

Faculty Learning Communities to Support Technology Integration: A Literature Review

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Abstract:

This literature review provides an examination of the existing research pertaining to Faculty Learning Communities (FLCs), groups of faculty that interact across disciplines to address issues pertaining to teaching and learning (Cox, 2004), as an educational development strategy to support faculty proficiency in the integration of technology into teaching and learning. It begins by considering what constitutes a FLC and summarizes the major rationales that have been offered for the inclusion of FLCs in educational development endeavours. It then explores findings from the literature that focus specifically on the strategies that studies indicate need to be present for the initiation and facilitation of successful and productive FLCs to support technology integration.

Key Words:

communities of practice, educational development, faculty learning communities, professional development, technology-enhanced learning, technology integration

Introduction

Digital technology has played a substantial role in influencing the current teaching and learning landscape in higher education. The rapidly evolving landscape of digital technologies and the increasingly digitally knowledgeable student population has increased the technological competence required by most higher education faculty (Dahlstrom, Brooks, Grajek & Reeves, 2015; Oblinger & Oblinger, 2005; Nugent et al., 2008; Prensky, 2009). In many instances, there is a gap between student expectations for the integration of digital technology, and the ability of the faculty to achieve such integration (Moore, Moore, & Fowler, 2005). Faculty are continually challenged to expand their technological proficiency and keep pace with emerging digital technologies. The growing expectations associated with technical competency and integration suggests that colleges and universities need to provide ongoing support for faculty to help encourage effective and appropriate integration of technology into their teaching and learning practice (Daly, 2011).

Educational development for technology integration is traditionally offered via face-to-face workshops or short courses facilitated through centralized educational development offices (Garet, Porter, Desimone, Birman, & Yoon, 2001). While workshops can provide introductions to the uses of specific digital technologies, the likelihood that a stand-alone workshop will effect a lasting change in faculty integration of technology is minimal (Glickman, Gordon, & Ross-Gordon, 2007). Over the past several years, there has been a growing recognition that effective educational development needs to incorporate opportunities for faculty to work together in furthering their professional growth. The utilization of various forms of Faculty Learning Communities (FLCs) has become a common element in many educational development programs. These communities provide a venue for faculty from different disciplines to collectively and critically reflect on their teaching practices (Cox, 2001).

FLCs have the potential to provide the supportive educational development required for faculty to develop and maintain their competence and fluency with the use of digital technology for teaching and learning. A major challenge for institutions and educational developers is harnessing current knowledge regarding best practices for effectively initiating and facilitating FLCs to support the integration of technology into faculty's teaching and learning practice. Therefore, a better understanding of the strategies that foster the development and sustainability of successful, effective FLCs is needed in order to provide guidance to educational developers responsible for supporting technology adoption within their institutions.

As more and more students who have grown up with digital technology continue to enter higher education, the demand for faculty to integrate technology into the classroom will continue to increase (Nugent et al., 2008). The purpose of this literature review is to provide an examination of the existing research pertaining to FLCs as an educational development strategy to support faculty proficiency in the integration of technology into teaching and learning. Included in the review are peer-reviewed articles that address the design, development, and/or use FLCs in any form of faculty professional training or development concerning technology integration from 2003 to 2015. The search included electronic databases focused on education research (including Academic Search Complete, Education Research Complete, ERIC, etc.) where the following key search words were used separately or in combination: educational development, faculty learning community, faculty professional development, community of practice, technology enhanced learning, digital technology, and technology integration. The literature search revealed 14 studies that focused on the topic of FLCs as an educational development strategy to support faculty proficiency in the integration of technology into teaching and learning. It is hoped that the results of this literature review will guide higher education institutions and educational developers as they plan, initiate, and facilitate FLCs to help support the assimilation of digital technology into teaching and learning.

FLCs Defined

FLCs have become widely discussed as forums for educational development. Milton Cox (2001; 2004), developer of FLCs at Miami University of Ohio, has been one of the main pioneers of the FLC movement within higher education (Kalish & Stockley, 2009).

Cox (2004) defines a FLC as an interdisciplinary group of around 8-12 faculty and staff who engage in an extended (typically year-long) planned program to enhance teaching and learning that incorporates frequent activities to facilitate learning, development, and community building. FLCs typically fall into two categories: cohort-based and topic-based. Cohort-focused FLCs address the teaching, learning, and developmental needs of a specific cohort of faculty, with the curriculum depending on the nature of the group and their requirements. Alternately, topic-based FLCs are designed to address a particular teaching and learning need, issue, or opportunity (Cox, 2004; Nugent, et. al, 2008).

FLCs represent a sustained model of educational development as they allow for continued interaction and reflection, rather than offering a one-time, limited duration learning opportunity (Layne, Froyd, Morgan, & Kenimer, 2002). The members often determine the way in which the group operates and the frequency of meetings, although the process typically includes frequent seminar-style meetings where faculty discuss teaching and learning and obtain advice, feedback, and support from one another (Daly, 2011). FLCs may be self-generated or they may be initiated through an institutional initiative or via an educational development center or program (Sherer, Shea, & Kristensen, 2003).

Cox (2013, p. 18) describes FLCs as “a special type of Community of Practice (CoP) in higher education.” A CoP is defined as a “group of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis” (Wenger, McDermott, & Snyder, 2002, p. 4). CoPs typically involve a much broader collection of community types, sizes, and structures beyond the FLC model. For example, CoPs can be anywhere from four or five members to a hundred members or more, they can develop organically or spontaneously, and can exist for an extended period of time (Wenger, 1998). In contrast, FLCs are small (8-12 members), short-lived (usually one year), local to the institution, and are intentional with respect to group structure, priorities, and relationship to the institution (Cox, 2013).

The Rationale for FLCs

In a study examining the effectiveness of educational development for US educators, Garet, Porter, Desimone, Birman, and Yoon (2001) found that sustained educational development opportunities were more likely to have an impact, as reported by educators, than shorter educational development offerings. Murray (1999, 2001), in a survey administered to faculty development officers at 130 American community colleges found that most educational development activities at the college-level involved ad hoc activities that did not lead to substantial or lasting changes in the classroom. Although these activities aroused faculty interest at the time of participation, they generally failed to prompt faculty to reflect on their teaching practices over a longer period of time (Murray, 1999).

A growing body of research has begun to document the effectiveness of FLCs as a model for educational development. FLCs represent a shift in focus from formal training to ongoing learning in practice, which requires faculty to actively participate in knowledge creation, fostering greater personal responsibility for their own growth and

development (Sobrero & Craycraft, 2008). Beach and Cox (2009) conducted a survey examining the impact of FLCs on faculty self-reports of student learning outcomes across six American universities. They found that as a result of their participation in FLCs, faculty reported using new pedagogical approaches. O'Meara (2005) examined the outcomes of a year-long FLC that included faculty in science, engineering, and mathematics from seven colleges in the US. In their study, faculty members' self-reported teaching effectiveness improved as a result of participating in the FLC. Other research indicates that participation in FLCs can improve scholarly practice, foster higher levels of interdisciplinary collegiality within the institution and establish a foundation for sustained professional development based on a spirit of inquiry (Cox, 2002; Heath & McDonald, 2012).

According to Di Petta (1998), as higher education changes dramatically in response to the rapid diffusion of digital technology, faculty require new ways of working together to prepare for the integration of this technology into their teaching and learning practice. FLCs have the potential to encourage and support faculty to investigate, attempt, assess, and explore new methods for adopting technology enhanced teaching and learning. FLCs provide faculty with the opportunity to regularly interact with colleagues, and talking about technology adoption issues with their peers could potentially inspire them to adopt technology for teaching and learning purposes. Given that FLCs are interdisciplinary, they also allow faculty to connect with colleagues and hear perspectives not usually available to them, which can help to validate what they know about technology integration, and identify the common challenges they share with colleagues (Layne et al., 2002).

Summary of the Literature Reviewed

Of the 14 studies reviewed, 7 were qualitative in nature and followed a descriptive case study design. For example, Eib and Miller's (2006) article describes a FLC that was designed to prepare faculty to effectively integrate technology to support an active learning approach at the University of Calgary. Roberts, Thomas, McFadden and Jacobs (2006) explored the case of a FLC focused on faculty preparation for digital instruction at Western Carolina University, highlighting the benefits to the institution. In their paper, Nugent et al. (2008) describe the initial year of a FLC with a focus on integrating digital technology and instruction established at Virginia Commonwealth University. Long, Janas, Kay and August (2009) also used a qualitative approach to illustrate the use of a FLC to support technology integration at Baldwin-Wallace College. In addition, Stock-Kupperman (2015) conducted a descriptive case study examining three different FLCs at Viterbo University, one dedicated to iPad adoption, another focused on teaching with technology, and one focused on flipped classrooms.

In their study, Schlitz et al. (2009) describe how a FLC was used at Bloomsburg University to support the implementation of new technology and, in doing so, lead to the collective adoption of a web-based rubric model for performance evaluation. Reilly, Vandenhouten, Gallagher-Lepak, and Ralston-Berg (2012) highlight a multi-campus FLC that made use of distance technology to connect nursing educators at the University of Wisconsin. Similarly, Ward and Selvester (2012) describe their experiences introducing faculty at California State University to a learning community

that encouraged the adoption of technologies to provide access to learning for students with disabilities. Soodjinda, Parker, Meyer and Ross (2015) describe another FLC at California State University, called the Digital Ambassador Program, which is focused on supporting faculty leaders who champion the use of educational technologies within their respective campuses.

Vaughan (2004) utilized a mixed methods approach to design a pilot study involving eleven faculty members who participated in a blended FLC at Mount Royal College to learn how to integrate technology into their teaching practice. Surveys, post-study interviews, and a focus group were conducted to examine the role of technology in supporting inquiry cycles in a FLC. Heath and McDonald (2012) also employed a mixed methods design based on personal observation and survey data in their exploration of FLCs at Wilfrid Laurier University. Niebuhr, Niebuhr, Trumble, and Urbani (2014) studied an online FLC at the University of Texas Medical Branch that was focused on supporting faculty in developing e-learning materials. Their evaluation was conducted using a mixed methods design of quantitative and qualitative data analysis. Wicks, Craft, Mason, Gritter and Bolding (2015) also employed an exploratory case study methodology to examine the potential benefits of using an FLC to support faculty adopting blended learning and incorporating new technologies in the classroom at Seattle Pacific University. They used a mixed methods approach and gathered feedback from faculty using two different surveys that included qualitative and quantitative data.

Horvitz and Beach's (2011) study was the only one that made use of a quantitative research design. They investigated a FLC at Western Michigan University that consisted of five faculty from a wide variety of disciplines. The FLC participants completed the Educators' Sense of Efficacy for Online Teaching Scale (Robinia, 2008) three times: at the start of a Master eTeacher Program, at the end of an initial 8- week set of workshops, and after completion of the FLC portion of the program.

Initiation of FLCs

In several cases, the impetus for the initiation of a FLC to support faculty adoption of technology for teaching and learning came from grant support (Horvitz & Beach, 2011; Long et al., 2009; Reilly et al., 2012; Ward & Selvester, 2012). In other instances, the formation of a FLC dedicated to faculty adoption of technology was initiated at the institutional level (Eib & Miller, 2006; Heath & McDonald, 2012; Niebuhr et al., 2014; Nugent et al., 2008; Soodjinda et al., 2015; Vaughan, 2004, Wicks et al., 2015). Conversely, the FLCs at Western Carolina University and Bloomsburg University emerged as grass roots initiatives led by faculty members (Roberts et al., 2006; Schlitz, et al., 2009). The FLCs at Viterbo University were initiated by the Director of the Library with the support of the VPAA, faculty development office, faculty representatives, and IT representatives (Stock-Kupperman, 2015). The studies reviewed failed to provide a rationale for their initiation approach, and none of them examined the impact of the initiation strategy on faculty recruitment and participation, or on the outcomes of the FLC. Thus, it is difficult to draw any evidence-based conclusions about the most effective approach for initiating a FLC to support faculty proficiency in the integration of technology into teaching and learning.

Several of the FLCs had an application process that required faculty to complete an application form in order to participate in the FLC (Eib & Miller, 2006; Long et al., 2009; Niebuhr et al., 2014; Nugent et al., 2008; Schlitz et al., 2009; Ward & Selvester, 2012; Wicks et al., 2015). Long et al. (2009) and Schlitz et al. (2009) indicated that they hoped requiring faculty to demonstrate their interest in the FLC via an application process would help to solidify their commitment to the FLC, although these studies did not include any attempt to examine if this was the case. The remaining studies that implemented an application process (Eib & Miller, 2006; Nugent et al., 2008; Ward & Selvester, 2012; Wicks et al., 2015) did not provide any justification for this approach and did not measure its impact on faculty interest or commitment. In addition, there was no indication of the strategies utilized for recruiting applicants, advertising the FLCs, or publicizing the application process.

In a few instances the participants were provided with a stipend to compensate them for their participation in the FLC and to support the integration of technology into teaching and learning (Eib & Miller, 2006; Long et al., 2009; Nugent et al., 2008; Schlitz et al., 2009; Ward & Selvester, 2012). There was no analysis of the impact of the stipend on faculty participation or on the results of the FLC. In the case of the iPad integration FLC at Viterbo University, participants received an iPad for their use during and after the FLC, as well as a \$100 gift card to the app store (Stock-Kupperman, 2015). The literature did not include any reference to the perspectives of the faculty in terms of the initiation of the FLCs, and there was no discussion of any opposition from faculty with regards to participation in the FLCs. In all instances, participation in the FLCs was voluntary on the part of the faculty, which could help to explain why there was no mention of opposition.

Facilitation of FLCs

In most cases, the FLCs were facilitated by a member of the institution's faculty development centre (Eib & Miller, 2006; Heath & McDonald, 2012; Horvitz & Beach, 2011; Nugent et al., 2008; Reilly et al., 2012; Vaughan, 2004; Ward & Selvester, 2012). The FLCs at Baldwin-Wallace College and Bloomsburg University adopted a co-facilitation model with one faculty member, and a member from the institution's faculty development centre or technology department forming a leadership combination (Long et al., 2009; Schlitz et al., 2009). The FLC at the University of Texas was facilitated by four faculty members with curriculum development expertise and one staff member with technical expertise (Niebuhr et al., 2014). At Viterbo University, the FLCs were facilitated by a leadership team that consisted of the Director of the Library, a faculty development officer, an instructional design support specialist, and the help desk manager (Stock-Kupperman, 2015).

The facilitators assumed different roles within the FLCs, in some instances they served as the group coordinator focusing on the operational and logistical aspects of the FLC (Heath & McDonald, 2012; Horvitz & Beach, 2011; Long et al., 2009; Reilly et al., 2012;) and in other instances they provided coaching, training, project management support and resources to assist the FLC members in their exploration of technology for teaching and learning (Eib & Miller, 2006; Nugent et al., 2008; Schlitz et al., 2009; Vaughan, 2004; Ward & Selvester, 2012).

Nugent et al. (2008), Long et al. (2009), and Schlitz et al. (2009) all described the facilitators of the FLCs as experienced faculty with strong technological expertise. Wicks et al. (2015) mentioned that the facilitator of their FLC had never participated in an FLC before and was not always clear of his role. The remaining studies did not provide any information regarding the facilitators' background or expertise, and there was no indication within most of the studies as to whether the facilitators had any prior experience supporting FLCs or if they had access to formal training regarding FLC facilitation. Moreover, the viewpoint of the facilitators was not addressed in the literature reviewed, and there was no attempt to examine the relationship between the facilitation of the FLCs and the outcomes of the FLCs.

Format and Structure of FLCs

The majority of the FLCs in the studies reviewed met face-to-face for a year-long period (Eib & Miller, 2006; Heath & McDonald, 2012; Horvitz & Beach, 2011; Long et al., 2009; Niebuhr et al., 2014; Nugent et al., 2008; Reilly et al., 2012; Roberts et al., 2006; Schlitz et al., 2009; Stock-Kupperman, 2015; Ward & Selvester, 2012; Wicks et al., 2015). The FLC at Mount Royal College met over a three month period and used a blended model that included face-to-face meetings with a series of online activities in between (Vaughan, 2004). Texas University also used a blended model with an initial face-to-face session followed by a combination of synchronous and asynchronous online interactions (Niebuhr et al., 2014). At the University of Wisconsin, the multi-campus FLC met via synchronous videoconference and communicated online between meetings (Reilly et al., 2012) as did the Digital Ambassador FLC at California State University (Soodjinda et al., 2015).

The FLC meetings varied from bi-weekly (Long, et al., 2009; Nugent et al., 2008; Vaughan, 2004), to tri-weekly (Heath & McDonald, 2012; Horvitz & Beach, 2011), and monthly (Reilly et al., 2012; Roberts et al., 2006) or bi-monthly (Stock-Kupperman, 2015; Ward & Selvester, 2012). Some of the FLCs began with a kick-off event or workshop series (Eib & Miller, 2006; Horvitz & Beach, 2011; Niebuhr et al., 2014; Schlitz, et al., 2009) and others concluded with a celebration or closing event (Eib & Miller, 2006; Heath & McDonald, 2012; Reilly et al., 2012; Schlitz, et al., 2009).

Nearly all of the FLCs used a project-based model where faculty were required to work on specific projects throughout the duration of the FLC (Eib & Miller, 2006; Horvitz & Beach, 2011; Long, et al., 2009; Niebuhr et al., 2014; Nugent et al., 2008; Roberts et al., 2006; Schlitz et al., 2009; Stock-Kupperman, 2015; Vaughan, 2004; Ward & Selvester, 2012; Wicks et al., 2015). Nugent et al., 2008 reported that the bi-weekly meeting commitment and the project-based model was a significant factor in the success of the FLC. The project based model was also identified as a success factor by Eib and Miller (2006), Schlitz et al. (2009), Vaughan (2004), and Ward and Selvester (2012). The remaining literature did not include any discussion regarding the impact of the format and structure on the success of the FLCs to support faculty proficiency in the integration of technology into teaching and learning.

The size of the FLCs reviewed ranged from five participants to twenty-eight participants, and in most cases they were interdisciplinary, with the exception of the FLC at the University of Wisconsin which consisted exclusively of nursing faculty (Reilly

et al., 2012) and the FLC at the University of Texas which consisted of faculty teaching in health professions (Niebuhr et al., 2014). In general, there was a range of skill level among the participants that varied from novice users of technology to early adopters (Eib & Miller, 2006; Nugent et al., 2008; Roberts et al., 2006; Schlitz et al., 2009; Wicks et al., 2015). There was no attempt within the literature to examine the impact of the size of the FLC or the skill level of the participants on the success of the FLC.

Measuring the Success of FLCs

At Virginia Commonwealth University, success of the FLC was measured by the number of faculty that made identifiable enhancements to their teaching practice. Nugent et al. (2008) discovered that three of the eight FLC members made readily identifiable improvements to their teaching repertoire (for example, creating podcasts of lectures, using wikis as class collaboration tools), and one FLC member documented their experience for publication. In addition, after the success of the initial FLC the university announced the creation of three new additional FLCs. Success of the FLCs at Viterbo University were also measured by the number of faculty that made changes to their teaching practice. At the end of the academic year, Stock-Kupperman (2015) found that all members of the iPad integration FLC were still participating fully and had taught using the iPad in at least one class. In addition, all members of the flipped classroom FLC completed their flipped classroom project and continued to use flipped classroom techniques in their teaching after the FLC. Members of the FLC focused on teaching with technology reported much less consistent results (Stock-Kupperman, 2015). At the University of Calgary, Eib and Miller (2006) found that only half of the participants in the FLC had completed their projects. Despite this, they reported that faculty members improved both their teaching repertoires and their technology skills and that the institution developed the capacity to deliver entire programs online.

At California State University, success of the FLC was measured by the number of participants that adopted the use of at least one type of technology and presented either locally, nationally or internationally on their work using accessible technologies. Ward and Selvester (2012) reported that all seven faculty who participated in the FLC adopted the use of at least one type of technology to improve accessibility, and all seven delivered at least one presentation based on their work in the FLC, and three also published their work in peer-reviewed journals. The University of Texas measured success via participant surveys and interviews, participant products posted for sharing, and the development of learning objects. By the end of the FLC, Niebuhr et al. (2014) found that 22 learning objects had been produced by the participants, and several participants reported helping their learners create online instructional materials. In addition, one participant was awarded a federal grant to support large scale development of learning objects. At Baldwin-Wallace College, Long et al. (2009) reported that all eight participants in the FLC redesigned and offered courses that exemplified best practices of technology integration in hybrid learning. The FLC also established best practices for the future development of hybrid courses at the College and developed guidelines to support decision-making related to offering hybrid courses. In addition, the FLC developed a rubric to evaluate hybrid courses at the College to ensure that the courses contained the characteristics that the FLC determined were important (Long et al., 2009).

At the University of Wisconsin a survey instrument was used to measure success which asked participants to score the impact of the FLC on their understanding of technology integration issues and to identify ways they had applied or planned to apply their new knowledge, skills and attitudes. Reilly et al. (2012) found that 93% of participants described enhanced knowledge and understanding of e-learning, and 95% indicated that participation in the FLC enhanced their ability to evaluate design and delivery methods in online courses. Wicks et al. (2015) utilized two surveys, the Faculty Learning Community Survey and the Faculty Interview Questions, to measure success at Seattle Pacific University which examined each member's motivation for joining the FLC, individual perceptions of the helpfulness of joining the FLC, and the learning opportunities of being members. Through the surveys they found that all of the faculty that participated in the FLC created a blended course that was implemented and that members of the FLC found the exchange of ideas and technology tips useful. Participants also reported that the peer pressure of community expectations was useful, and that being a member of the community was fun. The success of the Digital Ambassador FLC at California State University was also measured using a survey instrument and Soodjinda et al. (2015) discovered that nearly all (82%) of the respondents felt that the FLC had increased their comfort and confidence sharing new technologies for the classroom with colleagues and all of the participants (100%) reported that the FLC increased their knowledge and skills about integrating new technologies in the classroom.

Researchers at Western Michigan University administered the Educators' Sense of Efficacy for Online Teaching Scale three times throughout the FLC to measure the success (Horvitz & Beach, 2011). All five FLC participants completed the instrument each of the three times it was administered, and their scores improved in each subsequent administration. This indicates that the FLC participants felt increasingly efficacious engaging their students, choosing instructional strategies, dealing with online course management issues, and using computers as a result of participating in the FLC.

One of the main limitations of the success measures identified in the literature is that they relied solely on faculty self-reports, which required the faculty to identify how knowledge gained from the FLC influenced their proficiency in the integration of technology into teaching and learning. It is possible that the participants might have applied or adapted principles learned in a FLC without being consciously aware of the origins of that knowledge. The remaining studies (Heath & McDonald, 2012; Roberts et al., 2006; Schlitz et al., 2009; Vaughan, 2004) did not provide any mechanism to measure the success of the FLCs, and there was no attempt to gather evidence as to whether participants actually changed their technology integration practice as a result of their FLC experience. Moreover, there was no attempt in any of the literature reviewed to measure the impact of participation in the FLCs on student learning. The inclusion of an evaluation method that includes informal and formal opportunities for self, peer, and student feedback regarding the perceived impacts of FLCs on faculty teaching practice and student learning would have added to these studies.

Challenges of FLCs

Despite the many successes that were reported in the literature related to FLCs for technology integration, there were also several challenges that were identified. Heath and McDonald (2012) reported that at Wilfrid Laurier University, the FLC members occasionally used the group as a sounding board for institutional complaints, and it was difficult at times to redirect the conversation toward more constructive ends. They also found that the scheduling of the FLC meetings was a challenge as they inevitably conflicted with member teaching schedules. Horvitz and Beach (2011) also found the scheduling and time commitment of the FLC at Western Michigan University to be a challenge and suggested that faculty be given time in their teaching schedule to participate in FLCs. Members of the Digital Ambassadors FLC at California State University also reported that funding to release them from a portion of their teaching load would have increased the impact of the FLC (Soodjinda et al., 2015). The issue of time and scheduling was also echoed by Long et al. (2009) and Reilly et al. (2012). In addition, Ward and Selvester (2012) argued that there should be additional support from administrators so that faculty schedules could prioritise the FLC meetings at California State University, that faculty attending the meetings should get more recognition, and that their participation in the FLC should be considered for retention and promotion purposes.

Niebuhr et al. (2014) found that some participants in the FLC at the University of Texas were reluctant to review their peers' work and to seek peer feedback, either because they felt their work was not yet worthy of review or they did not want to bother their peers. As a result, they tended to rely on the FLC facilitators, rather than the other members of the FLC, for assistance and feedback. At Viterbo University, Stock-Kupperman (2015) found that members of the teaching technology FLC had a low level of commitment to cohort meetings and wanted to be taught how to do everything. They also did not come together as a group, and were very focused on their own work as opposed to the work of others. They concluded that members of the FLC were mostly late majority adopters of technology and were externally motivated by outside pressures which resulted in the FLC model not being as effective for this group. They suggested that a training session instead of a FLC model may be a better choice for this group to learn the technology.

At Mount Royal College, the biggest challenge reported by Vaughan (2004) was getting faculty to participate in the online component of the blended design FLC. He found that the study participants were very eager to attend the face-to-face sessions but less willing to participate in the online activities. The reasons for the lack of engagement in the online component included lack of familiarity with the online communication tools, lower value placed on online communication, online communication overload, and the ability to delay communication until the face-to-face sessions Vaughan (2004). Members of the FLC at Seattle Pacific University requested additional accountability check-ins between monthly face-to-face meetings as they found there was little contact between meetings which made progress on community learning and projects disjointed. The members suggested forming accountability partnerships within the group for checking in and working on projects together, and the implementation of a shared blog space to document ideas, experiences, and progress (Wicks et al., 2015). At the

University of Calgary, Eib and Miller (2006) found that once the FLC formally concluded the excitement around blended learning and the community that had developed quickly diminished in the weeks following the FLC. Participants suggested that another FLC be held, but unfortunately, it wasn't possible for the institution to support a continuation of the process as there was no structure in place to do so.

Discussion of Findings

The literature revealed several important findings that can guide institutions and educational developers as they plan, initiate, and facilitate FLCs to help support the assimilation of digital technology into teaching and learning. In terms of the initiation of FLCs, it was found that many FLCs are initiated through internal or external grants, and through institutional support (Heath and McDonald, 2012; Long et al., 2009; Nugent et al., 2008; Reilly et al., 2012; Vaughan, 2004; Ward & Selvester, 2012). Thus, in order to encourage the development of FLCs, educational developers should investigate internal and external funding options and work to ensure that administrative leadership makes supporting the development of FLCs a high priority. They should also strive to obtain incentives (i.e., stipends, travel to conferences, resources, etc.) to offer to faculty to help encourage ongoing commitment and participation (Eib & Miller, 2006; Long et al., 2009; Nugent et al., 2008; Schlitz et al., 2009; Ward & Selvester, 2012). With regards to facilitation, it would seem that a co-facilitation model, similar to the one followed by Baldwin-Wallace College and Bloomsburg University, would offer the greatest advantage as it would allow for a wide variety of expertise among the facilitators (Long, et al., 2009; Schlitz, et al., 2009).

In terms of the format and structure of FLCs, the literature suggests (Eib & Miller, 2006; Heath & McDonald, 2012; Horvitz & Beach, 2011; Long et al., 2009; Niebuhr et al., 2014; Nugent et al., 2008; Reilly et al., 2012; Roberts et al., 2006; Schlitz et al., 2009; Stock-Kupperman, 2015; Ward & Selvester, 2012; Wicks et al., 2015) that a year-long period is most effective, and given the busy schedules of faculty members, a monthly, or bi-monthly meeting schedule would be a realistic goal for faculty developers to aim for (Heath & McDonald, 2012; Roberts et al., 2006; Stock-Kupperman, 2015). Educational developers may also want to consider the use of a project-based model where faculty are required to work on specific projects throughout the duration of the FLC as this would help to encourage participation and could potentially lead to measurable deliverables (Eib & Miller, 2006; Nugent et al., 2008). When soliciting participation, educational developers may also want to consider implementing an application process, and should work to ensure that the group is interdisciplinary and includes a range of skill level among the participants which would allow novice users of technology to engage with and learn from early adopters (Eib & Miller, 2006; Niebuhr et al., 2014; Nugent et al., 2008; Roberts et al., 2006; Schlitz et al., 2009; Wicks et al., 2015). Finally, another good practice that educational developers may want to adopt is the facilitation of a culminating event at the end of year-long period to celebrate the successes of the FLC and bring closure to the group (Eib & Miller, 2006; Heath & McDonald, 2012).

Implications for Professional Practice

Baldwin (1998) proposes that "To succeed in a technologically advanced era, professors may need to become more interdependent and mutually supportive" (p. 17). Establishing FLCs is one way that institutions and educational developers can foster interdependence and mutual support, and address professional development for the ever greater and ever changing range of technical skills required by today's faculty. Having an understanding of the strategies that have been used for initiating and facilitating FLCs can provide educational developers with a realistic idea of the commitment and resources required as they attempt to foster and sustain FLCs at their own institutions. It can also help them to determine the necessary qualities and criteria for an effective facilitator and provide guidance for identifying and selecting a FLC facilitator. In addition, insight into the initiation and facilitation of FLCs can also help educational developers make decisions about the procedures and criteria for selecting members of the FLC, the expectations for members' participation, and the incentives and reward structures for recognizing participation (Cox, 2004).

Moreover, an awareness of the format and structure of FLCs is also worthwhile for educational developers as it can help to guide their implementation strategies and aid in determining which components to engage at their institutions. Knowledge of the format and structure can also help educational developers make decisions regarding the professional development outcomes of FLCs, the kinds of projects to be carried out by FLC members, the support and resources provided to FLC members and the procedures for assessing the effectiveness of FLCs in achieving the professional development outcomes regarding technology integration (Cox, 2004). By effectively initiating and facilitating FLCs, educational developers have the potential to support faculty to adopt technology for teaching and learning.

Future Directions

This review has found that there is a clear need for further research, particularly empirical research, into the use of FLCs to support faculty proficiency in the integration of technology into teaching and learning. The literature reviewed has documented the initiation, facilitation, format, structure and measurement of FLCs in face-to-face settings, yet only two of the studies reviewed considered online FLCs as a professional development approach to help support technology integration by faculty. Online FLCs could be accessed anytime, just-in-time, and anywhere which affords new possibilities and new options for faculty professional development (Sherer et al., 2003). In addition, online FLCs are no longer limited by physical boundaries which offer greater possibilities and greater opportunities for faculty to collaborate with peers outside of their institutions and local regions, and could even lead to international information sharing. Online FLCs offer potential avenues for faculty to deal with technology integration issues collaboratively with a diverse group of other faculty who might otherwise be difficult to meet. Additional research is needed to understand how online environments could be leveraged by FLCs to help support technology integration into teaching and learning and to enhance and expand faculty professional growth opportunities.

Conclusion

The rapid pace of technological change and the growing expectations associated with technology-enhanced teaching and learning suggest that faculty need systematic support to develop and maintain their fluency in technology integration. FLCs provide a platform where faculty can work in collaborative, collegial spaces investigating ideas, engaging in conversations, sharing resources and expertise, reflecting on practice, and providing support for the integration of technology for teaching and learning (Cox, 2004). This literature review provided an examination of the existing research pertaining to FLCs as an educational development strategy to support faculty proficiency in the integration of technology into teaching and learning. It offers insights which can guide institutions and educational developers as they plan, initiate, and facilitate FLCs to support the integration of digital technologies into teaching and learning.

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Appendix A – Comparison of Literature

Reference	Initiation	Participants	Facilitation	Format	Structure	Setting	Results	Implications for Institution
Eib & Miller (2006)	Institution	<ul style="list-style-type: none"> • Social Work Faculty (# not indicated) • Included application process • Faculty provided with a stipend 	Faculty Development Centre	Project-Based	<ul style="list-style-type: none"> • One-year • Began with a two-and-a-half-day kick-off. • Included mid-year meetings • Concluded with a closing session 	University of Calgary	<ul style="list-style-type: none"> • Generally, the FLC was considered to be a success. • Approximately half of the participants had completed their projects and were able to deliver comprehensive presentations. 	<ul style="list-style-type: none"> • Provided a vehicle to develop teaching capacity required for the Faculty to deliver its Leadership Masters of Social Work online. • Contributed to development of support in the Faculty for the creation of a new director-level position dedicated to e-learning and distance education.
Heath & McDonald (2012)	Institution	<ul style="list-style-type: none"> • # of participants not indicated 	Faculty Development Centre	Show and Tell	<ul style="list-style-type: none"> • One-year • Tri-weekly meetings • Concluded with an end of term social. 	Wilfrid Laurier University	<ul style="list-style-type: none"> • FLC was successful in exposing innovative practices from faculty, and they saw a great deal of collective problem-solving as well as cross-disciplinary resource and idea sharing taking place. 	<ul style="list-style-type: none"> • No reporting of impact.
Horvitz & Beach (2011)	Grant	<ul style="list-style-type: none"> • Five faculty who had taught at least one semester online in the prior two years. 	Faculty Development Centre	Project-Based	<ul style="list-style-type: none"> • One-year • Initial 14 weeks of face to face workshop series • Face to face meeting every second or third week. 	Western Michigan University	<ul style="list-style-type: none"> • Participant scores in each of the subscales of the Online Efficacy Instrument improved. 	<ul style="list-style-type: none"> • Provided evidence that FLCs can be an effective tool in helping university faculty make the transition from novice, advanced beginner, or competent to more expert self-concepts and practices in teaching online.
Long et al. (2009)	Grant	<ul style="list-style-type: none"> • Eight faculty members • Included application process • Faculty provided with a stipend 	Co-facilitated by Faculty Development Centre and Faculty member	Project-Based	<ul style="list-style-type: none"> • One-year • Bi-weekly meetings 	Baldwin-Wallace College	<ul style="list-style-type: none"> • Helped individual faculty to develop courses, and also helped establish a framework for online learning on campus. 	<ul style="list-style-type: none"> • Led the establishment of best practices for the future development of hybrid courses at the College. • Developed a course rubric to capture the students' evaluation of the blended courses.

Reference	Initiation	Participants	Facilitation	Format	Structure	Setting	Results	Implications for Institution
Niebuhr et al. (2014)	Institution	<ul style="list-style-type: none"> Twenty-seven health professions faculty 	Co-facilitated by four faculty members and one technical support member	Project-Based	<ul style="list-style-type: none"> One-year Kicked off with initial 2 hour face-to-face group meeting Used a combination of synchronous and asynchronous online interactions 	University of Texas Medical Branch	<ul style="list-style-type: none"> The FLC produced 22 new learning objects. 	<ul style="list-style-type: none"> One participant has been awarded a federal grant to support large scale development of learning objects. Several participants are now helping their learners create online instructional materials.
Nugent et al. (2008)	Institution	<ul style="list-style-type: none"> Eight faculty members Included application process Faculty provided with a \$1000 stipend 	Faculty Development Centre	Project-Based	<ul style="list-style-type: none"> One-year Bi-weekly meetings 	Virginia Commonwealth University	<ul style="list-style-type: none"> Three of the eight FLC members made readily identifiable enhancements to their teaching repertoire. 	<ul style="list-style-type: none"> FLC members collaborated on conducting a university-wide survey of the expectations of undergraduates concerning digital technology integration in their courses. The university announced the creation of three new FLCs.
Reilly et al. (2012)	Grant	<ul style="list-style-type: none"> Nursing faculty from five campuses who taught in a collaborative online Bachelor of Science Degree # of participants not indicated 	Faculty Development Centre	Expert Showcase	<ul style="list-style-type: none"> One-year One-hour monthly videoconferences Concluded with a two-day conference 	University of Wisconsin	<ul style="list-style-type: none"> Nine out of ten (93%) faculty described enhanced knowledge and understanding of e-learning. The majority (95%) indicated participation enhanced their ability to evaluate design and delivery methods in online courses. 	<ul style="list-style-type: none"> Resources from the FLC were made available to faculty who taught online in other disciplines.
Roberts et al. (2006)	Faculty	<ul style="list-style-type: none"> Ten faculty members 	Faculty	Project-Based	<ul style="list-style-type: none"> One-year Monthly meetings 	Western Carolina University	<ul style="list-style-type: none"> No reporting of results. 	<ul style="list-style-type: none"> Provided an opportunity for tenured faculty to support untenured faculty and also to learn from their more recent educational learning opportunities.

Reference	Initiation	Participants	Facilitation	Format	Structure	Setting	Results	Implications for Institution
Schlitz et al. (2009)	Faculty	<ul style="list-style-type: none"> • Six faculty • Included application process • Faculty provided with \$200 mini-grants 	Co-facilitated by Faculty Development Centre and Faculty member	Project-Based	<ul style="list-style-type: none"> • One-year • Initial three-day training workshop • Regular follow-up training sessions • Concluded with faculty member presentations 	Bloomsburg University	<ul style="list-style-type: none"> • No reporting of results. 	<ul style="list-style-type: none"> • Increased culture of assessment at institution.
Soodjinda et al. (2015)	Institution	<ul style="list-style-type: none"> • Thirteen faculty 	<ul style="list-style-type: none"> • No information provided about facilitation 	Project-Based	<ul style="list-style-type: none"> • Monthly online meetings 	California State University	<ul style="list-style-type: none"> • Increased comfort and confidence sharing new technologies for the classroom with colleagues. • Increased their knowledge and skills about integrating new technologies in the classroom. • Offered significant support and resources. • Connected them to other faculty doing similar work. 	<ul style="list-style-type: none"> • Helped to build capacity and promote experimentation, collaboration, mentorship, and professional self-renewal among faculty.

Reference	Initiation	Participants	Facilitation	Format	Structure	Setting	Results	Implications for Institution
Stock-Kupperman (2015)	Library, Faculty Development Officer, IT Services	<ul style="list-style-type: none"> Twenty faculty in the iPad FLC in Year 1 and Twenty-Eight in Year 2 Provided with an iPad and \$100 gift card to the app store Eight faculty in the Flipped Classroom FLC Eight faculty in the Teaching Technology FLC 	Facilitated by a leadership team that consisted of the Director of the Library, a faculty development officer, and instructional design support specialist, and the help desk manager	Project-Based	<ul style="list-style-type: none"> One-year Bi-monthly meetings 	Viterbo University	<ul style="list-style-type: none"> All participants in the iPad FLC implemented at least one iPad-based teaching strategy in one of their classes. All participants in the Flipped Classroom FLC completed their flipped classroom project and continued to use flipped classroom techniques in their teaching after the initial year. Most of the participants in the Teaching technology FLC completed a technology teaching project. 	<ul style="list-style-type: none"> No reporting of impact.
Vaughan (2004)	Institution	<ul style="list-style-type: none"> Eleven faculty members Faculty provided with release time 	Faculty Development Centre	Project-Based	<ul style="list-style-type: none"> Met six times, on a biweekly basis for three months 	Mount Royal College	<ul style="list-style-type: none"> No reporting of results. 	<ul style="list-style-type: none"> No reporting of impact.
Ward & Selvester (2012)	Grant	<ul style="list-style-type: none"> Seven faculty members Included application process 	Faculty Development Centre	Project-Based	<ul style="list-style-type: none"> One-year Bi-monthly meetings 	California State University	<ul style="list-style-type: none"> All faculty who participated had adopted the use of at least one type of technology to improve accessibility. 	<ul style="list-style-type: none"> All seven of the faculty presented either locally, nationally or internationally on their work using accessible technologies.
Wicks et al. (2015).	Institution	<ul style="list-style-type: none"> Six faculty Included application process 	Faculty	Project-Based	<ul style="list-style-type: none"> One-Year Monthly meetings 	Seattle Pacific University	<ul style="list-style-type: none"> Faculty reported that the FLC was beneficial as it provided practical advice as well as motivation and support. All of the faculty that participated in the FLC created a blended course that was implemented. 	<ul style="list-style-type: none"> The results provided insight into students' experience with the blended learning courses. Confirmed that FLCs are a useful form of professional development.