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Designing and Validating a Model of Professional Learning Community for Secondary Technical and Vocational Schools

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Abstract

The present review aims at designing and validating a model of Professional Learning Community for the technical and vocational schools of the upper secondary level.This research is conducted through a qualitative approach and applies the method of Grounded Theory. A Targeted Selection approach was applied for selecting the documents, including all academic sources related to the subject, which constituted the research statistical population of the study. Sixty titles were selected. In addition, Chain Sampling, one of the methods of Targeted Sampling was applied to select the individuals for the interviews and validation sections. Using the Theoretical Saturation method, seventeen individuals for designing the model and for the first phase of validation and forty-two individuals for the second phase of the validation (which assesses the extent to which the model can be executed) participated. Also, the data collection methods employed in each phase included a Semi-Structured Interview for the first phase and a Researcher-Made Questionnaire for the second phase. For analyzing the documents, Qualitative Content Analysis and for analyzing the interview transcripts Inductive Analysis and the coding of Grounded Theory was applied.

Results: The results demonstrated that the structure of the professional learning community includes 21 elements that were identified. The model is delineated in 5 steps Plan, Establish, Implement, Modify and Assess, and is validated in two phases. Validation results illustrated a remarkable degree of consistency between the interviewees in the first (structure and elements of the model) and the second (the degree to which the model is executable) phases.

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Introduction

Education, especially in today's world, which is replete with challenges, harms and dangers that invariably threaten physical and mental health, has an important role in enlightening people as it enables them to liberate themselves from ignorance, false impressions, and misunderstandings, and cultural, social and economic poverty. The ministry of education bears the responsibility of educating individuals and has a vital role in developing social, economic and citizenship skills as well as competitiveness at international levels. As an official, influential and principal institution, it must prepare itself to respond to the demands of the individuals in the 21st century (Shahsavari et al., 2021).

On the other hand, considering the ascending trend of globalization and the ever more fading of the borders between the countries, competition and also the need for competent and qualified people have reached their peak. However, in the new design, the modifications and improvements that teachers make depend on certain individual and professional characteristics (Cansoy, Palar 2017).

Studies have demonstrated that teachers and trainers have sophisticated roles at school. Hence it is important to find out what skills and knowledge they need and how they should gain them during their career span (MacPhail, Ulvik ,Guberman, Czerniawski, Oolbekkink-Marchand, & Bain 2018).

The scope of teachers' participation in lesson planning indicates the areas where teachers can participate in lesson planning. Experts have introduced various areas for teachers' participation in curriculum planning. Fathi and Ejargah (2015) believe that teachers can be used in five basic areas of content to be taught, teaching texts and materials, teaching models and methods, learning activities and how to evaluate students. In general, the most important area of teacher education in curriculum planning can be found in the areas of curriculum completion and improvement, implementation design, and curriculum evaluation.

Teachers are the most important element in the success of curricula due to their familiarity with the problems and needs of students and the school and the valuable experiences they gain through interaction with learners if the decisions related to the curriculum are made with a deep and comprehensive reflection, the effectiveness of the curriculum will improve significantly (Fathi and Ejargah, 2018).

With the changes made in the structure and needs of societies in all social, economic, political, scientific and cultural dimensions, the need to change the tasks, functions, as well as the goals and missions of education is clearly felt (Bazargan, 2015).

The current conditions of society and the importance of finding a knowledge-based society have caused schools, students and families to demand more

quality and comprehensive education. Therefore, educational systems have been exposed to judgment and accountability more than in the past (Mehr Alizadeh, 2018).

Considering the challenges face the educational system, such as: the increasing development to meet social demand, the knowledge-oriented economy and the development of information technology, there is an increasing expectation from them is accountable for their teachings, and this major emphasis is placed on quality assessment in relation to educational processes (Murray, Laurent & Gontarz, 2015).

Therefore, responding to the created expectations requires the identification of influential factors in the planning and implementation of courses, such as the strategy, goals and organizational structure of educational centers, its organization and management, educational standards, educational staff, available facilities and equipment, the teaching, learning and evaluation process. The degree of influence of each of them in helping to play the role of education in improving the quality of the product or service produced by the organization is (Ivancevich, 2013).

Teachers and human resources in the education system are the main elements within the students' learning process, and it is apprehended that the quality of the service they provide might experience a sudden and severe downfall due to this lack which in turn can aggravate the problems exist in the education system (Dibaei Saber, Abbassi, Fathi Vajargah, Safaei Movahed 2020). This lack is more noticeable in the technical and vocational education system since the constant and rapid changing of many work environments has consistently forced teachers to expand their skills, expertise, and Educational achievements (Grollmann, Bauer, 2008).

Nevertheless, the research in evaluating the technical and vocational majors has revealed the fact that there is a notable gap between the competencies of teachers and students with the expected ones (Ghasemi Pouya, 2010). Navidi (2011) illuminated that teachers and trainers still have a poor state of performance in applying teaching strategies and utilizing training tools and teaching aids; Abdolahi(2014) acknowledges that the retraining and in-service courses are not adequately efficient; the results from the assessment reports of Supply Teacher Training Courses manifest that the process of teachers' training had endured some shortcomings and the research conducted by Esmaeili (2011) implied the gaps between the competencies of technical and vocational graduates and those required by the labor market.

In such conditions enhancing skills and constantly rebuilding teachers and trainers' professional competencies becomes more prominent. They have the responsibility of educating the next generation, and therefore new approaches to training teachers and developing their

professional competencies as the main leaders of education have been of particular concern at the forefront of the educational system's priorities (Saki, 2014). A modern approach toward this end is Professional Learning Communities (PLC).

The origin of validation can be found in different theories, school theory as an open social system (Hoy & Miskel, 2013). Therefore, it emphasizes that at least four categories of main internal elements (people, structure, culture and atmosphere, power and politics) that interact in the teaching and learning process determine the performance of schools. According to the theory of learning organizations, the organization a learner is an organization in which participants pursue common goals with a collective commitment to evaluate the value of those goals with a specific routine, modify them if needed, and regularly find more effective and efficient methods to achieve those goals create and practically achieve the quality assurance and improvement of the organization (Leithwood & Louis, 1998, Fillion, Koffi, Ekionea, 2015 anda Flood 2018).

Effectiveness theories and models also refer to the category of validation and quality assurance in another way. Among the effectiveness models, we can mention the model of basic support for academic progress (Bryk, Sebring, Allensworth, Easton & Luppescu, 2010), who believe that student performance is within the framework of basic support and their motivating forces (educational leadership and collaborative leadership) and conditions. Relational trust, building relationships and bridging social capital are facilitated.

Demings total quality management theory, with the aim of quality assurance and evaluation emphasizes the continuous improvement of all internal activities of an organization, and its ultimate goal is to improve the quality of products and services, through the improvement of human resources, existing processes and equipment, and at the same time, reducing the costs of the operational area and this is the full quality guarantee (Owusu & Duah 2015, Mansouri, 2018) .

Referring to the Kaizen theory, it considers quality as something that does not have an end point, and for this purpose, organizational competencies should always be improved through evaluating and finding the root of problems and solving them at the source and finally changing the standards. Lean management theory sees quality assurance in creating value and eradicating waste and things that waste organizational resources. The theory of lean thinking is an attitude for increasing productivity, continuous value creation, minimizing costs and wastes (Jahangiri, 2015).

Applying this approach at schools will prime teachers within different groups, the manager, and other personnel (educational deputies and chancellors) to take the initiatives towards improvement and advancement of students' learning by

participating in constructive discussions, analyzing teaching methods, and their own performance and also their efforts to improve it (Pirtle & Tobia 2014).

At schools enjoying high levels of PLCs teachers have more opportunities to contact, collaborate and have open dialogues with their colleagues (Lee & Ip, 2021). In fact PLCs promote sharing different opinions, receiving support from colleagues and expressing common understandings. This has a direct impact on innovation (Gong, Kim, & Liu, 2020 ؛Hülsheger, Anderson, & Salgado, 2009 ؛ Lu, & Campbell, 2020; Holdsworth, & Maynes, 2017 ؛Rubenstein, Ridgley, Callan, Karami, & Ehlinger, 2018).

Studies conducted at Germany's vocational schools also demonstrated that, in comparison, the teachers participating in advanced PLCs had a more fruitful performance by providing students with more legitimate and more practical learning opportunities to acquire professional knowledge and skills (Warwas & Helm, 2018).In like manner, the research conducted in the US acknowledged that improvements in students' outcomes were highest in schools where PLC measures were implemented, and teachers were constantly focused on students' learning and improvement (Ratts, Pate, Archibald, Andrews, Ballard,& Lowney 2015).

The aforementioned approach was aimed at supporting teachers and helping them in acquiring their expected or desired knowledge and skills. Dufour (2004a) states in his study "the traditional concept of professional development as an occasional event that occurs outside of schools has now been evolved into the notion that the most influential professional development occurs within the workplace". In other words, professional development should be job-embedded and specifically designed for improving teachers' knowledge and skills according to their individual needs. On the other hand, studies have disclosed that traditional methods are less efficient since learning is defined within the school's system and seldom reaches the real classrooms. It means that learning follows the predetermined frame of the school and is hardly carried out within the real environment of the subject of study (Hord, & Sommers 2008; Eaker, DuFour & DuFour, 2002; Hord 2004).

One of the important factors in the professional development of teachers is the creation of professional learning communities in schools; the important role of school principals in leading professional learning communities is not hidden from anyone. Therefore, empowering managers and solving challenges in this field can play a very important role in the development of teachers' competencies and students' progress. In regard to developing PLCs in Iran, the studies have illustrated that the research conducted so far is not sufficient and that PLCs have not been implemented at any school, including public, private, Shahid, magnet, and charter, at any level.

The Theoretical Framework and Literature Review

Considering the role and active influence of teachers' professional development on improving the education system and schools and students' achievements, it has been accounted as one of the fundamental concerns within the education system. Previously the importance of preparing and training teachers necessitated the provision of a graduation certificate from a teacher training institute. However, teachers' professional development was brought up seriously and became inevitable in later years. In traditional methods of professional development, teachers, not considering their level or major of study, participated in an annual event in which they received the required information from the experts and through lectures, training courses, or independent professional research in a conventional manner.

Similarly, Lieberman (1995) believes that in order to engage teachers in true learning, which impacts students and class activities, schools require different learning opportunities that could involve teachers in "experiencing, creating and solving real problems based on cooperating with each other and their own experiences". Lieberman supports the belief that teachers' engagement in professional development should be constant and continuous. What they learn should be practicable in their everyday work profession (education), and she disagrees with the conventional workshops or separate training sessions. In order to assess the experiences of professional learning (teachers) in professional development, contemporary models of the learning process will be discussed in the next section.

Professional learning communities is one of the modern approaches to teachers' professional development; known as the teachers' professional and collaborative learning, Professional Learning Community or PLC in short, is a method through which the followings realizes: reviewing the standards, the required concepts, and skills to master these standards and determining an assessment method for them; selecting research-based instructional strategies and methods for implementing lessons learned, recording successes and challenges, and collecting documents (consented in the meetings) which represent the outcomes of students' learning; analyzing the performance of the students through revising associated standards and identifying strengths and weaknesses of the students; adjusting the teaching methods considering the students' needs after inspecting unsuccessful instructional experiences, and studying the alternative strategies for the future instructional challenges that may occur (Pirtle, 2014).

Dufour and Eaker describe PLC as “a group of teachers who work together to accomplish tasks which cannot be completed alone through establishing an environment for mutual cooperation, emotional support and personal growth (Blankenship, Ruona, 2007).

PLCs can be school-based, district-based, interregional or national. In the membership of a PLC the subject of study is determining. The existence of an Opposite culture and structure in schools or districts makes PLCs to have a more significant effect. PLCs always progress towards enhanced learning and development, a feature that is compatible with the variable nature of the schools and districts. The studies have also reflected the fact that each PLC has developed in a different way over time. The process through which the four learning activities namely Collaboration, Reflection, Feedback and Experimentation were performed portrayed a cautious development from individual to collective performance and no incidental development towards a systematic performance was noticed (Huijboom, Van Meeuwen, Rusman, Vermeulen, 2021). PLCs seek perfection and elevation for teaching methods and learning in individuals, groups and the whole system.

Committing to individual and collective learning and preparing for continuous development are the two features that distinguish PLCs from other communities. In these communities members try to find solutions or remedies for specific issues and problems, identify needs, boost their knowledge through study and discussion regarding issues related to teaching/learning methods, find ways to develop a culture of continuous learning at school, and present, analyze and mentor their own ideas and feedbacks on teachers and students performances, all in groups.

The elements of PLCs include learning, collaboration and results. In regard to the dimensions of the PLCs, Hord (1997) defined the following five dimensions: I) participative and supportive leadership II) shared values and visions III) collective innovation which was altered by the term "collective learning and its application" later IV) supportive conditions and V) shared personal practice. These features are similar to the ones indicated in the study of Dufour and Eaker (1998) to a large extent.

Dufour and Eaker (1998) introduced six dimensions of PLCs as follows: i) Shared mission, vision, values, goals ii) Collective inquiry iii) Action orientation and experimentation iv) Continuous improvement v) Results orientation and vi) Collaborative teams focused on learning. In paper titled "Professional Learning Communities at Work: Best Practices for Enhancing Student Achievement" (Eaker and Dufour, 1998) these characteristics were accepted by the educational community. Then in Dufour et.al (2010) the six essential dimensions and characteristics for PLCs were indicated as:

i) A focus on learning ii) A collaboration culture with a focus on learning for all iii) Collective inquiry into best practice and current reality iv) Action orientation: learning by doing v) A commitment to continuous improvement vi) Results-orientation.

Professional Learning Community Models

PDSA model: It is the abbreviation of 4 terms of Plan, Do, Study and Act. This model is stemmed from the concept of the learning organizations introduced by Peter Senge. A learning organization is a comprehensible framework for groups to evolve and grow through cooperation with each other. The five elements of learning organization indicated by Senge include Personal Mastery, Mental Models, Shared Vision, Team Learning and System Thinking.

In a similar way Dufour and Eaker (1998) defined the ensuing features as the essential features of a PLC: Shared mission, vison and values, Collective inquiry and practice, Collaborative teams, Commitment to improvement and Results orientation. The PDSA model is similar to the PDCA - Plan, Do, Check, Act - model introduced by Deming. The Deming model provides a framework for process or system improvement. Whenever items to be improved are recognized, this model can be utilized as a guide to improving certain projects . "This is a dynamic model continuously monitoring the system and improving it " (Henshall, 2017). This model includes four steps of plan, do/perform, study and act. Certain tasks should be done at each step, and it provides feedback on the performance of the system. The goal of this type of model in PLCs is to share the best methods of teaching-learning, determine students' expected instructional aims and outcomes, increase the collaboration, communication, and interaction between teachers, the manager, and other educational personnel, and analyze the performance of students through revising the associated standards and discerning students' strengths and weaknesses and identifying their learning problems precisely, standardize methods and specify the way they should be assessed, correspond teaching methods with students need after investigating unsuccessful instructional experiences, select alternative teaching strategies, find solutions for future instructional challenges, etc

The Cascade Model

The cascade model is "a top-down model in which information flows from "expert" teachers and primary trainers to the trainers of the middle levels at different levels" (Ngeze, Khwaja, & Iyer, 2018).

In this model, the communities, including groups of teachers, managers, and other educational personnel, are divided into smaller groups in lower levels based on the school's goals, and this process ends in the lowest level, which consists of the students (Mamlok-Naaman, Eilks, Bodner & Hofstein, 2018). This model illustrates different levels of sharing knowledge, activities, aims, duties, and tasks of all members. "In this model, based on the levels defined accomplishing the activities and plans at each level are considered as the goals for the next level. Deviation and inconformity between levels has a

significant impact on other levels. Generally, prominent teachers, experts, and the manager take the lead of other teachers in the group. They are the frontiers and have a serious responsibility in directing, mentoring and leading individuals in the other levels" (Mamlok-Naaman, 2018).

The Logic Model

It presents a simple and clear illustration of the relationship between inputs, policies, strategies, activities, outputs, and outcomes of the program. The logic model demonstrates the rationale behind the program's mechanism and explains the reason for the success or failure of a program. This, in fact, addresses the "program theory" or the logical foundation of the logic model (Chen, Pan, Morosanu & Turner, 2018).

The components include 1) inputs, 2) assumptions, 3) activities, 4) outputs, which should not be confused with outcomes, and 5) outcomes that mirror the changes caused by implementing the program. The logic model of the PLCs comprises six steps, and should they be implemented correctly, the teaching and students' learning improve (Addley, 2014: P 40).

The Diagnosis Model

This model is based on Horizontal Learning and is utilized for a certain form of learning. In the diagnosis model, knowledge sharing is done through collaboration between members and in an operational practice (Boshier and Huang 2007; Nilsen 2010; Cowie and Otrel-Cass 2011; Peng-Fei 2014). In horizontal learning, more responsibilities are delegated to the community since self-assessment and flexibility constitute the foundation for the horizontal learning process. The process is defined through collaborative learning, and empowerment is of the vital aspects of it. Horizontal learning is mainly considered a tool for knowledge management. In the structure of horizontal learning, adult learning theory as well as work-based learning, the goal is to develop a diagnostic tool to evaluate the organizational culture of the school and a methodological tool to facilitate work-based learning for adult teachers at schools (Knowles, Holton, and Swanson 2005).

Emphasizing determining measurable goals, PLCs try to ensure that the learning experience is based on the current problems. This is consequential for the learner. This means that learners learn about items and issues which are problematic to them. In such communities, the spirit of collaboration and sharing knowledge are parts of the culture of collaboration. As a result, the concept of professional learning communities supports and encompasses the theories of horizontal learning, adult learning, and work-based learning. Accordingly, Sleegers et al. (2013) presented a (multi-dimensional and multi- level) model of PLCs, which involves three types of competencies, namely Human Capacity, Interpersonal Capacity, and Organizational Capacity, which are required for developing PLCs (Horváth, Simon & Kovács, 2015) .

The Third Space (3PEx) Model in Professional Learning

This model provides a space for teachers and pre-service teachers to be able to receive guidance from experienced teachers in a real environment and support from leaders. "Negotiating and discussing multi-dimensional professional relations, the third space model which reflects the complexities of factors involved in professional learning experience comprises cultural aspects as well as other elements influencing student teachers, university supervisors, supervising teachers/guides, and support staff. Once personal aspects are identified, varied aspects of professional experience, their mutuality and interconnections can be studied (Le Cornu, Ewing, 2008; Williams, 2013, 2014).

Interactions develop in an overlapping space within the third space, where there are interconnections between teachers, student teachers, university supervisors, trainers, teachers, and support staff that bridges university and school or primary childhood environments /cultures. The basis for these interactions might be directed by government rules, quality of teaching standards, and educational policies Williams (2014) and Engeström (2004). This process is implemented with regard to partnerships that are based on a collaborative institutional partnership that has the common goal of teachers' professional development (Broadley, Martin, & Curtis, 2019).

Components	Leadership challenges of professional learning community	Reference
Individual	Vague understanding of the learning community, weak financial power of managers, expertise of school managers, lack of time, many administrative conflicts of managers, not having enough time, high workload of teachers, well-being of members, differences in teachers' professions, passive teachers	Bellibas et al.(2016), Chua et al.(2020), Zhang et al.(2017), Ho et al.(2019), Antinluoma et al.(2021), Rittenour(2017), Antinluoma et al.(2018), Williams et al.(2008), Carpenter(2015), Draper(2014), Dina(2013), Hairon et al.(2014)
Group	Organization of meeting time, manager's lack of acceptance among colleagues, mutual trust, interaction and cooperation of teachers, existence of communication problems between school members, collaborative decision-making processes, poor composition of the group.	
Organizational	Daily educational programs, school buildings, financial issues, structural hierarchies, holding	

	meetings, school culture, lack of material and human resources, school management and leadership, decentralization, unfavorable accountability policy, lack of team spirit among employees, weak educational systems	
External	Out-of-school environment, interaction with families	

According to what has been said, it is clear that the leadership of the vocational learning community in the schools of our country has a special attention and school managers are facing challenges in this field. There is a lack of academic research on the challenges of leading a professional learning community in schools as perceived by secondary school principals. This article aims to fill this gap in the literature. Its purpose is to know the major obstacles facing secondary school principals in the field of professional learning community leadership.

Research Methodology

The present study is qualitative research employing qualitative methods such as Grounded Theory, Delfi method, Focus Group, and Document Analysis. Since the Grounded Theory is based on data collected through field study, the researcher ensures the validity of the data. The ultimate output of this research does not merely reflect a set of findings or related categories but presents a coherent theoretical frame about foundations, procedures, and the outcomes of a phenomenon or an incident (Somekh & Lewin, 2005). The environment, field, or bedrock of the research in grounded theory has numerous types, just like other qualitative methods. Targeted Sampling and Analysis approaches were employed respectively for data collection, and analyzing and coding. Delfi and Document Analysis are the methods used in accordance and simultaneously with the grounded theory for answering the questions. The study is conducted in two steps; first, a combination of document methods and grounded theory were applied for the model's formation. For data collection, Semi-Structured Interviews and documents were used, and a comprehensive body of document types was studied (Mohammadpour, 2018).

Validation of the proposed model was examined using Delfi and Focus Group methods. In addition, the executability of the model was validated through the Delfi model as well, since the pilot run, which was previously supposed to be done in a technical and vocational school, coincided with the emergence of COVID 19 and subsequently the online-held classes. For the semi-structured interview, targeted sampling was applied. The targeted sampling used in this study is Chain or Snowball Sampling, and selecting the first participant was critical as it could lead the

researcher toward the desired targeted samples.

The goal of choosing this type of sampling is to cover all key elements related to the subject. In this way, those who had sufficient knowledge or experience in the concerned field or regarding the concerned phenomenon (professional learning communities) were selected. Thus individuals with work and research experience in PLCs and related topics were selected. The selection process continued until the state of theoretical saturation was reached, which conveys the fact that conducting more interviews did not provide the researcher with more information and merely was a repetition (Gubrium, & Holstein, 2001). For collecting data in the qualitative section semi-structured interview with the four groups of individuals introduced and recommended using Chain Sampling was conducted. Information from interviewees can be traced in Table 1.

Table 1. The profile of the interviewees in first part of the evaluation evaluating the structure of the proposed model

The interviwees	Number	Major of Study	Level of study
Faculty members of the universities and the Organization of Education and Research Planning	10	Curriculum, Educational Management	Phd
Phd graduates	3	Curriculum, Educational Management	Phd
Technical and vocational school managers	2	Psychology	Masters
Educational heads (teachers) of technical and vocational studies	2	Graphics - Accounting	Masters
	17		

These interviewees also took part in assessing the validation of the first phase of the devised (proposed) model. They were given both the model and a questionnaire. The process continued until reaching the researcher's desired level of agreement between interviewees (higher than 0.7).

Just like the previous phase, the validation of the second phase of the model was evaluated using the Delfi method, and the samples were selected based on the chain sampling approach of the targeted sampling method. In this phase, two groups of individuals were considered as the research sample (Table 2):

Expert teachers of technical and vocational majors currently employed: This group included teachers who were familiarized with lesson study projects and taught science, special courses, or technical subjects and were willing to cooperate in answering the questionnaire. **Active managers of technical and vocational schools** who had both the

experience of being an expert teacher and acquaintance with lesson study projects and were willing to cooperate in answering the questionnaire.

Table 2. The profile of the interviewees in evaluating the executability of the proposed PLC madel

Interviewees	Masters	PhD	Bachelors	Major of study
School Manager	5	1		Architecture, Graphics, Food Industry, Crop and Live Stock Production, Computer Hardware, Computer Software, Transportation, Accounting, Electrotechnique
Teacher	17	5	13	
Deputy			1	
Total	42			

In this study, the methods of member checking, peer checking, and data triangulation were conducted to evaluate the validation of the results. In order to improve the validity of the research after recording explanations and answers of the interviewees to the questions regarding PLCs, the researcher stated her deduction, and they were asked to check its accuracy. Of course, during the interview session researcher asked questions to inquire about the accuracy of her perceptions and to resolve doubts or ambiguities about the interviewee's statement. The outcomes of the interviews covered the context presented in the literature and theoretical principles to a great extent which reflects the validity of the research. In the method of member checking, the final report or specific contents/descriptions were then reverted to the interviewees to survey whether they confirm the accuracy of the results. This does not mean that the raw data was returned to the interviewees, but only a part of the produced and edited material was given to the interviewees, and they were asked to comment on the outcomes. Triangulation was applied to ascertain the validity of the data.

The goal of applying this technique was to avoid natural biases resulting from using a certain resource, method, investigator, or theory during the study. Employing different methods in research can enhance the reliability and validity of the research, as the strengths or merits of a method can ameliorate the weaknesses of another. From the four types of triangulation, namely data triangulation, investigator triangulation, theory triangulation, and methodological triangulation, data triangulation was applied. In more details, a comprehensive body of information was obtained through three resources; faculty members and university professors, managers and educational heads (teachers), and PhD graduates whose dissertations were on PLCs. In addition, books, guides, articles, and scientific journals were other sources utilized for the research.

In assessing the qualitative reliability, the goal is to evaluate the degree to which the researcher's approach coincides with other researchers and also with the

methods used in other projects. For assessing the reliability of the research inter-rated reliability method (comprehensive study) was applied (Creswell, 2009). Since the Delfi method was applied and considering the nature of collected data using this method, the validity of the questionnaire (Open-ended and Closed-ended (Likert)) in the design and validation phases of the model, the elements, and also its executability were evaluated through controlled feedback. Cronbach's alpha coefficient was used to assess the reliability of the questionnaire.

To this end, for the first and second phases of the validation process, samples and statistical populations with the overall sizes of 17 and 42, respectively, were asked to fill in the questionnaire. Cronbach's alpha coefficient was then obtained through SPSS software. The coefficient was 0.82 for the first phase consisting of 26 items and 0.94 for the second phase consisting of 25 items.

After devising the questionnaire (using the obtained items), a quantitative method was employed to check the validation of the structure of the devised model in PLCs (phases and elements). The goal at this stage was to evaluate the validation of the structure and elements of the suggested PLC model with respect to education experts' points of view. Validation evaluation of the devised (suggested) model's executability in the next phase is done with respect to the opinion of expert teachers and active managers of technical and vocational schools. The goal at this stage was to assess the degree to which the suggested model can be executed. Finally, the important factor considered in assessing the validation was the agreement rate between the experts over the structure and elements of the suggested model.

One of the statistical methods to calculate this number is the Kendall Coefficient of Concordance (Siegel & Castellan, 1988). Kendall coefficient presents whether the individuals who order the factors based on their relative importance have considered similar criteria for their judgment and to what extent the ranks are similar. It is equal to 1 in case of complete concordance and 0 if there is no correspondence between the answers. Determining the number of rounds in the Delphi method is the key factor for achieving a significant correspondence between participants, and it is estimated through the Kendall coefficient of concordance. The process will end when a high percent agreement is attained

Analyzing the Findings

Analyzing the findings with regard to the first question: The first question is about the elements of the suggested PLC model and its formation. To answer this question, the items of the interview were developed based on the outcomes of qualitative analysis of the selected papers and documents. The next step after interviews were conducted and documented was to read the texts for the contextual content analysis. For this

purpose, instead of words, phrases, sentences, lines, and paragraphs were considered as the units of analysis.

Whenever a context was addressed, it was then selected as a key sentence and was assigned a code. Codes are labels used for description or deduction during the content analysis as units of meaning.

Generally, they depend on pieces which can be words, phrases, sentences, paragraphs, or the whole text (Newman, 1997). The process of coding the units of meaning proceeded to the point of theoretical saturation, which reflects the fact that no new code or context was achieved through analyzing the content of interview texts, and points noted in interview sessions were merely repeated by different interviewees.

Table 3. **The elements of the PLC model**

Main Categories	Middle Categories	Sub-Categories
Planning	**Determining Goals**	Enjoying shared and similar concerns, shared norms and a specific goal. Setting values, and a shared vision. Noticing high priority documents in technical and vocational education.
	Determining Resources	Equipping network-based learning centers. Supplying resources (general and especial resources). Aggregating school resources. Providing access to resources. Providing sufficient space. Developing educational standard. Accessing to technical and vocational educational standards. Providing sufficient budget. Supplying required software and hardware. Providing facilities. Need for updated resources, facilities and equipment. Financial resources. Providing the foundations including both aspects of software and hardware. Providing space for studying the teachers' required resources. Allocating a meeting room for teachers' discussions. Providing schools' soft services. Manager and teacher are two key elements of the communities. Need for a school leader and manager. Need for school staff. Supplying human resources. All school members including the manager, teachers, office staff and even support staff, the members of the association and parents should be the members of this community in technical and vocational schools.

Main Categories	Middle Categories	Sub-Categories
	Culturalization and facilitation	Attending the communities in the work-hours' time. Voluntarily making a team. Determining teachers' professional competencies first. Teachers of diverse majors attending in professional learning community. Participation of all teachers and trainers. Having different councils of techers at school. Intervention of local community in school. Maintaining school's autonomy. Promoting an interactive atmosphere at schools. Developing the cultural foundation of the school. Flexibility and existing a flat structure at school. A non-hierarchical structure. Communities as school-based management systems. Determining instruction procedure for establishing communities. Team making. Determining professional competencies for groups. The teacher's area of expertise must not make a difference. Flexibility in enforcing laws and rules. Existence of a decentralized system. Training teachers and school managers. Each group comprises a community. Members should be interested [have passion, have enthusiasm]. Instructing general communication skills. No resistance or opposition should exist between members. Favorable conditions. Existence of a professional and collaborative spirit between members. Motivating and encouraging for collaboration. The group must be sociable.
	Limits, barriers and problems	Majors must not be aware of each other's weaknesses. Weaknesses are not to be shared. The know-hows are not to be shared. Teaching methods are highly dependent to the profession. Teachers' occupational group must be similar. Schools are not islands. Decentralization must not be accounted as absolute independence of school. Schools must not be neglected and turned into isolated islands. Establishing learning communities is time-consuming. Expertise does not cause any problem. Considering short time and low motivation level, in order for teachers to participate instructions must be very effective. Numerous challenges. Collaboration of all teachers is not possible for specialized subjects. Heeding the ongoing conditions of the current education system. The centralized system impedes the establishment of learning communities. Taking heed of distinguishing aspects of professional learning communities from other sorts of communities. There is no general/single prescription. Existence of a hierarchical structure in school. Teachers' restrictions in decision making.

Main Categories	Middle Categories	Sub-Categories
Establishing (communities)	**Defining the scope and the standardization of activities and processes**	Explaining to the current (working) human resource of the school. Determining the required practical instructions in general and specific frames. Providing the required general and specialized instructions for establishing the communities. The (practical) instructions are based on the establishing approach of PLCs. The careful study of the school from all aspects. Determining the teams needed at school. Assessing the current conditions. Determining the steps and the procedure to execute them. The process of all tasks and activities must be specified in the first meeting. Activities should be specified for the detailed steps. Both conceptual and operating models would better exist for the establishment of the communities. Taking heed of school's needs for planning and implementing communities. Determining the duties of members. Noting the teaching and learning standards of technical and vocational education.
	Ensuring a supportive structure	School should have capacity to accept changes (adopting new approaches). Noting the mentioned approaches in the upstream documents on school management and school based management system. Communities should be based on the needs of the local community. Interventions of the local community in school. Existence of different councils of teachers in school. Promoting the thought of progression towards decentralization of schools. Participation of the experts and officials of the ministry of education in learning communities.
	Supportive rules and instructions	Individuals' inclination to join the communities. Participation in communities must not be compulsory. Members should be interested to participate. Members should have compatible opinions. Developing a supportive atmosphere. School staff should have the knowledge of public relations. Paying attention to social topics. Delegation of authority and the responsibilities to teachers through issuing announcements. Implementing the school based management system. Recording details by teachers and instructors. Recording the essential incidents and details of school. Take heed of educational system's structure. Adopting procedures to resolve barriers imposed by laws. Learning communities as legal and official approach. Indiscrimination and observance of justice is expected from the manager, deputy and teachers of the school. The school manager's autonomy and freedom to act in implementing directives and instructions. The accountability of the individuals at school must be according to their role. Flexibility of the system of school's management. Making decisions through a voting system in learning communities. Taking heed of certain rules in technical and vocational education.

Main Categories	Middle Categories	Sub-Categories
	Resource provision (space, equipment, facilities, financial resources, human resources, etc.)	Affording required educational facilities and equipment for teachers and instructors from the school's budget. Providing the required space for holding the routine members' meetings (e.g. teachers, instructors, invitees). Communicating with research centers and libraries of the ministry of education research centers and providing necessary academic resources. Negotiating with research centers and research centers of the ministry of education for the students and teachers to utilize the environment and the facilities. Linking to academic centers in order to provide teachers and trainers with the required educational resources and instructors. Inviting experts. Connecting with beneficiaries for collaboration. Cooperation with the regional education centers to hold conferences to empower the teachers and the school's academic staff.
Implementing Learning Communities	**Enhancing professional communications and interactions**	Effective communication. Attending the meetings. The goal is to help each other. Improving the relations between teachers. Teachers of special and thematic courses will help each other. Collaboration of teachers of special courses. The interaction of teachers and students with learning environments. Promotion and expansion of communities to other schools. Teachers' attending the classes of more capable teachers. Noting the observance of general and non-technical competencies. Communities should be capable of converging the teachers of different majors toward the communities' goals. The culture of collaboration in school. Academic connections with schools at other provinces. Interaction and communication of teachers in adjacent schools to broaden the professional knowledge. Holding scientific assemblies based on research findings. Inviting the teachers of other schools to share findings and outcomes.

Main Categories	Middle Categories	Sub-Categories
	Teaching and learning	Creating a need for learning. It compels the teachers to improve themselves. Experiencing a pedagogical atmosphere. Instructing principles of communication. Instructing the proper behavior towards colleagues and students. Instructing the general teaching principles to teachers. Teachers must know how to listen to their students/interns. The goal is to improve the learning process and the students' performance. Responding to the learning needs of the teachers and students. Students should become knowledge producers. A teacher should have the role of a guide. The possibility of internship at work place. Creating diverse professional learning opportunities. Teachers' analysis of students' learning. Improving teachers' learning. Utilizing the advice and hints of the experts and for instruction. Enjoying assets like active and capable teachers. Flexibility of layout of the learning environment. Learning online and offline (face-to face) education methods, by teachers. Learning at work. Teachers should harmonize their teaching method with the subject they teach. Remarking constructivism approaches in teaching. Holding meetings on teaching methods' for the members. Teachers' decision-making based on expertise and the experience of establishing a learning community. Existence of formal and informal learning in the communities. Developing the culture of organizational learning in schools. Promoting the culture of skill based and research based instruction in teachers. Taking note of technical and non-technical competencies' instruction. Noting the students' internship.
	Distributed and supportive leadership	Developing healthy human relations. Agreeing with new and innovative ideas. More supportive leaderships. Flexible, active and affable managers. School management based on the needs of local community. Colleagues are free to decide. School manager's encompassing supervision on communities' implementation. The manager is a team member. Participatory and supportive management. The school manager's trust in employees. Positive attitude of the top level management (e.g. the manager) towards these communities. The manager holds the key to many of these positive events. Following up the problem solving in leaning communities. Handling the issues and problems of teachers and students. Supporting active and creative teachers.

Main Categories	Middle Categories	Sub-Categories
	Knowledge management and sharing	Members having shared and potential goals. Members sharing knowledge, ideas and experiences. Sharing non-technical competencies and also teaching profession competencies. Sharing strengths and weaknesses. Members using knowledge and skills of each other. Members believing in communication and sharing experiences. Having mutual interests. Emphasis on common aspects of programs (majors) in the meetings. Teachers are aware of the weaknesses (systematic, administrative and professional) of each other. Sharing the knowledge gained with the members. Teachers discussing their inquiries and fundamental problems with each other. Sharing the teaching methods. School's problems to be discussed by all teachers. Versatility of experiences and learnings in the community meetings. Aiming at reaching common goals.
Modification and Improvement	**Professional development evaluation**	Teachers thoroughly understand the route to professional development. Teachers specifically consider the competencies of each profession. Identifying the road to perfection in all professions. Evaluating a sample of implementation and modifying it. Assessing teachers and trainers through their performance. Teachers challenging each other. Teachers participating in professional critical review of each other. Evaluating based on learning processes. Teachers' self-evaluation. The evaluating criteria for the performance and advancement should be based on teaching-learning processes. Attending each other's classes. Teachers request for self-professional development in case of need. Professional progress and advancement should be of the members' concerns. Teachers should have professional insight. Teachers should be committed to the evaluation of the professional development of each other.
	Performance evaluation	Teachers determining the deficiencies. Continual assessment and revision of the students' activities. Members determining the norms for the students' evaluation methods. Attaining successful outcomes in the way towards academic achievement. Investigating the extent to which students have devoted to learning and problem solving. Examining individual progress through comparing individuals with themselves. Specifying a certain score for active teachers in the evaluation form. Great emphasis on gradual evaluation. Diverse evaluation methods such as observation or dialogue. Managers evaluating in the output stage. Peer supervision is conducted by members. Members analyze and judge the teachers' activities. Noticing the participation rate of the teachers and students in academic and research activities.

Main Categories	Middle Categories	Sub-Categories
	Presenting corrective feedbacks	Teachers know how to respond to the students having learning problems. Acknowledging the superior ideas of the students by the manager and the teacher. Members welcome sharing feedback in the meetings. Teachers and other members' progress based on gaining knowledge competencies. Students' advancement and acknowledgement should take place in the class. The procedure for accomplishing tasks instead of final evaluation (achievements and results). Dedicating a major part of the evaluation to the skill projects of the students.
Assessment	**Determining performance criteria**	Teachers collaborating with each other to determine certain criteria for students' activities. The community members determine criteria for assessing the manager or the leader. Selecting criteria for conducting the community's processes and activities correctly. Selecting criteria for providing the forms - reports of the meetings, and the class and supervisory tasks of the learning community. The manager and the members determining criteria for assessing the outputs of each stage.
	Stepwise assessment	Assessing the performance of the school. Assessing the determined goals of the community with respect to upstreaming documents of the technical and vocational education. Evaluation and estimation the available equipment and resources. Assessing the existing constraints and problems of the school. Assessing the governing conditions and the current atmosphere of the school. Assessing the school's collaborations and internal and external interactions. Evaluating processes and activities based on the criteria. Evaluating standards based on the criteria. Evaluating instructions and protocols. Assessing the current status of the school's human resource.

In the above table, concepts, middle concepts, and sub-concepts were identified. In this stage, the initial PLC model was designed. In addition, the prominent features which exist in all models were involved in devising the model. Figure 1 depicts an outline of the proposed model, and figure 2manifests the proposed executive model. *In devising the initial model, the researcher added the element "principles of determination" to the model based on her conceptual perception derived from interviewees' answers and the logic to be considered in planning and implementing all new approaches.*

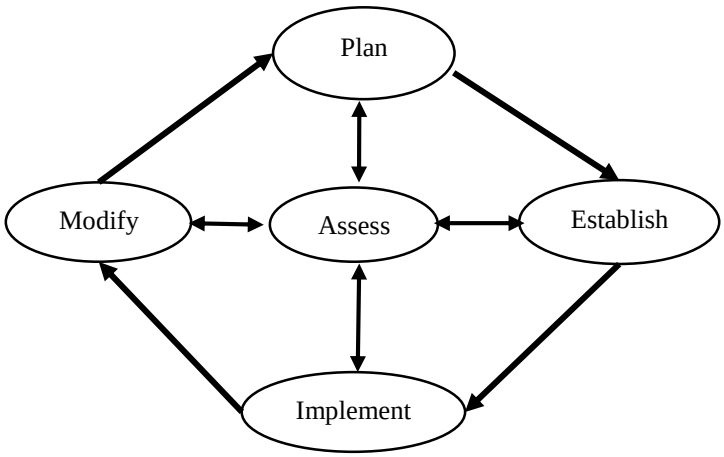

Figure 1. An Outline of the Proposed PLC Model

Figure 2. The Executive Model of PLC

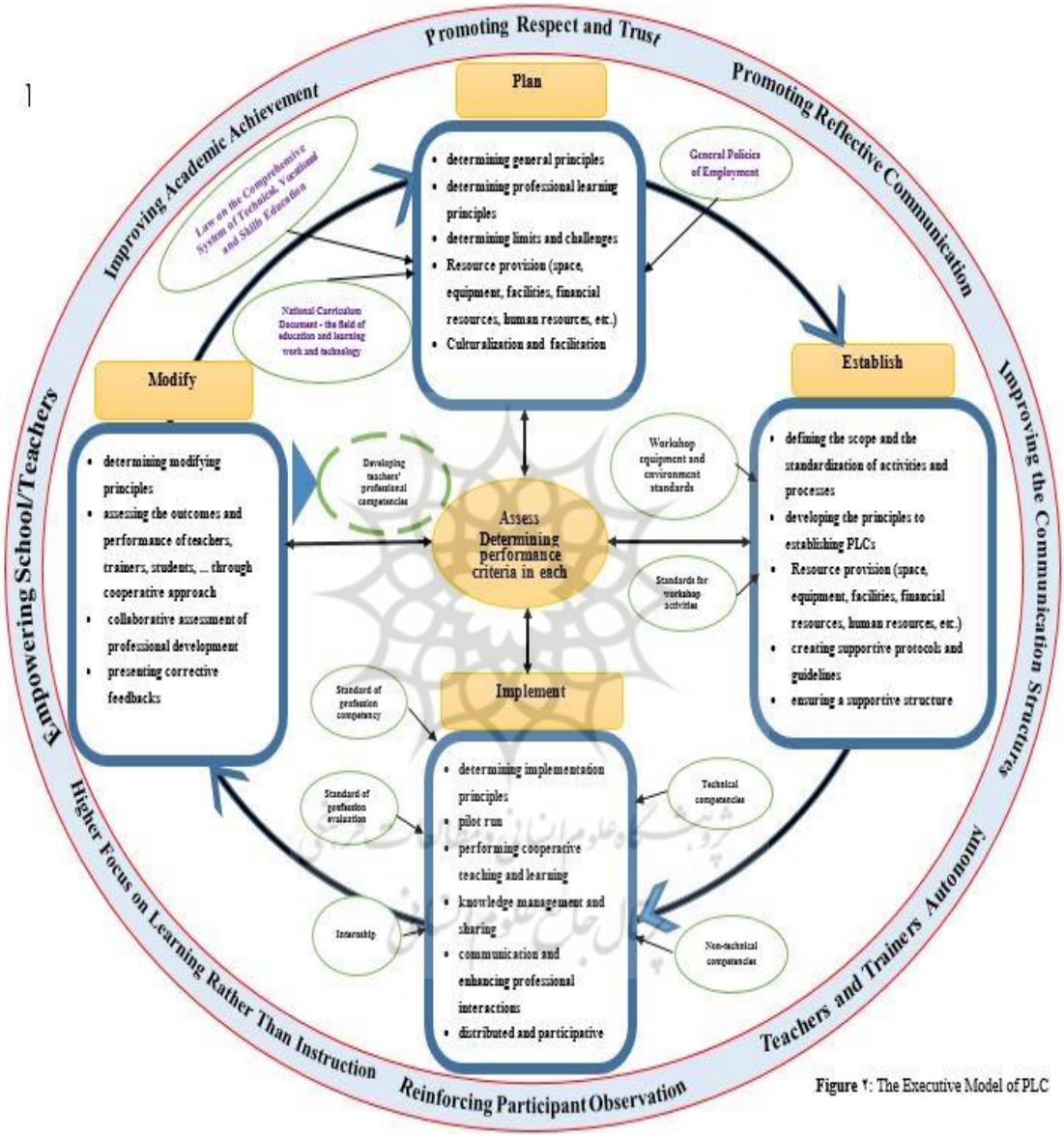

Figure ۲: The Executive Model of PLC

As can be seen in Figure 1, the proposed learning community model consists of 5stages Plan, Establish, Implement, Modify and Assess (in the center of the four other stages), and is accomplished thus accordingly. Evaluation in each stage makes it possible to figure out the degree to which the whole set is ready to move to the next phase. The model includes a cycle, the stages of which must be passed through for the first time, but the completion of the sequence (the order) of all stages is not necessary afterward.

In consideration of the fact that the implementing bedrock of the model includes the technical and vocational schools' environment, there are prevailing conditions driving the stages and elements towards technical and vocational education in a way that in the Plan stage, the upstreaming documents related to the technical and vocational education such as the Law on the Comprehensive System of Technical, Vocational and Skills Education, General Policies of Employment, National Curriculum Document - the field of education and learning work and technology, have a significant influence on the function of these two elements; determining general goals and determining professional learning principles. In Establish stage at which PLCs are established, the most imperative technical and vocational standards, including workshop equipment and environment standards and standards for workshop activities, are, in fact, the indicators of the technical and vocational schools' identity.

The elements of resource provision have an influence over the elements of ensuring a supportive structure, scope defining, and standardization of activities. Likewise, in the Implement stage, the standard of professional competency, the standard of profession evaluation, internship, and the technical and non-technical competencies, which somehow reflect the nature of these educations, will affect all elements within this stage in a way that the results impose a good impact on the performance of the school, teachers, and students. In the Modify stage, teachers' competencies and skills will develop if they had ample effort and performance in the previous stages. In other words, the most fundamental outcomes of this stage are competent and capable teachers and a school with the desired performance.

Analyzing the second question of the study regarding the validation of the model in terms of its executability in technical and vocational upper secondary level from the viewpoint of the education experts, teachers, and school managers; the answer to this question has two parts. In the first part, the validation of the model was evaluated in terms of structure, which means the stages and elements of the model, both in general and in each step. In the second part, the executability of the model in technical and vocational schools was evaluated generally and in each step. Table 4

reveals these results both in general and by steps

Table 4. The Results of the Kendall Coefficient of Concordance in two validation phases

	Kendall Coefficient of Concordance in the first stage of the evaluation	Kendall Coefficient of Concordance in the second stage of the evaluation	Kendall Coefficient of Concordance of the model First stage of the evaluation	Kendall Coefficient of Concordance of the model Second stage of the evaluation
Plan	.793	.735	.813	.779
Establish	.715	.781		
Implement	.816	.806		
Modify	.750	.729		
Assess (stepwise)	.882	.857		

As the results reveal: the stages of "Assess" and "Implement" had the highest compatibility degree in comparison with the other stages in both parts of the evaluation. This demonstrates that the elements introduced in these stages were corroborated by the majority of the participants in both parts of the evaluation in terms of structure and the executability of the model in schools.

Table 5. Comparing the Results of the Highest and Lowest Kendall Average Ranks Classified with Respect to the Levels, Elements and Validation Phases

Results	**First Part of the Evaluation**		**Second Part of the Evaluation**		**First Part of the Evaluation**		**Second Part of the Evaluation**	
Steps	**The highest average of rank**		**The highest average of rank**		**The lowest average of rank**		**The lowest average of rank**	
Plan	culturalization	**3.56**	executability determining general goals	**4.39**	barriers and challenges	**1.21**	Executability degree of culturalization and facilitation	**2.01**
	determining principles							
Establish	standardization of activities and processes	**5.65**	Executability degree of standardization of activities and processes	**5.67**	guidelines	**1.79**	Executability degree of resource provision (space, equipment, facilities, financial resources, human resources, etc.)	**2.05**
	determining principles							

Implement	distributed and participative leadership	**4.41**	Executability degree of distributed and participative leadership	**3.96**	knowledge management and sharing	**1.76**	the degree to which determining implementation principles is executable	**1.51**
Modify	performance evaluation of members manager/leader presenting corrective feedbacks	**5.47**	executability of teachers' professional competency assessment by the manager, and members identifying the strengths and weaknesses of each other	**4.89**	performance evaluation of students	**1.62**	the degree to which teachers' presenting corrective feedbacks (correcting learning process) to students is executable	**2.13**
Assess (stepwise)	determining performance criteria in each step	**1.94**	the executability degree of stepwise evaluation for assessing the preparedness to move to the next level	**1.93**	evaluation at each step	**1.06**	the degree to which determining performance criteria in each step is executable	**1.07**

The results of the evaluation (in general), which entails the structure of the model (the steps and elements) in the first part and the degree to which it can be implemented in the second part, demonstrate that the first part captured more compatibility comparing to the second part. Although it shows a slight difference between the evaluation parts, it indicates the fact that the proposed model, though confirmed by the experts in terms of the structure, would face many problems in implementation at schools, like provision of the required resources for culturalization and facilitation, determining criteria for performance evaluation in stages and the elements, etc. According to table 5, the elements of "Distributed and Participative Leadership" and "Standardization of Activities and Processes" have the highest mean of the Kendall rank coefficient in both parts of the evaluation compared to other elements. This means that these two elements had the highest degree of agreement between interviewees in terms of structure and executability at schools based on the evaluation results.

Therefore based on the results attained from the comparison of the evaluation outcomes and the literature reviewed and

considering the results of the interviews, it can be deduced that some of the identified elements, such as Cultrulization and Facilitation however important in establishing and developing learning communities, are much more complicated in implementation at schools comparing to the elements of Determining General Goals or Standardization of Activities and Processes. But the executability of the elements such as Distributed and Participative Leadership which has a pivotal role in the acceptance, establishment, and implementation of learning communities, are more achievable than other elements like Resource Provision or Cultrulization and Facilitation based on the interviewees' opinion.

Discussion and Conclusion

Noting the capabilities and features that professional learning communities have in empowering individuals sustains one of its imperative strengths, which is empowerment and personal and group development regardless of the method it is implemented. The popular and existing PLC models mentioned in this study are the PDSA model, the Cascade model, the Logic model, the Diagnosis model, and the Third Space (3PEx) model. In spite of the differences they have in formation and implementation, the key elements of PLCs are incorporated in all dimensions of these models, and the essential attributes of PLCs dominate them. The goals of all these models are: promoting the collaboration culture, communication, and participation between group members; reducing isolationism in individuals; sharing knowledge and experiences; developing individual competencies and improving the performance of the group members as well; promoting the team-working culture; promoting the supportive and participative leadership; developing learning networks; enhancing the system thinking of team members; improving the performance of the teachers, students, etc. in schools (primary and secondary levels) and other educational institutes. However, the extent to which these goals could be realized depends on the method dimensions and elements of the model implemented.

Compared to the aforementioned models, the proposed model, including its defined elements, have strengths and weaknesses. The questions stated were on: whether the model as a professional learning community model with the proposed structure can be implemented in all primary, lower, and upper secondary schools or it can be implemented merely in technical and vocational schools; and whether the structure changes with the level of education. To answer these questions with respect to the features, elements, dimensions, and identity of learning communities, five substantial criteria including knowledge sharing, the culture of collaboration and participation, concentration on collective learning, distributed and supportive leadership and supervision, and constant feedback for assessment and make comparisons were

considered, and the model was examined accordingly (Motehayerpasand, Fathi Vājārgāh, Musāpoor, & Toorāni, 2020). Finally the pros and cons of the model were discussed.

In evaluating the model according to the above criteria, the "knowledge sharing" criterion: in the PDSA model noticing the implementation process procedure and the elements defined, knowledge exchange and knowledge sharing is carried out among community members continuously. In addition, teachers try to share the best teaching strategies with each other to realize the determined goals. Thus it can be stated that this criterion is met to a great extent.

In the Cascade model knowledge sharing is carried out in all levels of the model hierarchy among the members of each level, however sharing across different levels (teachers of the pioneer level with teachers of the middle or primary levels) happens with much more limitations. Nevertheless knowledge sharing among all members is possible. In the Logic model knowledge sharing is realized to a good extent according to the levels defined in the model in the form of sharing and exchanging experiences, decisions and instructional ideas.

In the Diagnosis model as horizontal learning has a significant role and is mainly served as a tool for knowledge management; knowledge management as an element of the model sets conditions that enable knowledge sharing between members. It also helps knowledge sharing to be realized comprehensively. In the Third Space (3PEx) model, knowledge sharing is carried out in an expansive way that encompasses not just the school but a multi- faceted community whose members are the personnel of the school and university (instructors, managers, teachers, trainers, deputies, students' parents, counselors, novice teachers, and novice trainers, etc.). Knowledge sharing is more comprehensive in a setting with multi-layer and complex professional relations.

In the proposed model, too, knowledge sharing, one of the defined elements, has great importance according to the interviewees' point of view. Nonetheless, considering the results of the second part of the evaluation, its implementation in technical and vocational schools might face problems.

"Culture of collaboration and participation" criterion: In the PDSA model, this criterion is adopted from the concept introduced by Peter Senge, learning organization. Collaboration, which is the foundation of a learning organization, enables individuals to prosper and grow. Moreover, developing standards for teaching and learning (which exist within the model's elements) requires collaboration and interaction among members of the learning community and mirrors the extent of this collaboration. Therefore the criterion for the culture of collaboration and participation is incorporated into the PDSA model. In the Cascade model, considering its hierarchical levels, the culture of collaboration and participation

is enclosed by the levels and is followed by the members within each level exclusively, and the successful performance of the levels can be perceived through the collaboration of the members. Yet the collaboration between the expert level and the middle and primary levels is scarce and negligible. Hence the collaboration rate in this model is less than in other models.

In the Logic model, besides the fact that the collaboration culture is of the main elements, most of the activities have team-working nature, and this requires collaboration and interaction among members. Thus this culture is highly followed in the logic model. In the Diagnosis model, this should be noted that the theoretical fundamental of this model is horizontal learning. In horizontal learning, developing the human and interpersonal capacities, which are accounted as the main dimensions of the model, requires the culture and spirit of collaboration. In addition, in adult learning, which supports horizontal learning, the learning process is defined and shaped through collaborative learning. As a result, the culture of collaboration and participation is highly observed in this model.

In the Third Space (3PEx) model, the interactions cover a wide range of members, including a combination of school and university. However, due to the integration of different cultures, perspectives, and values and with respect to the lack of linkages between university and school-based components, the scope of the collaboration and participation is quite complicated. Also, in practice, the collaboration between individuals coming from such diverse cultures, ethnicities, races, and communities entails many challenges. In the proposed model, continuous collaboration and interaction have been considered one of the key elements of PLCs and are acknowledged by the interviewees. They believe that collaboration among individuals is the base and foundation of PLCs formation and consequently accounted as a main element of the learning communities. Implementation of PLCs in technical and vocational schools demonstrates to what extent the collaboration between teachers, school personnel, and manager will be.

"Concentration on Collective Learning" criterion: considering the nature of PLCs, collective learning is carried out to a remarkable degree in all of the indicated models. In like manner, individual, collaborative, and collective learning is considered as team learning and group research and is also one of the elements of the proposed model's dimensions.

"Supervision and Constant Feedback" criterion: In the PDSA model, this criterion is taken as one of the main elements. Supervision and feedback are performed in the form of activities done to evaluate the efficacy of the measures, analyzing the results attained from evaluating students, examining the influence of training presented to students through official assessments, and

evaluating students' learning. Therefore supervision and constant feedback are performed to a high degree. In the Cascade model, assessing the performance of students, feedback, and the process for modifying teaching and learning is performed at the lowest level, which includes students. In the Logic model, supervision and constant feedback are performed in the third and fourth steps of the model in the form of common and prevalent assessments. These steps are of the influential steps of the model. In the Diagnosis model, considering the cyclic process of the model and the existence of elements such as system thinking and the student-centered approach, as well as the imperative role of the students, performance evaluation of the students and constant feedback is embedded in the process cycle.

In the Third Space (3PEx) model, due to the vastness of the learning community and the numerosity of its members, the complexity and multi-dimensionality of the space and the challenges that exist in the implementation performance evaluation, constant feedback and supervision are not performed through the same way it is done in the other models. In the proposed model, supervision and constant feedback are of the elements and are indicated as the model's

Achilles heel by the interviewees. The reason is that it plays a pivotal role in realizing one of the main goals of the learning communities; improving the performance quality of teachers and students.

"Distributed and Supportive Leadership" criterion: The underlying rationale in the PDSA model stems from Deming's philosophy. Based on his theories, a leader is a trainer and counselor, one who understands the differences between individuals and motivates them towards continuous learning. He believed that the leader interacts with the parts of the systems obeying him. Though it is not clearly mentioned within the elements of the model and cannot be traced within the steps, a leader's support is done according to the model's logic. In the Cascade model, the manager is at the highest level and simultaneously provides the support and supervision essential for the other levels. In other words, distributed and supportive leadership in this model entails the duty of support and backing up rather than empowerment.

In the Logic model, based on the steps and elements of the model, the capability of the manager (leader) to arrange the state of affairs conducive to implementation and successful implementation of the PLCs is indispensable. In the Diagnosis model, this criterion has been clearly and explicitly addressed within the elements. It is considered as one of the dimensions of the organizational competencies and is being committed by the model in the implementation. In the Third Space (3PEx) model, with respect to the circumstances in devising the model, the

vastness of the community and numerosity of its members, the complexity and multi-dimensionality of the space, and also the elements, the distributed and supportive leadership is not performed through the same way it is done in the other models. However, based on the evidence and also the status of the model, the leadership is performed in a wider gamut and with the participation of the community members (school and university). In the proposed model, distributed and supportive leadership is of the main and influential elements and plays an important role in the establishment, development, and implementation of PLCs, according to the viewpoint of the interviewees. In terms of executability at schools, it obtained the highest score of agreement among interviewees.

The results of the comparison between examined criteria demonstrate that in none of the models, they are performed to a high level. Some of these criteria have not been seen explicitly in the elements but do exist latently according to the model's logic, theoretical fundamentals, specific features of the elements, etc. Some of them are carried out on a confined level due to the circumstances and the structure of the model. In some of the models performing criteria face many challenges owing to the status and the setting of the model. Besides, each of the investigated models can lay the groundwork for the establishment of PLCs in schools or educational institutes according to its features. The proposed model enjoys the main elements, dimensions, and features of a PLC compared to other models. Also, the criteria considered to analyze other models do exist in the proposed model, which is of the strengths of the proposed model. Even though the "Implement" step might face challenges based on the results obtained from the second part evaluation, gradual implementation can reveal solutions and strategies to deal with them.

On the other hand, the models being studied can be established and executed in all schools at all grades, from primary level to higher education, in general. The proposed model, however, is devised and assessed having technical and vocational education in mind, which begs the question of whether it can be implemented in other schools and high schools. To answer this, it can be asserted that in this model, the steps and elements were devised in a way that makes it possible for the model to be implemented in other schools (primary, lower secondary level, high school, etc.) too but the main and fundamental factors like Law on the Comprehensive System of Technical, Vocational and Skills Education, General Policies of Employment, the field of education and learning work and technology in National Curriculum, specific teaching standards of technical and vocational education, internship, etc., direct the orientation of the elements and steps towards technical and vocational education, the fact that cannot be ignored.

The implementation of elements from the "Plan" to the "Modify and Assess" stage and the evaluation at the end of each stage is influenced by the above-mentioned factors. Regarding "Whether its executability at all schools can be sorted in either its pros or cons," it should be noted that the present model is a PLC model; empowerment and development of individual competencies, performance improvement, promoting collaboration and teamwork, reducing isolationism to name but a few, are of its main goals and if the model realizes these goals or a part of them then can be said that it is a good model, even if the realization is time-consuming.

If the proposed model covers other schools in addition to technical and vocational schools and realizes the determined goals of the schools, then its inclusiveness in implementation is considered its strength, even if it's devised with a specific bias. One of the most remarkable weaknesses of the model, previously mentioned and indicated by the interviewees in the second part of the evaluation as well, targets the "Plan" and "Develop" steps; they believed that however good it might be developed, the implementation at technical and vocational schools will face several challenges and problems. Yet just as the new ideas, changes, and evolutions being resisted at first become acceptable over time, acceptance will bring enthusiasm with it.

In like manner, the pilot implementation of the model in a technical and vocational school over a three to four years period can improve its weaknesses. In general, the suggested model with the devised structure and elements, a two-stage evaluation, and a high score of agreement and compatibility between interviewees is presented as a PLC model to be established and implemented in technical and vocational schools with the aim of developing professional competencies of students and teachers, empowering them and improving the performance of these schools. Compared to the previous models, the proposed model is a better option for establishing and implementing PLC in schools in Iran. In the following, a number of recommendations are presented in order to enhance and develop the proposed model and for amending its weaknesses.

Suggestions

Considering the analyses and the results obtained from the second part of the evaluation and the comparison of the proposed model with other PLC models, the practical suggestions for resolving problems and eliminating barriers that exist in developing and implementing PLC models at schools and also for bolstering the proposed model are as follows:

-With regard to the momentum and the influence of Distributed and Participative Leadership element in the model and the results of the evaluations, it is recommended that the provinces/districts' managers of education note individual competencies such as flexibility,

affability, and well-behavior, responsibleness, being active, participatory, enjoying authority, risk-taker, compliant to changes and evolutions, determined, etc., as well as professional competencies. In addition, such competencies can be fostered in incumbent managers of technical and vocational schools through holding training workshops; this can develop a propitious bedrock to establish and execute the proposed model.

-With regard to the results obtained from the second part of the evaluation providing the required resources for schools is of the serious challenges technical and vocational schools face in establishing and executing the model. It is therefore recommended that the school managers, with the help of teachers and students, attempt to fundraise and provide the needed space, financial and human resources, equipment, and facilities through setting up school markets and exhibitions and presenting the students-made products to the philanthropists, education officials, students parents, representatives from factories and agricultural, industrial and manufacturing companies, agents of educational institutes and media reporters.

-Furthermore, in order to provide workshop equipment, it is recommended to utilize the products the students of different technical and vocational majors manufacture at school workshops; for instance, students of mechanical majors like machine tools or metal technology can build a part of the equipment needed by the students studying agriculture, civil or transportation majors in the school workshops.

-To develop the required facilities and equipment of the school it is recommended to benefit from the capabilities of the local community members.

-Based on the results obtained from the second part of the evaluation on the low rank of the element for collaborative and group teaching and learning according to the interviewees' opinion, and also the low capacity of this element to be executed in school, it is recommended that through recognizing active and capable teachers the school manager delegates them to make learning teams (3 to 4 persons).

-It is also recommended that a committee be made of the school managers of the district. The goal of constituting this committee is to expand the interactions and communications between schools, teachers, and students and to make efforts to hold retraining courses for teachers with the emphasis on collaborative and group learning through the education bureau of the districts as well as collaborations with schools' personnel with the aim of developing and implementing PLCs at technical and vocational schools.

-It is recommended that school managers connect with each other through social networks, in person and online, to improve interactions, collaborations and professional development.

Suggestions for Future Research

1- Running a pilot implementation of the proposed PLC model in a technical and vocational school and investigating the results using a systematic approach.

2-The application of the proposed model in vocational schools, investigating the results and comparing them with results obtained from implementing the model in technical and vocational schools.

3-Conducting an empirical study on the application of the model in the upper secondary level of a high school in the city of Tehran, investigating the results and comparing them with results obtained from implementing the model in technical and vocational schools.

4-Conducting an empirical study on the application of the model in the lower secondary level of a high school in the city of Tehran, investigating the results and comparing them with results obtained from implementing the model using the Lesson Study approach

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