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UNRAVELING INDONESIAN OUT-OF-FIELD SCIENCE TEACHERS' LEARNING AT WORK

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ABSTRACT

The research aimed to show the workplace as a substantial site of learning because it allowed learning opportunities that resulted from the nature of work and social interaction with workgroups. Learning in the workplace resulted from the demand for the upskilling of employees. Although workplace learning was often considered an informal type of learning, it allowed the employees to fill the gaps between their education and their current practice through coaching and mentoring. Workplace learning happened in schools, particularly schools that hired out-of-field teachers who did not have a teaching qualification. The qualitative single case study involving teachers with more than ten years of experience teaching junior high school science in Indonesia aimed to understand better how teachers who began teaching as out-of-field teachers learned from their experiences in the workplace. In-depth interviews were employed to gain insight into their learning processes. The findings show that schools can be a conducive environment for teachers to gradually acquire skills that are increasingly central to practice through learning from professionals (both provided and requested) and colleagues (including expert teachers). As out-of-field novices lack specific knowledge of teaching this content to students in context, workplace learning enables them to change gradually.

Keywords: *out-of-field teachers, workplace learning, professional learning, Indonesian context, science teachers*

INTRODUCTION

The workplace is an important environment to enhance learning for employees through participation and collaboration with colleagues (Eraut, 2014). Learning in the workplace provides an authentic context; the knowledge learned in the workplace is applicable in the workplace; thus, the learning is conducted without any attempt to 'simplify the environment' (Herrington & Oliver, 1995). Workplace learning also offers reliable activities that focus on objectives, allowing personal construction with participatory activities (Billett, 2020; Brown, Collins, & Duguid, 1989). The workplace provides novice employees with access to experts who offer valuable modeling, coaching, and scaffolding (Billett, 2020). Employees experience multiple role engagement, which increasingly enables them to move toward expertise (Billett, 2020).

Learning in the workplace is often considered an informal type of learning because of the process, learning location, purpose, and content (Manuti et al., 2015). However, considering workplace learning as an informal learning process neglects the learner's intention to construct and develop knowledge in the workplace. This knowledge, activities, and types of support are different from those in the classroom (Billett, 2020). Learning in the workplace is conducted because of the unavailability of formal education and a lack of expertise in current enterprises, the need to learn knowledge specific to certain circumstances, and the demand for upskilling employees (Billett, 2020). By providing people, time, and opportunity for employees to engage in learning activities in the

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workplace, both the individuals and the organization can be improved.

The research aims to gain a better understanding of how science teachers who started teaching as out-of-field teachers learned from their experiences in the workplace. The teachers have been teaching junior high school science for more than ten years in Indonesia. They have started teaching without possessing any teaching credentials instead of graduating from applied science. The teachers understand the content of teaching, but they lack an underlying pedagogical knowledge. Thus, the central question is how learning for teaching occurs. Insight into this learning process may have important implications for transforming the workplace into a real learning environment for out-of-field teachers.

Out-of-field teachers are teachers who do not have a teaching qualification (Du Plessis, 2017; Ingersoll, 2019), for example, a science department graduate who becomes a high school science teacher or an engineering department graduate who becomes an English teacher. Out-of-field teachers can also be trained teachers who have teaching qualifications, but they teach a subject, year level, or field outside their expertise (Du Plessis, 2017). For example, an English Education graduate trained to teach the English subject for junior and senior high school students becomes a primary school teacher who teaches mostly all subjects at that level. Out-of-field teachers exist worldwide, including in South Korea, the United States, Australia, and Germany (Hobbs & Törner, 2019; Ingersoll, 2019; Kim, 2011; Sharplin, 2014). Out-of-field teachers also exist in Indonesia. The World Bank report in 2018 has stated that only 53% of teachers in Indonesia are certified, and of those who are not certified, 17% are not eligible for certification (World Bank, 2018). These data indicate that 47% of Indonesian teachers are out-of-field teachers.

However, there is a scarcity of research on out-of-field teaching in Indonesia. The only available research in this area is by Jakaria (2014), who reports that over 67% of primary school teachers in Indonesia are out-of-field (based on data between 2010 and 2013). The research has stated that most primary school teachers do not hold bachelor's degrees, especially in remote provinces. Jakaria (2014) has discussed these data in relation to the teacher requirements issued by the Ministry of Education and Culture and has suggested that primary school teachers should be upskilled and have a bachelor's degree. Jakaria's (2014) research has focused on primary school teacher data, discussing quantitative data in relation to the regulations. Further investigations, including utilizing the voices from out-of-field teachers, would extend the research to another level. Providing out-of-field teachers with an opportunity to voice their learning processes would fill the current gap in the academic literature regarding Indonesian out-of-field teaching.

Out-of-field teachers have problems with their knowledge base of teaching (Du Plessis, Carroll, & Gillies, 2015). Some teachers lack content knowledge, pedagogical knowledge, or pedagogical content knowledge. A lack of a comprehensive knowledge base for their teaching affects teaching quality, disturbs lesson effectiveness, and leads to high attrition rates (Darling-Hammond et al., 2020).

Some teachers become out-of-field because they are assigned by their principals to teach the subject or field beyond their expertise. Some teachers pursue their interest in teaching despite being out-of-field because finding out that out-of-field teaching provides them with a new challenge and an opportunity to extend their identities and knowledge (Hobbs, 2013). When teachers are misassigned and are not happy with their job, they may consider their position as temporary. However, the teachers who pursue teaching despite being out-of-field consider learning new knowledge (Hobbs, 2013). Hobbs (2013) has further demonstrated that if their working environment provides collaboration among staff, teachers feel supported and are more likely to stay.

As out-of-field teachers start teaching as untrained teachers, they make rigorous learning efforts in their workplace (i.e., their school). Their workplace learning results are from the combination of the opportunity to work together with colleagues and leaders in school-based settings and their commitment to doing so with the aims of constructing teaching knowledge as well as improving instruction for students (Ahn, 2017; Hallinger, Piyaman, & Viseshsiri, 2017; Knight et al., 2015). Learning in the workplace with an increased focus on field experience promotes learning and change among in-service teachers (Desimone & Pak, 2017; Knight et al., 2015). For out-of-field teachers, their schools as their workplace can be a concrete place for learning as well as for applying what they have learned in the daily work of teaching.

Workplace learning activities should progress toward expertise through everyday practice carried out by learners (Billett, 2020). This is related to Lave's insight of learning as a process of becoming a member of a sustained community of practice. In his book in 1991, Lave describes the journey that apprentices make from their initial 'peripheral participation' in the workplace until they achieve 'full participation'. (Patton & Parker, 2017). Workplace learning activities should also include guidance, direct guidance from experts as a credible source of knowledge, and indirect guidance from listening to and observing other workers (Billett, 2020). This guidance is related to school leadership, which is crucial for the well-being of the school and its teachers (Hallinger, Piyaman, & Viseshsiri, 2017). School management (principal or director) can determine how, when, and where learning takes place (Parding & Berg-Jansson, 2018). They organize professional learning (PL) programs that align with their schools' policies (Poell et al., 2018) and accommodate teachers' ideas and interests (van Bussel et al., 2018).

METHODS

Qualitative research is an essential method when collating information directly from the field (Korstjens & Moser, 2017). The use of a qualitative single case study is appropriate as the case is based on the context and phenomenon of out-of-field teachers' learning in Indonesia. Korstjens and Moser (2017) have further argued that qualitative data, which elicits "depth, detail, and meaning at a very personal level of experience", yields a deeper understanding.

The research is performed in four private schools in Indonesia, which are under the same educational foundation. Those four schools are the branches located in several places on Java island. The main campus is in Jakarta, and the others are in Malang, Surabaya, and Tangerang. The schools use the Cambridge curriculum, and the main medium of instruction and communication is English. The school employs both local (Indonesian nationals) and expatriate teachers. The educational foundation conducts induction and annual teacher conference together for several days in the main campus, Jakarta.

The selected participants include four Indonesian teachers who have been teaching science for more than ten years. They start teaching science as out-of-field teachers. These teachers come from four different Satuan Pendidikan Kerjasama (SPKs) or independent schools. They all graduate from a science department, but they are not trained teachers and become science teachers because they are interested in teaching. They all apply for a teaching job despite their lack of teaching qualifications. The participants are coded with T1, T2, T3, and T4.

Data are collected using in-depth interviews and document analysis. Audiotaped, in-depth interviews conducted between April and July 2018 are used to gain insight into the teachers' learning processes. Documents such as teaching portfolios are obtained to supplement the interview.

The data are analyzed following the procedures developed by Braun and Clarke (2006) through six sequential stages of thematic analysis. This method is chosen as it illustrates what themes are important in the description of the phenomenon under study. The end result of a thematic analysis should highlight the most salient patterns.

The following measures are undertaken to ensure the reliability and validity of the data analysis. First, all constructed stories are sent to the participants for a member check; that is, the teachers all recognize their learning processes in the stories and judge the reconstruction of their learning processes as accurate. Second, another researcher checks the reliability of the coding process and the justifiability and acceptability of the analyses. Third, as the information is collected using multiple sources, triangulation—the process of validating each piece of information against at least one other source (Flick, 2018) is conducted to establish credibility.

RESULTS AND DISCUSSIONS

All participants share their learning processes. The school conducts four days of induction for all new teachers from all branches before they start teaching in Jakarta. The first one and a half days of induction are filled with an explanation of the school's vision, mission, and operational and academic procedures. According to T1, she is confused on her first day of induction: "I do not understand some terms, like PBL (problem-based learning), cooperative learning" (first interview, April 28, 2018). Similarly, T2 has said, "on the first day, the trainers mention about the lesson plan, scaffolds, inquiry, everything. It sounds foreign" (first interview, April 14, 2018).

The heads of the department (HoD) welcome them on the second day, and the participants are later grouped according to the departments. The HoD shows the SoW (Scheme of Work), lesson planning, and videos from their classrooms. These sessions are more interesting to the teachers, as T3 has said, "I learn something important that I have been using until today: lesson planning, selecting materials, reflection" (first interview, May 12, 2018). For these participants, writing lesson planning is considered something new; thus, it takes time to learn. As T4 has stated, "it is not an easy beginning, learning to write a lesson plan, while thinking about the activities, incorporating PBL, how to do inquiry but it helps me understand how the class is carried out" (first interview, May 27, 2019). T4 has further explained, "my favorite part is when the HoD asks us to plan a lesson, then he shows us a video of how a teacher conducts that lesson. We watch and try to match what the teacher in the video does and how we plan our lesson" (first interview, May 27, 2019). T4 has elaborated, "we realize that our planning at that time is too difficult to apply, after watching the video" (first interview, May 27, 2019).

The induction is followed by an annual teacher conference, where existing teachers could also join. This conference allows them the opportunity to learn from each other. The conference includes some sessions at which all teachers gather and sessions that teachers could choose based on the topics they need to learn. Thus, they learn both academic and non-academic sessions. The school invites external speakers who are the experts and internal speakers who are the senior teachers. All the participants state that during their first annual teacher conference, they go to the class where senior teachers share their teaching experience. As T2 has stated, "they tell their own story of their classroom, not a lot of theories. So practical and applicable" (first interview, April 14, 2018). Similarly, T1 has stated, "they give us real examples of students' behaviors and how to handle them" (first interview, April 28, 2018).

When out-of-field teachers return to their respective campuses, they state that they are seated according to the department. T3 has explained, "the arrangement makes us talk to one another because my left seatmate is also teaching science for the same level" (first interview, May 12, 2018). T4 has also

stated, "I sit next to my mentor, so we discuss a lot. She shares the materials, gives me feedback" (first interview, May 27, 2019).

Departmental meetings also occur once a month. T1 has explained, "the meeting is not only talking about the procedures, exams, and all, but either the HoD or other senior teachers present something useful, practical, and applicable" (first interview, April 28, 2018). Similarly, T2 has expressed, "there is always something fruitful to share during the departmental meeting" (first interview, April 14, 2018). T3 has also agreed, "we, science department from four campuses, gather once per term. The sharing session is always colorful because the students we face are totally different from one school to another" (first interview, May 12, 2018). T4 has added, "by listening to their stories, we also learn from their mistakes, and refine our teaching skills" (first interview, May 27, 2019). Fortnightly level meetings are also conducted for planning and evaluating. The level coordinator leads this meeting. T1 has shared, "when I was still new to teaching, I used to look forward to attending this level meeting because I did not know what to do in class next." T3 has also stated, "this helps me a lot in the first few weeks because the meeting equips us with enough ammunition" (first interview, May 12, 2018).

The school also offers conferences and short courses, both online and offline. T4 has explained, "we join science subject–related online course offered by Cambridge, then we share with others" (first interview, May 27, 2019). Similarly, T3 has stated, "I request cooperative learning training in my third year after I hear lots of benefits from the users. They send me to Singapore," She continues, "we implement after that, I have been the trainer for cooperative learning" (first interview, May 12, 2018). T1 has also explained, "I go for external courses about handling students' learning disabilities after I have one student like that in my class" (first interview, April 28, 2018). In their seventh year, the school offers scholarships to pursue master's degrees. T1 and T4 chose psychology master's degrees; T4 has explained, "I want to learn how to deal with students with learning disabilities more, and this major fits" (first interview, May 27, 2019). T2 and T3 are more interested in technology integration, so they pursue educational technology degrees.

All the teachers admit that they have grown in their workplace. They have all worked in other schools previously but appreciate the support of their current schools. As T1 has explained, "my principal is approachable. We can talk to her at any time." T2 has shared, "I talk to my HoD more often. I always discuss things with my HoD; he even handles my stupid questions" (first interview, April 14, 2018). T3 has also said, "I am fortunate having helpful colleagues; they make time to listen to my problems in teaching and offer solutions" (first interview, May 12, 2018). Similarly, T4 has stated, "my mentor spares another thirty minutes a week to check my lesson plan in my first few months. He makes sure I understand everything I write before coming to the class" (first interview, May 27, 2019).

Based on documents collected from the participants, they have PL (Professional Learning) at least three times a year (excluding requested PL). All teachers become level coordinators between their third and fifth years and become mentors from their third year. The documents also show they become speakers for the inductions and annual teacher conferences starting from their fourth year. T1 and T3 are currently the HoD in the science departments, responsible for the science department across the entire campuses. T2 and T4 are vice-principals in their respective campuses, but they are still teaching two science classes. All of them have stated firmly that they would not leave the job. T1 has stated, "I love teaching. It gives impacts on students" (first interview, April 28, 2018). Similarly, T2 has shared, "I never think about leaving teaching because I never stop learning as a teacher" (first interview, April 14, 2018). T3 has explained, "I used to think about leaving in the first two years, but I stop wanting when I realize how much help I get to be where I am now" (first interview, May 12, 2018). T4 has also stated, "I am happy I can be useful" (first interview, May 27, 2019).

The collected artifacts also contain teachers' evaluations. The feedback from their HoD, colleagues, and students shows that they do grow as teachers. First-year feedback contains issues with student interactions, the use of materials, unclear explanations, and lesson plans. These incidents are absent from the evaluations for the second year and beyond.

Analysis of data from interviews and participants' documents indicates that the workplace can be a creative and motivating site for learning. Initial education and training (i.e., educational degrees, apprenticeships) can be important as foundations on which learning at work can be built upon, and short training courses can sometimes be useful. However, learning that is the result of the challenges faced at work (i.e., solving problems, improving quality, getting things done, coping with change) and of interactions with school leaders, colleagues, students, and parents result in building of the knowledge base that leads to expertise.

The schools where the participants' work has offered guidance, strong leadership, and learning activities that progress expertise. There is both organized and non-organized learning. Organized learning occurs when the school leaders make deliberate attempts to enhance teacher learning through induction, sharing sessions, conferences, and providing scholarship for further studies. Non-organized learning is performed through a normal course of work by having periodic meetings and seating arrangements. These learning processes show that their schools are supportive learning environments.

The teachers are provided guidance, both directly and indirectly. Seating arrangements allow them to gain indirect guidance through, for example, intermingling with their colleagues, sharing their classroom experiences, and receiving information on

teaching strategies. The mentor-mentee arrangement provides them with direct guidance. All activities mentioned by the participants demonstrate that the schools gradually prepare teachers to take more complex tasks from observing, becoming a mentee, being observed, becoming a mentor, leading the department, and leading the school as vice principals. This evidence indicates that experience plays a major role in building a knowledge base, which consequently produces expertise (Makovec, 2018). Teachers extend their educational capabilities in learning through their work (DeLuca, Bolden, & Chan, 2017).

The findings also show that workplace learning will likely be successful with management support. When PL is embedded in the daily work of teachers, learning is more likely to occur (Crawford et al., 2017; Desimone & Pak, 2017). The learning plan provided by the school management, from induction to the requested PL, is well organized, school management's role in teachers' growth has evidently been considered important. The availability of the collaborative and participatory PL is present. They learn to teach, which they then apply in their classroom. Learning and working are no longer separated as each enhances the other. This fact is aligned with the purpose of learning in the workplace, which is improving performance that benefits the organization and improving learning that benefits the learners (Sjöberg & Holmgren, 2021). Shulman (1987) has once said that teaching is, essentially, a learned profession. Teachers can learn and apply what they learn in the same environment, then reflect and refine.

CONCLUSIONS

The research focuses on the learning processes of four science teachers who start as out-of-field novices. The research findings demonstrate that learning processes for out-of-field teachers can be achieved through engaging in activities at work and with others. The "what" is learned cannot be separated from the "how" people learn. Learning can lead to improvements in more effective teaching and more collaborative teamwork.

The research data presented demonstrates that schools can provide conducive learning environments for the professional growth of out-of-field teachers through both structured and unstructured learning experiences in schools, as what they learn addresses their developmental and classroom needs. As the major stakeholders in their workplace learning, the science teachers participate in pre-and in-service PL at their schools that appear to be instrumental in leading to beneficial learning outcomes. Responses show that teachers are offered a variety of PL from the first day they enter the schools as teachers; induction, effective seating arrangements that enable them to discuss and interact with more senior teachers, external PL, and offers to pursue master's degrees. Further, the teachers also comment about the role of their principals and HoD in supporting their careers.

Findings also suggest that out-of-field teachers gradually move toward expertise, becoming more knowledgeable as they participate in PL and conduct teaching. As out-of-field novices, they understand the content (as they graduated from a science department), but they lack specific knowledge of teaching this content to students in context. The documents show the gradual changes in their PL, from practical topics to more of those regarding leadership skills.

It is acknowledged that this study involved a small sample size. Thus, additional research is required to further understand workplace learning, especially for out-of-field teachers in other subjects and levels. The 'take-home' message to school leaders is the importance of reflection and providing effective support for all teachers, particularly out-of-field teachers. In-service out-of-field novices should also realize the importance of active participation, experiencing the provided support from the school, and reflecting that the core of knowing how to teach, and the construction of professional knowledge requires experience.

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