



## Improving the use of ICT through online professional development platform based on metacognitive strategies

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### Abstract

In this study, it is aimed to developing an online professional development practice to support teachers' use of ICT. The study was conducted as an action research. Within the scope of action research, the data collection/analysis process, the situation and problems have been identified and the action/implementation plan has been developed. Within the scope of the action/implementation plan, the process of structuring the professional development programme and the development of the online learning environment was carried out. The study group consists of teachers with different ICT usage competency levels, professional experiences and branches. The data were collected through different data collection tools, which were personal information form, semi-structured interview forms and valid and reliable scales. As a result of the study, it was determined that the online professional development practice contributed positively to teachers' use of ICT and the use of meta cognitive learning strategies. In this context, an online professional development model has been proposed that can support the use of ICT in the teaching–learning process in the context of developing ICT knowledge and skills, using meta cognitive learning strategies, and awareness of new technologies.

**Keywords:** Online learning, ICT, professional development, metacognition, technology use.

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## 1. Introduction

The effective use of ICT in teaching–learning processes is related to the ICT skills of teachers (Chai, 2010; Chai, Koh, Lim & Tsai, 2014). In this respect, it is suggested to support teachers with professional development activities to develop their knowledge and skills related to the use of technology (Belland, 2009; Chai, 2010; Tondeur, Braak, Sang, Voogt, Fisser & Ottenbreit-Leftwichd, 2012; Tsai & Chai, 2012). Factors such as not spending enough time for learning use of technology, lack of knowledge about the selection of appropriate instructional technologies and lack of knowledge about where to learn technology can negatively affect the use of ICT in the teaching process (Lane & Lyle, 2011). This emphasises the necessity of professional development activities that offer different educational opportunities according to individual interests, needs, expectations and suitability.

The literature reveals that teachers’ technological competencies are an important part of teachers’ general competencies (Seferoglu, 2015). On the other hand, in some studies that examined professional development practices for the development of ICT usage competencies, it is emphasised that the traditional approaches have some limitations (Levin & Wadmany, 2006; Tearle, 2003). This raises the need to make traditional in-service training activities more effective and efficient. In this context, it is suggested to design new in-service training programmes in which alternative teaching methods and strategies are employed, and in line with the subject areas of the teachers, to support the teaching process with ICT instead of basic ICT skills (Goktaş, Yildirim, & Yildirim, 2009). It is expected that an effective professional development activity on the use of ICT will enable them to adapt to change, develop confidence in lifelong learning and create positive change in values and beliefs (Phelps, Graham & Watts, 2011). In this way, teachers can change their pedagogical beliefs about the use of technology, develop their lifelong learning skills and define what they need and what they need to learn.

Within the scope of this study, a professional development practice is structured through an online learning environment based on metacognitive learning strategies. In this context, it is aimed to determine the changes in teachers’ ICT usage competencies and the use of metacognitive learning strategies. The effectiveness of this practice and the opinions of the teachers about this practice are determined as well. In the scope of this study, answers to the research questions given below have been sought.

- What are the general opinions/reactions of participants about the characteristics of online professional development practice?
- What is the effect of the practice of professional development on knowledge–skill change within the scope of learning objectives?
- What are the participants’ evaluations on the contribution of online professional development to the teaching–learning process?
- What are the characteristics of online professional development that contribute to teaching–learning processes?

## 2. Method

This research is designed according to an action research approach. Action research can be defined as a research that starts with a question, includes planning, data collection, data analysis and reporting processes, and does not have to prove anything (Schoen & Nolen, 2004). The main purpose of action research, which includes the process of developing applications to solve certain problems in the classroom or school, is to increase the quality of the practices carried out in the school setting (McMillan, 1996). In addition, teachers, who can directly observe the problems in the education and training process, are recommended to practice action research as researchers in order to identify problems in a realistic and concrete way and to produce solutions. Action research can provide a strong link between theory and practice in educational research, particularly for research on teachers’

professional development (Carr & Kemmis, 1989). The activities carried out within the scope of this action research are listed below.

*Deciding on the research problem and identifying action research questions*

This research started with the question of how lifelong learning support can be provided in order to develop ICT usage competencies within the context of teachers’ personal and professional needs. Characteristics of professional development activities that support teachers’ ICT usage competencies, the importance of metacognitive awareness skills in terms of being a lifelong ICT learner and adapting to rapidly developing technological innovations within the scope of teachers’ personal and professional needs were examined.

*Data collection and literature review*

The problem situation addressed has been revealed in detail through the related literature review and the analysis of teachers’ opinions and needs. The ICT usage status and experiences of the teachers and also current problems related to ICT usage in the teaching–learning processes were examined.

*Data analysis and interpretation*

The teachers stated that the proficiency levels for using ICT are generally at the level of having basic ICT skills. In addition, it was mentioned that professional development activities for the development of ICT usage qualifications are not sufficient. It was emphasised that there is a need for supportive courses and seminars for the development of these competencies, by mentioning the need for continuous improvement of ICT usage competencies.

*Developing an action/implementation plan*

Steps taken in this context are the structuring of the professional development programme and the development of the online learning environment.

*Stages of preparing a new action plan with analysis and evaluation of the application*

The processes of preparing a new action plan with the analysis and evaluation of the application were carried out gradually. These processes consisted of stages containing a circular structure in accordance with the nature of action research.

**2.1. Study group**

In the selection of the study group, convenient sampling method was used. This method can be used because it is impossible to choose random or systematic random samples for the research. The convenient sampling method is a method of selecting the sample from accessible and easy-to-apply units due to limitations (time, labour, etc.), and involving individuals eligible for research (Buyukozturk, Cakmak, Akgun, Karadeniz & Demirel, 2009; Fraenkel & Wallen, 2006).The study group consists of teachers from different branches. The process of data collection and participation in professional development were conducted on a voluntary basis. However, the profile of participants shows diversity in terms of different variables, such as gender, branch, professional experience, ICT usage levels, etc. This study group consists of 32 teachers who participated in the online professional development activity and work in the same school. Detailed information about the study group is shown in Table 1.

**Table 1. Distribution of the demographic features of the study group participating in the online professional development programme**

Variables	Options	f	%
Gender	Female	23	71.9
	Male	9	28.1
Age	20–29	3	9.4

	30–39	21	65.6
	40–49	8	25.0
Education level	Undergraduate (Faculty of education)	23	71.9
	Undergraduate (Pedagogical formation)	3	9.4
	Graduate	6	18.7
Professional experience	1–5 years	2	6.3
	6–10 years	10	31.3
	11–15 years	11	34.4
	16-20 years	8	25.0
	21 years +	1	3
Branch	Mathematics education	4	12.5
	English education	5	15.7
	Science education	5	15.7
	Social studies education	3	9.4
	Physical education	2	6.2
	Turkish education	7	21.8
	Visual arts education	1	3.1
	Religion culture education	2	6.2
	Technology design education	3	9.4
ICT usage experience	1–3 years	2	6.2
	4–6 years	3	9.4
	7–9 years	5	15.6
	10 years +	22	68.8
	Less than 1 year	2	6.5
ICT usage experience in lessons	1–3 years	6	16.1
	4–6 years	10	32.3
	7–9 years	5	16.1
	10 years +	9	29.0
ICT usage level	Beginner	2	6.2
	Intermediate	27	84.4
	Advanced	3	9.4

## 2.2. Data collection tools

In the process of data collection, personal information form, semi-structured interview forms developed by researchers, Metacognitive Learning Strategies Determination Scale (Cogenli & Guven, 2014), Information and Communication Technologies (ICT) Competency Perception Scale (Sad & Nalcaci, 2015) and participants' online environment posts and documents were used.

### 2.2.1. ICT Competency Perception Scale

Within the scope of the studies conducted to examine the reliability of ICT Competency Perception Scale (Sad & Nalcaci, 2015), the reliability of the scale items in terms of internal consistency was calculated using Cronbach's alpha and Guttman Test-Half-Formula formulas. Cronbach's alpha coefficient was 0.962 and Guttman two-half consistency coefficient was 0.938. Within the scope of this research, Cronbach's alpha was found to be 0.951.

### 2.2.2. Metacognitive Learning Strategies Determination Scale

Cronbach's alpha coefficient was used to examine the reliability of the Metacognitive Learning Strategies Determination Scale (Cogenli & Guven, 2014). Cronbach's alpha reliability of the whole scale was determined as 0.87. Within the scope of this research, Cronbach's alpha was found to be 0.977.

### **2.2.3. Semi-structured interview form**

The interview form is a data collection tool that provides a comprehensive overview of the research problem with its various dimensions and details (Yildirim & Simsek, 2011). The issues addressed when creating the questions in the interview form are structured as moving from general to specific. The questions in the interview form were presented to the experts and some statements were revised and made more understandable in line with the relevant suggestions. Interview forms were re-examined after interviews with several participants and some questions were reviewed.

### **2.2.4. Online learning environment data and documents**

Different data sources were used to increase the rigour of the research. Data for developing the online learning environment were collected through the process of online professional development activities, such as the participants' posts about their learning tasks, information-sharing ideas, user information and login sessions. In addition, the documents created by the participants during the professional development practice were also considered as data sources. The product files of the participants were examined especially in the context of evaluating the effectiveness of the professional development practice.

## **2.3. Data analysis**

Descriptive analysis and content analysis methods were used to analyse the qualitative data of the research. Descriptive analysis involves the process of summarising and interpreting data according to predefined themes. The data are presented according to the themes formed in line with the research questions. In the descriptive analysis process, direct quotations are often included to reflect the opinions of the participants, and the findings are presented by organising and interpreting (Yildirim & Simsek, 2011). The descriptive analysis process was carried out as creating a framework for descriptive analysis, processing data according to the thematic framework, defining the findings and interpreting the findings.

In addition to descriptive analysis, content analysis was used in the analysis of the data. With the content analysis, it is aimed to reach the concepts and relationships that can explain the data obtained in the research. In this process, the data summarised and interpreted with descriptive analysis were examined more deeply, and concepts and themes were discovered in the content analysis process. In this context, interview records, documents and online learning environment posts of the participants were examined and analysed separately.

Within the scope of the quantitative data of the research, the data obtained from personal information form and scale forms were analysed by using descriptive statistics methods such as frequency and percentage. Paired sample *t*-test was used to analyse the changes in competency perceptions and use of metacognitive learning strategies after participating in the online professional development application. .05 was accepted as the level of significance in the application of statistical methods.

## **2.4. Rigour in action research**

The processes carried out within the scope of the research, the quality, functionality and accuracy of the results are related to the rigourousness of the action research (Melrose, 2001). The concept of rigourousness includes the concept of validity and reliability (Yildirim & Simsek, 2011). The criteria to be taken into account to increase the rigourousness of action research (Melrose, 2001; Mertler, 2009; Mills, 2003; Stringer, 2007) and explanations on the procedures carried out in this context are as follows:

*Repeating the loop:* Considering the nature of action studies, it is possible to perform more than one cycle in the research process considering that it is in a cyclical structure.

*Long-term participation and research area observation:* One of the researchers has been working with his colleagues for a long time in the school in which the research was conducted.

*Researcher experience:* The researcher has enough professional experience to conduct professional development activities for teachers and to make adequate observations about teachers' technology usage situations.

*Member control:* Specialist and colleague opinions were applied to the creation of the general environment of the subject, the design of the application environment, data analysis and interpretation processes.

*Data variation:* The data collection process was carried out using different data collection tools in order to be able to demonstrate the richness of the situation.

*Making detailed quotations and confirmation of participants:* Participant answers within the scope of the interview questions were shared without any changes.

*Defining the limits of the research:* The focus of the research was determined and the subject to be focused was described. Certain limitations have been made within the scope of the research by considering various criteria (such as number of participants, duration of research, financial opportunities etc.).

## **2.5. Developing an action/implementation plan**

Within the scope of the action research, the current situation in the direction of the problem is discussed. As a result of the data collection/analysis process in the context of literature review and interviews with teachers, the situation and problems have been identified and the action/implementation plan has begun to be developed. Within the scope of the action/implementation plan, the process of structuring the professional development programme and developing the online learning environment was carried out.

### **2.5.1. Professional development programme**

The criteria for the professional development practice are supporting the active learning process (Desimone, 2009), the content of the professional development programme (Drage, 2010), joint participation (Desimone, 2011), colleague cooperation/interaction (Martson, 2010), compliance with individual interests and needs (Desimone, 2011), expert support in the professional development process (Hunzicker, 2011) and the duration of professional development activity (Desimone, 2009; Drage, 2010). The criteria of professional development programme are summarised in Table 2.

**Table 2. The criteria of professional development programme**

<b>Professional development criteria</b>	<b>Use in professional development programme</b>
The content of the professional development programme	By providing examples for teaching–learning processes, teachers' awareness of new technologies, knowledge and skill levels have been improved.
Colleague cooperation/interaction	An online, sustainable communication environment created an opportunity to share knowledge and experience among participants and to be aware of the innovations and developments specific to the branches.
Joint participation	Professional development was carried out with the participation of teachers working in the same school. Thus, it is aimed to support the positive change and development in the teaching–learning process.
Supporting the active learning process	Users were provided with the opportunity to create their own course materials and they were modelled for learning processes with educational videos. The implementation of metacognitive strategies has been ensured to manage new learning processes.

Expert support	It has been paid attention to share introductory and informative materials and contents, to be a model for teachers and to provide accessible expert support in case of new learning situations.
Individual interests and needs	The needs and expectations of teachers in different levels and in different branches and their knowledge skill levels have been determined. The content was created accordingly.
Duration of professional development activity	The professional development activity conducted through the online learning environment gives the opportunity to adjust the learning process according to personal suitability.

### 2.5.2. Online learning environment

The online learning environment uses the training content, the process and the strategies, and the platform in which they are conducted are structured in accordance with the determined criteria. The process of online professional development practice analysis and evaluation and preparation of a new action plan were carried out gradually. These processes consist of four stages, which include a cyclical structure in accordance with the nature of action research. The components of the online professional development platform are summarised in Table 3.

**Table 3. The components of online professional development programme**

Components	Operations
About course	The aim of the professional development activity, the scope of the course, the target group and the expected skills to be gained at the end of the course were shared.
Course operation Process	Explanatory information about the training process, the duration of the training, the main and sub-modules of the training, the evaluation process of the course and the colleague–expert support were shared.
Training modules	This section includes the training modules and sub-modules of the course. Information about the competencies that are intended to be gained at each module entry is given. * Module content–topics as a result of needs analysis.
Metacognitive learning	In this section, summary information is given about the teachers’ use of metacognitive learning strategies and the contribution of the development of these competencies to the process of adaptation to technology. * Metacognitive learning strategies should be applied when performing each learning task within the course.
Information–idea sharing	Through this section, there are various suggestions, experiences and information sharing on training main and sub-modules, learning tasks or use of technology. * This section allows direct active participation through each topic page in the training modules.
Messages	Through this section, users can simultaneously synchronise with other users or experts they want to consult.
My documents	Through this section, users can upload the product files they have created within the scope of learning tasks to the system.
My information	Users register to the system through this section and manage existing user information.

### 2.5.3. Design process of online professional development programme

The process of instructional design of the online professional development programme was created within the framework of the online course design model (Tuzun&Cinar, 2016). The design process of the online professional development programme and the procedures carried out are summarised in Table 4.

**Table 4. Design process of online professional development programme**

Design stage	Operations
Creating the design team	Design team was formed by reviewing the technical competencies of the researchers and the people/person who will support the design process of the online learning environment.
Preliminary research	Related studies in the literature have been examined predominantly on online learning environments and professional development practices and criteria and technical characteristics that may affect the design process have been determined.
Analysis	The training needs of the target group were determined and a detailed analysis of the qualifications and expectations of the participant group was made.
Designing	The criteria of professional development practice are determined in accordance with the literature review and the needs and expectations of the target audience. The selection and arrangement of the content appropriate for the learning objectives were made, the educational strategies to be used in the teaching–learning process and the general and specific objectives of the course process were determined. The environment in which the teaching–learning process will be carried out and materials suitable for individual needs and differences have been developed.
Integration	Preparations and arrangements for implementation have been carried out considering the variables that may affect the implementation process of the learning system. Preparing the application process, uploading the contents to the system within the scope of the regulation of the online environment, determining the technical competencies of the system etc. were carried out.
Test	At this stage, the process of evaluating the content and the environment has been progressively carried out. In the first stage, the environment and course content of the online professional development practice were reviewed by the design team and the final development / improvements were made based on the suggestions provided. In the next stage, expert opinions were consulted to evaluate the online professional development environment in terms of usability, content, design, etc. In addition, the availability, content and design of the system were tested with a certain number of users reflecting the target audience. In line with the feedback, corrections were made and the final evaluation process has begun.
Improvement	The evaluation process of professional development was carried out in four stages. Firstly, pre-test and post-test data were examined after opening and completing the training to general users. At the end of the training, a four-stage evaluation process, including reaction, learning, behaviour and results, was conducted.

### 3. Findings

The findings are presented in order of the research questions. The first research question was formed as: “What are the general opinions/reactions about the characteristics of online professional development practice?”

#### 3.1. The general opinions/reactions about the characteristics of online professional development practice

Participants’ reactions to the practice of online professional development are mostly positive. Professional development programme is considered to be appropriate in terms of content, duration, compliance with individual interests and needs, awareness for new technology, etc. One of the participant teachers’ opinion about this situation is as follows:

*‘I think that the professional development programme is a programme that every teacher should attend. It contributed to the awareness of our inadequacies in ICT use. It was an educational programme to prepare materials. It has contributed to our ability to use time when learning something new. The training process and*



*planning were quite successful. The programme was very well planned with instructions and stages. The duration was right for us. In the end we have created usable materials.’ (Participant 9)*

### 3.2. The effect of professional development on knowledge–skill change within the scope of learning objectives

The second research question was formed as: ‘What is the effect of the practice of professional development on knowledge-skill change within the scope of learning objectives?’ Within the scope of this research question, changes in ICT competency and use of metacognitive learning strategies are examined.

#### 3.2.1. The effect of online professional development on ICT competency

According to the results of the *t*-test performed for the significance of the difference between ICT competency scores, it was found that there was a significant increase in the ICT usage competence perceptions of the participants after online professional development practices [ $t(31) = 2.2$ ;  $p = 0.035$ ;  $p < 0.05$ ]. The mean score of ICT use competence perception scores of the participant teachers before the professional development programme was 107.06 and the mean scores increased to 116.34 after the implementation (See Table 5).

**Table 5. Distribution of ICT competence perception scores before and after online professional development practice**

Measurement	<i>N</i>	Mean	<i>S</i>	<i>df</i>	<i>t</i>	<i>p</i>
Pre-test	32	107.06	17.73	31	2.2	0.035
Post-test	32	116.34	12.93			

‘The online professional development application significantly increases the competence of ICT usage of participant teachers.’ In order to test the hypothesis, Cohen’s effect size statistic for the related *t*-test was calculated as 0.4 with the formula  $d = t / \sqrt{N}$ . The effect size is interpreted as small, medium and wide effect size, .2, .5 and .8, respectively, regardless of the (*d*) sign (Buyukozturk, Cakmak, Akgun, Karadeniz & Demirel, 2009). This value can be interpreted as approximate medium effect size.

#### 3.2.2. The effect of online professional development on use of metacognitive learning strategies

It was found that there was a significant increase in teachers’ use of metacognitive learning strategies after online professional development practice [ $t(31) = 3.598$ ;  $p = 0.001$ ;  $p < 0.05$ ]. After participating in the online professional development practice, it was determined that the average score of teachers’ use of metacognitive learning strategies increased from 115.96 to 124.56 (See Table 5).

**Table 6. Distribution of teachers’ scores of the use of metacognition learning strategies before and after professional development practice**

Measurement	<i>N</i>	Mean	<i>S</i>	<i>df</i>	<i>t</i>	<i>p</i>
Pre-test	32	115.96	8.68	31	3.598	0.001
Post-test	32	124.56	11.46			

‘Online professional development practice significantly increases the use of participating teachers’ metacognitive learning strategies.’ In order to test the hypothesis, Cohen’s effect size statistic for the related *t*-test was found to be 0.63 by calculating with the formula  $d = t / \sqrt{N}$ . Impact magnitude is interpreted as small, medium and wide impact magnitude, 0.2, 0.5 and 0.8, respectively, regardless of the (*d*) sign (Buyukozturk et al, 2009). This value can be interpreted as approximate medium effect size.

After participating in the online professional development programme, interviews were conducted with the participants in order to examine the changes in the use of metacognitive learning strategies

of teachers in more detail. The contribution of professional development practice in terms of metacognitive learning strategies has emerged within the scope of acquiring knowledge and implementation of these strategies, providing time management and developing skills to manage learning time. Some of the participant teachers' opinions about obtaining information about metacognitive learning strategies and developing their skills to apply these strategies are as follows:

*'Education has positively contributed to my metacognitive learning skills. Thanks to the professional development programme, I have incorporated my own learning process by applying metacognitive learning strategies, and my awareness has increased in this process, which I previously ignored.'* (Participant-4)

*'These three concepts, namely planning, monitoring, and evaluating the learning process, were the subjects I attached importance to in my previous studies or in the preparation process for the lesson. It was also helpful to use these strategies by applying them through the environment.'* (Participant 5)

Some of the participant teachers' opinions about obtaining information about providing time management are as follows:

*'I was able to manage my time correctly by planning my learning process with metacognitive strategies. I think I spend the time I guessed.'* (Participant 23)

*'Metacognitive learning strategies contributed to make things planned and organised for a new learning goal. Especially their contribution to time saving is an indisputable fact.'* (Participant-12)

### **3.3. The participants' evaluations on the contribution of online professional development to the teaching-learning process**

The third research question was formed as: 'What are the participants' evaluations on the contribution of online professional development to the teaching-learning process?' Within the scope of this research question, participants' opinions in relation of the contribution of the professional development programme to the teaching-learning process in terms of awareness-raising, knowledge-skills acquisition, material selection / organisation / preparation, and the inclusion of new technological applications in the teaching process are examined. One of the participant teachers' opinion about awareness-raising and knowledge-skills acquisition is as follows:

*'I've changed my point of view towards many technology-based applications. I thought I couldn't get out of work, but I realised how simple the events were. The technology-supported classroom activities I prepared according to the age group, interest and perception of the students affect the process in a positive way. I wish there was an environment where I could use all the applications. As far as I'm using in the course, I can say that even the smallest material positively affects the learning environment. I'm aiming to get closer to permanent learning with my newly learned applications.'* (Participant-10)

One of the participating teachers emphasised the contribution of the professional development programme in relation to material selection / organisation / preparation. Excerpt from his/her post is as follows:

*'This training contributed to being more conscious about the use of technology-based materials, preparing lectures by using digital tools, creating a technology-based interactive learning activity and using ICTs. After the training, I plan to activate the use of ICT in daily life and at every stage of my lesson. In particular, I believe that by creating technology-based interactive learning activities on topics, education will be more effective and lasting.'* (Participant-4)

On the other hand, one of the participating teachers highlighted the inclusion of new technological applications in the teaching process. Excerpt from his/her post is as follows:

*'I was introduced to a number of programmes and practices that I have not yet been informed about. Also, the fact that my use of these in my lessons contributed to the students' learning processes. I met Prezi,*

*animation and certificate preparation, Edpuzzle programmes. I would like to prepare presentations with Prezi, design a certificate and give animations in suitable subject presentations.’ (Participant-6)*

### **3.4. The characteristics of online professional development that contribute to teaching–learning processes**

The fourth research question was formed as: ‘What are the characteristics of online professional development that contribute to teaching-learning processes?’ Within the scope of this research question, it has been emphasised that the professional development practice contributes to the acquisition of new knowledge/ideas that support the teaching process, to support professional competence and to the acquisition of awareness-knowledge and skills about new practices. One of the participating teachers showed his/her appreciation about the support s/he received for developing his/her professional competence as follow:

*‘I was not enough to use technology. In fact, I’m still not; but this practice has encouraged me even to implement prejudiced practices. I took many notes during the application. For example, when I use a video about Earth, the subject was better processed, it was better understood. Because they’re interested. After this application I think I can prepare videos for my exact purpose. The application welcomed my important need in terms of improving myself.’ (Participant-10)’*

In terms of the acquisition of knowledge and skills gained through being part of the new practices, one of the participating teachers voiced his/her opinion as follow:

*‘This training broke my prejudices. When I was thinking that there were only office programmes in the technology when creating materials in my lessons, I realised that there were alternative technology based methods and I think it would be more effective to use these new applications.’ (Participant-12)*

## **4. Discussion and conclusion**

In this research, a professional development model is proposed to support teachers’ ICT usage competencies continuously within the scope of their personal–professional needs. Within the scope of this research, which is carried out as an action research, a needs analysis was made in line with the problem situation handled, and the implementation/action plan was developed based on the current situation and the action plan was put into practice. When the professional development model that includes the online learning process based on metacognitive learning strategies is applied and evaluated, it is determined that there is a positive change in teachers’ use of ICT and metacognitive learning strategies.

The stages of the evaluation of the professional development practice created within the scope of the research have been completed in line with the research findings. Within the scope of the evaluation, in the first stage, as a result of the professional development application, the general evaluations of the participants regarding the programme were revealed. In this context, professional development programme content, timing, suitability for individual interests and needs, awareness raising etc. In terms of teaching, it can be said that it supports the teaching–learning processes.

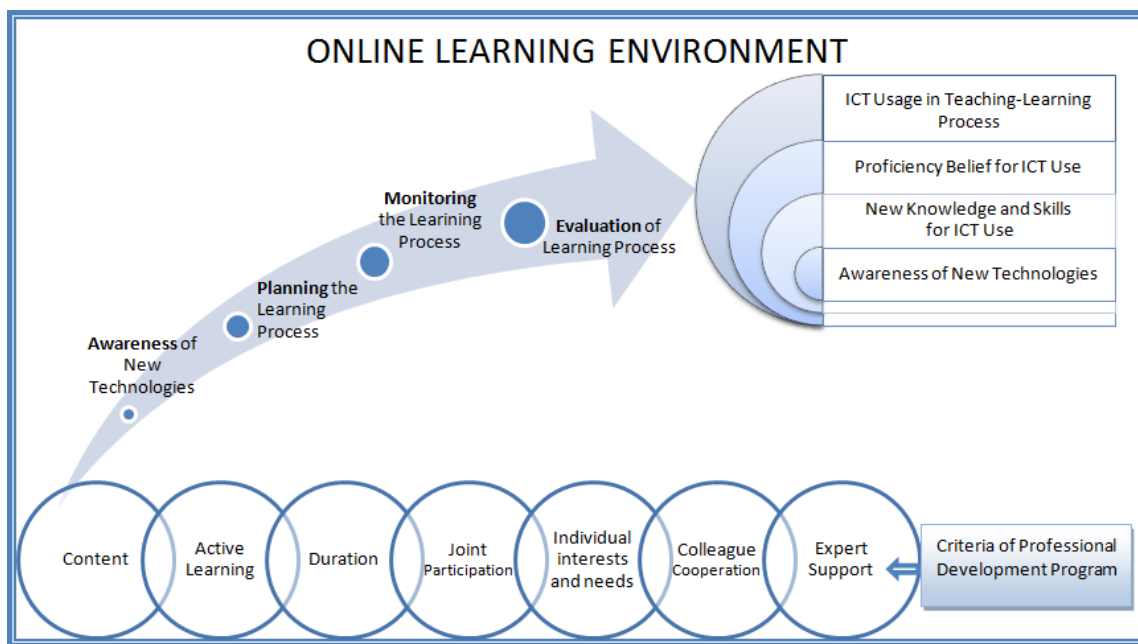
In the second stage of the assessment, it was determined that the expected knowledge–skill change within the scope of the learning objectives of the professional development programme was achieved. Within the scope of professional development programme, it has been determined that there is a positive knowledge–skill change, competence belief and awareness development within the context of using ICT and metacognitive learning strategies.

In the third stage of the assessment, the current and potential effects of those learned in the online learning process on the teaching–learning process are examined. It is stated that the professional development programme is instructive and useful in terms of selecting, organising, preparing, learning new technologies and learning in terms of instructional activities. Also, it is planned to include the

knowledge and skills acquired within the scope of the professional development programme process and the new technology-based applications learned in the teaching activities.

In the last stage of the evaluation, the components and features of the online professional development application that affect the results and contributions of the learning–teaching process are examined. Consequently, it can be said that the professional development programme is in a structure that can gain new knowledge and skills through active learning, contribute to creating materials, raise awareness of new technological applications, support cooperation and support the teaching–learning processes.

According to the results of the research, it can be said that the professional development programme carried out through an online learning environment based on metacognitive learning strategies supports the use of ICT in the teaching–learning process. In this context, the structure related to the online professional development practice, which was established within the scope of the research and suggested in accordance with the findings, is shown in Figure 1.



**Figure 1. Online professional development model proposal for improving ICT usage**

Online professional development practice based on metacognitive strategies for teachers is carried out through online learning environment. The professional development programme offered through the online learning environment consists of criteria that support each other and include common elements.

Supporting active learning is an important component in the professional development process (Angeli & Valanides, 2009; Bayar, 2014) and is one of the criteria of this professional development programme. In addition, as emphasised in various studies in the literature (Desimone, 2009; Drage, 2010; Garet, Porter, Desimone, Birman & Yoon, 2001), the content of the professional development programme supports the teaching–learning process. With the criteria of joint participation, one of the features that should be taken into consideration in the professional development process (Desimone, 2011; Hochberg & Desimone, 2010), teachers working in the same institution were enabled to participate in the same learning opportunities. Within the scope of the importance of communication and collaboration in the process of professional development (Martson, 2010; Musanti & Pence, 2010), an online, sustainable communication environment with interaction, communication and

collaboration elements, and information–experience sharing among participants, related to technological innovations awareness is provided.

As emphasised in various studies, the necessity of the online professional development process to be suitable for the interests, needs and expectations of the participants (Celen & Seferoglu, 2020; Bayar, 2014; Desimone, 2011) is taken into consideration. Within the scope of this criterion, professional development activities are ensured to be in accordance with the needs and expectations of teachers at different levels and in different branches. In addition, expert support in professional development practice is provided within the scope of the need to model and support teachers in experiences related to the use of technology in the learning–teaching process (Hunzicker, 2011; Tondeur, et al., 2012). In addition, with the professional development activity carried out through the online learning environment, it is provided to adjust the learning process according to personal suitability and to access the learning content over the Internet whenever and whenever desired.

Metacognitive strategies need to be implemented during the completion of the learning tasks, followed through the online learning environment. Due to the nature of the online professional development practice, the process of managing a new learning situation related to the use of technology is complemented by metacognitive strategies. In this way, the ability to adapt to rapidly changing technological innovations can be improved by supporting the development of the learning process awareness in order to reach the learning objectives.

Finally, within the scope of the online professional development practice, it is provided to create awareness about new technologies, to determine new learning goals related to the use of these technologies in the teaching process and to use metacognitive strategies, such as planning, monitoring and evaluating, in the process of reaching learning goals. Through this model, which is proposed for professional development practices planned to be carried out online, teachers' competence to adapt to ever-changing technology within the scope of their personal or professional needs can be supported and a positive contribution to the use of ICT in the teaching–learning process.

## References

- Angeli, C. & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: advances in technological pedagogical content knowledge (TPCK). *Computers & Education*, 52, 154–168.
- Bayar, A. (2014). The components of effective professional development activities in terms of teachers' perspective. *International Online Journal of Educational Sciences*, 6(2), 319–327.
- Belland, B. R. (2009). Using the theory of habitus to move beyond the study of barriers to technology integration. *Computers & Education*, 52(2), 353–364.
- Buckenmeyer, J. (2008). Revisiting teacher adoption of technology: research implications and recommendations for successful full technology integration. *College Teaching Methods & Styles Journal*, 4(6), 7–10.
- Buyukozturk, S., Cakmak, E. K, Akgun, O. E, Karadeniz, S. & Demirel, F. (2009). *Bilimsel arastirma yontemleri. [Scientific research methods]* (5th ed.). Ankara, Turkey: Pegem A Publishing.
- Carr, W. & Kemmis, S. (1989). Becoming critical: education, knowledge and action research. *The Journal of Educational Thought (JET)*, 23(3), 209–216.
- Chai, C. S. (2010). The relationships among Singaporean pre service teachers' ICT competencies, pedagogical beliefs and their beliefs on the espoused use of ICT. *The Asia-Pacific Education Researcher*, 19(3), 387–400.
- Chai, C. S., Koh, E., Lim, C. P. & Tsai, C. C. (2014). Deepening ICT integration through multilevel design of technological pedagogical content knowledge. *Journal of Computers in Education*, 1(1), 1–17.
- Celen, F. K. & Seferoglu, S. S. (2020). Features of effective professional development practices for teachers as ICT users (Chapter 2). In M. Duman & I. Limon (Eds.) *Enriching teaching and learning environments with*

- contemporary technologies* (Chapter 2, pp. 18–38). Hershey PA: IGI Global, Information Science Reference (an imprint of IGI Global).
- Cogenli, A. G. & Guven, M. (2014). Validity and reliability study of the scale of determining metacognitive learning strategies. *Dicle University Journal of Ziya Gokalp Education Faculty*, 22, 283–297.
- Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher*, 38(3), 181–199.
- Desimone, L. M. (2011). A primer on effective professional development. *Kappan*, 92(6), 68–71.
- Drage, K. (2010). Professional development: implications for Illinois career technical education teachers. *Journal of Career and Technical Education*, 25(2), 27–37.
- Fraenkel, J. R. & Wallen, N. E. (2006). *How to design and evaluate research in education* (6th ed.). New York: McGraw-Hill Book Company.
- Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F. & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, 38(4), 915–945.
- Göktaş, Y., Yildirim, Z. & Yildirim, S. (2009). Investigation of k12 teachers' ICT competences and the contributing factors in acquiring these competences. *The New Educational Review*, 17(1), 276–294.
- Hochberg, E. D. & Desimone, L. M. (2010). Professional development in the accountability context: Building capacity to achieve standards. *Educational Psychologist*, 45(2), 89–106.
- Hunzicker, J. (2011). Effective professional development for teachers: a checklist. *Professional Development in Education*, 37(2), 177–179.
- Lane, C. A. & Lyle, H. F. (2011). Obstacles and supports related to the use of educational technologies: the role of technological expertise, gender, and age. *Journal of Computing in Higher Education*, 23(1), 38–59.
- Levin, T. & Wadmany, R. (2006). Teachers' beliefs and practices in technology-based classrooms: A developmental view. *Journal of Research on Technology in Education*, 39(2), 157–181.
- Martson, S. H. (2010). Why do they teach? A comparison of elementary, high school, and college teachers. *Education*, 131(2), 437–454.
- McMillan, J. H. (1996). *Educational research fundamentals for the consumer* (2nd ed.). New York, NY: HarperCollins College Publishers Inc.
- Melrose, M. J. (2001). Maximizing the rigor of action research: Why would you want to? How could you? *Field Methods*, 13(2), 160–180.
- Mertler, C. A. (2009). *Action research: teachers as researchers in the classroom* (2nd ed.). Thousand Oaks, CA: SAGE Publications, Inc.
- Mills, G. E. (2003). *Action research: a guide for the teacher researcher* (2nd ed.). New Jersey: Merrill Prentice Hall.
- Musanti, S. I. & Pence, L. P. (2010). Collaboration and teacher development: Unpacking resistance, constructing knowledge, and navigating identities. *Teacher Education Quarterly*, 37(1), 73–89.
- Phelps, R., Graham, A. & Watts, A. (2011). Acknowledging the complexity and diversity of historical and cultural ICT professional learning practices in schools. *Asia-Pacific Journal of Teacher Education*, 39(1), 47–63.
- Schoen, S. F. & Nolen, J. (2004). Action research decreasing acting-out behavior and increasing learning. *Teaching Exceptional Children*, 37(1), 26–29.
- Seferoglu, S. S. (2015). Okullarda teknoloji kullanimi ve uygulamalar: Gozlemler, sorunlar ve çözüm önerileri [Use of technology in schools: Problems and solutions]. *Arti Egitim*, 123, 90–91.
- Stringer, E. T. (2007). *Action research* (3rd ed.). Thousand Oaks, CA: SAGE Publications Inc.
- Sad, S. N. & Nalcaci, O. I. (2015). Pre-service teachers' perceptions of competence regarding using information and communication technologies in education. *Mersin University Faculty of Education Journal*, 11(1), 177–197.
- Tearle, P. (2003). ICT implementation: what makes the difference? *British Journal of Educational Technology*, 34(5), 567–583.
- Tondeur, J., Braak, J. V., Sang, G., Voogt, J., Fisser, P. & Ottenbreit-Leftwich, A. (2012). Preparing pre-service teachers to integrate technology in education: a synthesis of qualitative evidence. *Computers & Education*, 59(1), 134–144.

Celen, F. K. & Seferoglu, S. S. (2020). Improving the use of ICT through online professional development platform based on meta cognitive strategies. *Global Journal of Information Technology: Emerging Technologies*, 10(1), 045-059. DOI: [10.18844/gjit.v%vi%i.4747](https://doi.org/10.18844/gjit.v%vi%i.4747)

Tsai, C. C. & Chai, C. S. (2012). The “third”-order barrier for technology-integration instruction: Implications for teacher education. *Australasian Journal of Educational Technology*, 28(Special issue, 6), 1057–1060.

Tuzun, H. & Cinar, M. (2016). Guidelines for transferring residential courses into web. *The International Review of Research in Open and Distributed Learning*, 17(4), 145–165.

Yildirim, A. & Simsek, H. (2011). *Sosyal bilimlerde nitel arastirma yontemleri*. [Qualitative research methods in social sciences](8thed.). Ankara, Turkey: Seckin Publishing.