Trends of Teacher Professional Development Strategies: A Systematic Review

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Abstract
Professional development is important for all teachers to improve the quality of teaching. This study is aimed to investigate the trends of professional development strategy and learning outcome in 2015-2019. A systematic review was used in analyzing 267 articles published between 2015 and 2019 in the Teaching and Teacher Education. The findings showed that the trend of professional development strategy is more collaborative and using collegial learning environment, and the trend of learning outcomes which developed through PD programs is more focused on the ability to teach, ability to manage the classroom, and ability to understand the subject field. These findings suggest future studies to develop professional development programs with collaborative and collegial learning environments to develop learning outcomes on practicing new instructional strategies.
Keywords: Professional Development, Professional Development Strategy, Learning Outcome, Systematic Review, Teaching and Teacher Education

Introduction

Professional development is important for all teachers to improve the quality of teaching. Alt (2018) suggests increasing ICT activities using constructivism learning theory in the professional development. Loucks-Horsley et al. (2009) suggest it is necessary to design an extensive Professional Development (PD) program, which includes using successful strategies to reach the ultimate goal. Additionally, teachers' motivation to attend the PD must be increased. Richter et al. (2019) suggest motivation as one of the first reasons to attend PD in a representative group of teachers. So, it needs to research professional development.

The learning outcome of professional development is also important to improve the quality of learning. The teachers who have the knowledge will give good feedback to their students at school (Golob, 2012). The power of professional development will help the teacher or educator accomplish learning outcomes on how to teach students to reach the learning goals. In addition, professional development is as good equipment on learning outcome to increasing teachers' ability on subject content and pedagogical content knowledge and teaching skills (Holloway, 2006). Moreover, the positive learning outcome that organized new networks like teacher community that connect teachers can be a source of efficacy and confidence in adopting new practices (Darling-Hammond et al., 2017).

To develop research about professional development, we need to conduct a preliminary study through a systematic review of trends in professional development. This study is needed to be conducted to survey the strategies in PD and the learning outcomes through PD implementation, which be conducted during 2015-2019. Wilson (2013) states that systematic review has many excellent bibliographies and information. So, this research method is suitable to conduct the preliminary study about trends in professional development.

The previous studies about professional development showed various strategies on professional development programs (Wetzel et al., 2019; Becker et al., 2019; Walshe and Driver, 2019; Ploeger et al., 2019) and showed various learning outcomes which developed through professional development programs (van Schaik et al., 2019; Akiba et al., 2019; Dirk et al., 2019; Thomson et al., 2019). Three different types of PD are based on a level and function of activities (Thurlings & Brok, 2017); a) coaching, wherein development in an experienced person which individual support another individual such as peer coaching and peer feedback (Huston & Weaver, 2008), b) collaborating, wherein larger groups collaborate on a shared goal and/or product eac other such as a community of practice, lesson study (Patton & Parker, 2017; Coenders & Verhoef, 2018) and c) assessment, assessment in either formative or summative ways, the collaboration involved in the learning process in the appraisal of their learning such as peer assessment and peer review (Sluijsmans et al., 2002). For review study of learning outcome though professional development suggested which characteristics of professional development make effective teacher learning. Findings showed that teacher knowledge, teacher skills, attitudes in teachers, teacher network, and student learning (McFadden & Williams, 2020; Ell & Major, 2019; Koponen et al., 2019).

So, we need to explore these two issues through systematic review by investigating these research questions; What are the trends in the strategy used on professional development programs since 2015-2019? What are the trends in learning outcomes developed through professional development programs since 2015-2019?

Definition of Professional Development

The literature provides various definitions of professional development. OECD (2009) defines professional development teachers: "as activities that develop an individual's skills, knowledge, expertise and other characteristics as a teacher." Darling-Hammond et al. (2017) define effective professional development as improving teacher practices and students' learning outcomes. It can be such as focusing on teaching strategies to support teacher learning within teachers' classroom contexts, supporting collaboration for teachers to share ideas and collaborate in their learning. In addition, Scher& O'Reilly (2009) define professional development as immediate outcomes about teachers' knowledge and beliefs, intermediate outcomes about leading to changes in teacher instruction, and long-term outcomes about resulting in improvements in student achievement. Based on previous definitions, we can state that professional development is activities to support teachers in improving their needs related to their work as teachers.

Professional Development Strategies

Loucks-Horsley et al. (2009) describe 16 specific professional development strategies that support the teaching and learning of science and mathematics include curriculum topic study, immersion in inquiry in science and problem-solving in mathematics, content courses, examining student work and thinking, demonstration lessons, lesson study, action research, case discussion, coaching, mentoring, instructional materials selection, curriculum implementation, workshops, institutes, and seminars, study group, professional networks, and online professional development. Other PD strategies are qualification programs, observation visits to other schools, and reading professional literature (OECD, 2009). These strategies can be combined to be 19 PD strategies that can be implemented in PD programs to improve learning outcomes.

Learning Outcome Which Developed Through Professional Development

The teacher development process is viewed as one of empowerment for ongoing development. Becker et al. (2019) focused on teaching basic skills

and providing to "transmit traditions of successful teaching." Ploeger et al. (2019) focused on teachers' analytical competence. Xu and Ko (2019) centered on professional development to make strides their information of how to advance self-regulated learning (SRL) agreeing to the standards of Communities of Practice (CoP). Thomson et al. (2019) focused on developmental science efficacy trajectories of novice teachers from a STEM-Focused program to draw inductions from longitudinal quantitative and qualitative data, giving a complex picture of science efficacy trajectories for novice teachers.

Furthermore, Dirk et al. (2019) focused on teachers' motivation. All learning outcomes of PD programs in these previous studies were adopted from OECD (2009), including 11 learning outcomes such as teaching special learning needs students, ICT teaching skills, student discipline, and behavior problems, instructional practices, subject field, student counseling, content and performance standards, student assessment practices, teaching in a multicultural setting, classroom management, and school management and administration. The framework of learning outcomes from OECD (2009) is important because it used the term of teacher needs so that this framework will be a benefit for teacher development.

Research Methodology

This study was conducted the systematic review by step of Dixon-Woods (2010) because it can be used in social science research. We have focused on articles with the term "Professional Development." The research articles used in this study were identified with six steps.

In the first step, we made a research question; What are the trend in strategies in professional development programs implementation and its learning outcomes developed through PD implementation since 2015-2019?

Second step: Making a definition of some inclusion and exclusion criteria to analyze articles and identify the more appropriate studies. The articles that did not present studies according to the inclusion and exclusion criteria were not selected after the definition of inclusion and exclusion criteria available at Tabel 1.

Third step: Searching the articles used the keyword professional development in Teaching and Teacher Education databases with impact factor 2018 as 2.411 and SJR 2018 as 1.51. Then we systematically analyzed all articles, including all of the parts of the manuscript in each article, and excluded the articles which not suitable with table 1, and we got 269 articles.

Fourth step: investigate the trend of professional development strategies and learning outcomes by investigating the highest and lowest number of strategy which used on professional development programs and learning outcomes developed through professional development programs. The process of information categorization by a strategy which used on professional development programs from Loucks-Horsley et al. (2009) and OECD (2009) and learning outcome which developed through professional development programs from OECD (2009). PD Strategies were curriculum topic study, immersion in inquiry in science and problem-solving in mathematics, content courses, examining student work and thinking, demonstration lessons, lesson study, action research, case discussion, coaching, mentoring, instructional materials selection, curriculum implementation, workshops, institutes and seminars, study group, professional networks, online professional development, qualification program, observation visits to other schools, and reading professional literature. The learning outcome which developed through professional development programs included 11 learning outcomes such as teaching special learning needs students, ICT teaching skills, student discipline, and behavior problems, instructional practices, subject field, student counseling, content and performance standards, student assessment practices, teaching in a multicultural setting, classroom management, and school management and administration.

The framework developed these criteria that professional development was related to the professional development strategy and the learning outcome that a professional development program can develop.

Table 1: Definition of Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Related to professional development and there is a minimum of one strategy used on professional development	Related to professional development but there are no learning outcomes that developed through professional development and learning outcomes which developed through professional development.
Related to professional development, there is a minimum of one learning outcome developed through professional development.	
Published in the year 2015-2019	

Tabel 2: Code and PD Strategies

Code	PD Strategies
1	Curriculum topic study
2	Immersion in inquiry in science and problem solving in mathematics
3	Content courses
4	Examining student work and thinking
5	Demonstration lessons
6	Lesson study
7	Action research
8	Case discussion
9	Coaching
10	Mentoring
11	Instructional materials selection
12	Curriculum implementation
13	Study group
14	Workshops, institutes and seminars
15	Professional networks
16	Online professional development
17	Qualification program
18	Observation visits to other schools
19	Reading professional literature

Results

The trends of professional development strategies used in professional development programs in 2015-2019 and learning outcomes that developed through professional development programs in 2015-2019 can be seen in Figure 1.

The Trend of Professional Development Strategies

The trend of professional development strategies used in professional development programs in 2015-2019 can be seen detailed in Figure 1. The professional development strategy in Figure 1 consists of 19 PD strategies with code in Table 2.

The trend of 7 PD strategies that become the top 4 was used each year from 2015 until 2019 can be seen in Figure 1.
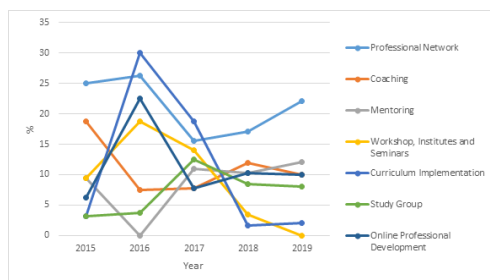
The Trend of Learning Outcome Which Developed Through PD Programs

The trend of learning outcomes that developed through professional development programs in 2015-2019 can be seen in Figure 2. The learning outcome in Figure 2 consists of 11 learning outcomes with code in Table 3.

The trend of 5learning outcomes that the top 2 developed through PD programs in each year from 2015 until 2019 can be seen in Figure 2.
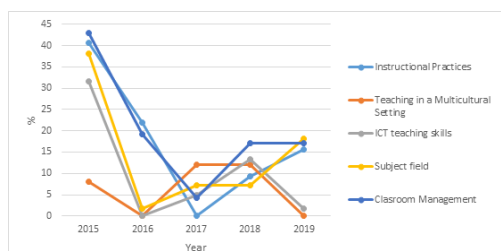

Figure 1: The Trend of 7 PD Strategies which become the Ttop 4 was used in each Year from 2015 Until 2019

Figure 2: The Trend of 5 Learning Outcomes that the Top 2 which Developed through PD Programs in each Year from 2015 until 2019

Tabel 3: Code and Learning Outcomes

Code	Learning Outcomes
1	Teaching special learning needs student
2	ICT teaching skills
3	Student discipline and behaviour problems
4	Instructional practices
5	Subject field
6	Student counselling
7	Content and performance standards
8	Student assessment practices
9	Teaching in a multicultural setting
10	Classroom management
11	School management and administration

Discussion

Based on Figure 1, we can see that the trend of the professional network is in the most popular used in 2015-2016. Even though was a decrease in 2017, however, in 2018 and 2019 was in the increasing trend to be used in PD programs. Professional networks will increase the enthusiasm of teachers because they can motivate each other during the program, and the goals of programs can be successful and effective for a long time in line with Mu et al. (2018) state that the most important that there is a community of enthusiastic educator. There are lifelong learning and share the resource, ideas from each other. Similarly, Mentis et al. (2016) found that the Mawhai (the New Zealand Maori term for both web and net framework is a professional learning approach of contemporary educational programs that can develop individual and professional identity through community networks and professional practices. The network is that they give importance to others, both inside and outside the expert area. Learning together has increased confidence and competence to practice more effectively together. In addition, Ell & Major (2019) focus on a networked professional learning community. The extensive activity and learning theory are an effective way to understand the network learning community. The learning challenge for the teacher who formed the group and constituted their motivation for coming together and raising achievement in mathematics in their community. An effective network learning community brings an about sustained change in teacher practice and is helpful for improvement in learner outcomes and the creation of new knowledge amongst the participants. It is relevant with Knapp (2003), and Darling-Hammond & McLaughlin (1995) found that effective professional development highlights the importance of collaborative and collegial learning environments and communities of practice in schools.

The opposite with professional networks, the workshop, institutes, and seminars are the less popular in 2019. Even though coaching was popular in 2015 and 2016 but from 2017 until 2019 in the decreasing trend to be used in PD programs and not used in 2019. This trend is similar with curriculum implementation, even though in 2015-2016 were increased and become the most popular but since 2017 until 2019 is in the decreasing trend to be used in PD programs. Workshop, institutes, and seminars are the PD strategies used in a short time and are not sustainable. It can be why recently this strategy has not been popular in the PD programs. Many teachers only attend workshops, institutes, and seminars on professional development, but the impact is not effective relatively. It is consistent with Yoon et al. (2007) found that workshop is ineffective to increase teacher practice. Additionally, many new strategies on PD program, so the PD strategies which be used in the PD program move to more effective and sustainable to increase the teacher practice such as online professional development which uses an online platform, and coaching, mentoring, and study group which has a collaborative and collegial learning environment that more effective in professional development programs (Knapp, 2003; Darling-Hammond & McLaughlin, 1995).

This study also found that the four other strategies, including coaching, mentoring, study group, and online professional development, are relatively similar and stable. The collaborative and collegial learning environment that is more effective in professional development programs can be why these four strategies are in the stable trend (Knapp, 2003; Darling-Hammond & McLaughlin, 1995).

Based on Figure 2, we can see that instructional practices, classroom management, and subject field trends are similar. These three learning outcomes are the top three in 2015 and were decreased in 2016 for

the subject field, and 2017 for instructional practices, classroom management, then increased in the next year until 2019 to be developed through PD programs. However, other learning outcomes included teaching in a multicultural setting and ICT teaching skills are similar but were decreased in 2019. This is the opposite of the three learning outcomes, including instructional practices, classroom management, and subject field. These findings can inform us that the three learning outcomes still focus on teacher professional development.

These three learning outcomes become the key success of teachers to teach in the classroom. Teachers who can teach, including pedagogical knowledge, content knowledge, and classroom management, will succeed in teaching. The previous studies about the importance of pedagogical knowledge, content knowledge, and classroom management in STEM Education by Shernoff et al. (2017) found that the teachers do not believe they can prepare for integrated STEM approach implementation. Dare et al. (2018) found that teachers must struggle to balance addressing each of the three STEM disciplines. Additionally, Tao (2019) found that most kindergarten teachers were not familiar with STEM education and were not confident implementing integrated STEM Education.

The instructional practices developed by professional development programs have various focuses, such as on teachers' pedagogical knowledge and competencies by Geldenhuys & Oosthuizene(2015). Geldenhuys & Oosthuizen (2015) found that the teachers' content knowledge and pedagogical knowledge and competencies have to be obtained through continuous professional development.Another focus is using differentiated instruction practice (DI-practice) give effect on self-reported changes (De Neve et al. (2015). De Neve et al. (2015) found that in using DI-practicerevealed a direct relationship between teacher autonomy with self-reported changes. De Neve et al. (2015) found that autonomous teachers have a higher degree of professionalism. Additionally, Dvir (2015) investigated the student teachers' views and ideas with disabilities regarding the inclusion of disabled students in the school/classroom context and how student teachers with physical disabilities construct their personal-professional identity.

Based on previous studies, we can see that many instructional strategies must be understood by teachers that can be trained to teachers through professional development programs, mainly the new instructional strategies. So teachers will need a professional development program to develop the learning outcome in practicing new instructional strategies by increasing the ability to teach, manage the classroom, and understand the subject field.

Conclusion

The findings showed that the trend of professional development strategy is more collaborative and using collegial learning environment, and the trend of learning outcomes which developed through PD programs is more focused on the ability to teach, ability to manage the classroom, and ability to understand the subject field.

The findings suggest that future studies develop professional development programs with collaborative, collegial learning environments to practice new instructional strategies.

Acknowledgement

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