Exploring the Effectiveness of Technology Integration Professional Development Models in K-12 Settings

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Abstract

The increase in the presence of educational technology in classrooms has led to the need for more professional development. However, there have been discrepancies in the type of learning opportunities that should be afforded to teachers to assist in the technology integration process. Through the decades of research on the subject, seven elements have emerged as the ideal characteristics for the design of effective professional development. The purpose of this study is to analyze technology integration professional development models within the context of these seven elements. The eight studies chosen were based in K-12 education in the United States from 2015 to 2019. The findings showed that each of these studies contained at least three elements of effective professional development, with modeling, reflecting, and feedback being the least frequently integrated. This review of the literature confirms the need for more examination of various technology integration professional development models in K-12 education.

Introduction

The term "professional development" is closely linked to education. Embedded into the educator job description is the need for the continuance of improving one's craft through participation in professional development learning experiences, bringing new ideas and expertise into the classroom. The idea of developing the most effective professional development has been extensively studied. Participation in these ongoing learning experiences has the potential to change both teacher attitudes and their practices (Desimone, 2009). In turn, teacher engagement in effective professional development could result in the improvement of student achievement and performance (Saxe et al., 2001).

The traditional model of professional development is a one-time workshop with an outside presenter giving a lecture with subsequent activities. Even from the early years of research within this field, this traditional framework has been scrutinized. Due to the time restrictions and lack of appropriate activities for participants, the traditional professional development model has been criticized as ineffective (Guskey & Yoon, 2009; Loucks-Horsely, Hewson, Love & Stiles, 1998). The design of professional development experiences needs to be carefully planned and organized while focusing on the necessary content (Guskey & Yoon, 2009). Ideally, professional development experiences would move beyond lectures and provide opportunities for teachers to plan for implementation (Penuel, Fishman, Yamaguchi, & Gallagher, 2007).

While professional development emphasizes the learning of new pedagogical and content knowledge strategies to incorporate into the classroom, technology integration sessions build on this foundation while adding digital tools and resources. However, technology professional development and training should not solely focus on the tool (Carlson & Gadio, 2002). The

technology resources need to be paired with content development and instruction for optimal effectiveness (Carlson & Gardio, 2002). Furthermore, when teachers participate in technology-focused professional development, the outcome should be a larger understanding of how to adapt their pedagogy (Matherson et al., 2014; Matzen & Edmunds, 2007).

The Seven Elements of Effective Professional Development

In the decades of studying teacher professional development, a variety of researchers have drawn their own conclusions about the elements that make sessions effective. Garet et al. (2001) used a survey of math and science teachers to determine that an emphasis on content knowledge, active learning, and coherence to be of value in professional development, while simultaneously arguing that there is value in the design of each learning activity, job-embedded collaboration, and an increase in participation time (Garet et al., 2001). This research built on the previous conclusions by Birman, Desimone, Porter, and Garet (2000), which identified form, content awareness, active learning, and coherence as the key factors to the design of successful professional development.

Darling-Hammond, Hyler, & Gardner (2017) drew from the work of the researchers before them to generate their own consensus about effective professional development. After examining 35 studies over the course of three decades, seven elements were selected due to the fact each of the studies contains some combination of the elements and 30 studies contained all seven (Darling-Hammond et al., 2017). The elements of effective professional development included focus on content, active learning, collaboration, modeling, coaching and experts, feedback and reflection, and time frame (Darling-Hammond et al., 2017).

The content focus element incorporates discipline-specific pedagogical strategies. Active learning refers to the use of authentic, interactive, hands-on strategies to better connect the

professional development content into the teachers' classrooms (Darling-Hammond et al., 2017). Collaboration allows for teachers to join together with other people in their district, matched by grade level, school, or content area to share ideas (Darling-Hammond et al., 2017). Through the element of coaching and expert support, people with specific expertise support the personalized needs of each educator (Darling-Hammond et al., 2017). The final two elements emphasize the need for opportunities to reflect or seek feedback on one's practice and the need for the duration of a professional development experience to be longer-term (Darling-Hammond et al., 2017)

Methods

The process for searching for relevant articles for this literature review began by searching through the WorldCat Discovery database in the New Jersey City University library. This all-encompassing database uses a single search system to find all relevant resources and articles contained by the library, including print books, e-books, and scholarly articles. The initial search query was for the keywords: "professional development", "teachers", and "technology integration." This search was further limited by applying the year filters, eliminating all articles before the year 2015. The list of results was left at 256 after the "peer-reviewed" filter was applied and left articles from the following databases: SAGE journals, ProQuest Central, WorldCat.org, ERIC, Academic Search Complete, and Gale Academic OneFile.

The remaining articles were subject to abstract review. Studies that focused on higher education were eliminated. The search was geographically limited to studies conducted in the United States, specifically with K-12 school districts. Furthermore, studies were selected based on the abstract inclusion of a tested model of professional development. The study had to use an approach where the researcher tried and evaluated a new or existing model of professional

development for teachers and detailed the design process within the study. With those search criteria considered, eight articles remained for full-text analysis.

Findings

Within each study, the design and execution of the professional development model were analyzed. Each of the studies was evaluated within the Darling-Hammond et al. (2017) seven elements of effective professional development to see which models incorporated the elements and in what capacity. Of the eight technology integration professional development studies, two contained all seven elements. The remaining studies contained three or more of the effective elements. Both the use of modeling and the incorporation of feedback and reflection were absent most frequently from the studies. Every study contained a sustained duration, where participants were involved in the professional development experience for an extended time including week-long institutes, online courses, and weekly or monthly coaching sessions. In addition, all the studies except one contained the inclusion of a coach or an expert to support the participants.

Content-Specific

Each of the eight technology integration professional development models made a connection to a specific content area. Furthermore, six of the eight studies referred to science curriculum and instruction in some capacity. Other subjects included social studies (Beriswill et al., 2016) and literacy (Hutchinson & Woodward, 2018). Aside from the introduction of technology tools, participants were taught how to bring the available digital resources into the standards and curriculum. For example, Beriswill et al. (2016) discussed the Global Academic Essentials Teacher Institute (GAETI), where each participant had to consider individual content area standards concerning the technology tools being presented. Similarly, Longhurst et al. (2016) created modules within the professional development model where educator participants

were learning technology lessons alongside scientific curricula. Participants discovered virtual simulations within the context of investigating "the factors that influence relationships between organisms" (Longhurst et al., 2016, p. 432). For Moore et al. (2016), participants learned to both troubleshoot and use the Geographic Information System (GIS) while also discovering and designing activities that relate to the state and national curriculum standards.

Active Learning

Active learning refers to the need for interactive, hands-on components to professional development (Darling-Hammond et al., 2017). These types of activities allow for the participants to move beyond passive listeners in a professional development experience and instead allow teachers to gain a better understanding of the needs of their students (Desimone et al., 2002). Within each of the eight studies that provided active learning opportunities, each model provided time for participants to have hands-on experience with the technology tool they were learning. Ciampa and Gallagher (2015) created a scavenger hunt activity for participants to allow them to become accustomed to the features of the e-learning portal. Gunter and Reeves (2017) continuously allowed for participants to have hands-on experience with iLearning. Moore et al. (2016) provided opportunities for participants to practice teaching the use of their GIS by using small groups of students and colleagues.

In each study, once participants were comfortable with the new technology, they were tasked with planning to integrate it into their classroom. Darling-Hammond et al. (2017) cite the ability to consider how the new content can be incorporated into a classroom as the next part of the active learning process within professional development. After the troubleshooting process, Moore et al. (2016) focused the professional development, not on the technology usage, but instead on how to develop plans for implementation. Hutchinson and Woodward (2018) had their

participants create a long-term plan for integrating skills and technology into their pedagogy. Ciampa and Gallagher (2015) had participants use the co-design process to translate their newfound skills into a unit for their classroom.

Collaboration

With regard to technology professional development, experiences need to be both authentic and collaborative (Carlson & Gadio, 2002). Teachers need opportunities to work with others within the same grade level or content areas, as well as to connect with their building-level teams and work with educators outside of their district (Darling-Hammond et al., 2017). Each of the professional development models in the studies, except one, include some form of collaboration, whether in a small group, large group, or one-on-one setting. Many studies emphasized larger group discussions about instructional topics (Beriswill et al., 2016; Longhurst et al., 2016). Hutchinson and Woodward (2018) separated groups based on teachers within the same school or grade-level team for discussion purposes.

Some studies allowed for collaboration to create actual materials for a course (Campbell et al., 2015; Matuk et al., 2016). Ciampa and Gallagher (2015) utilized the co-planning model to give participants two full days to plan for instruction in small groups. In developing a "pod" structure, Longhurst et al. (2016) allowed for participants to form a community with the others in the professional development experience to share resources. This community of practice atmosphere is mirrored in Moore et al. (2016), which used grouping to assist with communication and support between both the participants and the professional development staff.

Modeling

The integration of modeling experiences into professional development was one of the least used elements within the eight studies. Five studies used the idea of models in some capacity. Modeling does not necessarily have to involve the demonstration of a lesson by an expert; participants could look at mentor examples, curriculum materials, or observe other participants (Darling-Hammon et al., 2017). The majority of the studies focused on the latter: providing mentor materials and resources to model strategies for curriculum and technology integration. Beriswill et al. (2016) modeled activities through GAETI, specifically pedagogical strategies that blended the Common Core Standards and 21st century skills. In Hutchinson and Woodward's (2018) study, participants were sent weekly emails with examples of technology integration mentor lessons. The purpose was for participants to extend these examples to create lessons for their classrooms (Hutchinson & Woodward, 2018). Matuck et al. (2016) created mock-ups and artifacts that participants were eventually able to critique and discuss during sessions.

Coaching and Expertise

There is criticism in the field of education about using an outside expert to provide professional development for teachers (Guskey & Yoon, 2009). However, in a review of student outcomes and performance, Guskey and Yoon (2009) found that professional development experiences where experts are brought into a district can lead to improved student performance in the classroom. Darling-Hammond et al. (2017) did not limit expertise to outside professionals and instead extended the criteria to include coaches. Seven of the eight studies included some variation of coaches or outside professionals. Several of these studies emphasized the importance of collaboration between the outside expert and the educators. For example, Moore et al. (2016) used the community of practice framework to increase communication between the teacher

participants and the staff to determine how each teacher could integrate GIS into their classroom. Instructional coaches held a similar role, connecting with each participant to provide them with resources and strategies to support their needs (Hutchinson & Woodward, 2018). Longhurst et al. (2016) had university staff and teachers co-construct materials and curriculum alongside one another.

Feedback and Reflection

Aside from the use of models or modeling, providing opportunities for feedback and reflection were the least utilized element in the eight technology integration professional development studies. Only five studies contained any degree of either feedback or reflection. Hutchinson and Woodward (2018) offered both feedback and reflection within their professional development model. As teachers moved through the Technology Integration Planning Cycle (TIPC) and discovered more about integrating technology into student learning experiences, the participants were provided with a variety of chances for reflection and feedback from the researchers (Hutchinson & Woodward, 2018). Through this experience, teachers were observed at least once, although some teachers were observed more frequently depending on scheduling. The researchers used a rubric to evaluate the teacher's use of the TIPC framework into their lessons and the teacher completed their self-reflection (Hutchinson & Woodward, 2018). This professional development experience allowed for both authentic feedback based on real classroom observations and reflective practice.

Other studies offered more opportunities for reflection, rather than feedback. As teachers integrate technology into the classroom, they must reflect on their experiences (Matherson et al., 2014). For the participants in the GAETI social studies professional development, blogging was encouraged after each session (Beriswill et al., 2016). In their workshops, teachers were exposed

to different content, pedagogy, and technology explorations, including digital history tours, flipped classrooms, simulation, and video production, among others (Beriswill et al., 2016). Following these experiences, the teachers blogged, which allowed them to extend the learning by connecting it to their own life and practice in a meaningful way (Beriswill et al., 2016). Ciampa and Gallagher (2015) offered a similar option for participants, where engaging in conversations through the district's blog became part of the professional development experience and allowed for individual reflection.

Conclusion

This study aimed to analyze the elements of different technology integration professional development experiences for educators. The selection of eight studies from 2015 to 2019 was measured against the seven elements of effective professional development (Darling-Hammond et al., 2017). Although technology in education has been present for decades, few studies discuss the design of professional development models for this area. However, the studies that do meet this criterion often utilize at least a few of the elements of effective professional development. The low quantity of peer-reviewed journal articles related to the design of technology-integrated professional development for K-12 teachers suggests a need for further research in this area.

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