Using Design-based Research to Investigate the Design and Development of an Online Community of Practice for Teacher Professional Development

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Abstract: This paper discusses how design-based research (DBR) has been used to investigate the development of OLC4TPD (Online Learning Community for Teacher Professional Development), an online learning community developed in 2009 to support ongoing teacher professional development in Indonesia. Motivated by the sense of urgency to improve teachers’ professional competencies to teach the 21st century generation and to address the challenges of the existing teacher professional development in the country, a technology-based concept of ongoing TPD framework was introduced with reference to existing literatures and trends. A full cycle of DBR procedures was conducted to intervene in the existing practice, which resulted in the formation of the online community of practice of educators. This online community has reached out to teachers from different places in the country and engaged them in the process of knowledge building and sharing through online and face-to-face interaction. This paper describes four phases of the DBR process of OLC4TPD implementation in Indonesia.

Keywords: Online Learning Community (OLC), Community of Practice (CoP), Design-based Research (DBR), Teacher Professional Development (TPD), Online Learning Community for Teacher Professional Development (OLC4TPD).

Introduction

Community of Practice (CoP), as articulated by Lave and Wenger (1991), has been considered as a model that can stimulate the improvement of teachers’ professional practice (Rényi, 1996). A CoP is a common space and place to promote collaborative learning among its members, define problems impacting their professional practice, make decisions and solve problems in work practice (McNeil, 1997), reflect and evaluate their own and their peers’ beliefs. Social interactions with other practitioners in the CoP build identity and expand knowledge of its members through the social learning process, which as asserted by Barab (2001), cultivates sharing and provides sustainable support for teachers.

Information and communication technologies (ICT) have been used in a CoP to add significant value to the TPD process. A number of recent studies have been conducted to investigate the use of ICT for an online CoP (Barab, 2006; Lloyd, M., & Duncan-Howell, J., 2011; D. E. Scott & Scott, 2010). Dede (2000) argues the potential of ICT in facilitating the process of knowledge transfer and knowledge construction in the community.

 Classified as the Age of Post-Professional by Hargreaves (2000), the 21st Century is characterised by globalisation of economics and rapid development of educational technology. This age has brought a lot of significant changes in education and caused uncertainty among teachers as well as policy makers, concerning the nature of knowledge, and what kinds of knowledge are valuable to pass on from one generation to the next. A significant reconsideration on the practice of TPD is therefore required to address the challenges of the 21st century. TPD practice must be conducted in a more effective manner to ensure continual support for the teachers, so that they can enhance their professional competencies and fulfil critical demands of educating students in this era of globalisation (Barab, et. al., 2001; Lloyd & Duncan-Howell, 2010; S. Scott, 2010).

This study investigated the process of designing and developing a new model of TPD practice using OLC-based model to tackle the unknown challenges of the 21st century in Indonesian context. It was revealed that the implementation of this model in this context has generated new possibilities for educators to conduct collaborative and reflective professional learning in an equal-footing environment while enabling them to surpass the constraints of scarce financial and human resources and overcome the geographical remoteness limitations. This model also encourages the stakeholders’ participation and initiatives to create and build new knowledge to solve authentic professional issues (Sari, 2012).
In this paper, we describe the use of DBR as an overall approach to the investigation, and consider the issues associated with its use as a framework for the investigation.

The research design

There has been an urgent need to improve the quality of education in Indonesia through the development of teachers’ professional competencies. Some of the challenges of the existing TPD practice were geographical remoteness, poor facilities, a lack of access to ICT, a limited numbers of qualified teachers and teacher educators. Responding to this need, a DBR study was conducted to explore whether an OLC-based model is feasible to support the existing TPD practices in Indonesia on ongoing basis.

As a methodological framework of the study, DBR was employed to address complex design and development issues in an authentic setting of learning (Sari, 2012). DBR allows researchers to address complex problems in real contexts in collaboration with stakeholders (Reeves, 2006; Van den Akker, 1999; Van den Akker, McKenney, Nieveen, & Gravemeijer, 2006). This methodological approach was applied because of its unique characteristics (Reeves, Herrington & Oliver, 2005) that are relevant for this study (Sari, 2012), and enable the researcher to:

a. Focus on complex problems
b. Integrate design principles with technological affordances
c. Apply inquiry-based approach to refine the learning environment and reveal new design principles
d. Have a long-term engagement and refinement of research method
e. Involve intensive collaboration
f. Construct theory and find problem solution

In this study, an iterative design and evaluation process was conducted to address the complex problems of TPD in Indonesia (Sari & Lim, 2011). Figure 1 illustrates the DBR process employed by this study, consisting of four phases, as proposed by Reeves (2006).

![DBR process](image)

**Figure 1.** DBR phases (Reeves, 2006, p. 59)

**a. Phase 1: Problem Analysis**

A preliminary ethnographic-inspired study was conducted prior to the development of OLC to understand the current practice and policies of TPD in Indonesia. The DBR approach offers many advantages in this context because it focused on consultation with practitioners involved with the context of the problem. An extensive literature study on TPD theories and practices was also conducted to investigate the existing theories and possible solutions to tackle similar issues. Several data collection methods were applied to support this process.

During this phase, it was shown that ICT had some potential to tackle the existing challenges. Having a unique landscape, many places in the Indonesian archipelago have not yet been covered with sufficient ICT infrastructure, but in big cities like Jakarta, there has been a significant growth of technology adoption. The technology has a significant part in the 21st century education system, however, the use of technology to support TPD in Indonesia has not been maximised (Sari, 2012).
The results of the initial brainstorming session with a group of teacher educators suggested that there was an urgent need to reform the current TPD practice in Indonesia. The group had a shared goal that every teacher should involve in ongoing knowledge building and sharing (Scardamalia, 2002) if they wanted to improve their professional teaching competencies. The process of co-construction of knowledge should not only cover specialised subjects, but also other subjects like ICT, pedagogy and education leadership. In order to achieve that goal, they envisioned the importance of a CoP (Wenger, 1991), where everyone could have equal footholds to share and learn from each other. They said that the most viable way to make it happen was through the use of ICT (Scott & Scott, 2010), yet they could not yet figure out how it would work.

ICT surveys were also distributed to teachers, teacher educators and school leaders to investigate their ICT ownership and skills. There were 100 respondents returned the surveys, which revealed that most teachers in remote areas did not have ICT infrastructure including sufficient Internet connection to participate in online discussion, which caused poor ICT literacy (computer usage). E-mail was considered as the most popular ICT tool used for communication for both teachers and teacher educators, followed by the mobile phone and social media, like Facebook and Twitter. All teacher respondents said that they had no experience with an online community on the preliminary survey, yet during the course of the study it was revealed that many of them had used Facebook as a networking, communication and entertainment tool using their mobile phones.

**Figure 1. Four DBR Phases**

b. Phase 2: Design and Development

Having analysed the key issues of TPD in Indonesia, teachers and teacher educators were engaged in the design and development of an Online Learning Community for Teacher Professional Development (OLC4TPD) through several activities, including: a brainstorming workshop with 23 teacher educators, online discussions, ICT surveys and unstructured open-ended interviews. Based on the feedback and inputs from the prospective users, OLC4TPD was designed and developed starting from its conceptual framework, technological infrastructure, activities and resources. The DBR framework facilitated the design of CoP by drawing on the findings from the first phase of the investigation, so it was possible to incorporate ideas from the educators as the key stakeholders, and the more theoretical research literature.
Based on the data collected and review of existing theories conducted in Phase 1, a conceptual framework of OLC for Indonesian educators, the OLC4TPD, was developed during Phase 2. Four key aspects of OLC underpinned the design of the community:

1. **Community.** An online CoP consisting a group of Indonesian educators who shared a common goal to develop their professional competencies was developed to improve the quality of education in Indonesia.

2. **Learning.** A contextual social learning process was designed in three key online learning environments which consisted of three online learning components, i.e. *learning resources, activities and supports* (Oliver, 2006) to support social knowledge construction among its members (Scardamalia 2002; Scardamalia & Bereiter, 2000).

3. **Technology.** Network technology using asynchronous (i.e., a web portal discussion forum), synchronous (i.e. Skype) and social media tool were applied to facilitate social learning.

4. **Network.** A social network infrastructure was established to facilitate the social learning process in the OLC4TPD. Using Salmon’s (2011) e-tivities and e-moderating steps, the social network was built and nurtured through various learning activities and moderating strategies. As the foundation of thinking, contextual perspective enlightened by Hofstede’s Cultural Dimension (1994) was applied to develop social learning network strategy (Sari, 2012).

c. Phase 3: Iterative Testing and Refinement

Three main interventions were conducted using three key online learning environments — a Web portal discussion forum, Skype and Facebook— to test and refine the concept of OLC4TPD for Indonesian educators. Each iteration investigated the process of social learning among educators in OLC4TPD through five stages of online teaching and learning: Access and Motivation, Online Socialisation, Information Exchange, Knowledge Construction, and Development (Salmon, 2002, 2003). As online community transcripts were collected, the data were analysed using Scardamalia’s knowledge building perspective (2002; Scardamalia & Bereiter, 2000) and Hofstede’s Cultural Dimensions (1994). OLC4TPD was iteratively tested and refined with a group of teachers, teacher educators and school leaders during DBR Phase 3. Three main interventions were conducted to test and refine the OLC4TPD concept.

1. **Intervention 1 (October 2009 – May 2010)**

During the first intervention, a web portal discussion forum was implemented to facilitate a communication among the community members. While it was initially considered as the most popular, the study conveyed that the participation in the discussion forum was low, mainly due to the limited ICT literacy in using web-based tool and limited access to the Internet. The early key contributors were teacher educators, because they had a better access to ICT both at homes and workplaces compared to teachers and thus they used them more frequently compared to teachers. However, the teachers’ participation grew gradually in time and as other tools were introduced. Despite its limitations, the discussion forum was found to be a viable tool to facilitate deeper level of knowledge exchange and construction compared to some other tools investigated in this study. It particularly supported teacher educators’ needs for networking, exchanging information and dissemination of research results, envisioned during the consultations in Phase 1.

2. **Intervention 2 (November 2009 – May 2010)**

The second intervention was executed in a month after the first intervention. Skype VoIP was introduced as a tool to facilitate synchronous conversation among OLC4TPD members through fortnightly online meetings. The main drivers of this intervention were the slow membership growth and adoption of the web portal discussion forum, which were caused by poor ICT literacy, a lack of access to ICT and the needs of “face-to-face” interaction in an online learning environment. Most participants never used Skype; so many of them initially faced a lot of technical issues in adopting the tool. However, Skype has successfully provided a virtual venue for educators across the country to meet and exchange information despite their geographical differences, which has made Skype a popular tool to try out within the community. Those who were successful in adopting Skype considered that this intervention was phenomenal. The synchronous online meeting using Skype was an eye opening for collaboration among Indonesian educators. The online meeting seemed to help a lot of educators in solving their professional problems (Sari, 2012). They said that it took only a few seconds to get feedback from other colleagues using this interaction in comparison to day- or month-replies through email or discussion forum interactions.

3. **Intervention 3 (November 2009 – May 2010)**

The third intervention was driven by the needs to promote OLC4TPD to a wider audience and to make it more accessible for anyone. Based on the facts that Indonesia was the 3rd largest market of mobile technology and had
the 2nd largest users of Facebook in the world (Cuttler, 2010), it was assumed that this tool would serve the purpose of this intervention. The study showed that Facebook has successfully attracted most of the new members, both teacher educators and teachers, to join the community. Within two months, at least five hundred and twenty new educators had joined OLC4TPD (Sari, 2010). However, in term of actual participation and contribution in the community, the percentage of individual participation against the total number of Facebook members was the lowest compared to the participation rates on Skype and the Web Portal Discussion Forum respectively (Sari, 2012). This was mainly caused by a lack of awareness and competence of utilizing this online learning environment for professional purposes was therefore low. With the moderation from the OLC4TPD eModerator, participation through Facebook gradually improved. The lurkers started to be active participants when the eModerator identified the needs of the community, started to share relevant information consistently and organised online meetings on Skype regularly.

d. Phase 4: Reflection and Documentation

Documentation is an important part of any DBR study. The researcher investigated the evolution of OLC4TPD from its conception involving iterative processes of reflection as well as documentation throughout the entire study. The purpose of this phase was to reflect the process of change that had happened prior, during and after the design, development and implementation of OLC4TPD in order to produce design principles or guidelines that could inform others wishing to create similar or parallel communities of practice online. The whole journey was documented in order to allow the process of reflection to iteratively test and refine the concept of OLC. Online community transcripts collected from various resources were examined to understand the process and how changes and refinements to interventions could make a significant change in practice. From the discourse analysis of three main online environments, it was conveyed that OLC4TPD has played a significant role in developing a new framework of online TPD using the concept of community practice contextualised for Indonesian setting. Several impacts of OLC4TPD in teachers’ professional learning are:

1. **Joint lesson planning to implement innovation.** Several teachers engaged in collaborative activities to develop lesson plans, get collective feedback and make a noticeable improvement in their classrooms.
2. **Peer coaching (reciprocal observation).** A series of talks on peer coaching was conducted through online meeting. A junior teacher shared how she has built her knowledge throughout the time by reading the posts by other community members and engaging in Facebook and Skype conversation.
3. **Collegial Cultures.** OLC4TPD members supported each other when others shared their problems faced in the daily teaching and learning activities at individual schools.
4. **Reflection and Discussion.** Reflecting on the professional practice was one of the most popular discussion topics at OLC4TPD. The discussion has enriched and helped the members to improve their practice.
5. **Problem Solving.** Many teachers shared their problems with others in the community, while other teachers and teacher educators usually offered helps by providing some ideas and solutions to the problems.
6. **Development and Sharing of Materials.** The members voluntarily shared their teaching materials, such as articles, notes, diaries, lesson plans and photo, which benefited the other community members.
7. **Examination of Student Work.** A number of ongoing critical discussions on national assessment and its challenges were conducted on the Web Portal Discussion Forum.
8. **Increase Understanding of Sound Assessment.** Several online meetings were conducted to engage members in critical discussion and reflection on assessment including digital assessment.
9. **Self-determination Moderated by Collegial Accountability.** Several teachers decided to change their weak teaching practice after joining OLC4TPD meetings or engaging in asynchronous discussions.
10. **Empowerment.** Teachers regardless their geographical locations felt supported by OLC4TPD, because they could have the same chance and access to engage in professional discussions with other educators across the country without having to wait until the schools sent them for official teacher forums.

**Conclusion**

Through design-based research, it was conveyed that an OLC-based model has much potential to enhance ongoing TPD in Indonesian context. The feasibility of this model to support the existing TPD practices to reach out teachers across different geographical locations and engage them in ongoing social learning interactions needs further investigation. The result showed that this initiative, with its limitations, has encouraged its members to engage in ongoing social learning interaction processes with other educators from different geographical locations and educational institutions in Indonesia. Teacher professional competencies were developed, confidence was
increased, professional networks were expanded, educators were empowered, and teachers from rural and remote areas were given equal opportunities to develop. All were affected with limited resources (e.g., time and funding). Considering these impacts, the culture of social learning interaction within an OLC should be supported and nurtured by government institutions, teacher training institutes and other education organisations, for example: a systematic program of ongoing TPD using social media and mobile technology could be intentionally developed and implemented to improve the quality of in-service teachers in Indonesia.

This professional development model (as described in Sari 2012, and Sari & Lim, 2011) could be implemented in other contexts that share similar ICT landscapes and socio-cultural heritages. By learning from the similarities and differences, this will save the need for trial and error in implementing a completely new TPD model into existing practice. Anderson and Shattuck (2012) in their seminal paper on the impact of over a decade of DBR studies, speculated on whether the approach was capable of ‘bringing about large-scale and far-reaching systems reforms’ or whether it was a methodological approach ‘more suitable in small-scale systems’ (p. 24). Most of the studies covered in their review appeared to belong to the latter characterisation, that is, interventions that resulted in small improvements. However, they noted emphatically that ‘even small changes can have long-term effects’ (p. 24). This sentiment is reflected strongly in the current study. Small changes and improvements to many teachers’ pedagogical practice can have sustained and long-term effects when multiplied through the sharing of best practice across a nation.

References


