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Gender-Sensitive Effect of Problem-Based Learning on Student Performance in Indonesian Teacher College Classes

DOI: 10.15804/tner.2019.55.1.04

Abstract

To restore the quality of education, the 2013 curriculum reform in Indonesia urged teachers to employ pupil-centered, thematic problem-based learning (PBL). This study examined whether the PBL collaborative learning enabled students to learn better and in an equal manner through an array of cross-cutting aspects like race, social class, and gender. The presented study involved two teacher colleges and randomly assigned undergraduate classes that were taught with the use of PBL practices while other comparable classes were taught through traditional lecturing. It was found that the students in the experimental group performed better and more equalized than those in the other group. This is to assist the teacher colleges to teach their student-teachers to design and practice more engaging classes where boys and girls are given equal chances to foster their potentials to the fullest.

Keywords: *problem-based learning, gender sensitive, student-centered instruction*

Introduction

Schools in Indonesia have fallen under the nation-wide bureaucratic leadership that led to massive uses of traditional teacher-led instruction. It was deemed the primary cause of substandard education in the country (Suryadi et al., 2016), which has remained very much unchanged since the first 1975 nation-wide school

achievement study (Mangindaan & Elley, 1979). Among the most crucial factors affecting the poor quality of education is inequality of English achievement due to gender differences. The country's nation-wide reform introduced new School Curriculum in 2013, mandating changes in nearly all schools' practices to put into practice (Suryadi et al., 2016). This reform also promotes problem-based learning (PBL), by which pupils should no longer be given too many lectures or notes; instead, they are to be engaged in learning through thematic problem-based instruction, in which boys and girls are given an equal opportunity to fully participate in learning processes. The World Bank also sponsored cluster-based in-service teacher training programs in pilot schools in all provinces, though it was finally revealed that not much change took place in school practices. The proposed reforms have yet appropriately been unaddressed (Suryadi et al., 2017) and rote learning practices in virtually all schools prevail. English is one of the subjects largely taught using conventional instruction, which often leads students to memorize contents knowledge and rarely gives them an opportunity to practice.

Objective and Methodology

The presented study was aimed at exploring the effectiveness of PBL as one of the critical steps to create an engaging classroom using gender-sensitive PBL in English. This one-semester quasi-experimental study randomly selected intake of two pairs of undergraduate classes in two Indonesian teacher colleges, from which all students in each class were automatically selected as samples. Each pair of classes was randomly assigned to experimental and control groups, in which the numbers of students were 84 and 91, respectively. The students in the first group were taught with the use of inquiry-based PBL practices provided by course materials prepared by the researchers, while those in the second group were taught using teacher-led instruction. Student questionnaires and tests for all groups were administered at the pre- and post-test phases, including classroom observation to ensure that the intended interventions were put into practice.

The presented study developed classroom tests measuring two criterion variables – the students' English performance and gender awareness. A structured questionnaire also assessed the students' engagement in PBL, other personal characteristics, and family background variables supposedly had contributed to the variations of both benchmark variables. The assumptions made in this study were laid down while assessing each of the two research phases, i.e.: comparing students' English performance and gender awareness between the two students

groups; and employing a production function model of analysis to examine the effect of some background characteristics, student intellectual capacity, and some observed the students' actual engagement in PBL. Using ordinary least square criteria, the analysis was based on the shared and unique variance explained by each of the variables included in the model relative to that of others, as reflected in each magnitude of Beta Weight at probability levels, 0.001 and 0.05, respectively.

Conceptual Review

Indonesia has gone a long way in improving gender equality in education access within the overall quality improvement framework. Gender parity had been primarily accomplished at all school levels up to 2013 (ACDP, 2013). However, achieving gender parity in access to schools is only the first step as it offers no guarantee to achieve real equality, in which males and females are to be treated alike (UNESCO, 2004). Gender equality encompasses girls' and boys' experiences in school through equal and fair treatment by teachers using gender responsiveness of curriculum, textbooks, learning materials and approaches (ACDP, 2013). Therefore, improving the teacher's capability of employing inclusive learning approaches, in which both boys and girls are given an equal chance to participate fully is among the intended reforms in Indonesia.

Improving teachers' competence in crafting innovative ways of teaching is among the greatest challenges Indonesia is now facing. This has not been properly addressed as an issue; both pre- and in-service teachers are not suitably prepared to develop and use the said effective teaching approaches. Not many teachers are as capable as they should be in using innovative ways of instruction to make pupils highly motivated to learn (Suryadi et al., 2016a; Rosyidi, 2018). They are accustomed to employing traditional ways of teaching, mainly lecturing, in which teaching is mainly telling and showing; this is contrary to Atkins and Brown's (2002) suggestion that if we want students to know what we know we tell and/or show them and let them practice.

Rote learning practices have prevailed in Indonesian schools since the nationwide curriculum reforms started in 2013 (Rosyidi, 2014; Suryadi et al., 2009; Suryadi, 2016b; Mangindaan, 1975). Teachers find themselves out of their depth and unable to fully engage students, while students are driven too much by extrinsic rather than intrinsic motivation to learn and are referred to as surface learners. They are firmly attached to the outcomes of tasks and focus only on the topics that will be tested (Suryadi et al., 2016a; Savage & Birch, 2008). This non-participatory

teaching method rarely invites students to ask questions and apply critical inquiry in solving problems through learning processes (Gorghiu et al., 2015; Attard et al., 2010; Maclellan et al., 2004; Suryadi et al., 2017; Suryadi, 2003). As a result, in 20 out of 28 countries, more than one in four 15-year-old students considered school a place where they did not want to go; in almost half the countries the majority of students also agreed that school was a place in which they felt bored (PISA, OECD 2013).

In recent times, educationists have started to examine the effectiveness of traditional approaches of learning. Maclellan et al. (2004) and MacHemer et al. (2007) state that people should learn by being involved and active in the learning processes, often working in collaboration with others. In the *constructivist theory*, each individual has a unique set of experiences and interactions with the world to construct his/her own knowledge (Confrey, 1990; Glasersfeld, 2003; Biggs & Tang, 2007). Knowledge is not passively received from the world, from others, or from authoritative sources, all knowledge is created as individuals (or groups) adapt to and make sense of their experiential worlds through self-regulating processes. It has profound impacts on successful student learning (MacHemer et al., 2007; Applefield et al., 2001; Harun et al., 2012; Pease et al., 2011).

Well-designed PBL will trigger students to learn and lead to new or modified concepts, contributing to re-equilibration (Applefield et al., 2001; Biggs & Tang, 2007). It focuses more on developing students as self-directed learners compared to traditional lectures that encourage students to be spoon-fed by lecturers (Attard et al., 2010; Stinson & Milter, 1996). Through a realistic context and problems for students to work on, a facilitator can stimulate the students' motivation up to a desired learning level (Savage & Birch, 2008; Maclellan et al., 2004; Loewenstein, 1994). Teachers should be able to develop and maintain students' learning capacity and help them become highly motivated lifelong learners (Attard et al., 2010; Suryadi et al., 2016a). Yew and Goh (2016, p.76) add that "PBL has been widely adopted in diverse fields and educational contexts to promote critical thinking and problem-solving in authentic learning situations."

After being successfully implemented in various fields of medical education, PBL is now implemented throughout higher education as well as in K–12 education in the US (Hung, 2008). PBL was originally designed to respond to the criticism that traditional teaching methods fail to prepare students for solving problems in clinical settings (Jonassen & Hung, 2008). Rather than asking students to study content knowledge and then to practice context-free problems, PBL is to engage them in learning processes through hands-on experiences of analyzing and solving real-life problems (Barell, 2007; Khan et al., 2012). PBL is learning which

results from the process of working towards the understanding or resolution of problems (Eggen et al., 2012; Reynolds, 2003).

Capitalizing on individual differences, in terms of gender and socio-economic backgrounds, it is vitally important to make student learning processes and outcomes more stimulating. Carlo et al. (2003) proved that the effects of gender on differential learning group activities and outcomes through PBL are not negligible in the United Arab Emirates. They observed that female groups were more productive as rated by their facilitators; they also had significantly higher scores on motivation, cohesion, interaction, and elaboration, while they had lower scores for sponging and withdrawing. Student collaborative learning activities were observed through the study of Visschers-Pleijers (2004), where students, particularly females in the experimental groups, were sometimes reluctant to take part in collaborative activities. Their passivity began to break after a couple of weeks as the teachers delivered individual or group learning tasks to both male and female students.

This conceptual review shows that PBL should be a powerful learning method if the activities designed are to form a number of collaborative learning activities for individual students, regardless of sex and background characteristics. This is the curriculum and instructional reforms Indonesia intended to create through the change of school curriculum in 2013. The said reforms are to promote individual and group interactions, in which boys and girls are given equal chance to take part in learning activities and to play a crucial role in motivating and stimulating student learning.

Results and Discussion

Studies of the impact of PBL have generally shown that students experiencing PBL achieve similar or fewer learning gains when it comes to short-term knowledge acquisition compared to students in a lecture-based learning environment, though in terms of longer-term retention the results are significant in favor of PBL (Pourshanazari et al. 2013). Students need to retain long-term knowledge and skills in order to perform well.

Introducing one problem daily to discuss, female participation turned out to emerge such as to ask questions, share ideas, criticize or help friends, and lead a group discussion. The series of discussions not only had encouraged students to be mentally active; they also stimulated individual students, male and female alike, to learn more while facing the next series of discussions. These phenomena

were not apparent in the comparable groups taught through traditional lecturing. Table 1 shows that the students in the experimental group were encouraged to learn and performed better than those in the other group. Differences were evident between the two student groups' post-test scores; the students in the experimental group performed better in English ($F=51.81$) as they were taught through their involvement in collaborative learning activities.

Table 1. Differences in average post-test scores. Experimental and control groups

No. Student Group	Mean, Std. Dev. and, N of Samples	Post-test Score	
		English Performance	Gender Awareness
1 .Experimental Group	Mean	130.90	46.80
	N	84	84
	Std. Deviation	18.61	5.998
2. Control Group	Mean	127.22	45.16
	N	91	91
	Std. Deviation	15.70	6.776
3. F-Test	F Value	51.81	29.12
	Test of Significance	.00	.038

Gender awareness in this study was as one of the criteria to examine if collaborative PBL was effective. In the PBL process, the students were provided with some gender-sensitive materials and concepts to fully engage in a series of discussions. All the students, regardless of gender, were given an equal chance to lead, initiate and fully participate in overall learning activities. Based on the average scores on gender awareness, the students in the main groups achieved somewhat better than the other groups ($F=29.12$). This shows how important gender equity is in education to help the students improve gender awareness and fully participate in learning. This offered no guarantee. However, the students in both groups happened to be homogeneous since no random assignment was employed in splitting up individual students into the groups. The observed variation in gender awareness scores could be unaffected solely by the intervention.

The post-test scores differences in gender awareness were also attributable to their prior knowledge. The pre-test score as one of the predictors had a much stronger effect on gender awareness ($R^2 = 0.534$) than the said intervention did ($R^2\text{-Cha}=0.144$). It meant that some students might be able to learn through memorizing the pre-test items while they were doing their post-test. Nevertheless, the collaborative learning practices through problem-based instruction remained significant to provide positive effects on gender awareness in the experimental group.

Table 2. Effect of PBI against its covariates on two measured students' posttest scores of two measured criteria

A. Criterion: English Performance	R	R Square	Adjusted R Square	SE of the Estimate	Change Statistics		
					R2-Change	F Change	Sig. F Change
No. Predictor							
1. PBI Intervention	.480	.230	.226	17.16	.230	51.81	.000
2. Grade Point Average	.740	.548	.543	13.19	.317	120.74	.000
3. Students' Sex	.787	.619	.612	12.14	.071	32.00	.000
4. Father's Education	.811	.658	.650	11.54	.039	19.35	.000
5. Father's Occupation	.825	.680	.671	11.19	.022	11.76	.001
7. Mother's Education	.839	.705	.692	10.82	.014	7.64	.006
8. Ethnic Group	.843	.711	.698	10.72	.007	3.90	.050
B. Criterion: Gender Awareness (GA)							
No. Predictor							
1. PBI Intervention	.380 ^a	.144	.139	6.41	.144	29.12	.000
2. GA Pre-Test Score	.823 ^b	.678	.674	6.95	.534	284.62	.000

As mentioned before, there is no guarantee that the students in both groups were homogeneous in both measured criteria. Thus, some random variables should be examined to probe to what extent they provide covariance effects on student learning. Table 2 clearly shows that the PBL intervention was not, in fact, the strongest variable to affect student performance (R2-Cha =0.230). The strongest one was the student's GPA (R2-Cha =0.317). It shows that the significant effect of collaborative PBL activities on English performance was not independent of the effect of the students' academic potentials. The potentially high-achievers tended to find it easier to learn English through the PBL method compared to those otherwise.

In addition to the students' GPA, other predictors included in the model had some covariance effects. They were: students' sex (R2-Cha =0.071; p=.001), father's education (R2-Cha =0.039; p=.001), father's occupation (R2-Cha=0.022; p=.001), mother's education (R2-Cha =0.014; p=.001), and ethnic group (R2-Cha =0.007; p=.001). It means that the effect of PBL on English performance was higher in female, higher educated family, and non-West Javanese students. Thus, the difference in English performance as the effect of PBL intervention was not in a *ceteris paribus* condition concerning these economic and cultural backgrounds. However, the PBL intervention remained to be the second strongest effect variable after accounting for the students' GPA.

Conclusion

The presented study focused on gender-sensitive collaborative learning through PBL, in which all students were given an equal chance to participate and fully engage in learning. It showed that the PBL collaborative learning activities encouraged students to learn and perform better than those taught using traditional lecturing. The rote learning instruction, prevailing in most Indonesian classrooms, is unlikely to increase both students' English performance and gender awareness.

Based on the study, this student-centered instructional approach is necessary for teacher colleges in Indonesia to prepare their student-teachers to design and implement more engaging classes, where male and female students are given an equal chance to develop their full potentials. It means that upcoming school curriculum reforms in this country require, first of all, promotion of both pre- and in-service teacher training programmes to improve the respective students' and teachers' ability to manage the gender-sensitive and more stimulating student-centered learning approaches.

The study showed that PBL should be carried out while considering individual differences regarding students' academic potentials and some diversity variables, the major sources of inequality of education. Since this study neither randomly selected individual students from a given population nor assigned them to each of the groups, a future study needs to discriminate the effects of PBL intervention and use some diversity variables (gender, socio-economic and cultural backgrounds) in the selection and assignment of students.

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