

COLLABORATIVE PROBLEM SOLVING PROMOTES STUDENTS' INTEREST

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ABSTRACT

The aim of the study was to investigate the effects of collaborative problem solving (CPS) on students' interest of learning economics. The economics concept was a difficult subject for pre-university students to comprehend. A quasi-experimental method was applied in this study where 294 students were selected randomly from ten schools and divided into three groups (CPS1, CPS2 and CG). Surveys and interviews had been carried out before and after intervention. CPS1 outperformed in interest compared to CPS2 and CG. CPS2 also performed quite well in comparison to CG. The findings of qualitative responses also showed positive results in CPS. CPS can be applied in schools not only in economics but also other subjects.

Field of Research: collaborative problem solving, Economics Education

INTRODUCTION

Economics teaching in the pre-university level seem important as a large number of pre-university students are partial to take the subject on. This phenomenon was supported by the report from the Malaysian Examination Council (2008) which showed that there were 30,737, 29103 and 23,570 candidates who took economics in 2005, 2006 and 2007 respectively.

Although there were a great number of students who undertook economics yearly, the overall achievement in this subject was declining from year to year. This fact can be proven by the pre-university public examination results whereby a mere 52.33%, 51.84% and 49.30% passing rate was obtained in the years of 2005, 2006 and 2007 respectively (Malaysia Examination Council, 2008). Consequently, most students lost interest in this subject (Khoo Yin Yin, 2008).

One of the main factors of lack of performance in this subject was due to art students who undertook economics that were not keen in analyzing and understanding the concept while applying the element of mathematics. Johnston, James, Lye and McDonald (2000) suggested the best way of teaching economics is the implementation of active learning. In spite of this, the most popular teaching method amongst teachers is the "chalk and talk" method (Becker & Watts, 2001). This is a traditional teaching method where students are not required to be learning actively. Prior research shows that active learning promote students' learning interest in various subjects (Leung Yin Bing & Hui, 2009; Matveev & Milter, 2010; Chen Yuqing, Peng Xiaoshan & Sun Jian, 2010). However, there is a research gap between the implementation of CPS and pre-university economics students. Prior reviews from Jane and Jiri (2009), gave an overview of the effect of the implementation of active learning in secondary schools.

Previous studies have shown significant results between active learning and students' interest (Goldman, Cohen & Sheahan, 2008; Muhammad Akhlaq, Mukhtar Ahmad Chudhary, Samina Malik, Saeed-ul-Hassan & Khalid Mehmood, 2010). Therefore, CPS is claimed to be a practical strategy for fostering students' interest and performance. In addition, CPS is a theory and concept of active learning with the element of practical application on economics. This study will measure the effect of CPS on improving students' interest on economic learning.

CONCEPTUAL FRAMEWORK

The conceptual framework of this study is based on Adult Learning Theory (Knowles, Holton and Swanson, 1998) and Vygotsky's zone of proximal development (ZPD) theory (1997). According to Knowles, Holton and Swanson (1998), adults were autonomous and self-directed. Their teachers might involve adult participants in their active learning process and serve as facilitators. ZPD is the difference between what a learner can do without help and what he or she can do with help under the guidance of a facilitator. ZPD is easier to be achieved during activities, such as in a collaborative group (Vygotsky, 1997).

In this study, students are exposed to new information during discussions with peers. They had to resolve idea between prior understanding of old information and new information provided by peers. CPS group members had to share their ideas and helped their peers to achieve the ZPD learning zone by a more capable peer and teacher (Vygotsky, 1997). Teachers played an important role as facilitators in assisting and explaining to students. On the other hand, social interaction among group members is crucial in students' acquisition of new knowledge and critical thinking skills (Vygotsky, 1997) as well as promoting students' interest.

LITERATURE REVIEW

Collaborative Problem Solving

According to Wehmeier (2000) in the Oxford Advanced Learner's Dictionary, problem solving is defined as the action of finding a way to deal with a problem. Wehmeier (2000) also describes the term collaboration as the involvement of a few people in a group who work together. Both problem solving and collaboration signify that students are to present a question and the group members are to solve the problem collaboratively (together). Students are expected to use resources to find knowledge based on self-directed learning. The success of the problem solving depends on the evaluation by the problem solvers, self-directed students and the cooperation of group members (Barrows, 1994). Teachers need to assist students during the CPS process (Barrows, 1994). Teachers act as the expert in the problem solving process but they must be trained in this field because the success or failure of the problem solving depends highly on the teachers' function. Basically, the transformation of problem solving depends on the analysis of the capability of the students as well as the planning of the teacher during the process.

In point of fact, the CPS method originated from the Problem Based Learning method used in 1960 in a medical school in the United States of America. The CPS method is most suitable for heuristic tasks. Heuristic tasks include a complex question that needs great knowledge and high thinking skills to solve. Currently this method is used widely in the tertiary

level for fields such as computers, engineering, business and architecture. CPS is also used in the subject of economics in high schools and universities across Australia.

Among the advantages of CPS include building problem solving skills in addition to increasing self-directed learning and lifelong learning. It also promotes a good relationship between group members, increases intrinsic motivation to learn and enhances the interaction between students and the facilitator.

Blumberg and Michael (1992) stated that students in problem based learning (PBL) possess the action and reaction which displayed self-directed learning skills. Mauffette, Kandlbinder and Soucisse (2004) supported their views. Thorley and Gregory (1994) believed that students who worked together in a group or collaboratively generated knowledge through discussion and this advantage outweighs the individual learning. Members who collaborated will have a clearer understanding of concepts or theories taught through the exchange of ideas and produced work of better quality.

According to Baurer (2003), the study of CPS is to ensure that the group functions more effectively. The teacher should ensure that the group is dynamic and proceed smoothly. Problem solving method emphasises on the students' attendance, planning, involvement, equal contribution to the group project and motivates learning. These findings are supported by Gokhale (1995) who advocates that collaborative learning can develop critical thinking through discussions, classification and evaluation of other people's ideas.

Besides that, CPS enhances metacognitive skills. Bonk and Cunningham (1998) posits that learning will happen quicker when students process self-directed skill before discussion. Problem solving learning is the learning and teaching process which develops students' ability based on the metacognitive level. The success of the CPS is not based solely on knowledge but is based on the problem solving method to achieve targets (Gijsselaers, 1996).

The types of different learning for CPS include conceptual development and cognitive strategies. The formation of conceptual understanding includes the development of new knowledge schema and the assimilation of schema content. Cognitive strategies include critical thinking skills, strategy learning and metacognitive skills (Nelson, 1999).

Collaborative problem solving enables the advancement of critical thinking in the economics subject through assignments that reflect the real world situations, integration of learning activities which incorporates subject knowledge, types of thinking, skills and available opportunities which enable students to use more writing with pencil and paper to enhance motivation in providing meaningful tasks to students. Besides that, frame work may be used for active and collaborative learning which enable students to solve problems through analysis, application and resources acquired.

In the studies conducted by Johnston et al. (2000), Brooks and Khandler (2002), it is found that students who learn in a collaborative group obtained better results in examinations. Johnston et al. (2000) studied the CPS among year two students in the University of Melbourne and found out that it is one of the active learning methods that could stimulate learning. The project carried out could enhance communication skills and group work skills which increased learning. Collaborative learning assists students' discussion and integrates new ideas to learning in depth. Based on the findings, students' academic achievement after undergoing a nine-month project revealed that there were positive relationships between projects which utilised the CPS method. Students in these projects used a longer duration of time to prepare questions before proceeding to tutorial classes. Students' attendance showed an increase of 3% compared to the traditional tutorial classes. The findings of this study showed a change in the respondents' score

which is not equivalent to the two months duration used for preparation. Students' achievement was significant for the international students group but there was no significance for the Asian students group because they believed that the Asian students possess different learning styles. The findings from the study conducted by Johnston et al. (2000) also showed that a different duration is taken by the semester one experimental group while the control group was taken during the second semester. A different duration of time is not suitable to conduct the experimental study as students had experienced psychology and mental changes after one semester.

According to Alexander and McDougall (2001), tutors and students showed significance in the change of the traditional tutorial method to the CPS method as a new tutorial method. Mergendoller, Lahart and Mass (2002) studied the difference between the CPS method and the traditional teaching in a secondary school. From the findings, students who participated in the research programme did not show any significance in the change of the students' attitude towards economics and interest in the CPS method. This finding showed the opposite situation from that of which was hypothesised based on the review of the medical education work; CPS method is more effective compared to conventional learning. Based on gender, the raw data collected showed that female students obtained more benefits from the CPS method compared to male students even though there was no significance at the .05 level. Students involved in the CPS method showed progress in knowledge compared to the conventional method in the raw data. The main factor of the CPS method is that some students were involved in the problem solving whereas other students did not get involved but was merely waiting for the answers. Usually only one or two students worked while the rest became free passengers in the group.

Findings from studies are mostly taken from university students. However, the study conducted by Mergendoller, Maxwell and Bellisimo (2002) was carried out in a secondary school. The findings from the study conducted by Khoo Yin Yin and Zakaria Kassim (2005) on 200 form six economics students from four Penang secondary schools in 2004 showed that students studied economics through memorisation. They obtained higher scores in examinations if the examination questions were similar to their notes and work books. Students obtained better scores for lower thinking questions which were questions that tested knowledge, comprehension and simple application. On the other hand, for questions that were of high thinking levels such as synthesis and evaluation, students faced great difficulties. Amal Al-Dujarly and Hokyoung Ryu (2007) stated that CPS could develop a positive learning style. The findings showed that CPS is able to train students to develop an independent learning style.

All the methodology of the studies conducted was experimental and quantitative in the form of data analysis. One of the setbacks of the previous studies is that the experimental groups were collaborative in nature compared to individual learning. This setback will be given attention and will not be repeated by the researcher.

Theory Of Collaborative Problem Solving Method

CPS method is an active learning method. During the problem solving activity, students work together to ensure that the problem posed will be solved. The collaborative group is able to solve the problem posed and is able to identify its own weaknesses (Vygotsky, 1997). Problems prepared by teachers were solved by working with partners (Chiu Ming Ming, 2000). Collaborative problem solving method requires that a problem is solved in groups and not merely by an individual's ability. This is caused by lack of experience, different individual perspectives

and knowledge and experience levels about a different thing. There are many theories involved in the collaborative problem solving method such as instructional theory, behaviourist theory and constructivist theory. However, the focus of this study leads to the constructivist theory because this theory focuses on the mental activities which greatly influenced the learning outcomes through the collaborative problem solving method. The constructivist theory conflicted with the behaviourist theory which stressed on mental activities, knowledge originality and the way students develop knowledge from their actions. The collaborative problem solving method is learning based on the integration of cognitive and social perspectives to construct learning. Mergel (1998), considered the constructivist as a theory that involves learning from experience. According to Sally Hong (2002), constructivism is a theory for learning and philosophy for understanding. Learning is a constructive process in which economics students build knowledge based on prior knowledge. This matter is a process which fills the students' minds with information. This learning only allows economics students to retain facts or concepts in their memory and retrieve them when needed. The modern cognitive psychology states learning as a retaining process and based on concepts. New information can be used to collect and solve problems. Economics students are more suitable to be in collaborative learning which is a small group working together to solve problems.

METHODOLOGY

This study employed quasi experimental design with random assignment of 294 pre-university economics students from ten secondary schools in Penang, Malaysia. In order to control the threat of validity, all teachers had to teach the same microeconomics content using CPS method. Besides, teachers involved were given two sections of briefing prior to implementation of CPS method in the class to ensure proper usage of the method. The head of department was assigned to supervise teachers for the progress of the implementation of the CPS method .

This study was carried out in the middle of the year. The experiment took ten weeks to complete. The students in the selected schools were assigned randomly into three groups. There were CPS1, CPS2 and CG. CPS1 was a group that student learnt through CPS with fix working steps, whereas, CPS2 was a group that students learnt through CPS with free working steps. CG was a conventional group which function as a control group.

Pilot test was conducted to test for validity and reliability of the instruments. A set of questionnaires consisted of 10 items has found valid with reference to two lecturer in economics education. The overall Cronbach's Alpha reliability coefficients of questionnaire was obtained in .830. The pre and post questionnaires were given to 294 students who took part in this study.

Pre and post interview for 6 teachers and eight students was carried out. Their aim of the pre-interviews was to find out students' interest before implementation of CPS. The post-interview was to get their feedback about students' interest after implementation of CPS. The interview were tape-recorded and lasted approximately twenty minutes each participant. After the interviews, each word was coded, read in several times and analyzed using content analysis technique (Berg,1998).

FINDINGS

A) Analysis Of Questionnaire

Table 1 listed on mean of pre and post experiment CPS. One of the strongest benefits of CPS1 was built up confident of students to solve problem in economics (item 1). Item 1 also showed the highest difference of mean score. Item 2 and item 7 showed that the impact of CPS could help students' competence problem solving and understanding the microeconomics concept. It also indicated majority of the students liked group learning activities, it stated in item 6 and 10. In addition, CPS1 learning method showed the increased of mean on each item.

Item	Question	Pre Experiment (CPS1)	Pre Experiment (CPS2)	Pre Experiment (CG)	Post Experiment (CPS1)	Post Experiment (CPS2)	Post Experiment (CG)
1	Confident with problem solving	3.342	3.663	3.659	4.026	3.794	3.590
2	Like economics theory	3.386	3.402	3.580	3.763	3.652	3.500
3	Interest in economics	3.316	3.424	3.455	3.544	3.652	3.523
4	Enjoy learning economics	3.658	3.739	3.839	4.044	3.674	3.681
5	Discuss economics topic	3.535	3.380	3.494	3.921	3.576	3.398
6	Discuss with peers during CPS	3.325	3.337	3.318	3.693	3.489	3.489
7	Problem solving become very simple	3.228	3.294	3.193	3.781	3.478	3.477
8	Present better task	3.544	3.359	3.330	3.798	3.587	3.625
9	More time to spend on this subject	3.500	3.380	3.330	3.816	3.489	3.511
10	study economics in group	3.491	3.391	3.490	3.895	3.717	3.625

Surprisingly, item 4 showed decreasing of enjoy learning economics after implementing CPS2. However, researchers found out the influence on CPS2 towards interest through item 12,3,5,6, 7,8 and 10. These items obtained high mean score which above 3.4. This meant CPS had influenced on fostering students interest significantly. On the other hand, students in CG didn't show the decreasing of mean on item 2, 4 and 5. The overall mean score for CPS1 was 3.828, CPS2 was 3.611 and CG was 3.542. These results indicated that CPS1 outperformed compare to CPS2 and CG.

B) Pre-Intervention Interview

Six teachers and eight students were interviewed before implementation of CPS. Teachers were asked about problem they were faced when teaching economics. Besides students were asked about their interest to economics subject.

i) Teachers' perspective

Most of the teachers said that their students did not study economics before when they were in secondary school. Therefore, they dislike this subject and found it difficult. The two quotes below revealed similar beliefs.

Paragraph 1

PIT5: "...students' attitude. Majority of them not interest, they feel economic is a difficult subject, especially those poor in Mathematic."

PIT3: " They didn't study, refuse to do exercise. Most of them feel economic difficult but taking economic show status, when they have the feeling difficult, everything turn out become difficult."

However, one teacher had a different view. She said,

Paragraph 2

PIT1: " This is a new subject to students, when they know it, they will like it."

ii) Students' response

When researcher asked students whether they liked economics, students that studied economics before showed their interest more than those had not study before.

During the pre-intervention interview, students stated that,

Paragraph 3

PIS8: " I like economic because I score A during secondary."

PIS5: " Yes, I like economic this subject is challenging."

On the other hand, Student 4 had contradicted opinion although she had studied economics before when she was in secondary school. She had a different belief,

Paragraph 4

PIS4: " Not really like economic.because that lesson is bore, if my teacher can teach it a little bit interesting, may be I will like it."

Those students that never studied economics when they were in secondary school did not showed any interest in this subject. They had a similar view with Teacher 1. A student felt that economics was extremely hard. Her interview stated as below,

Paragraph 5

PI S1: " I really doesn't know what is economic, later perhaps I will like it but not now."

C) Post- Intervention Interview

i) Teachers' perspective

It seemed the students' response of collaborative learning changed noticeably after the intervention. After the implementation of CPS, six teachers indicated students benefits from collaborative learning. They also noted that student attitude changed after the intervention.

Paragraph 6

POT4: " They [students] are more interested in involving in discussion. Now, they will ask for discussion during lesson. Some they have their own group outside classroom"

POT1: " Most of them show more interest, except those very passive students."

ii) Students' response

Students had a similar view with their teachers. They agreed that they could understand the economics concept easily after peer discussion. The following three comments were typically across the eight students,

POS3: "Collaborative learning really help, the problem that I could not understand, I can ask my friends. I really like economic now."

POS5: "Is really interesting to study together, we can exchange idea."

POS8: "When we try to solve the answer together, we enhance our interest."

DISCUSSION

The study found out there was a strong positive relationship between fostering students' interest on microeconomics after participation in CPS. Findings of questionnaire showed that CPS1 and CPS2 were outperformed than CG. These indicate that CPS1 and CPS2 could develop students ability of thinking which will enhance their performance. When students could understand the economics concept and score in examination, they would show interest in the subject. Lischner (2007) also agreed that collaborative method could promote students' interest. On the other hand, Evensen and Hmelo (2000) also raised the similar views. However, this findings were contradicted by Mergendoller, Lahart and Mass (2002) result. Mergendoller, et al. (2002) results failed to show any significant between interest and group discussion.

Post- interview findings revealed that students had a positive perception towards the implementation of CPS. It showed that the implementation of CPS to learn economic had encouraged students to seek answer through discussion that promote their interest. These findings also indicated that students attitude changed after the implementation of CPS. The

absence of the involvement in group learning activities might cause students lack of interest in learning economics. However, teachers have their own preferences for certain teaching method. Teachers need to consider their students interest, ability and learning style before planning any teaching or learning method.

CONCLUSION

This study is based on pre-university students' interest after implementation of CPS. CPS is an effective learning method in fostering students' interest. At the same time, teachers must have alternative learning method in order to make their lesson lively. Besides, teachers must show their willingness to try out various learning method although they had burden with heavy workload. Lastly the positive findings supported the continuation of the future study, for example: CPS can be applied in school not only in economic but also other subjects.

REFERENCES

- Becker, W., & Watts, M. (2001), "Teaching Methods in U.S. Undergraduate Economics Courses", *Journal of Economic Education*, 32(3), pp. 269-80.
- Berg, E. (1998), "Why Aren't Aid Organizations Better Learners?" Available at: <http://www.egdi.gov.sel> (Accessed 4 August 2007).
- Chen Yuqing, Peng Xiaoshan & Sun Jian (2010), "National Undergraduate Electronic Design Contest: A Vehicle for Enhancing Active Learning", *British Journal of Educational Technology*, Vol.41, No. 4, pp. 660-664.
- Evensen, D.H. & Hmelo, C.E. (2000), "Problem-Based Learning~A Research Perspective on Learning Interactions", London, Lawrence Erlbaum Associates.
- Goldman, R.H., Cohen, A.P. & Sheahan, F. (2008), "Using Seminar Blog to Enhance Student Participation and Learning in Public Health School Classes", *American Journal of Public Health*, pp.1658-1663.
- Jane,D. & Jiri, D. (2009), "Use of Wiki Tools for Raising the Communicative Aspect of Learning" *Proceedings of the European Conference on E-Learnig*, pp.165-173.
- Johnston C.G., James, R.H., Lye, J.N., & McDonald, I.M. (2000), "An Evaluation of Collaboration Problem Solving for Learning Economics", *Journal of Economic Education*, pp. 13-29.
- Khoo, Y. Y. (2008), "The Effectiveness Collaborative Problem Solving Method Among Form Six Economic Students", Penang, University Science Malaysia.
- Leung Yin Bing & Hui, A. (2009), "Creative Language Teaching: A Pilot Study Using Torrance's Incubation Model. (English)" *New Horizon in Education*, Vol.57 No.1, pp.95-101.
- Lischner, R. (2007), "Collaborative Learning Lite", Available at: <http://www.tempest-sw.com/collab.html> (Accessed 20 Jun, 2007)
- Malaysia Examination Council (2008), "STPM Report", Available from: [http:// www.mpm.edu.my/](http://www.mpm.edu.my/) (Accessed 12 April, 2008)
- Mastropieri, M.A. & Scruggs, T.E. (2007), "The Inclusive Classroom: Strategies for Effective Instruction", (3rd. ed.) Upper Saddle River, NJ, Prentice Hall.
- Matveev, A.V. & Milter, R.G. (2010), "An Implementation of Active Learning: Assessing The Effectiveness of The Team Infomercial Assignment", *Innovations in Education and Teaching International*. Vol. 47, No. 2, pp.201-213.
- Mergendoller J.R., Lahart, T.E., & Mass, R.M Y. (2002), "The Effectiveness of Problem- Based Instruction: A Comparative Study of Instructional Methods and Student Characteristics" *Human Investment Research and Education (HIRE) Center*, California State University.

Mukhtar Ahmad Chudhary, Samina Malik, Saeed-ul-Hassan & Khalid Mahmood (2010), "An Experimental Study to Assess The Motivational Techniques Used by Teachers In The Teaching of Chemistry", Journal of Education and Sociology, pp.36-52.

Novak, J.D. (1993), "How Do We Learn Our Lesson? Taking Students Through the Process", Science Teacher, Vol.60 No. 3, pp. 50-55.

INITIAL

PIT1: Pre-Intervention Teacher 1

P1T5: Pre-Intervention Teacher 5

P1S1: Pre-Intervention Student 1

P1S4: Pre-Intervention Student 4

P1S5: Pre-Intervention Student 5

P1S8: Pre-Intervention Student 8

POT1: Post-Intervention Teacher 1

POT4: Post-Intervention Teacher 4

POS3: Post-Intervention Student 3

POS5: Post-Intervention Student 5

POS8: Post-Intervention Student 8