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Article

Exploring Elements That Support Teachers Engagement in Online Professional Development

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Abstract: This study sought to identify the most effective elements required in online professional development to enable teachers to improve their use of Information and Communications Technologies (ICT) in their classrooms. Four schools in Queensland were involved, with twelve classroom teachers participating in a year-long online professional development program over the school year supported by an online mentor. The online professional development program did not provide course based or sequential learning activities. Rather it was design to enable individual learning pathways and draw on the many professional learning opportunities available through web 2.0 tools and Internet resources. The focus was to explore the process of online ICT professional development to contribute to the conceptualization of how teachers learn in the 21st Century. Findings indicate that teachers need to engage in three elements: investigation, reflection, and constructive dialogue; build a sense of group and individual online presence; and be supported by mentorship that responds to the various cognitive and affective demands of autonomous learners.

Keywords: professional development; education technology integration; online learning; in-service teacher education

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1. Introduction

Worldwide, teachers are gaining access to Information and Communications Technologies (ICT), online tutorials are available, and digital curriculum resources are accessible and are continually being developed—the digital classroom is a reality [1]. However, teachers' ability to use digital tools in their classrooms, that is, practicing the digital pedagogies required for the effective integration of ICT, is not yet in evidence amongst the majority [2–4]. In addition, success with regard to technology integration has been based on how extensive or prominent the use of it has been in schools rather than on whether the teacher has been able to utilize it for "new", "better", or more "relevant" learning outcomes [5]. The *Digital Education Revolution* in Australia is a response to the disturbing finding that even though most teachers and students benefit from access to computers and online resources only a minority are reaping the benefits of the information technology revolution due to teacher capability [6] (p. 7). Similar results are evident in the United States with the *Partnership for 21st Century Skills* reform, which is doing little to direct technology integration away from teachers responding to accountability and standardized systems [7].

Teachers are expressing the need for effective professional development that will enable them to explore and discover the digital pedagogies required for the integration of ICT [8]. In Australia, two issues are guiding the reformation of professional development, these are, a geographic isolated population both across Australia and with the world, as well as the move to a National approach to Education with the current development and implementation of a national curriculum [9]. A move to online spaces for professional development, which are not limited by the need for face-to-face contact, is emerging with the growth and ease of use of web 2.0 tools [10,11]. Educators' professional learning landscape has shifted greatly through such technologies due to the opportunities for any-time, self-generating, and on-demand learning [12]. These researchers identify the potential for online professional development but also call for further research in this field. This study intends to respond to this need with a focus on identifying the most effective elements of online professional development.

1.1. The Move to Online ICT Professional Development

Conceptually, ICT professional development is perceived as an avenue for pedagogical change based on the notion that the implementation of ICT will signify subtle shifts in expectations of schooling in the 21st Century [13]. Professional development needs to focus on issues of pedagogy rather than on the technology itself and building understandings of pedagogy as implicit with ICT [14]. Fisher, Higgins and Loveless [15] call for a "renaissance", a cultural change in the teaching profession. Such a redefinition of pedagogy requires a mind-shift in teachers to work in new ways, collaborate beyond the school boundaries, focus student learning on high task complexity and continuous learning [16,17]. Professional development is therefore about building teachers' confidence in change rather than evidence of ICT competence [16]. It is no longer appropriate to believe that training teachers in computer applications or hardware so that they can in turn up-skill their students is an effective educational or professional development model especially as we already have multi-media expertise in our classrooms.

A shift in teacher professional development from training or workshops held on school sites or in school cluster groups to online environments first utilized the traditional models of professional development [18]. These approaches shifted the content to create online courses that included discussion forums to support teacher engagement. For practicing teachers, the first moves into the online environment mirrored the Higher Education or University level approach to online courses. In this phase, there were still components of face-to-face meetings with facilitators and teachers both individually and in cluster meetings that supported online engagement. Face-to-face meetings were perceived as necessary by teachers to provide the social presence for online communication [19]. An example of this blended approach in Australia and internationally was the teacher professional development project run by Henderson [20]. This project involved teachers in Australia and the United Kingdom in an online course through the Blackboard platform supported by an initial face-to-face training day in each location and the use of forums, chats, and emails though a coursework period. The move to fully online without a coursework approach for teacher professional development has been more recent. The Pathways for Learning, Anywhere, Anytime- Network for Educators (PLANE) website was trialed in 2011, as an environment for teacher collaboration [21]. Teachers were required to create an e-portfolio within the site, which upon completion provided accreditation. It was found that "early adopters" were the main users with learning outcomes based on new ideas shared in the e-portfolios. Real time webinars have also been found to benefit teacher learning as they offer spaces for reciprocal authentic dialogue that network worldwide teacher participants [10]. These studies indicate individual components such as an online "environment" or a "chat tool" but they do not represent the complexity of providing an online program of professional development that is not coursework but rather self-generating based on independent learning pathways. This contextualizing feature of professional development, that is, independent learning pathways, needs further exploration.

1.2. Independent Learning Pathways in Professional Development

Professional development models that draw from Action Research principles and practices offer platforms for independent learning pathways rather than course based models. Bannan-Ritland [22] presented a model of professional development based on teacher-led research involving the design and cyclic testing of instructional materials (that include the use of technologies). The model is called "Teacher-led Design-based Research" (TDR). The teacher is considered a researcher, implementing action research methodology. In summary, the TDR process consists of: teacher immersion in experiences that involve deep learning; constructing meaning from current experiences; focusing on how students learn; developing sustainable innovative practices; and developing collaborative research competence. Markauskaite and Reimann [23] also developed a design-based inquiry model to support teachers' engagement with ICT. They describe a similar process for teacher-led research: problem-design-implement-monitor-evaluate-reflect-disseminate. Their model is encapsulated in three spaces: design space, collaboration space, and decision-making space. Each of these spaces includes a range of interconnected digital tools that can help with the inquiry process. More recently, Ado [24] designed and implemented teacher-led semester long action research projects as professional development for early career teachers to interact with more experienced teachers, while Vrijnsen-de Corte *et al.* [25] studied teacher research in the context of a professional development consortium of schools and

universities. Action research methodology suggests a designated learning process that can be adopted for professional development enabling a more individualized approach.

Emerging from the literature is the identification of Action Research methodologies as one way to enable the move from coursework based professional development to the opportunity for individual learning pathways for teachers. However, what this looks like in an online mode is yet to be explored. This research will seek to identify the elements that are most effective in enabling teachers to participate in online professional development that offers individual learning pathways. The research question for this study is refined as: What elements of online professional development are most effective in supporting individual learning pathways?

2. Research Methods

2.1. Action Research

The project used an Action Research methodology to design an online professional development program and organize data collection. A number of strategies are involved in Action Research methodology. The methodology adopted by this project will firstly be described then applied to the online professional development program.

In an Action Research approach, a group is joined together by an interested "thematic concern" [26]. A period of reconnaissance is served whereby the group is involved in fact-finding and analysis of their current classroom practices. The core of the Action Research process is the self-reflective spirals of cycles of planning, acting, observing, and reflecting, from which conscious thought and action result. This process is embedded within two dimensions: discourse and practice, and construction and reconstruction. The mutual interaction of these two dimensions is actioned by the individual systematically and responsively for improvement in practice and understanding. The human dimensions of practice, past experiences and prior knowledge, intervene in the cyclic process, as does the proactive processes for future action and plans. Grundy and Kemmis [27] (p. 86) describe these capacities as "retrospective" and "prospective" (see Figure 1). These processes signify implementation of action research for continued learning and development. As demonstrated in Kemmis and McTaggart's [26] (p. 10) model below, retrospective understanding informs action (2) and reflection (4) whereas prospective understanding enables planning for the future (1) and for reflection in observation (3).

	Reconstructive	**Constructive**
Discourse (among participants)	4. Reflection Retrospective on Observation	1. The Plan Prospective to Action
Practice (in the social context)	3. Observation Prospective for Reflection	2. Action Retrospective Guidance from planning

Figure 1. Moments of Action Research.

Figure 1 shows the four stages within an action research cycle: plan-act-observe-reflect. The teacher constructs a plan (1) for strategic action that is guided by looking forward (prospective) to the action (2) that will be taken. What was planned can be considered (in retrospect) for guiding the action. In reality, much can happen in action that was not planned. Past experience and prior knowledge informs this action stage. As observation (3) involves thinking about action in terms of the intent, it serves as

prospective understanding for critical self-reflection. Finally, through reflection (4) improvement of practice can occur from a greater understanding of action enabling informed strategic action. In this way reflection looks back to observation, locating significant issues, problems and circumstances. Important at this stage is discussion among teachers to seek the meaning of action and thought enabling a reconstruction of the plan.

2.2. Online Professional Development Program

Data collection occurred during the implementation of the professional development program using this cycle (see Figure 2). The professional development program involved the teachers in planning, implementation and analysis of their own mini research project, termed "Action Learning Project" where ICT was designed to be a central tool in the learning phase of the curriculum unit. The professional development program aligned to the data phases and was designed to support the flow of the school year.

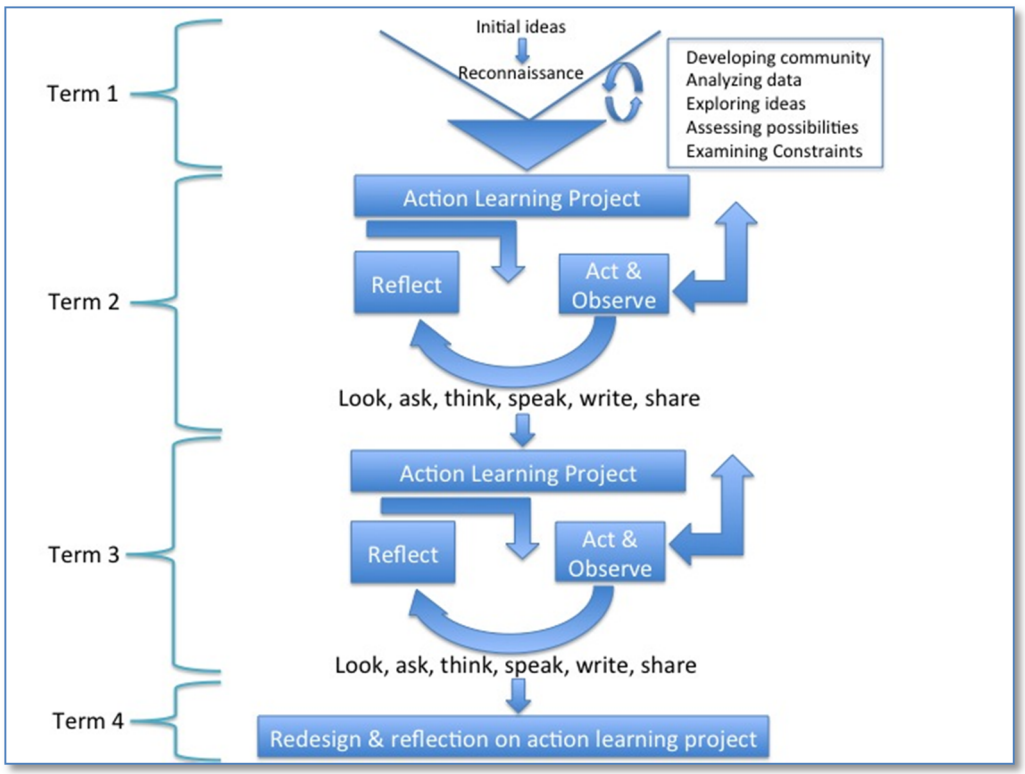

Figure 2. Professional development program for Action Learning Project.

In explaining Figure 2, to match the ebb and flow of a school year, the professional development program included: Term 1 teachers joining a private Educational Ning where the main source of communication was a Discussion Forum. An Educational Ning is a closed social networking site created for the purposes of providing a shared online environment. Each teacher developed their own profile page on the Ning. As part of the reconnaissance period in Term 1 teachers were asked to make conscious their beliefs about teaching and learning that inform their ICT practices though a shared Discussion Forum on the Ning. During this initial period the mentor's role was to question and support teachers in an analysis of their pedagogical beliefs, as an initial phase to an on-going self-analysis and

conscious raising reflection-action cycle; Term 2 involved the first cycle of plan-act-reflect of their Action Learning Project. Term 3 involved the second cycle of plan-act-reflect; and Term 4 involved redesign and reflection. Throughout the year teachers participated in "optional" online activities in the Ning with the support of an online mentor. These activities included a self-generating Discussion Forum where teachers took the lead and posted questions about their Action Learning Project; web conferencing in which the mentor would lead discussion about agreed topics related to Action Learning Projects; teachers' blogs (linked to the Ning) where they posted weekly reflections on their Action Learning Project; reading and reviewing teachers' curriculum materials; and the planning of Action Learning Project via email/Skype/phone with the mentor. Teachers also shared what they were doing at their school staff meetings, district meetings, and conferences. Table 1 provides an example of the topics teachers chose for their Action Learning Project.

Table 1. Example of Teacher's Action Learning Project.

Year 1	How can we collaborate beyond the classrooms to help stimulate writing?
Year 2	Does the creation of an ebook (audio & visual) enhance children's understanding of narrative?
Year 5	How do I use mindmaps such as Inspiration throughout the learning process, even as a reflective tool?
Year 6	What are boys learning when they experiment with Robotics?
Year 6	How does the wiki tool enable children to develop a deeper understanding of scientific concepts?
Year 7	Does the use of a blog encourage children to write?

2.3. Sample

Four Catholic primary schools (preparatory to year 7) were involved in the project. These schools responded to an invitation to participate sent out via the Catholic School departmental district email system. The schools and the relevant Dioceses had no formal teacher online environment for cross-communication and, as such, were considered independent or stand-alone. Each school nominated three to four teachers to participate in the professional development activity, totaling twelve teachers over the year period. These teachers volunteered to participate and were comprised generally of teachers who rated themselves as having little to moderate experience with the use of ICT in their classrooms (Table 2).

Table 2. Participant demographics.

School	Teacher	Years Teaching Experience	Use of ICT Teaching Little/Moderate/all the Time
A	Margaret	24	little
	Harry	16	little
B	Ben	20	moderate
	Darren	3	moderate
	Melissa	8	little
	Chloe	15	moderate

Table 2. *Cont.*

School	Teacher	Years Teaching Experience	Use of ICT Teaching Little/Moderate/all the Time
C	Angela	12	little
	Gary	12	little
	Kevin	18	moderate
	Andrew	3	moderate
D	Lyn	6	little
	Megan	4	moderate

2.4. Data Collection and Analysis

Several types of data were collected over the course of this online ICT professional development project. The online Discussion Forum and teachers' blogs were copied as screen captures and pasted into word documents on a weekly basis per term. Teachers' curriculum materials, planning documents, emails and final interviews were collected and transcribed as required for analysis. Skype/phone conversations between teachers and the mentor were also recorded and transcribed. The primary sources of data used in this paper to investigate elements of online professional development were drawn from the activities teachers engaged in online; these being teachers' blogs and the online Discussion Forum for evidence of engagement as well as teachers' comments in final interviews about their overall professional learning experiences.

Data analysis consisted of an interpretive process of organizing, categorizing, and coding qualitative data of final interviews, discussion forum sequences, and teacher blogs [28]. Themes emerged from the codes through the analytic process by which bodies of data are broken down, consistent with the constant comparative method of analysis, to identify concepts pertaining to related phenomena that are categorized [29]. This requires asking questions about the data and making comparisons for similarities and differences among the data to identify properties and dimensions of concepts [30]. Teacher interviews were the first body of data to be coded. Broad categories emerged at this point, namely, Investigations, Reflection, and Discussion. Under these broad categories were themes such as "investigation of pedagogy", "investigation as a basis", "personal reflection", "scaffolded reflection", "critical dialogue", and "social dialogue". Following this, discussion forum sequences followed by teacher blogs were analyzed. Further similarities and differences were made across the three bodies of data to refine the categorization of themes. For confidentiality, the teachers were allocated a famous face for their blog and Ning profile for publications. All ethical procedures were followed based on University Research standards.

3. Results and Discussion

Three major themes emerged from the data that teachers identified as having an impact on their professional engagement online. These have been identified as: investigation, reflection and constructive dialogue. Each of these themes will be explored respectively as an element of online professional development that supports independent learning pathways.

3.1. Investigation

The term "investigation" was chosen to represent the collective noun teachers used when describing their school based research: "project", "inquiry", "investigation", "study". The term "investigation" also included teachers' reference to "investigating", "looking at", "researching" the use of ICT in their classrooms. In interviews, teachers talked about their projects as an "entity" with elements or references to the process of investigating. It was difficult to divorce the content and the process. The teachers considered their investigation as a platform or basis from which wider school based professional activities were viewed. Teachers used their classrooms as a research base and relate what they learnt online, back to what was happening in their classroom Action Learning Project. It changed the way any professional development activities were perceived and utilized by teachers. This was evident in Darren's interview comment:

> Darren: They [technology workshops] would have been able to stand by themselves, but I think having to work through the Action Project gave an application for it rather, if they stood alone people might have thought that was a nice thing to do, I'll try it once, or Ok I've done that what's the next thing, but when it is linked to a project you see it more as a means rather than an end in itself.

Darren refers to a Mindstorm Lego@ robotics workshop that he attended. As he states this workshop was valuable by itself and he would have been happy to attend it, but it was made more relevant due to his investigation into Coding with year 6 boys. Ben, also attended a conference during the year that focused on thinking skills. He wrote at length in his blog about how "more" valuable this conference was due to his engagement in his Action Learning Project on the use of wikis in science (see Figure 3).

In his blog post, Ben states two aspects gained from the conference that relate to his investigation into the use of wikis, that being, wikis make children's thinking visible and the employment of thinking routines in the wiki. He states that it was "*an incredible coincidence*" that what we are doing here (in this professional development project) extends what was said at the conference. For Ben, like Darren, the classroom as a site of inquiry where the Action Learning Project is based, became the platform to relate to other professional development activities. The Action Learning Project gave purpose, relevance, and a basis for online engagement as well as the examination of other school based professional development.

Teachers also stated that their project had to be considered as part of what they were doing in their classrooms rather than as an add-on or additional exercise. For Angela it was "*killing two birds with one stone so to speak*", ensuring her Action Learning Project was related to the year 1 curriculum and student learning outcomes. There was general consensus from all teachers that their Action Learning Project and integration of ICT had to be part of the curriculum or they couldn't do it. Another practicality provided by teachers was related to catering to their professional needs and interests. For example, some teachers were interested in Web 2.0 tools or movie making, robotics or e-books, as evidenced in the range of Action Project topics (Table 1). Both curriculum and personal ICT interest areas directed teachers' choice of ICT in their projects.

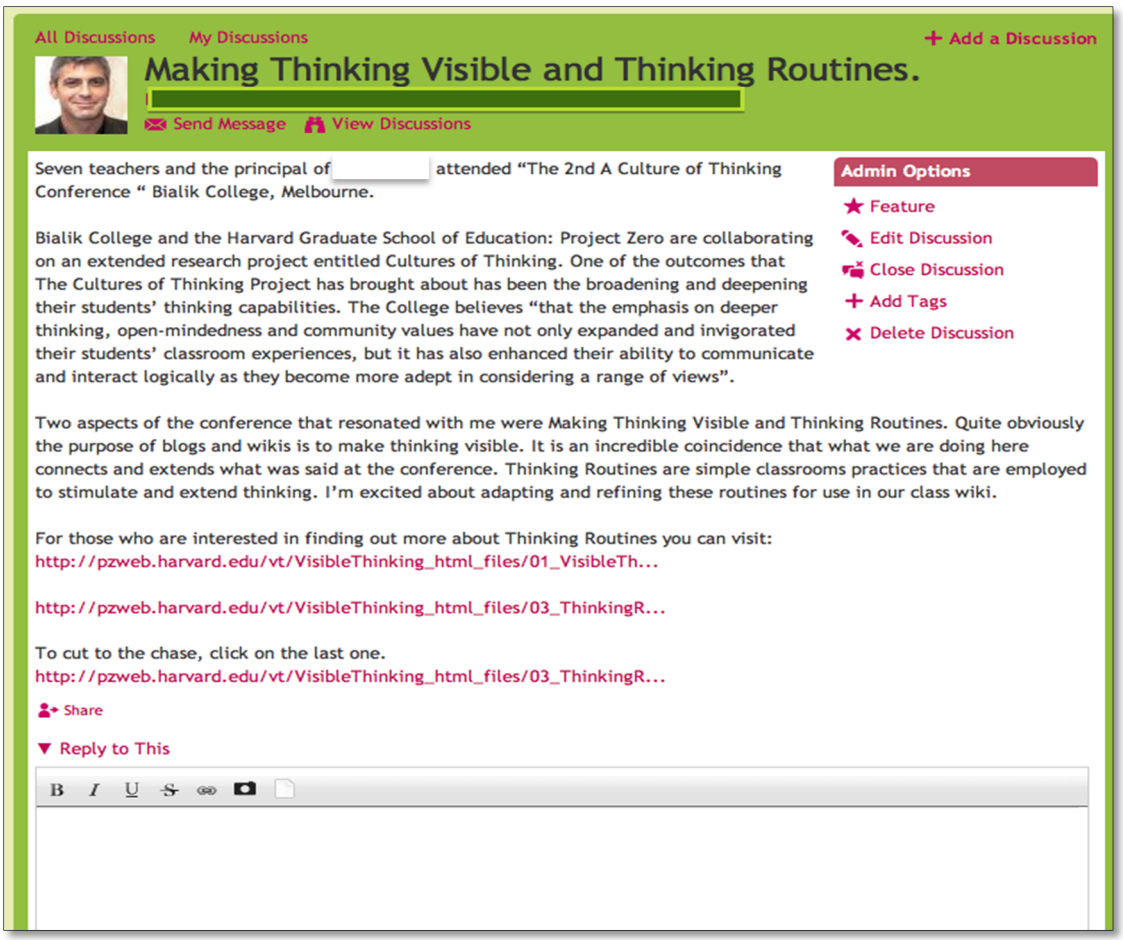

Figure 3. Ben's blog extract on visible thinking.

Lastly, in final interviews, teachers expressed a confidence in relation to having done their own classroom investigation but also having "watched" what other teachers had done. Kevin explains the link between his investigation and other teachers' projects and the affect it had on his confidence in using ICT:

> Kevin: Other school projects that teachers did were important because you could see how they used ICT in different ways, which gave you ideas for down the track. It helped because you've seen it, you've watched it, you have the confidence to do it because you know how they did it.

Classrooms investigations were the central focus of the online professional development and evolved over the year. As explained, teachers blogged, discussed what was happening through the online forum, and uploaded planning and resources to their Ning profiles. This created an online representation of their classroom use of ICT. As Kevin explained, watching how teachers used different ICTs and how the use of ICT evolved over the school year, gave him an insight into both the pedagogies and teachers' thinking behind it. These insights generated ideas for his future use of ICT as well as a professional confidence in using unfamiliar ICT.

The need to create a professional learning context in the teachers' classrooms was clearly evident in the data. Even with the professional development occurring online, teachers needed to generate their

learning from their sites, they needed to link their investigation to both curriculum and personal interest areas. It seems to be the case that online professional development had to be centered on their needs, but the teachers had to create that need. Once it was established, it seemed that teachers could make the link to the online professional development and any other professional development.

3.2. Reflection

The term reflection emerged out of the data as it represented both teachers' personal writings in their blogs and the reflective discussions they had with the mentor online. Terms such as "blog", "blogging", "reflect", "posting", "planning", "ramble", "debrief", included elements of reflection. One of the main sources of reflections was a teachers' weekly blog post. Eleven out of twelve teachers' blogs were found to align with what Hatton and Smith [31] considered recordkeeping devices that had little analytical quality. Teachers generally wrote, in a reporting fashion, about what happened during the week, the classroom activities and the way they were using ICT. This indicated that teachers had a lack of understanding of how to critically reflect on their practice (see Figure 4 as an example of Chloe's blog and Figure 5 Andrew's blog post as weekly reports). They were not given any formal training in reflective writing.

Figure 4. Chloe's blog extract demonstrating report writing.

Figure 5. Andrew's blog extract demonstrating report writing.

Even though these blog posts do not demonstrate any analytical quality they do represent online engagement and a representation of the teachers' thoughts about what was happening in their classrooms. Typically teachers stated in their final interviews that they "*got better at blogging*" as the project went on, with some finding it difficult to make the time for it, while others found it "*cathartic*", as evident in these interview excerpts:

> Andrew: I found my personal blog was an extremely useful tool, even cathartic, to reflect and then plan the next phase of my project. I was able to see and read how each-others' projects were progressing, or not.
>
> Lyn: I wasn't confident with experiences online and I found it difficult to get on to my blog at first, but when I did I used it like a sounding board, like you use a person, and I think that's the use of it and the benefit of it. So it gives you the chance to ramble on and get your own thoughts sorted out and in order, the way you are thinking. Because the weeks I thought I can't get on because I haven't got time, I know I would sit there and think, well this is what I would have said. I work well with that reflection but I just would not always get on.

Interestingly, reflecting on what was happening in his classroom was considered by Andrew as therapeutic and helpful for future planning. His blog became an online representation of his project and he could "*see*" and "*read*" other teachers' projects. This suggests that the teachers' blogs aided in the creation of an online presence, a representation of themselves and their classroom investigation. This would suggest that teachers were developing a sense of presence online.

Lyn describes quite clearly that she saw the benefit from reflecting on her practice but was limited by confidence, experience, and time to "*get on*" and post regularly. She used the blog to organize her thoughts, and interestingly, she used the analogy of a blog being like a person. In this sense, the blog was a space she could talk to, and provided a real space that helped shape her thoughts, even though it was online. Again this suggests that reflecting in a blog enabled a sense of presence and connectedness in the online professional space.

Conversely, verbal reflection was perceived by the teachers as a valuable form of reflective activity. Through professional opportunities online such as the Discussion Forum and planning sessions teachers were found to be more constructive in their reflections. Firstly, in instances where teachers were asked probing questions by the mentor in individual planning sessions, verbal reflection was found to be deeper than written reflection, and had the capacity for development, such as expressed by Megan and Kevin:

> Megan: I talked to the mentor to debrief with them, like when I lost track. Go blah, spill all the frustrations out and she gave me, "Well how about you try it this way?" and the more she listened and the more I rambled on the more I got to where I needed to be going.
>
> Kevin: The mentor helped set me up a question. This gave me the "What" I was going to do. Once I had that I could think about the How and the key to How was having the mentor to talk to, to get advice, ideas, it made me think more about my teaching.

Reflective discussion was considered an important part of the professional development but it was only activated in private discussions directed by the mentor. The role of the mentor as a critical friend will be discussed in the follow theme, however, it is evident here that the mentor played an important role in enabling teachers to "*think about their teaching more*" within online professional development.

In summary, reflection was a key component of the online professional development as it was an embedded part of connecting what was happening in the classroom to the online environment. The blogs became a representation of the teachers' investigation online and also a representation of themselves professionally, as they were blogging about what was happening in their classroom from a pedagogical perspective. With support of the online mentor in planning sessions teachers were able to reflect more deeply about their practice.

3.3. Constructive Dialogue

Discussion was one of the main online professional development activities. This occurred in the Ning, on the front page, as a Discussion Forum. Emerging out of the data was of what has been termed here as "Constructive Dialogue" that is discussion that had the propensity to inform or educated the participants. Terms such as "Ning", "discussion", "sharing", "questions", "saying", "mentor", "questioning" were representative of this theme. The term "Ning" was included here as teachers often referred to the Discussion Forum as the Ning.

There were two aspects evident in the teachers' online discussion, firstly a collegial, community building aspect as well as a critical, questioning aspect. With respect to collegial discussion, teachers discussed their Action Learning Projects, providing feedback and ideas and getting to know each other. Figure 6 illustrates a sequence of contributions on the topic of children/student blogging that occurred in the Discussion Forum. This sequence evidences collegial discourse as teachers supported one-another's comments as well as built on each other's ideas.

Lyn started the discussion about the literacy benefits of student blogging and the role of "purpose" and "audience". "Audience" was then picked up by Andrew, who supported this idea and elaborated on it with statements about "*learn(*ing*) from one another*" and it "*lead(*ing*) to deep learning*". Melissa responded with further discussion about Audience and the involvement of parents, indicating the difference between "destination" and "journey". This series of posts to the Discussion Forum indicates both the development of teachers' understanding about the use of student blogs and role of audience, as well as the building of ideas and collegial dialogue.

Conversely, the opportunity to critique, challenge, and/or voice different opinions was also considered an important part of online discussion. However, in an online space, critical discourse can be difficult without the development of a strong sense of community. Melissa explains the complexities of critique online:

> Melissa: Late at night, you'd finish your school work and then you'd think, I'd better check that Ning. I think there is a real benefit for education when you can question each other not just say how good it all is. You've got to be able to make a suggestion or say something, pull things apart, make each other think, not just agree all the time. It helps, but you don't want to upset people.

Figure 6. Online discussion about student blogging.

Melissa validates the effort to stay up late to engage in critical discussion. The statement that she sees the "*real benefit*" of online discussion as "*you can ask questions*", "*pull things apart*", "*not agree*", but she doesn't want to "*upset people*" indicates that she has a concern in the online space for genuine critical discussion combined with the acknowledgment of how difficult that is to achieve.

Melissa also mentions time issues associated with the professional development and online discussion, that is, validating the time, "*late at night*" for critical dialogue. In this interview excerpt, Harry provides further insight into issues of time in these online spaces:

> Harry: I was surprised at myself. I became a Ning junky. There were times that you were thinking about something, then people would say things similar online and then I liked to share my ideas. I'd just get home from work and click on the forum and see what was going on. Then I'd post something and then I'd be on it waiting to see what someone would say.

Harry found the online professional development easily accessible, through a "*click*" and he could "*see what was going on*". He spent time "*thinking*" about his project, time looking at the Forum, time posting to both the online Discussion Forum and his personal blog. Both the accessibility, the opportunity to connect with other teachers and think more deeply about an issue "*see what someone*

says" and "*say something similar*", were the catalyst for spending time engaging online. For both Melissa and Harry, discussion online had to have more than just a "sharing" element, discussion had to ensure opportunities for professional learning. This validated their investment of time online.

Within this theme of Constructive Dialogue, there was evidence of a relationship between online discussion and the role of the mentor. The mentor was considered in two different ways in association with online discussion, in a cognitive and an affective manner. Figure 7 presents Chloe's blog post after an online discussion via Skype with the mentor (Sarah). This illustrates the cognitive role.

> Week 5
> After my chat with Sarah, it made me really question whether my blog site was an appropriate model for the children. Questions were raised in regard to what a blog site should look like and if there was any true or correct version. We had modeled ours on many examples and the children had provided feedback on what they wanted it to look like. This in itself had been a very effective part of the learning journey and although the questions raised encouraged me to slightly modify the site we decided to stick to our most of our original design and purpose. We went ahead in adding further to our site in regard to what we had been learning about in our unit work and in designing pages to display aspects of our work.
>
> *Posted by Chloe'sBlog at 4:50 AM 0 comments*

Figure 7. Teachers' blog post to cognitive support by mentor.

It is evident in this blog post by Chloe, that she was challenged by the mentor to think about the quality of learning enabled through her class blog. She states "*it made me really question whether my blog site was an appropriate model*". Interestingly though, her final comment indicates that little changes were made to the class blog. This could be symptomatic of cognitive distance in the transactions that occur online, however, it can be noted that the mentor stimulated the teacher's cognitive inquiry into the pedagogical application of student blogging.

The mentor's affective support was evident in the mentor's comments on teachers' blog post and participation in Forum Discussions, by giving reminders, directions, and seeking clarifications; messages of encouragement and interest. Figure 8 presents the mentor's response to Megan's blog post.

The mentor's response to Megan's many changes to her major question for her Action Learning Project was "*it is a better question*" with reinforcing comments to further validate Megan's persistence in establishing a clear question. There were many instances of both cognitive and affective support offered by the mentor, as her role in facilitating both the building of community and professional learning for each teacher.

The term Constructive Dialogue has emerged as a response to the evidence of both collegial and critical discourse and the cognitive and affective roles of the mentor in online professional development. Collegial discussion and the mentors' affective role indicated support for community building online. Critical discussion and a cognitive mentoring role, however, were identified as the

reasons for engagement in online professional development, as they were the key to professional learning and a suggested reason teachers were spending the "time" online.

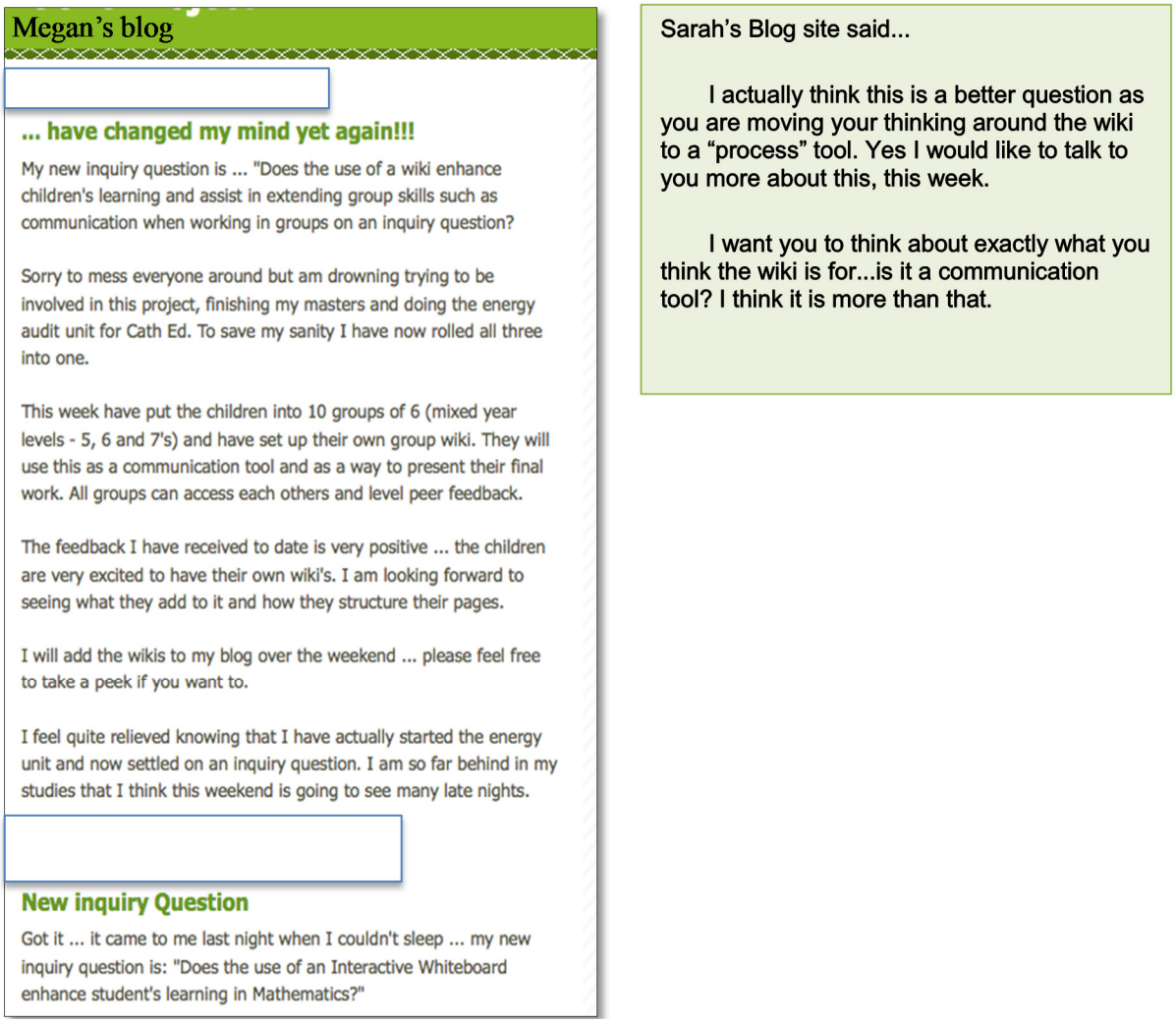

Figure 8. Sarah the mentor's encouraging response to Megan's blog post.

3.4. Discussion

The focus for this paper was to explore the elements of online professional development that are required to support teachers' independent learning pathways. Emerging from the data are three themes within online professional development. These three themes are "investigation", "reflection", and "constructive dialogue". In examining the data, each theme was independently categorized which enabled a clearer sense of what each theme consisted of as well as its relationship with the other themes. It was evident that each of the themes was intrinsically related to one another. Emerging from the findings of this study is a conceptualization of online professional development through the identification of and the relationship between the themes. Figure 9 represents one way of understanding online professional development that responds to the need for teachers to establish both an individual and community presence that supports their development of independent learning pathways. In Figure 9 the three themes, their relationship, and what they develop are represented.

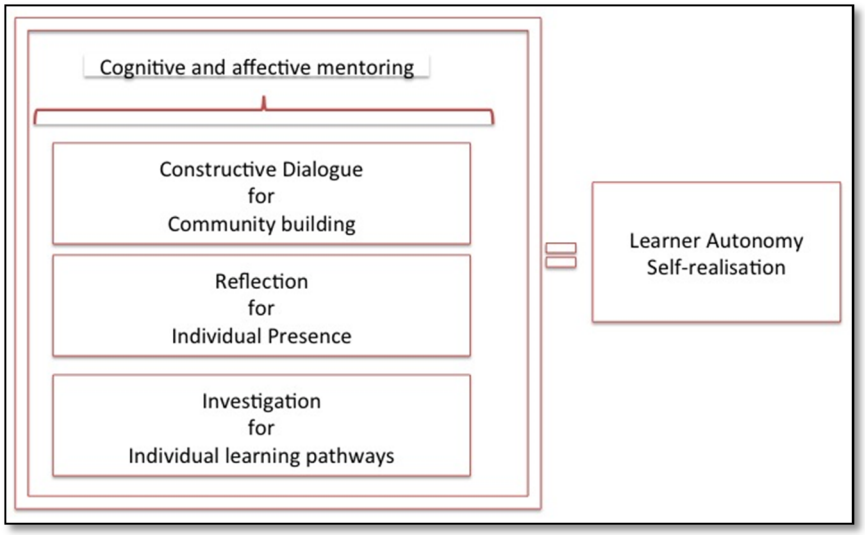

Figure 9. A conceptualization of online professional development.

Online professional development consists of the interconnected elements of investigation, reflection and constructive dialogue. Investigation in this study was represented as classroom-based inquiry, signifying the opportunity for individual learning pathways. Investigation was found to provide both the corpus and guiding principle for online professional development. Teachers' classroom-based investigations became the platform and reason for online engagement (see Figure 9 where investigation is positioned at the bottom indicating a platform). Teachers were motivated to explore more about what interested them both professionally, in regard to curriculum and student outcomes as well as their own personal interests in the ICT. Both professional and personal factors have been identified as requirements for teacher professional learning [32]. The outcome of the online professional development was perceived by the teachers in relevance to the outcome of their Action Learning Project as well as the emergence of teachers' "self-realisation" as a conscious analysis focused on their pedagogical use of ICT. This construction of investigation as a guiding principle where teachers adopt the activist role as part of their professional practice is founded in action research based professional development [26,33,34].

Reflection is a key process in pedagogical renewal, described by [35] as critical engagement for reworking knowledge. Reflection on their investigation, was expressed by the teachers in both the written form, mainly through their blogs, as well as verbal reflections though discussions with the mentor. The findings indicate two important points. Firstly, blogging and mentoring sessions can be considered engagement online and were key in the development of a sense of individual representation or online presence [36]. The building of an online presence is considered necessary for more robust and valuable networking experiences that are essential for learning [37,38]. This implies that reflection and the building of an online individual presence underpins constructive dialogue for greater levels of community engagement (See Figure 9 where reflection is positioned under constructive dialogue).

Secondly—as teachers' blogs demonstrated a reporting level—the more complex levels of reflection, dialogic and critical [30] that is, may require greater guidance and support by the mentor and may be difficult to achieve when there is no assessment or course-based requirements. As found in other research, critical levels of teacher blogging can be achieved as part of a course work or as a set requirement [39], however, Tomberg *et al.* [40] identify that when building online professional learning

networks, the mentor has little control over the content of blogs. In this research, teachers' written blogs were found to play a supporting role to teachers' engagement in verbal reflection. That is, writing a weekly blog that reports on what was happening in the classroom gave a basis for verbal reflection through discussion with the mentor and other colleagues. Similar results can be found in other adult educators' reflective blogs where teachers' lack of understanding on how to reflect limits their reflective writing abilities [41]. These findings, the role of the mentor in supporting teacher reflection and the mentor being outside of the school context, were also found in Fleet and Patterson's [42] study of professional growth re-conceptualization.

Like verbal reflection, constructive dialogue is a process that teachers engage in collaboratively to stimulate new ideas. Fullan [43] (p. 47) advocates social interaction as a means of "convert[ing] information into knowledge" with "sustained interaction produc[ing] wisdom". Teachers' constructive dialogue implies the need for teachers to engage in critical discourse encompassed within a collegial community. Constructive dialogue within a Discussion Forum as well as the role of the online mentor indicated the development of an online community. Constructive dialogue was termed to represent both the need for collegial discussion, which underpins community formation as well as critical discussion, which supported the opportunity for learning. Teachers' engagement that is collegial establishes a context (community) that enables critical discussion to be formulated and actioned. A concomitant relationship between collegial and critical discussion emerged and were both considered by the teachers as an important part of online professional development. Similar results can be found in the relationship between online community building and discourse with regard to web based negotiations and regulatory comments [44,45], and feedback and questioning [46] as well as networking in online spaces [21].

The online mentor also played a key role in the building of a community through constructive dialogue. This can be supported in other research findings [47,48]. The mentor in this research used cognitive support, which aligned to critical discourse and therefore opportunities for professional learning; and affective support that aligned with collegial discourse and the development of a community. Similar results were found in Hutchison and Colwell's [48] research on wiki-based professional learning communities where the mentor was required to provide various levels of support to teachers and that the teachers still preferred face to face support. Various levels of mentor support was raised by Moore [49,50] with the understanding that in online setting, participants come with varied competencies as autonomous learners, and that the educational outcome of any distance learning must be focused on the development of learner autonomy. Figure 9 represents constructive dialogue positioned above reflection with the mentor facilitating from above. The educational outcome of online professional development is presented as a process of self-realization and learner autonomy.

4. Conclusions and Implications for Further Research

With the changing nature of teachers' work, the explosion of online digital teaching resources, the need to make classrooms transparent and the expansion of communication mediums, the move to online professional development is both responsive and required. What is important to consider is that key elements of effective professional development remain guiding axioms for face to face, mix mode, and/or online professional development. However, the way these elements are enabled in these different

modes may need to change. The underlying context of action research in professional development establishes a demand driven model in the sense that the participant controls the nature and timing of support activities (cognitive support) and services (affective support). Activities and services can be offered but not mandated by the mentor and teachers' responses are critical to informing decisions about further activities and services. In online professional development this requires the mentor to work in different ways as they are not able to seek engagement at a prescribed time in a face to face setting. To add to the complexity, online professional development that is self-directed and not "product", "coursework" or "reward/certificate based", ensure participation in the learning and the development of autonomy as the outcome.

This research has opened up many areas for study that can further shape our understanding of online professional development and how teachers participate in professional learning online. Emerging from this research is the idea that a teacher needs to create a sense of presence, as a representation of themselves, so that they have an online identity which enables them to become part of a virtual community. Further research is needed into the establishment and development of an online identity. There is also a need for further research into the role of the mentor within demand driven professional development, in regard to the cognitive and affective support required to enable the development of teachers as autonomous learners. This becomes more complicated as teachers present with varied competencies for self-directed learning and experience online. Online professional development that intends to enable teacher self-renewal and self-efficacy is a key part of helping teachers deal constructively with the proliferation of education resources and tools available to them. Teachers are currently exploring the Internet, using social networking, and gathering digital resources as part of their professional learning. How we leverage these approaches for effective professional development requires further research.

Author Contributions

Sarah Prestridge conceptualised, designed and implemented this study. Jo Tondeur contributed to the theoretical framework to support data analysis. Sarah and Jo research in the same field and are in constant communication around their on-going projects. This intellectual dialogue is fundamental to their work and feeds directly into this paper. This paper is part of a series of partnered publications dealing with similar conceptual issues.

Conflicts of Interest

The authors declare no conflict of interest.

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