



TRANSFORMING TRAINING INTO PRACTICE: TEACHER PROFESSIONAL DEVELOPMENT PARTICIPANTS' CLASSROOM PRACTICE IN APPLYING THEMATIC LEARNING FOR TEACHING ENVIRONMENTAL ISSUES

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ABSTRACT

Teacher Professional development or TPD is a program that develops teachers' competency to teach. This study observed how teachers who previously completed the TPD program applied thematic learning for teaching environmental issues. Classroom practice of five junior high school teachers who recently completed 32 hours of TPD was observed. Classroom observation suggested that classroom activity was varied. Their decision in designing their lesson brings about a difference in their students' ability to understand and communicate current environmental issues. All teachers use a problem-based learning approach, which they believe to be challenging to implement before participating in TPD.

ABSTRAK

Pengembangan Profesi Guru atau TPD adalah program pengembangan kompetensi guru untuk mengajar. Penelitian ini mengamati bagaimana guru yang sebelumnya menyelesaikan program TPD menerapkan pembelajaran tematik untuk mengajarkan isu-isu lingkungan. Kelas lima guru SMP yang baru saja menyelesaikan 32 jam TPD diamati. Pengamatan menunjukkan bahwa aktivitas kelas bervariasi antar guru. Keputusan mereka dalam merancang pembelajaran menghasilkan perbedaan dalam kemampuan siswa untuk memahami dan mengomunikasikan isu-isu lingkungan terkini. Semua guru menggunakan pendekatan pembelajaran berbasis masalah, yang mereka yakini sulit untuk diterapkan sebelum berpartisipasi dalam TPD.

INTRODUCTION

Teacher Professional development or TPD is defined as activities that develop an individual's skills, knowledge, expertise, and other characteristics as a teacher (OECD, 2009 p.49). The importance of TPD is also cemented via United Nations Resolution No. 70/1/2015, in which 198 nations pledge to take part in ensuring the attainment of Sustainable Development Goals (SDGs) fourth target: inclusive and equitable quality education and promote lifelong learning opportunities for all (UN General Assembly, 2015) in which by 2030, supply of qualified teachers will substantially increase (UN General Assembly, 2015 p. 17). As of 2016, World Bank data showed that approximately 86% of teachers are considered as qualified (Roser, 2017). As in the rest of the world, Indonesian Government also took the pledge in 2015

and as of now teachers in Indonesia have been participated in TPD program.

Dating back from the 1970s (see Thair and Treagust, 2003), Indonesia has been conducting TPD program and in 2012 approximately 1.15 million teachers were certified (World Bank, 2015). Alas, World Bank study further estimated that upgrading 40 percent of the primary teachers and 20 percent of the junior secondary teachers leads to an increase in student-learning outcomes by 0.08, in which these impacts are not nearly enough to catch up with the more advanced countries. Hill (2009) stated that there are four points in evaluating the effectiveness of teacher's professional development: (1) The quality of products, overall quality of the program, for example how it covers specific contents without ambiguities or error or misinformation, (2) The capacity of TPD providers, (3) The quality of transfer, how what teachers

ARTICLE INFO:

Received: 3 February 2019

Accepted for publication: 15 April 2019

Final version: 22 October 2019

Keywords:

teacher professional development
problem-based learning
thematic learning
environmental education

Kata kunci:

pengembangan profesi guru
pembelajaran berbasis masalah
pembelajaran tematik
pendidikan lingkungan

How to cite: Tapilouw, M.C., Firman, H., Redjeki, S., & Chandra, D.T. (2019). Transforming Training into Practice: Teacher Professional Development Participants' Classroom Practice In Applying Thematic Learning For Teaching Environmental Issues. *Jurnal Pengajaran MIPA*, 24(1), 14-21.

learn in the TPD successfully transferred into their classroom, and (4) coherence, alignment between development materials with the adopted curriculum and instructional approaches in the teachers' respective region.

Hill (2009) further stated that by evaluating TPD, we could explain why TPD has not always associated with gains in student outcomes in many studies. A study also supports Hill (2009) concern in which Avalos (2011) found that although studies do prove that professional development affects teachers, how pervasive and to what degree they sustain continuous efforts to move ahead is still relatively unknown. Therefore, this present study addressed two primary concerns in teacher professional development programs: how teachers can deliver the subject in their classroom and how what the teacher learns in the program successfully transferred into their classroom practice.

Teachers deliver and practice their teaching in numerous different ways, and one teaching approach which integrates curriculum, knowledge, and the characteristic features of cognitive learning is thematic learning (Liu and Wang, 2010; Huang, Liu, Chu, and Cheng, 2007). There are five steps for thematic learning: (1) identify a central theme, (2) identify related subject domains based on learner interest, (3) collect information for the specific topics, (4) integrate collected information to build shared knowledge, and (5) exhibit learning outcomes and share with others (see Liu and Wang, 2010; Huang et al., 2007). Because learning focuses on a specific theme, learners can voluntarily construct knowledge since the theme is strongly connected with daily life and developed from learners' willingness (Huang et al., 2007).

In terms of the science theme strongly related to daily life, environmental issues proved to be an area of concern. Studies found that teachers are not confident in their ability in teaching environmental issues (Ko and Lee, 2003), their environmental knowledge was somewhat inadequate (Tuncer et al., 2009), or even if perception towards the environment is considered to be high but not in the state of implementing solutions and personal responsibility in their own lives (Tuncer, Sungur, Tekkaya, and Ertepinar, 2007). Recent studies also found that a good proportion of teachers choose not to teach specific environmental issues such as climate change (Dawson, 2012), or teachers even downplayed student' responsibility in solving environmental problems because they feel that students will fulfill their role in solving any en-

vironmental problems only in their adult life (Essi, 2019). Therefore, this present study focused on applying thematic learning to teach environmental issues by teachers previously enrolled in Teacher Professional Development program.

METHOD

Five junior high school teachers recently enrolled and completed 32 hours of the Teachers Professional Program (TPD) and their respective students served as the sample in this study. All teachers have had a minimum of one year of teaching experience. Classroom observation uncovers how and to what degree knowledge acquired from the TPD program was implemented in their actual classroom. Teacher classroom practice was observed based on their learning approach and activity, environment topics/theme or subtheme they deliver to the students. To evaluate learning effectiveness, students were asked to fill a form containing short questions related to the environment. Students were asked to answer two questions: 1) *State environmental problems/issues around you and give a brief explanation of why you think of them as environmental problems/issues*, and 2) *Give simple solutions/methods to overcome /prevent the environmental problems/issues*. Students will be given a total score (4) if they can give four or more environmental problems/issues with its appropriate solutions/method, three (3) if they can give three environmental problems/issues with its appropriate solutions/method, and so on.

RESULTS AND DISCUSSION

Categorically, three teachers chose a water pollution theme: two teachers chose a specific theme of water pollution while one teacher added air pollution topic aside from the water pollution topic. The remaining two teachers choose a notably different theme in which a teacher chooses pollution in general (water, air, soil, and noise pollution) while the other chooses an overpopulation theme. In essence, all teachers focus on environmental problems/issues of how human activity affects the environment. Another similar choice was utilizing the same learning approach in which all teachers use a problem-based learning approach (Table 1).

Problem based-learning is an instructional approach that has been proven successfully used as an instructional method in teaching environ-

mental materials. Vasconcelos (2012), for example, found that problem-based learning helped students develop collaborative group works and learn from real environmental problem. Jansson, Söderström, Andersson, and Nording (2015) also found similar result. Jansson et al. (2015) implemented problem-based learning as an instructional method for environmental chemistry concept in which PBL improves students' ability to communicate and present environmental chemistry material. Beside collaborative work facilitation, Reynolds and Hancock (2010) also found that students appreciated, learned, and acquiring more in depth knowledge about the environment more from PBL than from conventional lectures (Kwan and So, 2008). Students are also found to have a more positive attitude towards the environment in which they can define environmental problems more clearly and take on more active tasks in the solution process (Genc, 2015). This present study also found similar results in which the use of PBL resulted in students' ability to understand and communicate current environmental issues.

All teachers use problem-based learning but choose different learning activities. Two teachers (A1 and C3) delivering water pollution issues using similar learning activities: practicum or laboratory work. Both teachers use simple *fishes in polluted water* scenario, but one pick detergent as the pollutant while the other also use temperature and acid as additional pollutants. Practicum results presentation and discussion were also conducted in both teachers' learning activities. The differing classroom practice between these two teachers was that teacher C3 assigned preliminary work before the lesson (making a poster concerning current environmental problems) while teacher A1 did not. The impact of learning activity was measured through short questions related to the environment. Students were asked to answer two questions: 1) *State environmental problems/issues around you and give a brief explanation of why you think of them as environmental problems or /issues*, and 2) *Give simple solutions/methods to overcome /prevent the environmental problems or issues*. The average score for the first question was 3.23 (Teacher A1 students) and 3.44 (Teacher C3 students), while for the second question was 3.41 (A1) and 3.19 (C3). This result suggested that C3's students achieved a higher average score in their ability to identify environmental problems or issues and give simple solutions to the environmental problems/issues. A1's students could iden-

tify two environmental issues, while C3's students can pinpoint four environmental issues. However, A1's students can give five reasonable methods to solve the environmental problems such as by identifying specific activities (reforestation policy for factory and vehicle users in terms of pollution and emission), in contrast to C3's students who give four more straightforward methods to solve the environmental problems such as disposing waste correctly or making a waste bank. Different from laboratory activity in both teachers, two teachers (Teacher D4 and E5) choose different scenarios in delivering environmental pollution themes.

Teachers D4 and E5 both guided the students to conduct classroom discussion and presentation, but they took different approaches before classroom discussion or presentation. Both teachers give a brief explanation before moving on to the discussion/presentation phase, but D4 uses videos for his brief introductory explanation and uses cooperative-jigsaw design instead of regular classroom discussion as in Teacher E5 classroom. However, unlike E5 who previously assigned the students to make a presentation (group work) concerning air and water pollution causes and effects, Teacher D4 did not give any preparatory assignment for the class that day. Student average score after learning was 2.38 (D4 students) and 2.63 (E5 students) for the first question, while for the second question was 2.5 (D4) and 2.79 (E5). Students' scores for D4 and E5 students were statistically different from the other three teachers ($p = 0.000$).

The last teacher (B2) took on a different environment theme compared to the other four teachers and chose to pick a theme concerning the impact of overpopulation on the environment. The teacher exposes environmental problems by presenting newspaper headlines about floods and landslides. The teacher also highlights a specific problem in the Karawang region, a region formerly known as the nation's top rice producer. The teacher divided the students into groups in which each group internally discussed the environmental issues of their choice. After an internal discussion, each group presented the problems in front of the class. All environmental issues were subsequently discussed with the entire class. In the open classroom discussion, reasons and implications for the environmental problems were addressed and discussed with classroom discussion. After the lesson, the teacher assigns the students to create a creative product from plastic waste, e.g., flower

Table 1. Teachers' Classroom Practice and Learning Result

Participant/School	Learning Approach	Environment Topics/theme	Environment subtopics/subtheme	Learning Activity	Students' Performance
A1 Junior High School A-Bandung	Problem-Based Learning	Human interaction with environment: environmental pollution	Water pollution by detergents posed harm to aquatic biota/fish	<p>I. Teachers give a brief explanation about environmental pollution caused by human activities.</p> <p>II. Teachers facilitated a laboratory work activity (practicum) for exploring water pollution caused by detergent discharge to the water bodies.</p> <p>III. Students conducting a practicum. Two water basins were filled with water and fishes. Two types of pollutants (laundry and dish soap) were then discharged to the water basins.</p> <p>III. Students were asked to observe fishes' movement in the basins.</p> <p>IV. Students present their finding</p>	<p>Average score in identifying environmental problems/issues: 3.23</p> <p>Average score in giving simple solution to the environmental problems or issues: 3.41</p>
C3 Junior High School C-Bandung	Problem-Based Learning	Human interaction with environment: environmental pollution	Water pollution by detergents, extreme water temperature, and acids that posed harm to aquatic biota/fish	<p>I. Teacher assign preliminary work before the lesson (making poster concerning current environmental problems)</p> <p>II. Teachers give a brief explanation about environmental pollution caused by human activities.</p> <p>III. Teachers facilitated a laboratory work activity (practicum) for exploring water pollution caused by pollutants (detergent, high temperature wastewater, and acid) discharge to the water bodies.</p> <p>IV. Students conducting a practicum. Four water basins were filled with water and fishes. Four types of pollutants (detergent, hot water to simulate high temperature wastewater, and vinegar) were then discharged to the water basins.</p> <p>V. Students were asked to observe fishes' movement in the basins.</p> <p>VI. Students present their finding</p>	<p>Average score in identifying environmental problems: 3.44</p> <p>Average score in posing solution to the environmental problems: 3.19</p>
D4 Junior High School D-Bandung	Problem-Based Learning	Human interaction with environment:	Environmental problems causes and effects	I. Teacher give a brief explanation about environmental problems causes and effects through videos.	Average score in identifying environmental problems: 2.38

		environmental pollution		<p>II. Students was divided into four groups (Air Pollution, Water Pollution, Soil Pollution, and Noise Pollution) with Cooperative-Jigsaw Design.</p> <p>III. Each students discussed the environmental problems according to their assigned groups and comeback to their original group to share their knowledge from the discussion</p>	Average score in posing solution to the environmental problems: 2.5
E5 Junior High School E-Bandung	Problem-Based Learning	Human interaction with environment: environmental pollution	Air and water pollution causes and effects	<p>I. Teacher previously assign the students to make presentation (group work) about air and water pollution causes and effects in groups before the lesson.</p> <p>II. In the lesson, teacher open the lesson by giving a brief explanation about air and water pollution.</p> <p>II. Each groups present their group work and every student in the class actively participated in classroom discussion</p>	<p>Average score in identifying environmental problems: 2.63</p> <p>Average score in posing solution to the environmental problems: 2.79</p>
B2 Junior High School B-Karawang	Problem-Based Learning	Human overpopulation and its connection to the environment	Environmental problems due to overpopulation	<p>I. Teacher give a brief explanation about human overpopulation and its connection to the environment</p> <p>II. Students was divided into groups</p> <p>III. Teacher expose environmental problem by presenting newspaper headline concerning floods and landslide. Teacher also highlights problem specific in the Karawang region: Karawang past achievement as the nation top rice producer.</p> <p>III. Each group internally discussed the environmental problems and after internal discussion, each group presented the problems in front of the class and all environmental problems were discussed with the entire class.</p> <p>IV. Reasons and implications for the environmental problems was addressed and discussed with classroom discussion.</p> <p>V. Teacher assign the students to create creative product from plastic waste e.g. flower pot from water bottle.</p>	<p>Average score in identifying environmental problems: 3.44</p> <p>Average score in posing solution to the environmental problems: 3.31</p>

1. Pencemaran Air
 - Terdapat pencemaran air akibat di sungai Citarum. Sungai berbau keruh, dan berbau menyengat. Memiliki struktur air dengan gumpalan-gumpalan yang merambat dalam air. Organisme dapat bertahan dalam kurun waktu tertentu, tetapi setelah beberapa jam, organisme semakin lemah dan membongkang terbelak.
 Air Citarum sangat tercemar.

(a)

2. - Menanam pohon di hulu sungai / di pinggir sungai sebagai resapan air
 - Mengeruk di sungai sungai sebagai pembersihan sungai dengan:
 • Menutupi sungai
 • Mengajak orang membuat pengolahan limbah sebelum dibuang ke sungai
 - Membuat perumahan lahan pinggir sungai sebagai pemukiman yang memicu perkembangan kumuh
 - Menghambat migrasi / urbanisasi berlebihan sebagai bentuk larangan perkembangan kumuh

(b)

Figure 1a-b. Teacher B2 Student' Answer Example for Question 1(a) and Question 2 (b)

pot from water bottle. The average students score in pinpoint environmental problems was 3.44, and for posing solutions to the environmental issues was 3.31. B2's students give similarly reasonable answers as in A1's and C3's students, but the answers were comparatively more intricate and detailed (Figure 1a-b). In Figure 1a, a student pinpointed environmental problems based on the environmental compartments (water, air, and land), in which she explained water pollution in the Citarum River. She wrote that Citarum river water is muddy (*keruh*) and smelly (*berbau menyengat*), having a mass structure in its water, and the organisms cannot survive in the water. In proposing a solution to the problem (Figure 1b), she wrote planting a tree as a water infiltration area (*resapan air*), decreasing river dysfunction by dredging the river (*mengeruk sungai*), and encouraging the factory to have a waste treatment facility before the waste is discharged to the water, making a policy of no riverside settlement or slums, as well as prohibit migration and urbanization that may lead to the existence of riverside slums (*perkampungan*

kumuh). These answers showed that the students understand the interconnection between factors that ultimately lead to the pollution problem.

Results from teachers' classroom observation suggested that classroom practice is varied between teachers in which their decision in designing their lesson bring about different results. As previously identified, two teachers (A1 and C3) use laboratory activity and presentation in which C3 students have a higher average score in identifying environmental issues than A1 students. However, A1 students have a better ability to pinpoint reasonable methods to solve environmental problems. Two other teachers (D4 and E5) facilitate classroom discussion, one conventional discussion with a preliminary assignment. In contrast, the other use discussion with jigsaw arrangement and without prior assignment, in which students of the former showed better average score than the latter. However, teachers D4 and E5 students have a statistically lower score than the other three teachers ($p = 0.000$). The last teacher (B2) also used conventional classroom discussion in

E5's classroom. Even so, as opposed to lower scores found in E5's students, B2's students' score average is the second-highest among five teachers. The students also give a more intricate and detailed answer in addressing environmental issues even when compared to students conducting laboratory work (A1 and C3 students). These results suggested that problem based-learning approach resulted in students' ability to understand as well as communicate current environmental issues but how the teachers translate it into an effective lesson activity is also instrumental in achieving better results. This present study also corroborated previous studies on the importance of lab works in teaching about environmental issues (Amarasiriwardena, 2007) as well as the importance of effective classroom discussion.

All five teachers used the presentation and discussion framework. However, students' results suggested that classroom discussion is presumably the most effective when the classroom discussion is designed as effectively as possible. In Teacher B2's classroom, the discussion is designed in a more orderly manner in contrast to the other classroom discussion. B2 laying the groundwork for a more engaging discussion with exposing intriguing problems connected to daily life and facilitating discussion about the reasons and implications for every environmental problem pointed out in the discussion. It is also worthy to note that students' awareness of environmental problems is also developed beyond the lesson by asking the students to create a creative product from plastic waste.

At the beginning of the TPD, participants were given a questionnaire related to learning practices. The questionnaire results showed that 70% of the participants thought that PBL was learning approach that difficult to implement in the classroom. However, in the questionnaire at the end of TPD, participants considered that the introduction to problem-based learning in training made them feel that this approach was practical. The actual application in the classroom shows that training can inspire and enrich the teachers teaching repertoire. Even though the application suggested differing results, interview results showed that the essence of student-centered learning is already deeply cemented in teachers' minds when designing learning activities. Thus, the next step would be to ensure the teachers are well-equipped in reflecting learning results, develop expertise in designing the most suitable classroom practice,

and understand the teacher's role as a learning facilitator because unguided instruction is normally less effective and can even have an adverse impact if students acquire misconceptions or disorganized knowledge (Kirschner, Sweller, and Clark, 2006).

CONCLUSION

Teachers' actual classroom practice shows that Teacher Professional Development program (TPD) can inspire and enrich the teachers teaching repertoire. Even though the application of Problem Based Learning (PBL) thematic learning showed differing results, student-centered learning is ingrained in teachers' learning activities design. Nevertheless, ensuring that the teachers (1) are well-equipped to reflect learning results, (2) develop expertise in designing the most suitable classroom practice, and (3) understand their role as a learning facilitator in a student-centered learning are critical points that must be considered for continuously improving the TPD program.

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