



Science Teachers' Conceptualizations and Implications for the Development of the Professional Development Programs

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ABSTRACT

This study aimed to investigate the two primary school science teachers' conceptions of professional development, their perceptions of self-improvement and the factors influencing their professional development. In this investigation, a case study approach was adopted. The participant teachers were given a semi-structured interview and the data collected was qualitatively analyzed. After individual case analysis, cross-case analysis was carried out to compare the participants' conceptions of professional development, their perceptions of self-improvement and the factors influencing their professional development. The findings of the study revealed that the two teachers viewed professional development as an individual process rather than collaborative. They perceived their professional development locally practiced and self-renewed, gained with the help of self critical reflection. They also emphasized that the in-service training courses offered to them by the Ministry of Education do not respond to their needs. Thus, they cannot get the maximum benefit from them. The findings of this study has a significant contribution in drawing a clearer picture of the professional development endeavours the teachers get engaged into and the nature of the professional development in Northern Cyprus context. The findings of this study also indicated that there is a need to develop teacher development programs where teachers are also involved in the decision making process and constructivist stance is adopted that puts the teachers in the center of learning and development process.

Keywords: collaborative environment, reflective practice, professional development, work context, program development.

INTRODUCTION

The value of ongoing professional teacher development cannot be underestimated. 'Teacher learning', 'teacher development', 'in-service training', and 'staff development' are some of the key terms encountered in the area of professional development of teachers. 'Professional development encompasses both teacher training and teacher development and refers to both

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State of the literature

- Self-critical reflection is a must for professional development.
- Professional development is a life- long learning process and is based on constructivist principles.
- 'Reflection- in- action' and 'reflection- on- action' are essentials for practitioners.

Contribution of this paper to the literature

- Work context of the teachers and collaboration among themselves in that context contribute to teacher learning.
- The nature of the professional development programs need to be changed for the benefit of the practitioners.
- Teachers need to go through the process of critical self-reflection in order to develop new perspectives, understandings and practices in teaching.

formal as well as informal that seek to promote different dimensions of teacher learning' (Richards, 2016, p.700).

Teacher professional development has been considered as one of the most important factors to influence teacher learning and student learning (Qablan, Mansour, Alshamrani, Aldahmash, & Sabbah, 2015; Stasinakis & Athanasiou, 2016;). Engaging in effective professional development practices can help teachers to reshape not only their beliefs, ideas, and assumptions but also their practices regarding learning and teaching. Particularly, when professional development practices are effective and meaningful for teachers and can address their professional needs, they are more likely to contribute to teachers' professional development.

Professional development

Teacher professional development is a lifelong process in which, ideally, teachers are expected to engage in learning endeavors to improve themselves. Hunzicker (2010) defines effective professional development as "anything that engages teachers in learning activities that are supportive, job-embedded, instructionally focused, collaborative, and ongoing" (p.177). It is also defined as the main route to achieve quality teaching" (Guskey, 1986, Guskey and Huberman, 1995, Borko, 2010, Eun, 2010) and it targets to help teachers to become better professionals in their daily practices (Eun, 2014). According to Evans and Esch (2013) professional development should be "viewed not as a one-shot event, or indeed as a series of intermittent shots targeted at gradual attainment of an idealised level of teaching proficiency but as an ongoing and self-renewing process of critical reflection on and in locally defined practice" (p.137). In this respect, the distinction between teacher training and teacher development has been drawn by Richards and Farrell (2005) indicating that teacher training targets for short-term and immediate goals while teacher development aims "long-term goal and seeks to facilitate growth of teachers' understanding of teaching and of themselves as teachers' (p.4).

Professional development practices

Teachers can get involved into the process of professional development formally or informally with the help of “teacher observation, on-the-job coaching, team teaching, self-directed study, in-service courses, job shadowing and rotation, membership of working groups, collaborative learning, professional reflection and action research” (Czerniawski, 2013, p.385). According to Lipowski et al. (2011) professional development is divided into two kinds of practice: in-service programs which involve engaging teachers in organized programs (i.e. formal practices such as workshops, seminars, etc.) and continuous experiential learning which refer to informal learning opportunities that help teachers develop professionally (i.e. informal practices such as self-reflection). Professional development activities have also been grouped by Richards and Farrell (2005) under four major categories: individual, one-to-one, group-based and institutional. Self-monitoring, journal writing, teaching portfolios, action research and critical incidents are grouped under individual professional development activities. One-to-one professional development activities include peer coaching, peer observation, critical friendships, action research, critical incidents and team teaching. Case studies, action research, journal writing and teacher support groups are considered as group-based activities. Institution-based professional development activities are workshops, action research and teacher support groups.

In general, professional development processes, whether through formal or informal target for one common aim: improved practice. Traditional professional development processes are in sharp contrast with professional development processes based on reflective practice and social interaction. Training model is an example to traditional professional development whereas Kolb’s (1984) ‘experiential learning cycle’ and Shön’s (1983) ‘reflection-in-action’ and reflection-on-action’ are the models that are believed to enhance behavioral changes in teachers. For further clarification, training model, Kolb’s Model and Shön’s Model will be discussed below.

Traditional professional development : Training model

In centralized educational systems in which educational planning and decisions, as well as policies, syllabi, curricula and textbooks (give reference) are responsibility of the Ministry, current Northern Cyprus context is no exception to this, training model of professional development has been adopted. Guskey (2000) asserts that training model “typically involves a presenter or theme of presenters that shares its ideas and expertise through a variety of group-based activities” (p.22). In this model, there is “a high degree of central control, often veiled as quality assurance, where the focus is firmly on coherence and standardization. It is powerful in maintaining a narrow view of teaching and education whereby the standardisation of training opportunities overshadows the need for teachers to be proactive in identifying and meeting their own development needs”(Kennedy, 2014, p.338).

The training model considers teachers as passive agents. It “provides an effective way for dominant stakeholders to control and limit the agenda, and places teachers in a passive role as recipients of specific knowledge” (Kennedy, 2014, p. 339). In other words, this model does not give teachers any professional autonomy. “It is generally ‘delivered’ to the teacher by an ‘expert’, with the agenda determined by the deliverer, and the participant placed in a passive role. While the training can take place within the institution in which the participant works, it is most commonly delivered off-site and is often subject to criticism about its lack of connection to the current classroom context in which participants work” (Kennedy, 2014, p.338). Today’s educational contexts require teachers to be well equipped to respond to the learners’ needs and thus the society’s needs. However, training model of professional development can offer limited learning opportunities to the teachers since they do not take into account the participant teachers’ needs. Besides, these training programs are not usually situated in teacher’s own learning context, which is basically his/her work context where most of the learning for a teacher takes place. Moreover, these training programmes do not have a room for reflective practice. Yet, it is a widely accepted view that teachers develop professionally more when they go through continuous experiential learning and self-reflection processes.

Kolb’s ‘Experiential Cycle’ and Shön’s ‘reflection-in-action’ and ‘reflection-on-action’

Kolb’s (1984) Experiential Learning Theory regards learning a combination of ‘experience, perception, cognition and behaviour’ (p.21). According to experiential learning, learning is dialectic and cyclical process that consists of four stages: experience, observation and reflection, abstract reconceptualization, and experimentation. In this cycle experience is the basis of learning and it cannot be achieved without reflection (**Figure 1**).

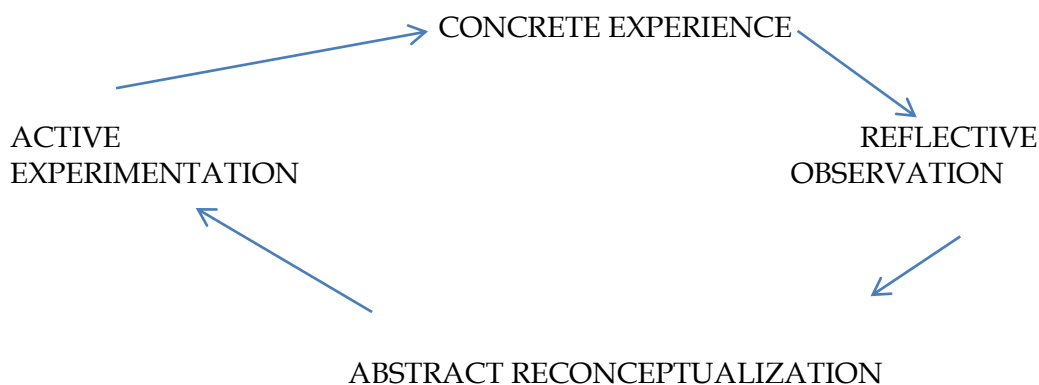


Figure 1. Experiential Learning Cycle (Kolb, 1984)

When teachers engage in experiential cycle of learning they are more likely to become lifelong learners and inevitably they can continually engage themselves into professional development activities. According to this cycle, when teachers reflectively observe their concrete experience in teaching they can reconceptualize their own teaching. In other words, after the concrete experience, with the help of reflective observation teachers can become

more aware of not only their practices but also their teaching philosophy, ideas, values and assumptions about teaching and learning. This process is believed to help teachers modify or even sometimes alter their beliefs, ideas, and assumptions and form new ones in light of their experiences. Then, they go through active experimentation of their conceptualizations. If they realize that their new conceptualizations work, they start to form stronger beliefs about teaching and learning. This experiential cycle can enhance learning in teachers and help teachers to renew their knowledge of teaching and practical knowledge. Therefore, when a teacher is eager to develop and learn about teaching and learning he/she is inevitably expected to go through this cycle all his/her academic life and become a lifelong learner.

The paramount importance of reflective practice is also emphasized by Shön's (1983) model where "The practitioner becomes a researcher...and engages in process of self-education" (1983, p.299). S/he engages in informal learning experiences and tests them against the views of others. Although Kolb (1984) argues that experience is the source of learning Shön (1983) emphasizes that learning cannot take place without reflection and he introduces the concepts of 'reflection- in- action' and 'reflection- on- action'. 'Reflection-in-action' refers to the reflection process that teachers go through when they are in the teaching situation whereas 'reflection-on-action' refers to the reflection after teaching.

Reflection-in-action

- The teaching experience itself
- Thinking and analyzing the experience
- Deciding how to act during the experience
- Taking immediate action
(problem-solving & decision- making)

Reflection-on-action

- Reflecting on the teaching experience
- Evaluating it
- Thinking what you might do differently to solve the problem you faced
- New information & perspectives gained through reflective experience are used to process feelings and actions

Figure 2. Adapted from 'Reflection-in-action' & 'Reflection-on-action' Model (Shön, 1983)

According to Shön's model, 'reflection- in- action' emphasizes the critical thinking and evaluation processes that teachers experience while teaching when in the teaching situation a problem arises that they have to take action to solve or things do not work as they planned in advanced(**Figure 2**). This type of reflection is a very quick one since the teacher has to do it while teaching. On the other hand, 'reflection-on-action' is the critical evaluation process in which teachers engage in retrospectively. In this process, teachers look back at their teaching and think about the alternatives for solving the problem aroused. This helps them to develop a repertoire of solutions and helps them gain new information and perspectives about teaching and learning. This experience of learning through reflection enhances teachers' professional development.

Professional development based on reflective practice and social interaction

It is believed that teachers' professional development can be enhanced when they can get into reflective practice as well as collaborative sharing. According to Farrell (2008) "Teachers who engage in reflective practice can develop a deeper understanding of their

teaching, assess their professional growth, develop informed decision-making skills, and become proactive and confident in their teaching” (p.4).

Reflection helps internalizing what has been learnt since it is an individualized process. However, Vygotsky’s (1978) developmental theory suggests social interaction is a must for individuals to develop. Reflection in isolation can hardly influence professional development because learning is socially and culturally constructed, (Morris and Stew 2007). Thus, for professional development “reflective dialogue and social interaction with peers are significant” (Karagiorgi, 2012, p.80). Collaboration among teachers allow for various types of expertise to be shared and internalized” (Eun 2010) since “each participating teacher in the collaboration process is an expert in some aspects and a novice in others” (Eun, 2010,p. 325).

Therefore, creating a collaborative learning environment can facilitate teachers’ professional development since colleagues can nurture each other. “Empowering teachers to collaborate over sustained periods of time leads to highly positive outcomes such as professional interactions, leadership and improved attitudes, as well as improving the quality of teaching” (Luchoomun, 2007, p.216).

However, how teachers view ‘professional development’ is also important. Is it viewed as an individual or a collaborative endeavor? In this respect, the influence of work culture the teachers function in, on how they conceptualize professional development cannot be underestimated. The work context in which learning and teaching take place reflects the cultural assumptions of society, and so the decisions teachers make about teaching, learning and learners are highly context bound, thus culture bound (Kaymakamoğlu, 2011, p.22). Unfortunately, in Cyprus Turkish Educational contexts teacher individualism has always been common. This common characteristic of the existing work culture has also been identified by Mertkan-Ozunlu & Thomson (2008) who emphasized the lack of a collaborative environment even in The Ministry of Education. According to Hargreaves (1993) “Teacher individualism, teacher isolation, teacher privatism- the qualities and characteristics that fall under these closely associated labels have come to be widely perceived as significant threats or barriers to professional development” (p.53). Work culture is one of the determinants of the nature of professional development teachers can go through. Sangani and Stelma (2012, p.116) emphasized that reflective teacher development and practice in developing countries are shaped by the following factors:

- The hierarchical nature of educational systems and the associated lack of autonomy on different levels;
- The absence of a culture of ‘openness’ and ‘questioning’;
- Challenging working conditions, including time, financial and other resource constraints;
- (lack of) pedagogical and content knowledge; and
- The extent to which reflective practice is supported/scaffolded.

This study was conducted to explore the conceptualizations of the two experienced primary school teachers’ conceptualizations regarding professional development, their perceptions of self-improvement and the factors that influence their professional development. Bearing in

mind, the potential influence of the nature of the work culture and the work context the teachers function in, the professional development activities offered to them by the educational authorities and the teachers' self-improvement endeavors in Cyprus Turkish government primary school context, this study has the potential to shed light on the process of professional development experience and the nature of the professional growth the teachers engage in.

METHODOLOGY

This study aimed to explore the two-government primary school science teachers' conceptions of professional development, their perceptions of self-improvement and the factors influencing their professional development. For this purpose, the following key research questions were adopted in this investigation:

- 1) What are the teachers' conceptions regarding professional development?
- 2) How do the teachers perceive their own professional development?
- 3) What are the factors influencing their professional development?

In this investigation, for the purpose of exploring the participants' perceptions and conceptualizations from their own perspectives phenomenological paradigm was adopted since it puts emphasis on the participants' subjective realities. Case study method, which is a method of phenomenological paradigm, "provides tools for researchers to study complex phenomena within their contexts" (Baxter and Jack, 2008, p. 544). Therefore, in this study case study method was employed to gain in-depth information about the phenomenon under investigation and to understand the participants' perspectives especially in their work context.

In order to explore the teachers' perceptions, conceptualizations and factors influencing their professional development semi-structured interviews were conducted to collect data. The interview questions were derived from the research questions. The interviews were semi-structured to help the researcher probe whenever needed. They were also carried out in the participants' native language (Turkish) since the participant teachers were not proficient enough to express themselves in English. Each interview was carried out individually and took about 20-25 minutes. The place and time of the interviews were scheduled at the participants' convenience. They were audio-recorded for the purpose of detailed analysis by the researcher and by a colleague.

The audio-recorded interviews were translated into English by the researcher and by another colleague. The two translations were compared and one version was arrived at. Then, this was given to another colleague to back-translate. After the reliability of the translation was checked the data was coded to explore the themes emerging in the transcripts. Color coding (using colored highlighting pens) and marginal note taking techniques (Patton, p.463) were employed for thematic coding. Later, a colleague coded some of the data in accordance with the criteria that the researcher briefed her to enhance reliability of the original data coding. Then, both the researcher's and the colleagues coding were compared to see if there were any discrepancies and the coding system was adjusted.

Then, the data was described and interpreted. Respondent validation (Cohen et al., 2004, p.120) was obtained through showing the transcripts and analysis of the interviews to the participants since the participants' subjective views were sought, as far as possible without distortions brought by the researcher. This process helped the interviewees to express if they had anything to add or withdraw from the interview transcripts.

To seek permission for access from the gatekeepers, first a letter was written to the Ministry of Education of the Turkish Republic of Northern Cyprus and then the school head teachers of the participant teachers were contacted to ask for permission. After gaining access, two female volunteering science teachers with at least 10 years of experience in teaching were asked to participate voluntarily in the proposed study. The participants were purposively selected by criterion sampling strategy, which is "an approach commonly used within case studies" (Robson, 1993, p.142). Since the aim of the investigation was to explore the conceptions of the teachers' professional development and their perceptions of self-improvement, experienced teachers were believed to yield richer data compared to the novice teachers.

In this study, the participant teachers were informed about the study and the benefits of it as well as their rights and how and for what purposes the data will be collected and used. The participants' informed consent was asked both orally and written. For the purpose of ensuring the confidentiality of the participants, pseudonyms were used when reporting the findings of the research.

FINDINGS AND DISCUSSION

The participants were two female science teachers who were classroom teachers. One of them was with 12 years of teaching experience of which was one year in a different primary school as her first year teaching. The other respondent had 13 years of teaching experience. She also had one year teaching experiences in another primary school, which was in her first year of teaching. Both of the respondents teach in a primary school in a small town. For the purpose of anonymity the teachers were assigned pseudonyms as Joan and Susan.

Perceptions of professional development

When Joan was asked how she perceived 'professional development' she expressed her view as "theoretical and practical development of one's self". She emphasized the importance of practical knowledge in teaching:

Being able to teach is more important than being knowledgeable.

She believed that a teacher can be a really effective teacher if she can teach and indicated that adjusting teaching according to the level of learners and responding to your learners' needs are the ways of achieving it:

Being able to teach according to the students' level of understanding is very important. You exist depending on the degree you can teach. Since every child has

got a different learning style, you need to tailor your teaching according to your learners.

Susan defined professional development differently putting more emphasis on personally developing oneself to be able to a better teacher and developing problem solving skills. She also stressed the importance of being a reflective practitioner for professional development:

It is closely related with personally what we add to the knowledge we have gained through formal education we receive at teacher education programs we graduate from. It is not enough to say I have a diploma, I'm a teacher. I should be able to solve the problems I encounter in teaching. I should ask myself whether I'm efficient or not and how I can overcome my weaknesses. I also believe in being up-to-date and meeting the demands of this century. For example, using computers for weekly lesson plans.

Both of the teachers referred professional development as a personal endeavour. The process of professional development was seen as combining theoretical knowledge with practical knowledge and responding to learners' needs.

Perceptions of personal professional development

When asked about how they perceived their own professional development they emphasized the importance of experience in teaching. In explaining how Joan's teaching experiences have shaped her teaching, she clarified:

I got more experienced in teaching. I've developed different ways in teaching in time. I've explored using visuals and connecting things to real life when teaching. I realize that I've developed. I've explored short ways to teach. When you teach through practical and experiential learning, you can provide learners more permanent knowledge. This change has been gained with the help of practical knowledge I've gained through work and trial.

Regarding her own professional development, Susan put emphasis on reflection-in-action and reflection-on-action. Besides, she expressed the role of experience in teaching on her professional development. She also mentioned her interest in being innovative.

I developed my practical knowledge about teaching by finding immediate solutions to the problems when they arise while teaching. When I first started teaching I had theoretical knowledge but I did not know how to transfer it to the practical knowledge. My teaching methods have improved with help of my experience. I try to follow technology. I always try to find different ways to solve the problems I face. I try to benefit from the books, journals I read by considering the examples in them.

Joan acknowledged her own professional development merely gained in the classroom context where her instructional behaviors were shaped by her learners' needs. Her self-explored teaching techniques regarding teaching materials, such as using visuals and connecting things with real life for more permanent and meaningful learning. However, Susan's conceptions for her personal professional development was based on reading publications (journals and books) and exploring the teaching practices of others in the area to benefit from as well as her own classroom practices.

Perceptions of the factors influencing professional development

When she was asked what factors influenced her professional development she put emphasis on personal qualities such as being innovative and open to changes and sharing knowledge:

One's personal development is related with being innovative and open to changes. I mean developing oneself, sharing knowledge, being able to give and take knowledge. Sometimes you can learn from your students.

Joan also mentioned three sources that contributed to her professional development. The positive characteristics of her work context, the in-service training courses organized by the Ministry of Education and her own interest for searching and learning.

She indicated how her work context nurtured her:

In our school most of the teachers share knowledge, tell each other their experiences and classroom practices and guide each other.

In explaining the factors that influenced her personal professional development she referred to her personal interest for learning:

I attend the in-service training courses organized by the Ministry of Education. Besides, I try to find different visuals and materials through Internet.

She particularly noted the role of the activities she employs in class in her professional development. She believed that her teaching especially has improved through in class activities. She believed that interaction with individual students has contributed her learning and development as a teacher:

I realize that my teaching has developed especially as a result of individual classroom activities. I mean, when I interact with my students one by one, in other words, when I teach and explain to the individual students.

When Susan was asked to talk about the factors influencing her professional development she emphasized her intrinsic motivation for learning, experience in teaching and her collaboration with her colleagues. She also underlined the supportive environment

created among some teachers in their work context and the negative attitude of the more experienced teachers towards the less experienced teachers:

I like learning a lot and I get very happy when my students learn. There is collaboration among the novice teachers. They give each other opinions, they share their experiences. They suggest new websites to each other. There are some teachers with 25 year teaching experience who do not support the less experienced ones. Let alone not sharing their experiences or helping sometimes they even demotivate them.

Susan mentioned the influence of cooperative environment on her personal professional development:

After the lesson I have discussions with my colleagues and this has helped me to develop creative thinking.

Susan expressed the positive impact of getting well-prepared for teaching in advance on her motivation for teaching and thus learning in teaching:

I enjoy considering every single detail while planning and preparing my lessons. This motivates me a lot.

Both of the teachers mentioned the the top-down nature of in-service training courses and claimed that since the teachers are not involved in the decision making process of regarding the decision of the content of the courses, they do not really respond to the teachers' needs:

The in-service training courses offered to us do not generally meet our needs. The topics are decided by the Ministry authorities. It is very rarely asked to the teachers to decide about the topics. (Joan)

In-service courses are not quality, in general. Sometimes they are useful, yet sometimes they are not. I'm not sure whether these courses are designed considering the needs of the teachers or not, whether the topics were determined by some people who are close the Ministry, or by some people who are in need of collecting points to get a promotion. (Susan)

According to Joan, the in-service training courses do not improve teachers practically since they are more theoretical knowledge based:

More than 50 % of the in-service training courses are theoretical today. I believe that if these courses were designed practical rather than theoretical, they would be more beneficial.

Susan also expressed her opinions regarding the nature and quality of in-service training courses and also stressed how different views teachers held for in-service training sessions:

Some teachers attend the in-service training programs to learn yet some of them attend these courses to collect points for promotion. The experienced teachers do not attend the in-service training programs to develop themselves. They think these courses do not add something new to them so they find them useless. Sometimes in-service training courses are given by inefficient teachers so they can be demotivating. I remember once we started asking questions to the presenter about the topic but she could not respond to the questions. Then, the session finished in 20 minutes. I remember once that the session was cancelled because of having a few people attending to it.

Susan also complained about being far from the Ministry that made them feel remote from the center which brought some disadvantages to them:

We are not close to the Ministry. Therefore, we are usually late informed about many things, such as the exams for promotion. We sometimes receive the information about the exams after they are completed.

In conclusion, the participants views revealed professional development was seen as an individual practice rather than collaborative, in general. This might be seen as an obvious reflection of the common characteristic of existing work cultures in North Cyprus where individualism is favoured. Teachers in this investigation particularly defined their personal professional development locally practiced and as a self-renewed process with the help of critical reflection. The general characteristic of their professional development process was achieved by engaging in continuous experiential learning practices which provided limited informal learning opportunities to them. Their perceptions regarding the factors influencing their own professional development were self related. They underlined the influence and importance of interest in learning development as well as the role of intrinsic motivation for professional development. The respondent teachers regarded professional development self responsibility. It seems that the teachers cannot get the maximum benefit from the in-service training courses offered by the Ministry since the courses offered to them do not respond to the teachers' needs.

Implications for program development

The findings of this study revealed that there is a need for the design of the in-service teacher training programs to respond to the teachers' needs in their work contexts. In designing these programs it is essential to adopt the bottom-up strategies where teachers who will benefit from training are also involved in the decision making process of the topics of learning and development in the program. Constructivist teacher learning stance needs to be followed where teachers are in the center of the teacher professional development and teacher learning process.

CONCLUSIONS

Despite the limitations involved in such a small study, the findings clearly indicate certain implications for the professional development of teachers. Since the respondent

teachers in this study underlined the benefit received from informal learning rather than formal training, there is a need for designing schedules that engage teachers in formal as well as informal practices. Besides, it is of paramount importance to involve teachers in the decision making process of the content of the in-service training sessions in order to meet their pedagogical needs if the optimum benefit is targeted. Furthermore, it is highly essential to establish a collaborative culture where teachers can find opportunities to explore, discuss, learn and gain new perspectives regarding teaching.

In conclusion, in order to initiate and maintain a culture where there is continuous growth, it is essential to establish structures that foster professional development and redefine the role of the teachers in this new culture. 'Professional development of in-service teachers require school-based model model which will provide them with opportunities for collaboration in building an environment that supports their capacity-building and pedagogical improvement' (Gutierrez, 2016, 801p.). Besides, it is of paramount importance to design in-service courses and teacher development programs that will motivate teachers to benefit from profesional development endeavours. Since this study was conducted with a limited number of teachers and their objective views were sought, the findings of it should not be generalized to all the teachers working in North Cyprus primary school contexts. For this reason, it would be helpful to conduct a similar study with a larger group of teachers to explore their conceptualizations and draw conclusions.

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