

Work Package 3: PLCs' Conceptual framework

D3.1 Literature review

Consolidated report

This consolidated literature report on PLCs in higher education and public school system, seeks to highlight the main points acquired by a throughout literature review, identify a number of similarities of PLC characteristics and function across the two educational levels, and provide guidance to the further needs of research in this area. We begin with a consolidated definition of PLCs, then pinpoint to the main positive effects of PLCs, identify the PLCs work characteristics and good practices. Then, we briefly discuss the multiple roles of people found in productive PLCs and the notion of managing PLCs everyday technicalities. We finish the consolidated report with a brief discussion about the gaps we have identified in the literature that worth pursuing in the future, identification of possible synergies between the two education levels, and further research in identifying ways to foster the impact of PLCs on teaching and learning. The consolidated report seeks to identify the main points from the literature, which are then described further in the thorough literature reviews that follow.

Defining PLCs

Professional Learning Communities (PLCs) is a recent, alternative form of professional development which provides teachers/instructors a productive framework to work as “learners” and schools as “communities of learners” (Clarke & Hollingsworth, 2002). PLC is “a group of people sharing and critically interrogating their practice in an ongoing, reflective, collaborative, inclusive, learning-oriented, growth-promoting way” (Stoll et al., 2006, p. 223). In this sense, PLCs refer to small groups (communities) of teachers/instructors (professionals) who share professional visions, interests, and values. These teachers/instructors meet on a regular, basis throughout the school year, based on the shared notion of learning-for-improvement, exchange expertise, and work together with the explicit purpose for enhancing their teaching abilities and practices (Brookhart, 2009; Margalef & Roblin, 2016; Stoll et al., 2006). In this sense, PLCs are directly related to teachers’/instructors’ daily teaching practices, and PLCs’ participants work to identify common issues they face in their everyday teaching, and identify and apply solutions by opening up to one another trustfully.

Positive effects of PLCs

PLCs have been promising for the expansion of teachers’/instructors’ professional learning. Research has highlighted a number of positive effects of the involvement of teachers/instructors in PLCs, related to their satisfaction, attitudes and applications in practice. These include: (i) an increase in the motivation of improving teaching practices (Roth, 2014), (ii) a reduction of the sense of isolation and burnout (Prenger et al., 2019; Roth, 2014), (iii) an improvement of teachers’/instructors’ knowledge, skills, and teaching practices, and thus students’ learning (Roth, 2014; Darling -Hammond et al, 2009; McLaughlin & Talbert, 2001), (iv) an increase in collaboration among colleagues (Stacey & Mackey, 2009). Therefore, teachers’/instructors’ involvement in PLCs enhances the overall capacity of their school/organization.

Important characteristics of PLCs

There are several characteristics that have been highlighted by the literature describing the productive teachers’/instructors’ PLCs (Bolam et al., 2005; Stoll et Earl, 2003). These can be merged into the following: (i) *Sharing common values and vision*. Productive PLCs’ participants need to share common values and visions, on which communities’ actions are decided based on. A shared vision should foster the genuine commitment of all PLC members. (ii) *Reflection and reflective professional examinations*. PLCs’ teachers/instructors need to engage in reflective professional inquiry through reflective dialogue in order to discuss problems of the educational practice and to share and generate knowledge through interaction (Margalef & Roblin, 2016). (iii) *Collective responsibility for student learning*: The

mission in a PLC should not be constricted to simply ensuring that students are taught, but the focus should shift to ensuring that students learn through meaningful and productive learning opportunities (DuFour, 2004). Towards this goal, teachers/instructors in PLCs need to share a sense of responsibility for their students learning (King & Newmann, 2001; Leithwood & Louis, 1998; Kruse et al., 1995;). (iv) *Individual and group professional learning*: PLC work needs to promote both group as well as individual professional learning. (v) *Supportive and shared leadership*: PLCs' teachers'/instructors' work should be characterized by their collaboration focused on learning by working together (Margalef & Roblin, 2016).

Good practices

PLCs work and functions are based on the development of a community of professionals with a shared vision and culture (Cox, 2002). To develop and establish productive PLCs, their members need to work in a safe and supportive environment, which provides opportunities to share and reflect upon ideas, successes, and challenges and promotes community building and informal learning (Tucker & Quintero-Ares, 2021). As research supports (Gerken et al., 2016), informal community spaces created important learning opportunities for their members. The critical aspects of PLCs function, also include the members constitution (may affect members' communication and collaboration) and meetings' structure. To this end, is important to be given time and space for the community's development and then, through collective dialogue decisions for implementations and actions to be taken. In this direction, the implementation and the changes in teachers'/instructors' teachings (at least at the first stages) need to be small in scale, in order to have opportunities for evaluation and reflection.

Multiple roles in PLCs

Research has identify a number of different PLC participant roles for the smooth operation of PLCs. Among them, the role of the PLC coordinator and facilitator is of great importance. Teachers/instructors with insider knowledge of their school/department context, are usually called to lead a PLC as coordinators. Their role is crucial for the PLCs' organization and operation, although they may face several barriers and challenges. In this direction, PLC leaders who act as coordinators need to be supported by a number of tools and strategies in order to productively promote their PLC (Turner et al, 2017; Wenger, McDermott & Snyder, 2002). Additionally, the external facilitator's presence has also highlighted as crucial for the PLC operation. The facilitators can contribute to making the work of the communities more productive by coordinating, creating a proper working environment, and strengthening the ability of the group to generate knowledge about their own teaching (Avgitidou, 2009; McLaughlin & Talbert, 2006). The facilitator is responsible for creating an environment that gives participants opportunities to learn by (1) helping them to stay focused and ensuring continuity in the meetings, (2) stimulating reflection, (3) providing access to relevant resources, (4) providing continuous feedback and (5) helping participants to generate knowledge from their own practice (McLaughlin & Talbert, 2006; Ellerani & Gentile, 2013). The external PLC facilitator should be in close collaboration with PLC leaders (coordinators).

Managing technicalities

The operation and development of PLCs require several elements related to facilitating the participation and interaction of PLC members as well as supporting their learning. Participation in PLCs requires that the work done in them is aligned with teachers'/instructors' everyday teaching practice and that their participation develops them as professionals. PLC work is positively affected when, through restructuring of existing organization's arrangements, the space and necessary time is provided to teachers/instructors for discussion and reflection (Stoll et al, 2006; De Neve & Devos, 2017; Hord & Sommers, 2008; Leclerc et al, 2012; Hairon & Tan, 2017). In addition, productive PLCs require strategic planning for meaningful and effective cooperation between their members (Hargreaves & O' Connor, 2018), as well as creating circumstances for considering different perspectives and making evidence-based decisions (Fullan & Pinchot,

2018). In this direction, it is important to further explore the ways in which cooperation between teachers/instructors can be facilitated, but also the arrangements that need to be made, in order to consolidate teachers'/instructors' professional learning through the PLCs.

Stages of evolution of PLCs

Mclaughlin & Talbert (2006) have proposed that the work of PLCs goes through a 3-stage schema, which may provide a useful tool for recognizing the work in PLCs, PLC participants' needs, and the support required. At the same time this scheme may also be a useful tool for describing the work carried out in PLCs. Their scheme suggests that at the beginning of the PLC work, the work carried out related to changes sought, new emphases or any new tasks and demands are usually associated with somehow a sense of pressure or frustration amongst teachers, as they are guided to identify ways of monitoring their own practices, and collect appropriate classroom-based data to examine what constitutes evidence of progress. At this stage, Mclaughlin & Talbert (2006) suggest, teachers begin to develop research skills, formulating questions, identify concerns and pinpoint to perspectives useful for analyzing data related to the issue of concern of their PLC. A second stage of learning community development, teachers start using a circular process of implementing new practices and seeking small improvements. Despite the difficulties of connecting research with practice, and the possible resistance of teachers to the new way of group operation, at this stage they turn to reflection, begin to collaborate with each other and make decisions about their PLC work, thus contributing to the identification and consolidation of common goals. They also gain procedural knowledge that helps them understand how they can work more productively together. In the third stage of their scheme, Mclaughlin & Talbert (2006) suggest that the development of the actual learning community takes place. The teachers in the PLC work to investigate questions and collect and gather data on the basis of which decisions for actions are made. A sense of shared responsibility guides their decisions to pursue progress, as well as systematic investigative processes, which are embedded in the operation of the school organization.

Gaps in the literature that worth pursuing.

Given all the points above, we suggest that PLCs as a way of improving teaching and learning in schools and universities may be a very powerful approach. Despite the characteristics of productive PLC work that has been identified in the literature, different participant's roles that are important for PLC function, and the productive functions of PLCs that have been described, there are to date limited research efforts that have described in detail the function and the everyday work withing PLCs. Thus, we suggest that there is need for more detailed studies about the function of PLCs, which also related to our deliverable D6.2 related to the description of two case studies from the application of the PLCs in the project. A case study could be one of the ways that this need may be addressed. Additionally, based on a number of shared characteristics in PLCs at the higher education level and the public school system level, it is also important that in the future research focuses on potential differences between the two education levels that are related to the productive function of PLCs in these different contexts. We also feel that the D6.2 may be a way of contributing to this need. Finally, given the limited research work in higher education PLCs, there is a clear need for further studies in this area, which also should be addressed in this project.

Areas of synergies between the public school and the higher education level.

Given the fact, that research in PLCs in the two different educational contexts describes many similarities in the ways PLCs work, an important goal of this project should be to "joint forces" between the two educational levels and find ways and areas of synergies. A possible start could be sharing the knowledge that already exists (mostly in the public school level) about tools and activities that can be used by PLC coordinators in order to help support the various work tasks that take place in the PLCs. This is related to our D4.1 which is part of our work in the WP4 of this project. Another potentially useful collaboration is to exchange

experience from supporting PLCs in the two education levels, which again may guide our work on WP4 and possible WP6. Here it is important to expect that different experiences/needs of instructors/teachers from the two education levels may lead to different ways of handling particular needs or fulfilling particular tasks, that can provide insights to the over education level.

Literature review - Professional Learning Communities in higher education

Introduction

For decades, the professional development of teachers/instructors followed models which involved an expert delivering information to teachers/instructors seeking to influence their teaching strategies, while teachers had a rather passive role (Clarke & Hollingsworth, 2002). These approaches received wide criticism as they mostly failed to make meaningful connections with the teachers'/instructors' classroom realities (Dorier & Maaß, 2012). One-shot-trainings proved to have limited connections to the classroom everyday activities (Lipowsky & Rzejak, 2015).

During the past decades, research has investigated and documented the benefits of collaborative teaching techniques for student learning (Johnson, Johnson, & Smith, 1998; Prince, 2004; Springer, Stanne, & Donovan, 1999). Among the documented benefits, research has highlighted improvements in student achievement and student attitudes, the quality of student-student interactions, student self-esteem, and student retention. We follow Barkley, Major, and Cross's (2005) definition of professional collaborative learning to include all types of structured forms of small-group interactions between professionals.

An alternative form of professional development that provides teachers/instructors a context in which teachers/instructors work as "learners" and institutions as "communities of learners" (Clarke & Hollingsworth, 2002), known as Professional Learning Communities (PLCs) has led to a paradigm shift of professional development of teachers/instructors (Vescio et al., 2008). As defined by Stoll et al. (2006) PLC is "a group of people sharing and critically interrogating their practice in an ongoing, reflective, collaborative, inclusive, learning-oriented, growth-promoting way; operating as a collective enterprise" (p. 223). Therefore, PLCs refer to small groups (communities) of teachers/instructors (professionals) that share professional visions, interests, and values, that meet on a regular, continuous basis throughout the school year, based on the shared notion of learning-for-improvement, exchange expertise, and work together with the explicit purpose for enhancing their teaching abilities and practices (Brookhart, 2009; Margalef & Roblin, 2016; Stoll et al., 2006), identifying common issues they face in their everyday teaching, and identify and apply solutions by opening up to one another trustfully about routines and obstacles.

Professional Learning Communities (PLCs) as a dynamic form of professional learning

PLCs have been defined as a powerful tool for school development and improvement. In this context, the quality of education is heavily based on teachers continuously reflecting, renewing and enhancing their professional knowledge and skills (Darling, Hammond, Chung Wei, Alethea, Richardson & Orphanos, 2009). The application of PLCs plays an important role for teachers' and school improvement throughout Europe (e.g., Lee & Louis, 2019), due to their positive contributions to professional development, teaching effectiveness, and eventually, student learning.

In the context of PLCs, improving teachers' professional knowledge becomes an important step for improving schools (e.g., Ellerani & Gentile, 2013; Bonsen, 2006; Robinson, Hohepa & Lloyd, 2007; Scheerens, Glas & Thomas, 2003). Professional Learning (PL) should be continuous, sustained, structured and intensive in nature, as well as a collaborative approach to improving teachers'/instructors' effectiveness (Slabine, 2011) and enhancing student learning experiences.

PL includes both activities and processes designed to improve teachers'/instructors' professional knowledge, expertise, and skills, (Guskey, 2000), provide a way to discuss and communicate teaching knowledge, skills and resources about teaching and learning (Roth, 2014) seeking to bring meaningful changes in aspects of teaching strategies (Fraser et al., 2007) by engaging teachers/instructors in active learning (Garet et al., 2001; Loucks-Horsley

et al., 1998) and conversations about everyday teaching situations (Louca et al., 2013; Philippou et al., 2015). This active teacher learning may take a number of forms, including observation of expert teachers, observations of other colleagues, exchanging interactive feedback, and reflection on and about student learning (e.g., Banilower & Shimkus, 2004; Borko, 2004; Carey & Frechtling, 1997; Darling-Hammond, 1997), and evaluation of the effectiveness of teaching changes implemented (Roth, 2014). This process ultimately provides teachers/instructors with ways to improve their content knowledge and teaching strategies, identify the need to improvement, and helps them identify ways to apply changes in their teaching with the ultimately goal to enhance their students' learning (e.g., Fishman, Marx, Best & Tal, 2003; Loucks-Horsley et al., 2003).

The heart of PLCs is in nature a data-driven process that includes systematic reflection and review of the current teaching ideas, strategies, knowledge and constructive critique of participants' teaching practice through reflections, observation of teachers'/instructors' practice, and joint ideas for changes (Stoll et al., 2005). This way, PLCs provide teachers/instructors with opportunities to refine and improve their own teaching through a systematic approach that includes both investigation of and experimentation with their own teaching including collecting, analysing and reflecting upon teaching and learning evidence. Extant literature has highlighted five characteristics related to productive teacher/instructor PLCs (Bolam et al., 2005; Stoll et al., 2003). These include (i) sharing common values and vision, (ii) reflection and reflective professional examinations, (iii) collective responsibility for student learning, (iv) individual and group professional learning, and (v) supportive and shared leadership (Bolam et al., 2005; Hord, 1997).

Firstly, members of productive PLCs share common values and visions, on which PLCs' actions are based on. A shared vision would support the commitment of all participating teachers towards the common goals of a PLC group. Secondly, teachers/instructors in PLCs need to have a collective responsibility for their students learning (King & Newmann, 2001; Kruse et al., 1995; Leithwood & Louis, 1998; DuFour, 2004). Thirdly, teacher/instructor PLCs should engage in reflective professional inquiry focusing on problems of their everyday teaching practice, and sharing and generating knowledge (Margalef & Roblin, 2016). Fourthly, PLC members' collaboration should focus on learning (Margalef & Roblin, 2016). To achieve that, PLC structures that would promote a collaborative culture play an important role (DuFour, 2004). Lastly, PLCs need to promote both individual and group and professional learning. In this sense, teachers/instructors learn from one another through the meaningful interactions generated within the community (Stoll, Bolam, McMahon, Wallace & Thomas, 2006).

Higher Education Faculty Professional Learning Communities

Although a recently growing number of studies have investigated the use and function of PLCs at the primary and secondary education levels, there has been to date relatively limited investigation of PLCs in higher education (e.g., Laws 1996) and even a slower growth of the implementation of this idea in higher education settings (Palmer, 2002), despite the growing interest in higher education student learning outcomes and innovative approaches to teaching (Terry, Zafonte, & Elliott, 2018). For instance, Massy, Wilger, & Colbeck (1994) found that collegiality in university departments is "hollowed", with a common sense of community usually absent from meetings, curricular planning, and pedagogical work. Despite that, Cox (2004) indicated that faculty PLCs (fPLCs) can play an important role in faculty development with evidence suggesting that both student and faculty learning is improved through this process. While the need to identify productive ways within fPLCs with which faculty members may engage in long-term pedagogical changes in their teaching approaches has been highlighted as important (Cox, 2004; Richlin & Cox, 2004), there is to date very little evidence whether these changes may be sustainable in the long term (Tinnell, Ralston, Tretter & Mills, 2019).

Characteristics of fPLCs

A fPLCs is usually a group of faculty members from various fields and disciplines (Roth, 2014) engaging in an active collaboration over a significant period of time (Roth, 2014; Tinnel et al., 2019), with the explicit purpose to impact their teaching, and productively and meaningfully enhance student learning (Cox, 2003). fPLCs provide flexible but structured “intensive professional development opportunities designed to provide encouragement, support, reflection, and community building” (Ralston et al., 2017, p. 91). fPLCs seek to engage participating faculty in processes that would enable them to share their teaching experiences and knowledge with other members of their university community (Cox, 2004), to learn from one another and push towards common learning goals (Roth, 2014). The literature suggests that fPLCs foster professional growth and pedagogical innovation in faculty’s teaching (Furco & Moely, 2012; Richlin & Cox, 2004); increase faculty interest, motivation and confidence in teaching; promote active, learner-centred approaches to teaching and learning; lead to improved student learning (Cox, 2001; 2003; 2004).

Despite the differences in the particular contexts (Coll & Taylor, 2008), fPLCs share a number of features with teachers’ PLCs, such as the focus on a particular content, their nature and complexity; focusing on the students’ struggles and learning difficulties with the content; an emphasis on the enhancement of practical teaching skills (Coll & Eames, 2008).

fPLCs may be also seen as particularly important and necessary within the context of higher education. Due to the nature of the university teaching environments, it is likely that instructors often resolve to isolated teaching practices, mostly working on their own. The difficulties of building a positive learning culture and developing mutual trust among faculty members (Alles et al. 2019) may be related to this faculty isolation (Hargreaves 2007; Alles et al. 2019). Due to these difficulties, it may take up considerable time to develop productive fPLC culture within universities, deeming even more important the need for investigations about fPLCs that would lead to theoretical models accounting for the operational characteristics for building, running, and sustaining fPLCs (Wen & Zhang, 2020).

One of the important characteristics that fPLCs offer to the university teaching community is the engagement of instructors in evidence-based teaching strategies and evidence-based improvement of their teaching practices (Tinnel et al., 2019; Ralston et al., 2017; Ralston, Tretter, & Kendall-Brown, 2017), grounding faculty professional development on how students learn (Borrego & Henderson, 2014).

fPLCs usually require substantial investment in time and commitment by instructors, which may result in pushback from faculty. This usually creates a preference for traditional one-time professional development programs, (Hurtado et al., 2012), suggesting that the potential value and impact of fPLCs need to be explicitly explained (Roth, 2014). On other hand, due to the development of online courses (partly due to covid-19 pandemic), a possible meaningful way for involving faculty in fPLCs could be to build virtual fPLCs, which will be based on more flexible online resources that would allow participation from faculty both onsite and offsite, synchronously and asynchronously (Roth, 2014).

Working in fPLCs

The literature suggests that among the important things of fPLCs is the members constitution, which may affect the creation and better facilitation of a collaborative culture. Cox (2004) described two categories of fPLCs: cohort-based and topic-based. Cohort-based fPLCs address particular professional needs (including but not limited to teaching and learning) of specific groups of faculty that have been for any reason isolated, traditionally neglected or unusually stressed. Topic-based fPLCs are usually put together to address a specific campus-wide teaching and learning issue or need. The coordinator collects proposed topics from the faculty members, decides on particular topics that are popular among faculty, and advertises a call for participation in the fPLC(s) across campus.

Similar to teachers’ PLCs, fPLCs’ work and functions are based on the development of a community of professionals with a shared vision and culture (Cox, 2002). In a study, Mu and

Gnyawali (2003) reported that across institutions, ten qualities are very important in the function of fPLCs which support the development of a community culture that promotes professional learning among faculty. These include safety and trust, openness, respect, responsiveness, collaboration, relevance, challenge, enjoyment, enthusiasm and devotion, and empowerment. These characteristics play a crucial role in establishing what Tucker and Quintero-Ares (2021) name as a collaborative space that would be open to dialogue and will support and promote community building and informal learning. In their study, Gerken et al. (2016) suggested that informal community spaces created important learning opportunities, which they suggest are important for brainstorming ideas, discussing instructional practices, and sustaining proactive relationships with colleagues to seek and offer feedback.

Ralston et al. (2017) suggested that time for working with colleagues and structure for the fPLC meetings are critical aspects of fPLCs, along with working within a safe environment for all participants to share and reflect upon ideas, successes, and challenges.

As research also supports (e.g., Ralston et al., 2017), actions within fPLCs are also crucial for the work of the PLC groups. These actions may include in addition to discussions, peer observations, planning and implementing new ideas, analysis of results, and reflections. As important, the implementation of changes from participating faculty in their teachings should be slow, and small in scale, in order to afford opportunities for evaluation, revision, and trial.

Positive outcomes & impacts of fPLCs

While the importance of PLC has been known for a long time (Bullough, 2007), direct empirical evidence from higher education has been a more recent focus of research (Roth, 2014). In this section, we highlight some of the most important points identified.

Stacey & Mackey (2009) highlighted that positive outcomes from benefits of fPLCs may include instructors' better conceptualization of their own teaching philosophy, an increase in their confidence in revising and applying new teaching strategies (Hadar & Brody, 2010; Ash et al., 2009), and an increase of the collaboration among colleagues even outside of one's own department. Of course, fPLCs have been also found to be successful in impacting positively student learning (Butler et al., 2004; Jetton, Cancienne & Greever, 2008). Further, Roth (2014) suggested that additional benefits of fPLCs include a possible increase in the instructors' motivation to improve their teaching practices, reduction of instructor burnout, and improvement of the teaching practices for active student learning.

Vescio and colleagues (2008) provided a thorough overview of research in fPLCs, which showed a positive impact of fPLCs on teaching practice as well as student learning. This impact included improved collaboration among faculty (Marston & Brunetti, 2009), focus the faculty attention on student learning than simple changes in their teaching strategies, development of an identity that includes a strong sense of agency and authority among participants for their work and development in fPLC groups and a commitment towards a culture of continuous learning.

Tools and approaches used during the covid-19 pandemic

During the years of the covid-19 pandemic, all the aspects of school-related work and development we substantially disrupted. Among others, the work of teacher/instructors PLCs was also disrupted. At the same time, through the difficulties encountered, many opportunities for professional growth emerged, which utilized characteristics of fPLCs.

Tucker and Quintero-Ares (2021) highlighted that during this pandemic, but also any pandemic, the notion of the community has been vital as a tool for responding to the professional isolation because of the various (in some cases significant) changes in professional work of higher education instructors. They also suggest that in any crisis, the establishment or the existence of communication "channels" for higher education faculty are very important in providing ways for peer support. In this context, working with aspects of

fPLC, such as collaboration, can open opportunities for supporting and/or mentoring between faculty, exchanging of knowledge and experience with new ways of teaching (e.g., technological tools for teaching during the pandemic). Due to that, fPLCs around the globe were “forced” to be formed as or changed in nature to become online or virtual fPLCs.

In their study, Tucker and Quintero-Ares (2021) also found that fPLCs during covid-19 seemed to provide faculty with a balanced support among peers (through informal exchange of experiences and ideas), and experts such as more knowledgeable faculty and instructional designers. At the same time, many institutions and faculty have reported that due to covid-19, they had opportunities to meet, trust, and work with colleagues that have not collaborated in the past, from different departments creating a culture of community within a virtual collaborative space (Rapanta et al., 2020) sharing the same concerns, ideas to solve problems, and experiences. Studies such as the one from Avgerinou and Moros (2020) indicated that a sense of community and the formation of collective knowledge supported a shift to virtual teaching during covid-19.

In a different study on simulated crisis, Öberg et al. (2019) identified 4 aspects that play an important role in community engagement during a crisis: the creation of different groups, the formation of partnerships between peers, value creation, and visibility in PLCs. At the same time, the roles of people both within and outside PLCs shifted or altered during the pandemic (e.g., Netolicky, 2020; Beauchamp et al., 2021; Rasmitadila et al., 2020; Rasmitadila et al., 2020; Koumarianou & Louca, 2022), indicating a further need to possibly investigate the ways fPLCs function in the post covid era. These characteristics include among others the nature of the participants reflections during online PLCs, the role of the PLCs’ participants, the use of tools for communication and collaboration, as well as the role of the PLC coordinator.

Using research findings (e.g., Alsaleh, 2021; Louca et al, 2021; Koumarianou & Louca, 2022) we suggest that there are a number of ways that covid-19 has influenced the use function and characteristics of fPLCs. These include:

- The use of online tools that extend fPLC member communication (asynchronous): These tools can be used to keep fPLC participants in touch between one meeting and the next meeting in a way that keeps sharing information such as a collaborative reflection wall, instant messaging (e.g., WhatsUp, Alsaleh, 2021), etc.
- The use of online tools that help student learning: Issues identified during fPLC meetings for supporting student learning in the class may be solved using a variety of tools that are available or have been available during the pandemic, such as applications that allow the active engagement of large crowds during lecture time, and applications for leading students to reflect upon their own learning.
- The use of online tools for synchronous communication: During covid-19, fPLC meetings we held virtually/online. There is now a clear need to further investigate whether our faculty prefer face-to-face meetings, online meetings, or the option of hybrid meetings, as well as which of the above are more meaningful and productive.
- The use of online tools that can foster and scaffold communication and reflection during PLC meetings: There are a variety of tools that can support communication among faculty during the meeting and facilitate the discussion. There is a clear need to further investigate this idea and available tools, identify particular needs and provide solutions.

References

Alles, M., Seidel, T., & Gröschner, A. (2019). Establishing a positive learning atmosphere and conversation culture in the context of a video-based teacher learning community. *Professional Development in Education*, 45(2), 250-263.

- Alsaleh, A. (2021). Professional learning communities for educators' capacity building during COVID-19: Kuwait educators' successes and challenges. *International Journal of Leadership in Education*, 1-20.
- Ash, D., Brown, C., Kluger-Bell, B., & Hunter, L. (2009). Creating hybrid communities using inquiry as professional development for college science faculty. *Journal of College Science Teaching*, 38(6), 68–76.
- Avgerinou, M. D., & Moros, S. E. (2020). The 5-phase process as a balancing act during times of disruption: Transitioning to virtual teaching at an international JK-5 school. In R. E. Ferdig, E. Baumgartner, R. Hartshorne, R. Kaplan-Rakowski, & C. Mouza (Eds.), *Teaching, technology, and teacher education during the COVID-19 pandemic: Stories from the field* (pp. 583–594). Association for the Advancement of Computing in Education (AACE).
- Banilower, E. & Shimkus, E. (2004). Professional development observation study. Chapel Hill, NC: Horizon Research.
- Barkley, E. F, Major, C. H., & Cross, K. P. (2005). *Collaborative learning techniques: A handbook for college faculty*. San Francisco, CA: Jossey-Bass.
- Beauchamp, G., Hulme, M., Clarke, L., Hamilton, L., & Harvey, J. A. (2021). 'People miss people': A study of school leadership and management in the four nations of the United Kingdom in the early stage of the COVID-19 pandemic. *Educational Management Administration & Leadership*, 49(3), 375–392. Advance online publication.
- Bolam, R., McMahon, A., Stoll, L., Thomas, S., Wallace, M., Greenwood, A., Hawkey, K., Ingram, M., Atkinson, A. & Smith, M. (2005). *Creating and sustaining effective professional learning communities*. Research Report 637. London: DfES and University of Bristol.
- Bonsen, M. (2006). Wirksame Schulleitung. In Buchen, H. & Rolff, H.G. (Hrsg.): *Professionswissen Schulleitung* (193-228). Weinheim: Beltz.
- Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational researcher*, 33(8), 3-15.
- Borrego, M., & Henderson, C. (2014). Increasing the use of evidence-based teaching in STEM higher education: A comparison of eight change strategies. *Journal of Engineering Education*, 103(2), 220-252.
- Brookhart, S. M. (2009). *Exploring Formative Assessment. The Professional Learning Community Series*. Association for Supervision and Curriculum Development. 1703 North Beauregard Street, Alexandria, VA 22311-1714.
- Bullough, R.V., Jr. (2007). Professional learning communities and the eight-year study. *Educational Horizons*, 85(3), 168–180.
- Butler, D.L., Lauscher, H.N., Jarvis-Selinger, S., & Beckingham, B. (2004). Collaboration and self-regulation in teachers' professional development. *Teaching and Teacher Education*, 20(5), 435–455.
- Carey, N. L. & Frechtling, J. A. (1997). *Best practice in action: Followup survey on teacher enhancement programs*. National Science Foundation, Directorate for Education and Human Resources, Division of Research, Evaluation, and Communication.
- Clarke, D., & Hollingsworth, H. (2002). Elaborating a model of teacher professional growth. *Teaching and teacher education*, 18(8), 947-967.
- Coll, R. K., & Eames, C. (2008). Developing an understanding of higher education science and engineering learning communities. *Research in Science & Technological Education*, 26(3), 245-257.
- Coll, R. K., & Taylor, N. (2008a). Science education in context: An overview and some observations. In R. K. Coll & N. Taylor (Eds.), *Science education in context: An international*

examination of the influence of context on science curricula development and implementation (pp. xi–xiv). Rotterdam: Sense Publishers.

Cox, M. D. (2002). The role of community in learning: Making connections for your classroom and campus, your students and colleagues. *Teaching and learning in college: A resource for educators*, 4, 1-38.

Cox, M. (2003). Fostering the scholarship of teaching and learning through faculty learning communities. *Journal on Excellence in College Teaching*, 14(2/ 3), 161–198.

Cox, M. (2001). 5: Faculty learning communities: change agents for transforming institutions into learning organizations. *To Improve the Academy*, 19(1), 69–93.

Cox, M. (2004). Introduction to faculty learning communities. *New Directions for Teaching and Learning*, 2004(97), 5–23.

Darling-Hammond, L. (1997). *The Right To Learn: A Blueprint for Creating Schools That Work. The Jossey-Bass Education Series*. Jossey-Bass, Inc., Publishers, 350 Sansome Street, San Francisco, CA 94104.

Darling-Hammond, L., Wei, R. C., Andree, A., Richardson, N., & Orphanos, S. (2009). Professional learning in the learning profession. *Washington, DC: National Staff Development Council*, 12.

Dorier, J. L., & Maaß, K. (2012). The PRIMAS Project: Promoting inquiry-based learning (IBL) in mathematics and science education across Europe PRIMAS context analysis for the implementation of IBL: International Synthesis Report PRIMAS–Promoting Inquiry-Based Learning in Mathemati (Vol. 1). *Lokaliseret på: www.primasproject.eu/servlet/supportBinaryFiles*.

DuFour, R. (2004). What is a " professional learning community"?. *Educational leadership*, 61(8), 6-11.

Ellerani, P. & Gentile, M. (2013). The role of teachers as facilitators to develop empowering leadership and school communities supported by the method of cooperative learning. *Procedia-Social and Behavioral Sciences*, 93, 12-17.

Fishman, B. J., Marx, R. W., Best, S., & Tal, R. T. (2003). Linking teacher and student learning to improve professional development in systemic reform. *Teaching and teacher education*, 19(6), 643-658.

Fraser, C., Kennedy, A., Reid, L., & Mckinney, S. (2007). Teachers' continuing professional development: Contested concepts, understandings and models. *Journal of in-service education*, 33(2), 153-169.

Furco, A., & Moely, B. E. (2012). Using learning communities to build faculty support for pedagogical innovation: A multi-campus study. *The Journal of Higher Education*, 83(1), 128–153.

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American educational research journal*, 38(4), 915-945.

Gerken, M., Beusaert, S., & Segers, M. (2016). Working on professional development of faculty staff in higher education: Investigating the relationship between social informal learning activities and employability. *Human Resource Development International*, 19(2), 135–151.

Guskey, T. R. (2000). *Evaluating professional development*. Corwin press.

Hadar, L., & Brody, D. (2010). From isolation to symphonic harmony: Building a professional development community among teacher educators. *Teaching and Teacher Education*, 26(8), 1641–1651.

- Hargreaves, A. (2007). Sustainable professional learning communities. In Louise Stoll, Karen Seashore Louis (eds.), *Professional Learning Communities: Divergence, Depth and Dilemma*, Maidenhead: Open University Press, 181-195.
- Hord, S.M. (1997). *Professional learning communities: Communities of continuous inquiry and improvement*. Austin, Texas: Southwest Educational Development Laboratory.
- Hurtado, S., Eagan, K., Pryor, J.H., Whang, H., & Tran, S. (2012). *Undergraduate teaching faculty: The 2010–2011 HERI Faculty Survey*. Los Angeles, CA: Higher Education Research Institute, UCLA.
- Jetton, T. L., Cancienne, M. B., & Greever, B. (2008). The evolving roles of faculty learning communities: A university/high school literacy partnership. *Theory Into Practice*, 47(4), 327-335.
- Johnson, D. W., Johnson, R. T., & Smith, K. A. (1998). Cooperative learning returns to college what evidence is there that it works? *Change: the magazine of higher learning*, 30(4), 26-35.
- King, M. B. & Newmann, F. M. (2001). Building school capacity through professional development: Conceptual and empirical considerations. *International journal of educational management*, 15(2), 86-94.
- Koumarianou, A & Louca, T. L. (2022). Online Professional Learning Communities in pre-school education: Towards a new culture? Reflections on covid-19. Paper presented at the American Educational Research Association Annual Conference (AERA).
- Kruse, S. & Louis, K. S. (Spring, 1995). Teacher teaming—opportunities and dilemmas. Brief to Principals, *Center on Organization and Restructuring of Schools*, Brief No. 11, 2-7.
- Laws, P. M. (1996). Undergraduate science education: A review of research. *Studies in Science Education*, 28, 1–85.
- Lee, M., & Louis, K. S. (2019). Mapping a strong school culture and linking it to sustainable school improvement. *Teaching and Teacher Education*, 81, 84-96.
- Leithwood, K. & Louis, K. (1998). Organisational learning in schools. *Lisse: Swets & Zeitlinger*.
- Lipowsky, F. & Rzejak, D. (2015). Key features of effective professional development programmes for teachers. *RICERCAZIONE*, Six-monthly Journal on Learning. Research and Innovation in Education. - Vol. 7, n. 2, 25-51.
- Louca, L. T., Mavrou, K., Vryonides, M. & Symeou, L. (2021). Speed, Innovation, and Adaptability as Pillars for Success: European University Cyprus' Transition to Emergency Response Teaching Through Online Instruction During Spring 2020 Semester. In EDULEARN21, 13th International Conference on Education and New Learning Technologies Proceedings, 4155 – 4163, doi: 10.21125/edulearn.2021.0882, available at <https://library.iated.org/view/LOUCA2021SPE>
- Louca, L. T., Tzialli, D., Skoulia, T., & Constantinou, C. P. (2013). Developing teaching responsiveness to children's inquiry in science: A case study of professional development for pre-school teachers. *Nordic Studies in Science Education*, 9(1), 66-81.
- Loucks-Horsley, S., Hewson, P. W., Love, N., & Stiles, K. E. (1998). *Designing professional development for teachers of science and mathematics*. Thousand Oaks, CA: Corwin Press.
- Loucks-Horsley, S., Love, N., Stiles, K., Mundry, S., & Hewson, P. (2003). *Designing professional development for teachers of science and mathematics* (2nd ed.). Thousand Oaks, CA: Corwin Press.

- Margalef, L., & Pareja Roblin, N. (2016). Unpacking the roles of the facilitator in higher education professional learning communities. *Educational Research and Evaluation*, 22(3–4), 155–172.
- Marston, S.H., & Brunetti, G.J. (2009). Job satisfaction of experienced professors at a liberal arts college. *Education*, 130(2), 323–347.
- Massy, W. F., Wilger, A. K., & Colbeck, C. (1994). Departmental cultures and teaching quality: Overcoming “hollowed” collegiality. *Change: The Magazine of Higher Learning*, 26(4), 11-20.
- Mu, S., & Gnyawali, D. R. (2003). Developing synergistic knowledge in student groups. *The Journal of Higher Education*, 74(6), 689-711.
- Netolicky, D. M. (2020). School leadership during a pandemic: Navigating tensions. *Journal of Professional Capital and Community*, 5(3/4), 391–395.
- Öberg, L. M., Nyström, C. A., Littlejohn, A., & Vrieling-Teunter, E. (2019). Communities of inquiry in crisis management exercises. In A. Littlejohn, J. Jaldemark, E. Vrieling-Teunter, & F. Nijland (Eds.), *Networked professional learning: Emerging and equitable discourses for professional development* (pp. 55–68). Springer.
- Palmer, P. J., (2002). The quest for community in higher education. In W. M. McDonald and Associates (Eds.), *Creating campus community*. San Francisco, CA: JosseyBass, 179-192
- Philippou, S., Papademetri-Kachrimani, C., & Louca, L. (2015). ‘The exchange of ideas was mutual, I have to say’: negotiating researcher and teacher ‘roles’ in an early years educators’ professional development programme on inquiry-based mathematics and science learning. *Professional development in education*, 41(2), 382-400.
- Prince, M. (2004). Does active learning work? A review of the research. *Journal of engineering education*, 93(3), 223-231.
- Ralston, P. S., Tretter, T. R., & Brown, M. K. (2017). Implementing collaborative learning across the engineering curriculum. *Journal of the Scholarship of Teaching and Learning*, 17(3), 89-108.
- Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online university teaching during and after the Covid-19 crisis: Refocusing teacher presence and learning activity. *Postdigital science and education*, 2(3), 923-945.
- Rasmitadila, R., Aliyyah, R. R., Rachmadtullah, R., Samsudin, A., Syaodih, E., Nurtanto, M., & Tambunan, A. R. S. (2020). The perceptions of primary school teachers of online learning during the COVID-19 pandemic period: A case study in Indonesia. *Journal of Ethnic and Cultural Studies*, 7(2), 90–109.
- Richlin, L., & Cox, M. D. (2004). Developing scholarly teaching and the scholarship of teaching and learning through faculty learning communities. *New Directions for Teaching and Learning*, 2004(97), 127–135.
- Robinson, V. M., Hohepa, M., & Lloyd, C. (2007). *School leadership and student outcomes: Identifying what works and why* (Vol. 41, pp. 1-27). Winmalee: Australian Council for Educational Leaders.
- Roth, S. M. (2014). Improving teaching effectiveness and student learning through the use of faculty learning communities. *Kinesiology review*, 3(4), 209-216.
- Scheerens, J., Glas, C. A. W. & Thomas, S. M. (2003). *Educational evaluation, assessment, and monitoring: a systemic approach*. Lisse: Swets & Zeitlinger.
- Slabine, N. A. (2011). Evidence of Effectiveness. *Learning Forward (NJ)*.

Springer, L., Stanne, M. E., & Donovan, S. S. (1999). Effects of small-group learning on undergraduates in science, mathematics, engineering, and technology: A meta-analysis. *Review of Educational Research*, 69(1), 21–51.

Stacey, E., & Mackey, J. (2009). *Researching blended learning practices for teachers' professional learning*. Quality Education Symposium 2009: Education and Research. Retrieved from https://www.researchgate.net/profile/Elizabeth_Stacey/publication/29489326_Researching_blended_learning_practices_for_teachers'_professional_learning/links/54b97e440cf2d11571a4b4a4.pdf

Stoll, L., Bolam, R., McMahon, A., Thomas, S., Wallace, M., Greenwood, A., & Hawkey, K. (2005). *What is a professional learning community? A summary*. Retrieved February, 2011, from <http://www.decs.sa.gov.au/docs/documents/1/ProfessionalLearningComm-1.pdf>

Stoll, L., & Earl, L. (2003). Making it Last: Building Capacity for Sustainability. In B. Davies and J. West-Burnham (Eds.), *Handbook of Educational Leadership and Management* (pp. 491-504). London: Pearson Education

Stoll, L., Bolam, R., McMahon, A., Wallace, M., & Thomas, S. (2006). Professional learning communities: A review of the literature. *Journal of Educational Change*, 7(4), 221–258.

Terry, L., Zafonte, M., & Elliott, S. (2018). Interdisciplinary Professional Learning Communities: Support for Faculty Teaching Blended Learning. *International Journal of Teaching and Learning in Higher Education*, 30(3), 402-411.

Tinnell, T. L., Ralston, P. A., Tretter, T. R., & Mills, M. E. (2019). Sustaining pedagogical change via faculty learning community. *International Journal of STEM Education*, 6(1), 1-16.

Tucker, L., & Quintero-Ares, A. (2021). Professional learning communities as a faculty support during the COVID-19 transition to online learning. *Online Journal of Distance Learning Administration*, 24(1), 1-18.

Vescio, V., Ross, D., & Adams, A. (2008). A review of research on the impact of professional learning communities on teaching practice and student learning. *Teaching and Teacher Education*, 24(1), 80-91.

Wen, Q., & Zhang, H. (2020). Building professional learning communities of foreign language teachers in higher education. *CÍRCULO de Lingüística Aplicada a la Comunicación*, 84, 1.

Literature review – Professional Learning Communities in public schools

Professional Learning Communities – Evolution

PLCs have been a promising low-stakes pathway for school-based teachers' professional learning. In PLCs, groups of teachers share and critically research their practices in a constantly reflective, learning-oriented thinking (Voelkel & Chrispeels, 2017) aiming collaborative integration, personal and community development, as well as improvement of teaching and learning. PLCs follow inquiry-based approaches in-site for collective teachers' deep learning through focused discussions, decision making, action and reflection (Nehring & Fitzsimons, 2011; Woodland, 2016; Gore & Rosser, 2020; Van Meeuwen et al, 2020; Antinluoma et al, 2018, Stoll et al, 2006).

PLCs emerged while research investigated effective routes to improve teaching and learning outcomes (Darling-Hammond et al, 2009; Dufour & Dufour, 2012; McLaughlin & Talbert, 2006; Woodland, 2016), as research combined the concept of reflection, as a central element of the human intellect, and the concept of learning within an organization, as a pathway towards the improvement of educational organizations (Nehring & Fitzsimons, 2011). PLCs are characterized as the best, most economical, and most professionally rewarded way to improve the school and create hope for improved teaching (Dufour, Eaker, & Dufour, 2005), as they improve professional and school culture (Antinluoma et al, 2018; Turner et al, 2017) by giving meaning to the learning environment and by increasing the well-being of children and teachers (Prenger, Poortman & Handelzalts, 2019).

Prenger et al (2019) highlighted positive effects of PLCs on teacher satisfaction, attitudes and applications in practice. Despite the initial stage of development of the PLCs, it became clear in their research that the involvement of teachers in the networking of PLCs is promising for the expansion of their professional learning. PLCs influence teachers' satisfaction and self-sufficiency, as well as their ability to collect and analyze multiple types of data regarding children. They also reduce teachers' sense of isolation, and they contribute to the creation of a collective culture for high-quality teaching practice, enhancing the overall capacity of the school organization (Talbert, 2010; Woodland, 2016; Stoll & Louis, 2007; McLaughlin & Talbert, 2006; Vescio, Ross & Adams, 2008; Caprara et al, 2006). PLCs increase the knowledge and skills of teachers and, thus, children's learning (Darling -Hammond et al, 2009; McLaughlin & Talbert, 2001). When teachers collaboratively explore ways of overcoming obstacles to their students' learning, they achieve broadening of experiences and sharing the most successful of them, effectiveness and improvement of their learning and improvement of performance regardless of school context and socio-economic profile (Vescio et al, 2008; Andrews & Lewis, 2004; Elmore, 2002; Goldenberg, 2004 στο Welsh Government, 2011).

Within a PLC, teachers are encouraged to rethink their practices and improve them, through sharing and collaborating with colleagues (Prenger et al, 2019). PLCs seek learning for all teachers in the school community through cooperation, where members share the common goal for improving learning outcomes. Developed PLCs are characterized by changed culture and practice, although it is not clear how they develop and how improvement is achieved (Turner et al, 2017). Collective dialogue within PLCs focuses on reflecting and highlighting each member of the community as a personality and as a professional being an integral element (Antinluoma et al, 2018). Schools work systematically to find space and time to focus precisely on children's learning, aligning the work of the learning community with the day-to-day work of the school.

In PLCs collaboration perceives unique content, since the school becomes a collaborative space "where ideas belong to the group and learning is promoted and valued" (Patton & Parker, 2017, p. 359). Collaboration in learning communities is about the collaborative practices and actions that teachers choose in order to collectively focus on children's progress, with the belief that the community can bring about significant changes, exploring not only what students are intended to achieve, but how the community can act when students are not

learning (Brown, Horn & King, 2018). Collaboration and participation make sense within the learning and practice community, since actions are defined as worthy of pursuit and participation is recognized as competence (Wenger in Philpott, 2014). Participation concerns the learning process starting from individual activities and projects and gradually moving to the center of practice and experience.

Learning communities are based on learning models in which teachers are supported and develop skills that enable them to respond to the challenges that arise in the field in which they act. According to Drago-Severson (2009, as cited in Sprott, 2019), teachers move, initially, from more instrumental-type choices that focus on "doing things right", to focusing on interpersonal relationships and their social status within the group of colleagues (socializing). Within the group, a cyclical path followed (Darling-Hammond et al, 2009) gradually leads to the formation and formulation of a collective theory, stemming from the collective structured dialogue and guiding the future practices of the community (Hollins et al, 2004). Based on collective dialogue, decisions are taken by the learning community aiming to achieve quality practices that positively affect children's learning, as well as the implementation of practices and actions that contribute to the improvement of teaching and learning according to data collected (Darling-Hammond et al, 2017).

The evolution of a learning community is gradual (Nehring & Fitzsimmons, 2011). It is not an end in itself, nor is it a "technical project" or a renaming of some other existing structures (Welsh Government, 2011). It is about the process of transforming a culture that connects the practices of the community with the practice in the classroom and the common goal and, as such, it is carried out gradually and involves opportunities and challenges. McLaughlin & Talbert (2006), recognize three stages of the evolution of learning communities. At an early stage, the changes sought, new emphases or any new tasks and demands are associated with difficult feelings of pressure or even frustration for teachers, as they are asked to identify ways of monitoring their practices and appropriate data to examine what constitutes evidence of progress. It is the stage in which teachers begin to develop research skills, formulating questions, concerns and ideas for analyzing data related to the issue of concern to the community. At an intermediate stage of learning community development, educators begin to use a circular process of implementing new practices and seeking small improvements. Despite the difficulties of connecting research with practice, and the resistance of a number of teachers to the new way of group operation, at this stage they turn to reflection, begin to cooperate with each other and make decisions on the database they are studying, thus contributing to the consolidation of common goals and gaining procedural knowledge that helps them understand how they can work together and move forward. In an advanced stage of development of the learning community, the teachers in the PLC work to investigate questions, collect and gather data on the basis of which decisions for actions are made. A sense of shared responsibility guides decisions to pursue progress, as well as systematic investigative processes, which are embedded in the operation of the school organization.

Characteristics of PLCs – The role of leadership and participating teachers as leaders

Schools that function as PLCs have differentiated characteristics both organizationally and functionally. They are organized on the basis of a culture of trust and professional collegiality, which seeks social interaction and the discussion of values and expected behaviors, professional synergy, cooperation and empowerment among teachers, breaking down of the professional isolation in the direction of collective action and responsibility (Nehring & Fitzsimmons, 2011). This culture is associated with a sense of cohesion, readiness for change and a sense of collective identity. The day-to-day operation of the school incorporates cooperation between community members to focus on children's learning, with co-organizing actions, co-teaching, lesson planning and implementation, participation in subgroups, reflective meetings after teachings and other professional cooperation actions. Schools that function as PLCs work systematically to find space and time to focus precisely on children's learning, aligning the work of the learning community with the day-to-day work of the school.

They organize focused collective reflection and structured dialogue, for sharing ideas, concerns, dilemmas and questions and getting feedback from within the team. Members of PLCs in schools are organized in sub-groups that act as critical peers to each other in search of best practices to meet the needs and readiness of their students (Sprott, 2019).

There is a number of structural and cultural factors and characteristics that affect the development of a PLC in the complex school environment, reflecting the importance of organismic, psychological, work and cultural factors located inside and outside the school, i.e., the internal conditions of the school but also the external context (political, local and national culture, etc.). For example, in their conceptual framework, Van Meeuwen et al (2020) suggested a number of steering factors (leadership, collective autonomy and facilitating group dynamic processes) that interact with a number of context factors of the PLC (professional orientation, group dynamic characteristics, individual and collective learning). The context factors include 11 characteristics: shared vision, shared responsibility, shared focus on student learning, shared focus on continuous learning, mutual trust and respect, collegial support and encouragement, social cohesion, collaboration, reflection, giving and receiving feedback, experimenting. Also, Turner et al (2017) highlight some elements having the greatest impact on the of PLC development and on teachers-leaders: the school culture, teachers' role, their views on the workload it brings, and the management's decision to focus on improving learning outcomes. Turner et al (2017) explained how the interaction of all these factors essentially creates the zone of proximal development of action, and they emphasized the role of teacher-leaders, as only teachers can act as effective agents of change who form and may change school culture. Teachers participating in PLCs are expected to establish relationships and partnerships, to encourage engagement and loyalty, to focus on students' learning, to (re)design effective practices and reflect on actions and decisions. Therefore, teachers' perceptions on the context and the processes through which a PLC functions and evolves is an important issue that needs to be taken into consideration.

At the level of organizational characteristics, the creation of a positive school culture is crucial for the implementation of PLCs, since school culture affects the readiness for change and effective schools form collaborative cultures. Effective leadership and its quality define and cultivate a climate that promotes innovative professional actions and provide time and resources. Effective leadership adopts distributed leadership that formally and strongly supports the process, aiming for as many members of the educational staff as possible to participate in the collective work of the learning community, focusing on improving the knowledge, skills and attitudes of individuals, subgroups and groups through the use of social capital of the school (Antinluoma et al, 2018). At the heart of effective actions is a focus on the mission, vision and goals that are set, elements that are an essential part of the discussion and communication on a daily basis in the school. The whole school is organized in collaborative teams, working in a repetitive cycle of reflection, planning, implementation of new ideas, analysis of results and adoption of good practices. Leaders provide opportunities to articulate shared values, ask questions for reflective dialogue, reduce teacher isolation, hear examples and stories that stem from successes that highlight shared values, while promoting an approach and culture that focuses on student learning (Nehring & Fitzsimons, 2011; Brown et al, 2018).

The role of the PLC coordinator as a teacher leader

Teachers, as experienced instructors who have insider knowledge of the school context and of the students, are often called to lead a PLC in their schools, in order to coordinate, support and guide the PLC while seeking improvement. This crucial key-role is the PLC coordinator, who needs to find ways to make better use of the new knowledge produced and acquired in the community as signs of autonomy, facilitate the group collaborative work, but also to carefully manage the planning and utilization of time at school, taking into account that teachers often experience daily work at school as intense, frustrating and tedious (Woolway, Msimanga & Lelliott, 2019; Hollins et al, 2004). Literature shows that the teacher-leaders' role

to support colleagues improved practice is hampered by obstacles related to the long-standing traditional norms, facing resistance, passivity and resentment and having difficulties in involving other teachers. Also, teacher-leaders face challenges in establishing good relationships and handling tension, as well as facing challenges to foster collaboration and integrate new activities. Literature also suggests that teacher leaders who act as PLC coordinators need a number of tools, strategies and activities to guide their complex role within the school in order to nurture shared values and norms, promote interaction, introduce forms of collaboration and reflection, and find ways to make practice public (Turner et al, 2017; Wenger, McDermott & Snyder, 2002).

The role of the external PLC facilitator

Evidence shows that the presence of an external facilitator is crucial for a PLC to become viable (Tan & Hairon, 2016). The role of the facilitator is complex and multifaceted, as he/she is called to act in a flexible and adoptive way within a group of professionals, in order to elicit prior knowledge, create cognitive dissonance, foster opportunities for application of actions with feedback and reflection on learning (Baviskar et al, 2009, in Ince 2017). The facilitator acts as a critical friend, whose role is shaped while interacting with each and all individuals in the group (Avgitidou, 2009), as they jointly take responsibility for collaborating in a learning environment that fosters the sense of a PLC. Occasionally, the facilitator encourages the PLC to maintain focus by restarting the topic under discussion, raises prompts and questions for clarification, summarizes major points or accomplishments, describes next steps. The facilitator, in close collaboration with the school leader, and with the PLC coordinator, creates opportunities to share methods, materials and activities and encourages teachers to implement one of the ideas shared and celebrate successes. The facilitator's role also includes establishing credibility and building rapport, by understanding the context, the lives and the authentic interest in improving students' outcomes (Hollins et al, 2004). The facilitator is responsible to foster critical reflection opportunities for teachers through structured dialogue in order for them to rethink their actions, their values and their pedagogical decisions (Huijboom et al, 2021).

Ince (2017) suggests five factors that affect the success of the facilitator's role: the ability to critically reflect; experience in the role; acuity of observation; personal motivation or commitment; and knowledge and understanding of cognitive dissonance in learning. Facilitators need to be skilled observers of learners' reactions, and they need to leverage opportunities to support learning, by engaging teachers deeply in critical reflection on own actions, understandings and challenges. Being a PLC facilitator is a challenging role, that requires constant practice and training on a variety of skills: on how and when to respond during meetings to facilitate communication and on how to better plan and understand teaching and students' learning, on how to interpret and response to teachers' attitudes and feelings, on how to better make use of new insights acquired to promote a more self-sustaining learning community, on how to carefully schedule and use time in schools to avoid frustration within an exhausting day for teachers (Hollins et al, 2004).

Managing technicalities

In order for a PLC to evolve and function, many things need to be in place. Structural and cultural support to nurture teachers' learning involves managing technicalities. Teachers participate in a PLC when it is aligned with the day-to-day work and with what is valued at the school, when the PLC constitutes a way to exist and evolve as a professional in the educational field, and when any pressure is perceived as a normal element of the work done in the school. Community development is positively influenced when actions and teachers perceive the practices discussed and implemented at school, as directly linked to their daily mission (Schaap & De Bruijn, 2018; Schaap et al, 2019). Therefore, creating space and time at school and restructuring existing arrangements are crucial factors for the implementation of PLCs, for participating teachers to regularly meet, talk and reflect, as time is critical for learning

(Stoll et al, 2006; De Neve & Devos, 2017; Hord & Sommers, 2008; Leclerc et al, 2012; Hairon & Tan, 2017).

Meaningful and effective collaboration among teachers needs to be strategically designed in a way that is not limited to a simple description of how teachers will work collectively but to focus on how teachers will work in depth in a way that will bring about a greater impact on progress (Hargreaves & O' Connor, 2018). In this light, the partnership needs to be strategically planned, towards "collaborative professionalism", a notion introduced by Hargreaves and O' Connor (2018). PLCs need to create an appropriate knowledge-base available, in order to use evidence, consider different perspectives and make appropriate decisions (Fullan & Pinchot, 2018). Finding ways to improve the quality of work via experimentation, reflection and feedback has always been a challenge.

Towards this direction, it is important to explore and understand the way teachers' collaboration and interaction may be facilitated, technicalities be handled, and institutional framework be used in order schools to establish and consolidate a teachers' PLC. Also, finding ways to enhance key-role teachers, such as the PLC coordinators in schools, is crucial, as these persons are called to act as school-leaders who utilize and adopt competences, tools, templates and models to foster teachers' professional learning in school.

References

Andrews, D., & Lewis, M. (2004). Building sustainable futures: Emerging understandings of the significant contribution of the professional learning community. *Improving schools*, 7(2), 129-150.

Antinluoma, M., Ilomäki, L., Lahti-Nuuttila, P., & Toom, A. (2018). Schools as professional learning communities. *Journal of education and learning*, 7(5).

Avgitidou, S. (2009). Participation, roles and processes in a collaborative action research project: A reflexive account of the facilitator. *Educational action research*, 17(4), 585-600.

Brown, B. D., Horn, R. S., & King, G. (2018). The effective implementation of professional learning communities. *Alabama Journal of Educational Leadership*, 5, 53-59.

Caprara, G. V., Barbaranelli, C., Steca, P., & Malone, P. S. (2006). Teachers' self-efficacy beliefs as determinants of job satisfaction and students' academic achievement: A study at the school level. *Journal of school psychology*, 44(6), 473-490.

Darling-Hammond, L., Wei, R. C., Andree, A., Richardson, N., & Orphanos, S. (2009). Professional learning in the learning profession. *Washington, DC: National Staff Development Council*, 12.

Darling-Hammond, L., Hyster, M. E., & Gardner, M. (2017). *Effective Teacher Professional Development*. Palo Alto, CA: Learning Policy Institute.

De Neve, D., & Devos, G. (2017). How do professional learning communities aid and hamper professional learning of beginning teachers related to differentiated instruction?. *Teachers and Teaching*, 23(3), 262-283.

DuFour, R., Eaker, R., & DuFour, R. (2005). Recurring themes of professional learning communities and the assumptions they challenge. *On common ground: The power of professional learning communities*, 7-29.

DuFour, R., & DuFour, R. (2012). *The school leader's guide to professional learning communities at work tm*. Solution Tree Press.

Elmore, R. F. (2002). Bridging the gap between standards and achievement: The imperative for professional development in education. *Secondary lenses on learning participant book: Team leadership for mathematics in middle and high schools*, 313-344.

- Fullan, M., & Pinchot, M. (2018). The fast track to sustainable turnaround. *Educational Leadership*, 75(6), 48-54.
- Gore, J., & Rosser, B. (2022). Beyond content-focused professional development: powerful professional learning through genuine learning communities across grades and subjects. *Professional Development in Education*, 48(2), 218-232.
- Hairon, S., & Tan, C. (2017). Professional learning communities in Singapore and Shanghai: Implications for teacher collaboration. *Compare: A Journal of Comparative and International Education*, 47(1), 91-104.
- Hargreaves, A. & O'Connor M.T. (2018). Leading collaborative professionalism. Seminar Series Paper #274. Centre for Strategic Education (CSE), Victoria. Downloaded from: chrome-extension://ohfgljdgelakfkefopgklohadegdpjf/http://www.andyhargreaves.com/uploads/5/2/9/2/5292616/seminar_series_274-april2018.pdf (on 05/01/2021)
- Hollins, E. R., McIntyre, L. R., DeBose, C., Hollins, K. S., & Towner, A. (2004). Promoting a self-sustaining learning community: Investigating an internal model for teacher development. *International journal of qualitative studies in education*, 17(2), 247-264.
- Hord, S. M., & Sommers, W. A. (Eds.). (2008). *Leading professional learning communities: Voices from research and practice*. Corwin Press.
- Huijboom, F., Van Meeuwen, P., Rusman, E., & Vermeulen, M. (2021). Professional learning communities (PLCs) as learning environments for teachers: An in-depth examination of the development of seven PLCs and influencing factors. *Learning, Culture and Social Interaction*, 31, 100566.
- Ince, A. (2017). Managing risk in complex adult professional learning: the facilitator's role. *Professional development in education*, 43(2), 194-211.
- Leclerc, M., Moreau, A. C., Dumouchel, C., & Sallafranque-St-Louis, F. (2012). Factors that promote progression in schools functioning as professional learning community. *International Journal of Education Policy and Leadership*, 7(7), 1-14.
- McLaughlin, M. W., & Talbert, J. E. (2001). *Professional communities and the work of high school teaching*. University of Chicago Press.
- McLaughlin, M. W., & Talbert, J. E. (2006). *Building school-based teacher learning communities: Professional strategies to improve student achievement* (Vol. 45). Teachers College Press.
- Nehring, J., & Fitzsimons, G. (2011). The professional learning community as subversive activity: Countering the culture of conventional schooling. *Professional development in Education*, 37(4), 513-535.
- Patton, K., & Parker, M. (2017). Teacher education communities of practice: More than a culture of collaboration. *Teaching and Teacher Education*, 67, 351-360.
- Philpott, C. (2014). *Theories of professional learning: A critical guide for teacher educators*. St Albans: Critical Publishing
- Prenger, R., Poortman, C. L., & Handelzalts, A. (2019). The effects of networked professional learning communities. *Journal of Teacher Education*, 70(5), 441-452.
- Schaap, H., & De Bruijn, E. (2018). Elements affecting the development of professional learning communities in schools. *Learning environments research*, 21(1), 109-134.
- Schaap, H., Louws, M., Meirink, J., Oolbakkink-Marchand, H., Van Der Want, A., Zuiker, I., Zwart, R. & Meijer, P. (2019). Tensions experienced by teachers when participating in a professional learning community. *Professional development in education*, 45(5), 814-831.

- Sprott, R. A. (2019). Factors that foster and deter advanced teachers' professional development. *Teaching and Teacher Education*, 77, 321-331.
- Stoll, L., Bolam, R., McMahon, A., Wallace, M., & Thomas, S. (2006). Professional learning communities: A review of the literature. *Journal of educational change*, 7(4), 221-258.
- Stoll, L., & Louis, K. S. (2007). *Professional learning communities*. McGraw-Hill Education (UK).
- Talbert, J. E. (2010). Professional learning communities at the crossroads: How systems hinder or engender change. In *Second international handbook of educational change* (pp. 555-571). Springer, Dordrecht.
- Tan, C., & Hairon, S. (2016). Education reform in China: Toward classroom communities. *Action in Teacher Education*, 38(4), 315-326.
- Turner, J. C., Christensen, A., Kackar-Cam, H. Z., Fulmer, S. M., & Trucano, M. (2017). The development of professional learning communities and their teacher leaders: An activity systems analysis. *Journal of the Learning Sciences*, 27(1), 49-88.
- Van Meeuwen, P., Huijboom, F., Rusman, E., Vermeulen, M., & Imants, J. (2020). Towards a comprehensive and dynamic conceptual framework to research and enact professional learning communities in the context of secondary education. *European journal of teacher education*, 43(3), 405-427.
- Vescio, V., Ross, D., & Adams, A. (2008). A review of research on the impact of professional learning communities on teaching practice and student learning. *Teaching and teacher education*, 24(1), 80-91.
- Voelkel Jr, R. H., & Chrispeels, J. H. (2017). Understanding the link between professional learning communities and teacher collective efficacy. *School effectiveness and school improvement*, 28(4), 505-526.
- Welsh Government (2011) Professional learning communities. Guidance document No: 062/2011(December 2011).
- Wenger, E., McDermott, R. A., & Snyder, W. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Harvard Business Review Press.
- Woodland, R. H. (2016). Evaluating PK–12 professional learning communities: An improvement science perspective. *American Journal of Evaluation*, 37(4), 505-521.
- Woolway, J., Msimanga, A., & Lelliott, A. (2019). Continuous collaborative reflection sessions in a professional learning community: The development of grade 8 natural sciences teachers' reflective practice. *African Journal of Research in Mathematics, Science and Technology Education*, 23(1), 1-13.