work to provide a response to a central question. Since students must sort out for themselves what they need to do and know in order to develop this response, student-centered approaches are more likely to promote student ownership over their process and learning than do teacher-directed approaches (Pedersen and Liu, 2003).

The role of the lecturer/teacher: In teacher-directed instruction, the teacher sets learning objectives, and then plans a set of activities designed to help learners meet those objectives. In student-centered learning, the teacher presents the central question (issue, case, problem), and then works as a facilitator as students determine the nature of the response they will develop, and then formulate and carry out a process to develop that response. Teachers help students to work through the difficulties they encounter by questioning them and helping them to identify alternative paths or resources, but they do not resolve these difficulties for the students (Pedersen and Liu, 2003).

Students' motivational orientation: Teacher directed approaches often depend, at least in part, on extrinsic motivators, such as grades, degrees, or other rewards, to motivate students' efforts to learn. In student-centered approaches, teachers attempt to present a question that is interesting enough to motivate students to take ownership of the process of developing a response. As a result, students' actions are driven by the goals they have set for themselves rather than external rewards promised by a teacher or institution (Pedersen and Liu, 2003).

Assessment: In teacher directed instruction, teachers use assessments to determine grades, which in turn are used to motivate students and provide parents with information about their children's progress (Kohn, 1994). Assessment is often based on objective tests, which, Shepard (2000) pointed out, is consistent with a model of education based on a social efficiency curriculum and behaviourist theory, but which is at odds with the principles of constructivism that currently guide efforts to develop student-centered learning activities. Shepard instead recommended the use of open-ended assessment techniques that are designed to involve students in

examining their own learning, focusing their attention on their learning needs and changing understanding rather than on a grade.

Student Interaction: The success of the cooperative learning movement according to National Center for Educational Statistics, (1999) has resulted in an increase in the amount of interaction between students during teacher-directed instruction. This interaction, however, is frequently under teacher control, with teachers determining group membership, the nature of the interactions between the members, and even the role each member of the group plays. Lecturers/teachers intervene in the group process when there are difficulties, and hold the group accountable for individual learning.

Bruffee (1995) argued that the structure and vigilance teachers provide during cooperative learning tends to undermine students' control over their own process. Instead, student-centered approaches, which also assume a great deal of student interaction, are more in keeping with *collaborative* learning than *cooperative* learning. Collaborative learning emphasizes students' self-governance of their interactions, allowing them to make decisions about with whom they work, and how. As students negotiate their relationships with each other, they must articulate their ideas, and engage in a disciplined social process of inquiry; these activities are in keeping with constructivist principles and the goals of student-centered learning.

3. THE MAJOR CHALLENGES IN IMPLEMENTING STUDENT-CENTRED LEARNING APPROACHES

According to Na (2012) the learning and instructional models show some common challenges in implementation, namely;

- Traditional teaching and learning models can be robust, and it is difficult for the students and teachers to change their roles. The constructivist and student-centred learning models are even more difficult to implement in cultures where transmissive instructional models are pervasive.
- Although a variety of educational objectives are emphasized in the curriculum guidelines across cultures, the lack of guidance and ambiguity of the implementation strategies, and the inexperience of school and/or (college) staff and teachers might lead to superficial implementation.
- Many factors such as age-related constraints need to be addressed in implementing these learning approaches, and these need to be included in the articulation documents.
- Although emerging technologies provide opportunities for implementing various constructivist and student-centred learning models, they may not be effectively and appropriately used in the classroom due to the inexperience of curriculum designers and lecturers and teachers.

Furthermore, according to Keengwe, Onchwari and Onchwari, (2009) while active learner-centered pedagogy is desirable in current educational practices, issues such as time could affect its successful implementation in the classroom.

4. COLLABORATIVE STRATEGY TO STUDENT CENTERED-LEARNING

In curriculum reform collaborative teaching was a transformational method emphasizing teaching innovation. It overthrew the traditional belief of teachers being senior to students. Following the learning goals, with a variety of learning methods, better learning effectiveness can be achieved by giving students more opportunities to be guided. Moreover, with remedial teaching, students of different levels could be modulated. In student-teacher interactions, the ability to solve problems and make logical thinking would be developed. Therefore, it is believed that collaborative teaching has more positive influences on learning effectiveness than individual teaching does (Bullough, Young, Birrell, Cecil & Winston, 2003; Hoogveld, Paas & Jochems, 2003; Vidmar, 2005).

It is also believed that collaborative teaching can provide teachers more opportunities to get involved, overcoming teaching difficulties, stimulating the growth of professional knowledge and abilities and learning from each other. In addition, integrated teaching activities could bring up students' interest, so they could start further discussions on certain topics, to achieve learning goals and to help them create a more pluralistic space (Moran, 2007; Trent, Driver, Wood, Parrott & Martin, 2003; Huffman & Kalnin, 2003; Rathgen, 2006). The key factors of collaborative teaching's success are teachers' experiences, personalities, working styles and attitudes toward learning (Garcia-Morales, Lopez-Martin & Llamas-Sanchez, 2006; Perry & Stewart, 2005).

4.1 Difficulties and Suggestions

The difficulties of implementing collaborative teaching include: personnel organization, space and equipment, lack of specialized skills required in the related fields, collaborative teaching schedule arrangement, constant interruption at work site, time pressure, extra burdens and lack of support from school administration. These problems are waiting to be solved (Chen, 2005; Guo, 2006). Secondly, it takes time to coordinate conflicts and problems among teachers, so that teachers with different cultural backgrounds can be blended to come up with a more pluralistic teaching method (Carless, 2006; Darling-Hammond & Snyder, 2000; Pugh & Zhao, 2003).

Suggestions for the implementation of collaborative teaching include: Schools should encourage teachers to adopt collaborative teaching in a

single subject to build a collaborative environment. A group of 3-6 teachers must leave behind individualism to create a culture of collaboration among teachers and stimulate each other's professional growth (Jang, 2002; Lai, 2004; Su, 2003). Through collaborative teaching, both teachers and students could learn the importance of cooperation and teachers can demonstrate their professional specialties. Of course, any insufficiency could also be patched by other teachers. Thus the relationship among teachers would be improved. Therefore, it is suggested to look for more and better ways of applying collaborative teaching patterns to meet the needs of different types of students (Moran, 2007; Rathgen, 2006; Vidmar, 2005). This strategy of active learning was introduced for Construction Technology 3 students at the University of Johannesburg.

4.2 Construction Technology

Construction Technology is one of the three major subjects for under graduates pursuing National Diploma in Building at the University of Johannesburg. The subject is very practical and requires the students to visualise drawings in 3 dimensions and understand how different parts of a building are assembled. This has been a challenge to students pursuing this qualification at the tertiary institution. The group discussion topic assigned to the students was suspended ceiling and drywall partitions. The questions formulated were:

- Describe the components that are required in assembling a suspended ceiling and draw a suspended ceiling with a grid layout of 600mm x 600mm in a room which is 3600mm x 1800mm
- Describe with the aid of drawings three types of bulkheads
- Describe the different types of access floor panels
- With the aid of drawing describe access floor understructures
- With the aid of drawings describe drywall partition systems

Based on the above discussions, so far there has been little research on collaboration strategy via group work as a catalyst to assist students in learning construction technology at the university. In order to achieve the stated problem the specific research objectives delved into were:

- To observe the students active involvement in learning construction technology 3 using collaboration strategy of group work; and
- Determine the challenges in using collaboration strategy of group work in student centered learning.

4. RESEARCH METHODOLOGY

A qualitative approach based on case study was used for this study. The case study was 3rd years National Diploma Building students registered construction technology subject. Observation was used to collect data. This

approach was deemed appropriate as the researcher (lecturer) was part of the research process. Ten groups were formed from a class register of 90 registered students. This process was met with challenges from students as they were used to their friends and found it difficult to accept this method of group formulation.

The breakdown of the assignment was discussed in class prior to sending it to the students via the ulink process. Ulink is an online technology for communicating academic information between the lecturer and the students registered for a particular subject at the University of Johannesburg. This online technology allows lecturers to post study materials, assignments, notices etc. to the students.

5. RESULTS AND DISCUSSIONS

5.1 Descriptive statistics on demographic information

All the 90 students who took part in the group discussions attended the class presentations. They were inclusive of all races i.e. Africans, whites and Indians. The male and female students were equally divided.

5.2 Findings of group work presentation

The group work was presented in class. The lecturer acted as a facilitator and observer, not a "sage on the stage". It can be indicated that the students were involved in the learning process as they asked questions and gave comments to add to the discussion once the second group had finished their presentation. One student commented that "there is another method used to assemble suspended ceiling which they found in their group" this was an additional method from the two that were presented by the first group.

In line with the students' involvement in each group, the group members indicated those who were actively involved in preparing the work as this was reflected in their attendance list per group during their preparation. This attendance register per group could assist the lecturer to know the members who were actively involved and those who were not, hence the group members could award marks for each individual member. It is quite interesting to note that students in the groups that presented supported one another in discussions and answering the questions.

Before the presentations of the group work, a member of one group that presented their work, came to inquire about the drywall partitions, i.e. if they had the correct information and if the presentation was correct. As the facilitator/lecturer, I did not give the answer to the student, but gave the student direction and hints. This is in line with the recommendation of Pedersen and Liu, (2003) on student-centered learning approach, where the lecturer is a facilitator and directs the students.

In terms of technology usage on the presentation, the students were technologically savvy. The power point presentations were presentable and easy to follow and read.

5.3 Challenges in implementing group work

This study also established different challenges these were: time constraint to ensure that each group presented their work. The time for each presentation including questions and comments was 35minutes each period lasts for 1hour 30minutes. This time frame scheduled in the time table was not enough for all the ten groups to present their discussions. Furthermore, the venue for presentation was year marked as an exam venue, hence it was locked. As a lecturer I had to find an alternative venue which consumed on the allotted time for the lesson. These observations were in line with the findings of Chen, (2005) and Guo, (2006).

Furthermore, the students were hesitant to ask questions at the beginning, but with motivation from the lecturer who was the facilitator they were able to ask and give comments. This might have been due to the fear that members from one group want to challenge members from other groups.

6. CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE STUDY

Through observation, this study established that students were involved in their learning process as they were actively involved in their group work and class presentation. They asked questions and gave comments based on their peers' presentation. Furthermore, the lecturer acted as a facilitator during the process of class presentation and also out class environment. The students also had the sense of enhancing their technology ability and this was verified by the student ability of being computer savvy. However, time constraint due to lack of venue was a key challenge to allow all the groups to present their work.

Further research is advocated based on students' survey in order to establish the benefits of using collaboration via group work as a strategy for student centered-learning for construction technology 3. The researchers are also advocating for the students to be interviewed.

7. REFERENCES

- Bruffee, K.A (1995). Sharing our toys: Cooperative learning versus collaborative learning. *Change*, 27(1), 12–18.
- Bullough, J. R. V., Young, J., Birrell, J. R., Cecil, C. D., & Winston, E. M. (2003). Teaching with a peer: a comparison of two models of student teaching. *Teaching and Teacher Education*, 19(1), 57-73.
- Carless, D. R. (2006). Good practices in team teaching in Japan, South Korea and Hong Kong. *System*, 34(3), 341-351.

Proceedings 8th Built Environment Conference
Collaboration as a strategy of student Centered Learning in Construction
Technology

27-29 July 2014
Durban, South Africa
ISBN 978-0-620-60356-0

- Chen, S. H. (2005). *Research on the education of the mutually collaborative teaching utilized by library-citing Taipei metropolis Ming-Hu junior high school for example*. Unpublished master dissertation, Department of Adult & Continuing Education, National Taiwan Normal University, Taiwan.
- Craig, R.J, Amernic J.H, 2006, PowerPoint presentation technology and the dynamics of teaching. *Innovation Higher Education*, **31**,147-160.
- Cuban, L. 1983. How did teachers teach, 1890–1980. *Theory into Practice*, **22**, 3, 159–165.
- Darling-Hammond, L., and Snyder, J. 2000. Authentic assessment of teaching in context. *Teaching and Teacher Education*, **16**, 5-6, 523-545.
- Garcia-Morales, V. J., Lopez-Martin, F. J., and Llamas-Sanchez, R., 2006. Strategic factors and barriers for promoting educational organizational learning. *Teaching and Teacher Education*, **22**, 4, 478-502
- Guo, C. I. 2006. *The research of the team teaching for arts and humanities domain in elementary school-A case study of Lu-chou elementary school*. Unpublished master dissertation, Department of Arts, National Taipei University, Taiwan.
- Hoogveld, A. W. M., Paas, F., and Jochems, W. M. G. 2003. Application of an instructional systems design approach by teachers in higher education: individual versus team design. *Teaching and Teacher Education*, **19**,6, 581-590.
- Huffman, D., and Kainin, J. 2003. Collaborative inquiry to make data-based decisions in schools. *Teaching and Teacher Education*, **19**,6, 569-580.
- Jang, J. H. 2002. *Research on the teachers' specialized growth of the pattern of the mutually collaborative teaching*. Unpublished master dissertation, Graduate school of Curriculum and Instruction, National Taipei University of Education, Taiwan
- Keengwe, J., Onchwari, G., and Onchwari, J. 2009. Technology and Student Learning: Toward a Learner-Centered Teaching Model, *Association for the Advancement of Computing in Education Journal*, **17**,1, 11-22.
- King, A., 1993. From sage on the stage to guide on the side. *College teaching*, **41**, 30-35
- Kohn, A. 1994. Grading: The issue is not how but why. *Educational Leadership*, **38**–41.
- Lai, M. J. 2004. *Collaborative teaching and teacher professional development: Case study*. Unpublished master dissertation, Department of Chemistry, National Taiwan Normal University, Taiwan.
- Lom, B., 2012, Classroom activities: simple strategies to incorporate student-centered activities within undergraduate science lecturers, *The Journal of Undergraduate Neuroscience Education*, Fall, **11**,1, A64-A71.
- Moran, M. J. 2007. Collaborative action research and project work: Promising practices for developing collaborative inquiry among early childhood pre-service teachers. *Teaching and Teacher Education*, **23**,4, 418-431.
- Na Li., 2012, Approaches to learning: Literature review
- National Center for Educational Statistics, 1999, *What happens in classrooms? Instructional practices in elementary and secondary schools 1994–95 (NCES 1999–348)*. Retrieved July 15, 2014, from <http://nces.ed.gov/pubs99/1999348.pdf>

- Owston R, Lupshenyuk D, and Wideman, H. 2011. Lecture capture in large undergraduate classes: student perception and academic performance. *Internet Higher Education* **14**, 262-268.
- Pedersen, S. and Liu, M, 2003. Teachers' Beliefs about Issues in the Implementation of a Student-Centered Learning Environment. *Educational Technology Research and Development*, **51**, 2, 57-76
- Perry, B., and Stewart, T. 2005. Insights into effective partnership in interdisciplinary team teaching. *System*, **33**,4, 563-573.
- Pugh, K. J., and Zhao, Y. 2003. Stories of teacher alienation: a look at the unintended consequences of efforts to empower teachers. *Teaching and Teacher Education*, **19**,2, 187-201.
- Rathgen, E. 2006. In the voice of teachers: The promise and challenge of participating in classroom-based research for teachers' professional learning. *Teaching and Teacher Education*, **22**, 5, 580-591.
- Saulnier BM (2009) From "sage on the stage" to "guide on the side" revisited: (un)covering the content in the learner-centered information systems course. *Information Systems Education Journal*, **7**,3-10.
- Shepard, L.A. 2000. The role of assessment in a learning culture. *Educational Researcher*, **29**,7, 4-14.
- Su, C. C. 2003, *The research of strategies for enhancing the accomplishment of team teaching about the elementary school: In the view of team management*. Unpublished master dissertation, Institute of Education, National Cheng-kung University, Taiwan.
- Tanner, K.D., 2009. Talking to learn: why biology students should be talking in classrooms and how to make it happen. *CBE-Life Sciences Education*, **8**,89-94.
- Trent, S. C., Driver, B. L., Wood, M. H., Parrott, P. S., and Martin, T. F. 2003, Creating and sustaining a special education/general education partnership: a story of change and uncertainty. *Teaching and Teacher Education*, **19**, 2, 203-219.
- Vajoczki, S., Watt, S., Marquis, N., Liao, R., Vine, M, 2011, Students' approach to learning and their use of lecture capture. *Journal of Education Multimedia Hypermedia* **20**,195-214.
- Vidmar, D. J. 2005, Reflective peer coaching: Crafting collaborative self-assessment in teaching. *Research Strategies*, **20**,3, 135-148.