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| Research Article / Araştırma Makalesi |

Effects of Question Prompts in Web-Based Video Analysis System on Pre-service Teachers' Reflective Thinking

Web Tabanlı Video Analiz Sisteminde Kullanılan Soru İpuçlarının Öğretmen Adaylarının Yansıtıcı Düşünme Becerileri Üzerindeki Etkileri

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Keywords
1. Scaffold
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Abstract

In this study, in order to facilitate pre-service teachers'(PSTs) peer-interaction and reflective thinking during their microteaching process, a web-based video analysis environment was designed. The purpose of this study is to examine the effects of generic and directed scaffolds embedded within this environment on PSTs' reflective thinking while they are making the reflection on peers' microteaching video. For this purpose, a true experimental study was designed and applied. 55 PSTs were enrolled in this study. Finding of this study revealed that the use of directed question prompts embedded in a web-based video analysis system has a positive significant effect on PSTs' reflective thinking level.

Öz

Bu çalışmada, öğretmen adaylarının mikro öğretim süreçlerinde akran etkileşimini ve yansıtıcı düşünmeyi kolaylaştırmak için web tabanlı bir video analiz ortamı tasarlanmıştır. Bu çalışmanın amacı, ortama yerleştirilmiş genel ve yönlendirilmiş öğrenme desteklerinin, öğretmen adaylarının akranlarının mikro öğretim videolarına geri dönüt sürecinin yansıtıcı düşünme üzerindeki etkilerini incelemektir. Bu amaçla, gerçek bir deneysel çalışma tasarlanmış ve uygulanmıştır. Bu çalışmaya 55 öğretmen adayı katılmıştır. Bu çalışmanın bulguları, web tabanlı bir video analiz sistemine gömülü soru ipuçlarının kullanımının, öğretmen adaylarının yansıtıcı düşünme düzeyi üzerinde olumlu ve anlamlı bir etkiye sahip olduğunu ortaya koymuştur.

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INTRODUCTION

In almost all of the educational training programs, pre-service teachers (PSTs) engage in field experiences. Especially they have a chance of teaching experiences once or twice. As stated by Greene (2003), for a variety of reasons, it is often difficult to find placements for teacher candidates in local schools for experiences (Greene, 2003, p. 22). For the teacher candidates both observation and to be observed play an important role in professional development (Richards & Farrell, 2011) and also PSTs cannot see the teaching styles of different teachers and gain experience (Paker, 2000).

In teacher education programs, microteaching technique as a way of providing real life experience and it has been in use for many years (Remesh, 2013). All over the world it is widely in use for different ELT Masters, in teaching assistant training, and FLE teacher education settings. Microteaching technique plays an important role in determining the inadequate and absent sides of the pre-service teaching related with their teaching profession (Kuran, 2009). This technique was used for training of the PSTs in the controlled classroom in a simplified way. The first aim of this technique was to train the PST in a rapid way in order to close the gap between practice and theory (Tochon, 2008). The intended aim is to prepare the PSTs for professional working life.

In teacher training programs, PSTs can take a limited feedback from the supervisor teacher (Rorrison, 2005). However, it is known that divergent and multiple perspective feedbacks are really beneficial for PSTs' professional development (Huang, 2001). Peer feedback, shows a number of learning benefits for the feedback recipient, on the other hand it is also beneficial for the feedback provider (Cao, Yu, & Huang, 2019). In recent years the importance of the reflective practice (McDermott el al., 2012; Schön, 1983; 1987) has taken attention in preparing the individuals for the professional environment. Dealing with the difficulties has positive effects of the critical thinking in classroom setting (Dewey, 1933; Schön, 1987; Hulfish&Smith,

1961; Van Manen, 1977). The importance of reflective thinking in teacher education programs have been emphasized by significant educational researchers (Dewey, 1933; Schön, 1987; Shulman, 1986). Thinking about the teaching and learning in a deep way helps them to improve their teaching professional skills. Reflection during the PSTs' professional development gives chances to teachers to think about their work, and understanding the view of what the students and they do and by the way, they can improve the teaching and learning quality (A'Dhahab & Region, 2009; Akbari, 2007). So, in microteaching sessions, students by sharing experiences, collaborating with each other and group discussions may improve their critical thinking attitudes (Arsal, 2015). The feedback quality plays an important role. Huang (2001) was conducted a study in order to explore the PSTs' reflective practice during the microteaching peer feedback session. The findings of the study showed that reflective level of the participants was at the reporting level, and explained what had been done instead analyzing the related issues and in the conclusion author discovered that reflection contents and the reflective thinking issues needed to be an improvement (Huang, 2001).

In order to improve the microteaching technique and consequently, enhance the teaching experience of PSTs, some new approaches can be adopted into these environments. By promoting the reflective thinking level of the PSTs, they can make more reflective peer feedbacks. In addition, it is aimed to refine reflection quality and quantity of peer evaluation. Through the scaffolding and strategic interventions reflection can be learned (Coulson & Harvey, 2013). In order to improve the reflective thinking levels of the peer, a Web-based Peer Evaluation System (WBPES) developed specifically for this study. This supporting tool was designed in order to make peer evaluation of the microteaching sessions facilitate the peer feedback process and management workload. In addition to technical support, PSTs are needed to be trained in order to be critical and reflective thinking teachers. In this environment PSTs were forced to be more reflective by using different techniques, so, in the WBPES, question prompts as a scaffold has been used in order to enhance the reflective thinking level of the PSTs and guided them while observing the peers. As a scaffold, generic and directed question prompts were used to enhance the reflection. Davis (2003) claims that generic scaffolds yields deeper reflection, on the other hand, the context-specific scaffolds are effective during writing scientific arguments (McNeill & Krajcik, 2009). By different question prompts may affect the PSTs reflective thinking and by the way, the quality of the peer review might increase. So this paper explores the effects of the generic and the directed scaffolds on PSTs reflective thinking level.

LITERATURE REVIEW

Reflective Thinking and PSTs

Reflective thinking plays a critical role in individuals' learning (Bloom, 1956; Dewey, 1933). There are many claims in the literature on the importance of the reflection while the individual's learning (Bloom, 1956; Dewey, 1933). Dewey (1933) defined the reflective thinking as a kind of better way of thinking that consists of turning a subject over in the mind by giving it serious and consecutive consideration. Shön (1983), explained a connection between reflection and action. He defined this issue in two types of reflection as reflection-in-action and reflection-on- action. According to Schön(1983), reflection in action occurs during the event while evaluating and making changes consciously. On the other hand, reflection-on-action occurs before or after the action take place (Freese, 1999).

During the performance some of the most interesting examples of reflection in action occurs (Shön, 1983, p.54). From this approach, it can be assumed that while teaching process thinking on the existing action and reaction may result in teaching (Freese, 1999). Zeichner and Liston (1996) argued that while bringing the understanding to the complex situations in the classroom, reflection plays an important role, in addition, Munby and Russell (1990) think that, by reflective practice, teachers can

find the chance of reframing and reinterpreting their experiences from a different looking side. Like this, in most of the studies, researchers claimed the crucial role of the reflection while teaching and learning processes.

Reflection is important for PSTs' professional development. It gives chances to teachers to think about their work, and understanding the view of what the students and they do and by the way, they can improve the teaching and learning quality. (A'Dhahab & Region, 2009; Akbari, 2007). By asking questions, making critics, evaluating learners construct their own knowledge in the situation of reflective thinking help them to construct a bridge between the belief and relatives of teaching (Lee, 2008). By linking the theory and practice reflective thinking helps to make mental activities on the educational issues. (Taggart, & Wilson, 2005).

Although it is known the reflective thinking in learning is very important, but how it can lead to learning is very little known (Resnik, 1987). Also how it can be best promoted in the classroom needs to be investigated (Davis, 2003). Reflection orient can depend on the learners' own thinking and reflection helps learners set goals and improve the understanding (Davis, 2003) and it is a very crucial component for teachers' professional development (Dewey, 1933; Schon, 1987; Shulman, 1986).

Microteaching and Reflective Thinking

Microteaching developed and firstly used at Standford University in 1963 in order to find out a new and effective training method for PSTs (Allen & Cooper, 1970). This process serves a very convenient environment to PSTs in order to gain experiences on teaching skills in the controlled classroom atmosphere. In this environment the real classroom difficulties are reduced for the practitioners and the teacher candidates receives a great deal of feedbacks (Allen, and Ryan,1969).

Microteaching environment allows the PST to gain experience on the teaching skills and to cultivate the reflective thinking (Huang, 2001). In microteaching sessions PSTs can learn many useful new skills; especially they can learn the application of the teaching skills in the classroom environment. For instance fluency in asking questions, probing questions, higher order questions, divergent questions, reinforcement, recognizing attention behavior, silence and nonverbal cues, closure, lecturing, use of examples, planned repetition, completeness of communication (Allen and Cooper, 1970).

In order to increase the understanding of teaching and learning PSTs are expected to give careful and thoughtful deliberation to microteaching environments (Huang, 2001). Especially the feedback part is important in microteaching process, because in the feedback part microteaching performers could find the chance of how their performance qualified in the evaluators' side. Evaluators give feedback by making reflection while watching the performers' video. Reflection is used for PSTs both consider their own learning and encountered problems; in addition, reflection is considered the main component of peer evaluation (Roberts, 2006). While peer is watching the microteaching video s/he can model the successful sides of the performer's act and they can take the positive and useful vicarious experiences and refuse the useless ones (Bandura, 1977). While describing the experience critical reflection is the helper of the learner in order to analysis the experience and make judgments for future (Brookfield, 1995).

The reflection of the PSTs' focus on the following eight points: teacher characteristics (82%), delivery of instruction (78%), classroom interaction (40%), subject content knowledge (25%), questioning techniques (23%), instructional aids (15%), students (9%), and general education issues (4%) (Huang, 2001). Feedback step comes after the teaching part and the PSTs give this feedback by answering different questions which are attached to the related parts of the microteaching (Baird, Belt,Webb, 1967). Zink (2010), claims that reflection is a key part of the teaching process because making reflection, students talk about which experience is meaningful and how this learning can be applied in the future, but in a study, Huang (2001) revealed that for the feedback session of the microteaching process, the reflective level of the participants are at the reporting level, and they explain what had been done instead analyzing the related issues and also author discovered that reflection contents and the reflective thinking issues were needful to improvement.

Scaffolding and Reflection

The concept of the scaffolding was rooted by the Vygotsky with the idea of Zone of Proximal Development (ZPD). Dennen (2004), defined the scaffolding as a metaphor for a structure which is put in a place in order to help learners reach their goals in an educational environment and removed time by time until no need to its existence. In the educational setting, structures can be constructed by achieving the required learning tasks. According to Sharma and Hannafin (2007), while selecting the learning tasks for individuals the ZPD provides a conceptual framework, in addition, to support the specific learning scaffolding provides a strategic framework while selecting and implementing the strategies. For these strategies depend on the specifications, different scaffolds can be used related to their functions.

Scaffolds have been used for different purposes including reflection and inquiring. Selecting the appropriate scaffold for the requirement of the circumstance might be difficult for the designers and researchers (Belland, 2017). The key question here is what to scaffold. This question is used in order to focus the leaner on the topic or domain or in the learning process which is the metacognitive processes like problem-solving and self-regulatory processes (Azevedo & Jacobson, 2008). In literature, scaffolding can be used for different aims depend on their functions and mechanisms. Technology-based tools have been used to help the learners to understand a task, decompose problems, and gain strategies by displaying disciplinary strategies (Edelson et al., 1999, Quintana et al., 2004). Technology is a general concept and this concept includes especially computer supported learning environments. Jonassen (1999) called these computer-based learning environments as Mindtools and claims that Mindtools are used in order to engage the leaner in constructive, higher-order thinking and critical thinking on the studying subjects. Mindtools

for scaffolding are used to assist the students while they are interpreting and organizing their personal knowledge within a complex content (Hwang, Shi and Chu, 2011).

Technology-Based Scaffolds

In the literature technology-based tools have been used to enhance the learners during the cognitive and metacognitive processes. Metacognitive scaffolds guide the learners while learning in terms of how to think by modeling cognitive strategies and self-regulatory processes.

Technology based scaffolds are used in various educational settings and different studies conducted on this issue. As Sharma and Hannafin (2007) claimed that in order to direct and enhance the learning via the use of the computers the technology-based scaffolds can be used. Different types of scaffolds have been adFyıopted in technology enhanced learning environments (TELEs). TELEs are differentiate from the traditional learning environments in terms of usage of computers to direct and enhance learning (Sharma and Hannafin, 2007). In a computer-mediated learning environment, Ping and Swe (2004) made a categorization on the existing scaffolding strategies as orienting strategies, peer interaction, prompts, and modeling. Technology based scaffolds have been used to prepare the learners for the learning environment by giving guidance and making connections to existing ones and personal experiences. For instance Edelson et al. (1999) designed "staging activities" used for sequences of structured investigations and used the "bridging activities" which is a type of visualization method used to articulate the learners' initial conceptions. Kolodner et al. (2003) used a tool named "messing about" which enables the learners to design and build an initial model depend on their prior knowledge.

Embedded computer-based scaffolds have been used to enhance the PSTs' reflective practice. In order to support the PSTs reflection, Lin at al. (1999) declared four types of computer based scaffolding strategies. First one is the process prompts which were used to help the PSTs to track and understand their process by revealing appropriate questions. The second one is the process displays which were used to make the tacit learning process explicit and overt. The third one is the process modeling which is used to focus the leaner on the process that an expert would use in order to think about or solve the specific problem. The last and the fourth one is the reflective social discourse which is used for creating community-based discourse in order to provide multiple perspective and feedback for making the reflection.

Prompt Scaffolds

Prompt scaffolds have been used in the different environment for different purposes. For instance used in software to let the learner track and understand their learning process. In specific, prompts are important for the learners in the situation of problem-solving task (Lin at al., 1999). In literature, prompts have been used in the forms of hints, reminders, sentence starters and questions. To support the scientific explanation and argumentation, prompts have been used (Bell and Davis, 2000). Sandoval provided the prompts in the BGuILE environment by using Explanation Constructor software (1998; 2003). The researcher gave hints to learners about what they could include in their explanations.

Question prompts are used to trigger the learner's response by using different question types for different cognitive levels. (Wandberg & Rohwer, 2010) These cognitive levels as defined by Bloom's taxonomic levels (1956) could be supported by using different question prompts. In promoting the higher levels of reflection, prompts and questioning as scaffolding strategy has been most widely in use (Lai, 2008). The question prompts, make it easier for students to understand the steps behind their actions and the steps they are taking and the decisions they make (Linn el al., 1995).

Generic and Directed Prompts

(generic directed tanım) Prompts can be used in different ways. Prompts are the hints or questions given to the learner (Renkl, Skuballa, Schwonke, Harr, & Leber, 2015). Generic prompts were used by stopping the student and asking a question, on the other hand directed prompts were used by providing hints addition to the question (Davis, 2003).

Davis (2003) conducted a study in order to investigate the way of prompting students for reflection. She investigated the research question of "Do students merely need to be prompted to reflect, or do they need guidance in reflecting productively?" In the study, two types of scaffolds, generic and directed, were contrasted. The results of the study show that the directed group students reflected unproductively responded to the prompts than the generic group. Also, the generic prompted students developed more coherent understandings than the directed group students.

In another study, Wu and Looi (2011) worked on the agents prompts as a scaffold. In this study, they used two types of scaffolds, generic and specific prompts. In this study, as a learning partner, the inquisitive agent tutee in learning-by-teaching activities was explored. In result, they found that while generic prompts yielded to deeper contemplative reflection, the specific prompts resulted into more reactive reflection.

In one study, King (1991) compared the 3 groups of guided, unguided and control group of 5th grade students. While guiding the group, peer questioning strategy was used. The guided group students were asked more strategic questions, and they performed better than the unguided questioners and control group students on problem solving and novel computer test. Using guided questioning, prompts the students to create their own questions in higher order level. By asking and receiving these types of questions helped the students to construct the knowledge in long term memory.

In their study, NcNeill and Krajcik (2006) contrasted the effects of domain-specific and domain-generic scaffolds and they found that domain-specific scaffolds are more effective than the domain generic scaffolds in terms of understanding the content. Also

in another study it was found that domain specific scaffolds can achieve to start the knowledge integration process but they are not capable in knowledge fostering alone (Bell & Davis, 2000; Kyza & Edelson, 2003).

In a study university students were given generic and context-specific prompts in order to make reflection on their answers about human immune system and a concept map, so the generic prompted students gained significantly more from the context-specific prompted and the control group students (Ifenthaler, 2012).

Purpose of the study

In literature there different studies and some of them resulted in in a positive effect of the generic scaffolds (Davis, 2003; Ifenthaler, 2012), on the other hand some others supports the valuable effects of the directed scaffolds (King, 1991; NcNeill and Krajcik, 2006)). Purpose of this study is to improve the reflective thinking level of the PSTs during the feedback process. For this aim, a web-based peer evaluation system (WBPES) was designed and in this environment, generic and directed scaffolds were used in order to improve the reflective thinking levels of the PSTs.

In this study, question prompts(QPs) were embedded in this WBPES in order to support the PSTs during the peer evaluation process. So, in this environment, two types of question prompts were contrasted. One of them is the generic questions. These questions were given to the one part of the PSTs. It is used to collect peer feedbacks of the PSTs without the guidance of specific questions in WBPES. In this process PSTs reflected on three parts, labeled as the introduction, main activities, and closure-evaluation. They wrote down reflections into the text boxes which were only captioned by the name of the part as introduction part, main activities part, closure- evaluation part. This form was used inside the WBPES. On this system, PSTs made reflections by watching the microteaching performer's video. The system also gives the chance to evaluators to check out the materials used during the microteaching performance like lesson plan, presentation and evaluation documents The other type of the question prompt was the directed questions. It is used to collect peer feedbacks of the PSTs under the directed QPs in WBPES. QPs were used as a scaffold to direct the learner on the specific point about to reach the appropriate leaning goals (Azevedo & Hadwin, 2005). In order to guidance the treatment group, domain-specific QPs were asked. QPs were prepared based on the aspects of a lesson plan. For three main parts as main activities and closure-evaluation parts on the WBPES, PSTs made reflections by watching the microteaching performer's video. For three parts 12 question prompts were asked. Also, the microteaching video was divided into three parts as named introduction, main activities, and closure-evaluation. By dividing the video slices, it was aimed to make easier finding the answers for QPs. Like on the other group, the system gives the chance to evaluators to check out the materials used during the microteaching performance by the microteaching performer.

Although literature suggests that use of video can be effective to facilitate reflection for teacher education, new tools and supporting evidence are beginning to emerge (Rich & Hannafin, 2009). Therefore, the purpose of this study is to examine the effectiveness of question prompts as scaffolding tool embedded within web-based peer evaluation system for supporting PSTs' reflective thinking while they are making a reflection on the peers' microteaching video. The study was designed to examine the following question:

- Does the use of generic and directed question prompts embedded in a web-based video analysis system have an effect on PSTs' reflective thinking level over the peer assessment sessions?

METHOD

Participants

Participants included the third year PSTs enrolled in the Computer Education Teaching Methods II Course at Department of Computer Education and Instructional Technology at Middle East Technical University in Turkey. A total of 55 PSTs participated in the study with 45 male and 10 female, aged between 21 and 27 years old. PSTs had an experience on instructional planning in the courses that they took previously at the department.

Web-based peer evaluation system

Web-based peer evaluation system (WBPES) was developed to provide video analysis environment for the PSTs enrolled in Computer Education Teaching Methods II course. This is a must course and specifically, focuses on both micro strategies of teaching and learning. PSTs are required to develop the lesson plan and present it as microteaching performance.

Peer evaluation screen in the WBPES consisted of three parts including, microteaching video, lesson plan and materials, and microteaching video evaluation report. In the microteaching video part, PSTs could be able to watch the microteaching performer's video. Microteaching videos were stored on the video server of VIMEO ®, they were protected with a password. This password was given to all participants. In the material part, PSTs can check out the materials, including a lesson plan, activity sheets, and handouts etc., used during the microteaching performance. Microteaching video evaluation report part consist of three areas, including introduction, main activities, and closure. Each part included text entry boxes for PSTs to write down their reflections about the microteaching performance.

Treatment conditions

Two versions of the WBPES were designed with the modification on the video and reflection parts assisted with generic and directed scaffolds. While in generic WBPES, peer evaluation screen includes the microteaching video as a whole, in directed WBPES, microteaching video was divided into three parts introduction, main activities, and closure. Moreover, while in generic

WBPES, instate of directed question prompts, generic scaffolds provided in the peer evaluation screen microteaching video evaluation report part; in directed WBPES, directed question prompts were used as a scaffold for each part, introduction, main activities, and closure. Domain-specific question prompts were designed in order to help them reflect on the different parts of the lessons. All the question prompts were reviewed by experts.

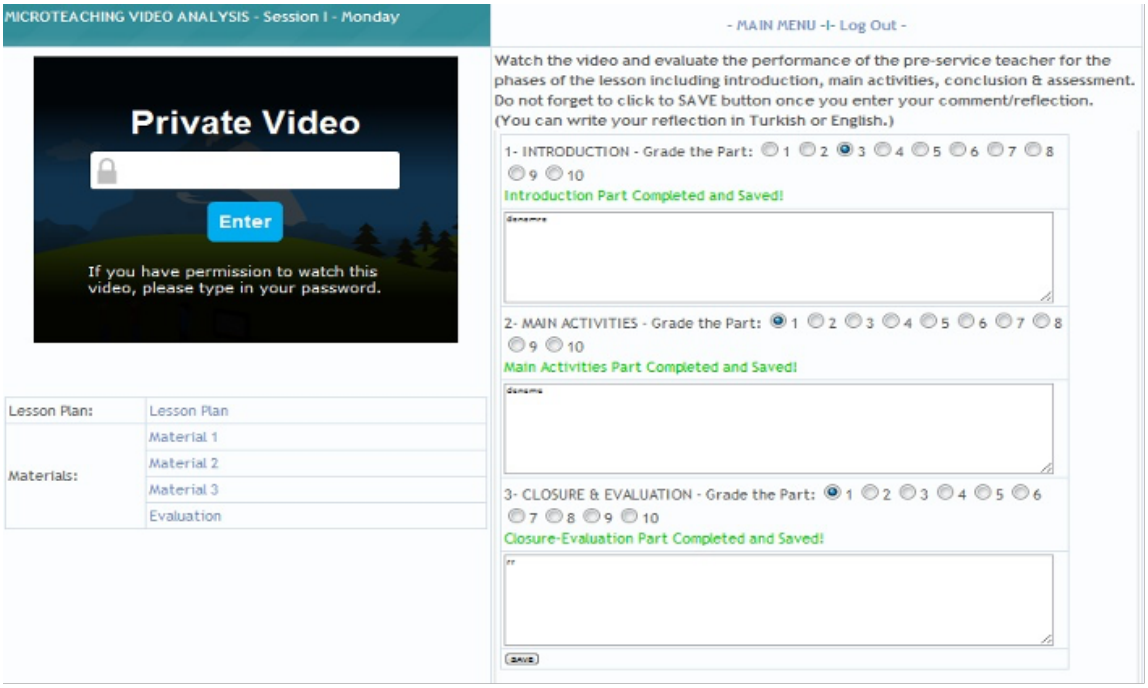

Figure 1. Generic Group Screen

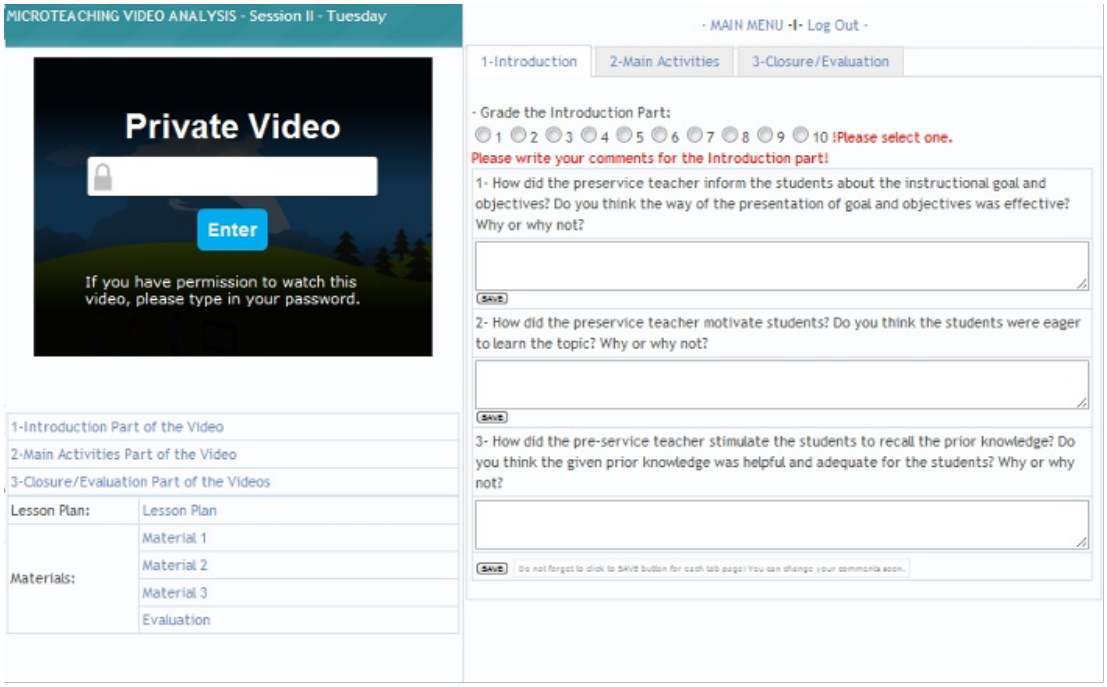

Figure 2. Directed Group Screen

Research Design

In order to examine the effectiveness of scaffolds within web-based peer evaluation system, a true experimental study that included control and experimental group with pre and post-test was designed (Fraenkel & Wallen, 2006). Participants were randomly assigned to each group. For the effects of generic and directed scaffolds in peer evaluation system on the reflective thinking skills of PSTs, both groups' reflective thinking levels as the dependent variable were measured before and after the study.

Procedure

At the beginning of the semester, PSTs were assigned to either control (n=27) and experimental group (n=28). First, all PSTs provided with a pre microteaching video, which was selected from the previous year's performances by the researchers, in a generic scaffolded peer evaluation system. They were required to watch the microteaching video and write their reflections about

the introduction, main activities, and closure part of the lesson. Then, all PSTs worked individually on the preparation of a twenty-minute lesson plan to be implemented in the microteaching performance for two weeks. Afterward, every week, three pre-service teachers performed microteaching at each section over nine weeks. Depending on the control and experimental group assigned, each section provided access with either generic and directed WBPES, respectively. PSTs at both groups evaluated each week's microteaching performances in WBPES. At the end of the study, PSTs were provided with the post microteaching performance video in a generic peer evaluation system identical to the one provided at the beginning. They again wrote their reflections about the parts of the lesson.

Data sources

Evaluation reports of Microteaching videos

In order to evaluate the reflective level of participants, responses to the pre and post microteaching video evaluation reports in the peer evaluation system were analyzed. A rubric, named "Criteria for the Recognition of Evidence for Different Types of Reflective Writing", developed by Hattan and Smith's (1994, 1995) was modified and used to score reflective level of participants. The rubric consisted of four levels, including descriptive writing, descriptive reflection, dialogic reflection, and critical reflection. Each of these levels was categorized according to characteristics of the reflector's writing.

The first level, descriptive writing is not considered as a reflection, but just reporting or describing events occurred. In this level individual does not have any attempt to provide reasons or justifications. The second level, the descriptive reflection, individual not only make a description of events but also makes some attempt to provide the reason for events or actions but still in a report or descriptive way. As a third level, dialogic **reflection**, individual thinks on the events and makes qualities of judgment and possible alternatives for explaining and hypothesizing by exploring the experience, events, and actions. The forth and the last level is the critical reflection. In this level, individual demonstrates an awareness of events and actions and can look from the multiple perspectives. Using the rubric, reflections of the PSTs were scored from 1, the lowest thinking reflective level, to 4, highest reflective thinking level. Microteaching video evaluation reports were graded by two raters, who were blind to groups. Before grading, the raters go through each level in the rubric and they reached a consensus on the rubric by scoring 20 of the reports together. Then, both raters scored the forms using the rubric. At the end, an inter-rater reliability analysis was conducted (alpha=.89).

Data Analysis

In order to examine the effects of the question prompts embedded within WBPES on PSTs' reflective thinking level, one-way analysis of variance (ANOVA) was conducted. The independent variable was the group and the dependent variable was the mean difference of pre and the post reflective thinking level scores. Scores of 48 PSTs, 22 in experimental and 26 in the control group, who were completed both pre and post reflection were included to analysis. In order to control the data whether it is ready for running one-way ANOVA, the required assumptions of independent observation, normality, and homogeneity of variance were checked.

RESULTS

Table 1 summarizes the descriptive statistics for pre and post-reflective thinking levels for control and experimental group. Descriptive statistics indicated that for the pretest the mean scores of PSTs' reflective thinking levels for the control group (M = 2.48) and experimental (M = 2.19) group are approximate to each other. When the post-test scores investigated, the experimental group's mean score (M = 3.12) is a bit greater than the control group's one (M = 2.80). The ANOVA results at Table 2 revealed that mean difference in the control and experimental group was significant, F (1, 46) =12.40, p = .001, partial η^2 = 0.21. Namely, mean difference for the experimental group (d = 0.93) was significantly higher than control group (d = 0.32).

Table 1. Descriptive statistics for reflective thinking levels of PSTs

	Group	n	M	SD	Min	Max
Pretest	Control Group	22	2.48	.60	1.67	3.67
	Exp. Group	26	2.19	.69	1.00	3.67
Pretest	Control Group	22	2.80	.73	1.00	4.00
	Exp. Group	26	3.12	.60	1.67	4.00

Table 2. ANOVA results for reflective thinking levels of PSTs

	Sum of Squares	*df*	Mean Square	*F*	Sign
Between Groups	Control Group	1	4.360	12.401	.001
Within Groups	Exp. Group	46	.352		
Total	Control Group	47			

DISCUSSION

In literature, different studies were conducted on the guidance of the learner while thinking cognitively and meta-cognitively. Some studies resulted that guidance improves the reflective thinking level and learning, on the other hand, some other studies advocated that minimal or lack of guidance of learner result in more reflective thinking level.

This study investigated the effects of question prompts as scaffolding tool embedded within web-based peer evaluation system on PSTs' reflective thinking. Overall findings of this study indicated that at the end of the research the use of directed question prompts embedded in a web-based video analysis system make a positive significant effect on PSTs' reflective thinking level, also it is revealed that both experimental and the control group PSTs' reflective thinking levels have increased.

Most of the studies in the literature are on the effects of scaffolds on the problem-solving skills and science learning but there were not enough studies focus at how question prompts can be used to foster reflective thinking while PSTs are giving feedback to their peers. King (2002) argues that for promoting the different kinds of cognitive processing, it is necessary to ask different sort of questions. Therefore, engaging in these cognitive processes strengthens the understanding (King, 2002). In the literature there were some studies, claimed that "People can sometimes learn very well through unguided exploration, and can also learn by listening passively to lectures or stories or by being directly instructed" (Mercer, 1995). But in this context directed PST performed more reflective results than the generic group.

Reflective thinking is important for professional development (Schön, 1987). With the help of the cognitive scaffolds, learners could reach to levels that they could not achieve without it (Holton and Clarke, 2002). After the learner reach to intended point then it is expected learner may represent the specifications gained with the help of scaffolds (Holton and Clarke, 2002). In this study, PSTs were trained with question prompts as generic and directed scaffolds. It was revealed that making reflection with question prompts change the PSTs reflective thinking process in a positive way for both groups. Both groups were asked to make the reflection on a sample microteaching video under the generic questions prompts at pre and post-test. The experimental group, trained with the directed question prompts, gave more reflective feedbacks from pre to post test.

At the end of the study, it is revealed that the reflective thinking level of the PSTs has increased. Both groups PSTs forced to give reflection to the microteaching videos. By the time, the progress of the reflective thinking level is an expected result, because in literature most of the studies claimed that the both generic and the directed question prompts have positive effects on reflective thinking (Lai, 2008; Davis, 2003, Wu and Looi, 2011).

Improvement the affordance of preparing qualified teacher candidates with highly critical thinking capacity is an active debate (Lai, 2008). Early field experiences act an important role in teacher education (Gutton & McIntyre, 1990). In these field experiences, teacher education programs have been widely using the microteaching technique in order to prepare the PSTs for the real classroom setting. Microteaching environments serve very convenient opportunities to PSTs in order to gain experiences on teaching skills in the classroom environment. Studies in which the PSTs involve in reflective inquiry, point out significant effect on the cognitive development of the PSTs (Dunkin et al., 1994). For teaching actions, the initial role of the evaluation criteria is to supply evidence and determining which evidence is relevant to the evaluation criteria is the evaluator's skill (Danielson & McGreal, 2000). During the peer evaluation process of the microteaching sessions, it is expected from the evaluator to make a meaningful and evidence-based evaluation, by the way that the microteaching performer could take the optimum benefit from the feedbacks. So, these microteaching sessions may explain the progress of the reflective thinking level for both groups.

In this study, with regard to scaffolded PSTs, peer feedbacks showed that they were more successful at explaining the actions and events. Some of them could achieve to look action and events from multiple perspectives and they were more successful than the generic scaffolded PSTs on providing reasons and making justification about the events or actions. But it is possible to say that some of the generic scaffolded PSTs were represented high reflective thinking level, but in this group most of the PSTs are at the descriptive writing or descriptive reflection level which are the first and the second level of the "Criteria for the Recognition of Evidence for Different Types of Reflective Writing" rubric.

As findings revealed that reflection level of PSTs in the control group was between descriptive and dialogical (M=2.48) at the beginning of the study. Moreover, at the end of the study, it was more close to the dialogical (M=2.80) but not significantly. On the other hand, findings showed that while reflection level of pre-service in the experimental group was near to descriptive (M=2.19) at the beginning of the study, it was over dialogical (M=3.12) at the end of the study. Despite the overall learning gain, the results suggested that use of directed question prompts embedded in a web-based peer evaluation system facilitated reflective thinking of PSTs better than generic scaffolds embedded web-based peer evaluation system, so by the time directed scaffolded group members learned to give more reflective feedbacks.

Findings of this study also suggest that providing PSTs with domain-specific prompts in the directed system might help them focus on each part of the peer evaluation process like instructional planning, introduction, main activities, and conclusion. This might have helped the PSTs give more critical and reflective feedbacks. Findings of this study about the effects of the QPs on reflective thinking were supported by different studies in literature (NcNeill and Krajcik, 2006; Bell & Davis, 2000; Kyza & Edelson, 2003). By scaffold the experimental group with directed question prompts could force them to find out an answer to question prompts from the video parts and the related materials, on the other hand, in control group because the PSTs were asked to answer generic questions without any stress of finding specific answers, they wrote down what they saw in the video. So this feeling could make unwillingness for making the reflection.

For the novice learners, guided instructional approaches are more effective than the unguided or minimal guided ones (Kirschner et. al., 2006). All the participants of the study were the novice PSTs. Also, the results of the study showed that novice PSTs needed to be guided by instructional approaches. But after they learned how to deal with the obstacles they automatically remove the guidance, in other words, they unintentionally faded the scaffolds. Until the student independently completes the task successfully than the students start to trust themselves and they slowly fades the scaffolds (Puntambekar & Hubscher, 2005; Sharma & Hannafin, 2007).

CONCLUSION AND RECOMMENDATIONS

Evaluating teacher candidates with limited practical knowledge can be challenging, so in this situation it is required to scaffold the peers in order to help to think higher order thinking level and by the way they can make valuable and evidence based critical thinking while evaluating the peers. The reflection process could give chance of to monitor their own knowledge construction and make a connection with new ideas to the existing ones and generates new ones for self-reflection and evaluation.

Scaffolds have been an important argument for reflective thinking process. There are different views about the scaffolds' effect to reflective thinking level. This study might make valuable contributions to this debate. In this study, to support the learners' reflective skills on the process of planning, monitoring, and evaluation technology based tools have been used. These tools have been used to help the leaner to see their thinking and learning process explicitly (Lin, Hmelo, Kinzer, and Secules, 1999). Two types of scaffolds as generic and directed was used and their effects on reflective thinking level were investigated. As a result, directed group members were more reflective than the generic ones.

The result of this study gives clues to the instructional designers, educators, and teachers about effects of scaffolds in order to facilitate the peer evaluation and improve the reflective thinking process. However scaffolds can be used in different learning environments, the result of this study is concentrate on the reflective thinking process. The result of the study shows that the guiding the learner with QP as a scaffold enhances the reflective thinking and results in greater knowledge acquisition. Prompting is a time consuming process for the teacher and in the classroom environment it may not be feasible with a single teacher for each student (Cuevas et al., 2002). In this study by the help of the computer supported scaffolding environment, it became possible to manage the prompting process for each student individually.It can be recommended that rather than the static scaffolds, dynamic scaffolds can be used in order to facilitate the peer feedback process by using adoptive systems. By the way PST do not guess which type of QP will be assessed and thus they can concentrate to the different points in their every peer evaluation. Much research is needed about the effect of video analysis tools on PSTs' reflective thinking during microteaching.

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Statements of publication ethics

We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Examples of author contribution statements

A.B. and B.C. conceived of the presented idea. A.B. developed the theory and performed the computations. C.D. and D.E. verified the analytical methods. B.C. encouraged A.B. to investigate [a specific aspect] and supervised the findings of this work. All authors discussed the results and contributed to the final manuscript.

Researchers' contribution rate

The study was conducted and reported with equal collaboration of the researchers.

Ethics Committee Approval Information

This study was conducted before 2020.

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