



INVESTIGATION OF MULTIPLE INTELLIGENCE ACTIVITIES BY TEACHING, MEASUREMENT AND EVALUATION METHODS AND TECHNIQUES IN THE 5E MODEL OF CANDIDATE TEACHERSⁱⁱⁱ

Necati Hirca, Hakan Saraçⁱⁱⁱ

Dumlupınar University, Institute of Educational Sciences, Kütahya, Turkey

Department of Science Education, Bartın University, Bartın, Turkey

Abstract:

5E learning model based on constructivist approach have been implementing Science education program since 2005. Therefore, the program requisitions teachers to use student-centered teaching methods and techniques, complementary measurement and evaluation methods-techniques and multiple intelligences activities. Based on this context, the aim of this study is to examine prospective classroom teachers' Constructivist 5E lesson plans. The participants are third grade prospective classroom teachers (19 men and 24 women) who took science education lesson. The data gathered by document analysis. The results show that although prospective classroom teachers' use Constructivist 5E learning model, they prefer to use teacher-centered teaching methods and techniques such as lectures and the measurement and evaluation methods and techniques such as questions and answers instead of student-centered active teaching methods and techniques and complementary assessment methods and techniques.

Keywords: 5E model, multiple intelligence activities, teaching methods and techniques, assessment and evaluation techniques

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ⁱⁱⁱ Correspondence: email hknsrcmv@gmail.com

Özet:

Fen Bilimleri öğretim programında 2005 yılından itibaren yapılandırmacı yaklaşıma dayalı 5E öğrenim modelini uygulamaktadır. Program ayrıca öğrenci merkezli öğretim yöntem ve teknikleri, tamamlayıcı ölçme ve değerlendirme yöntem ve teknikleri ile çoklu zekaya dayalı etkinliklerin kullanılmasını önermektedir. Bu çalışmanın da amacı Fen ve Teknoloji Öğretimi dersi görmüş öğretmen adaylarının ders planlarını bu açıdan incelemektir. Araştırmanın katılımcıları, Bir Eğitim Fakültesinin Sınıf Öğretmenliği Programının üçüncü sınıfında öğrenim gören Fen ve Teknoloji Öğretimi-I dersini alan 19'u erkek, 24'ü bayan toplam 43 kişidir. Adayların 5E Modeli ile ilgili hazırladıkları planlar, toplanarak "doküman analizi" yöntemi ile incelenmiştir. Çalışmanın sonuçları sınıf öğretmeni adaylarının Yapılandırmacı 5E Modeli de kullansalar da öğrenci merkezli aktif öğretim, tamamlayıcı ölçme-değerlendirme yöntem ve tekniklerini kullanmak yerine yine de öğretmen merkezli olan anlatım, örnek olay gibi öğretim yöntem-tekniklerini ve soru-cevap gibi ölçme-değerlendirme yöntem-tekniklerini kullanmakta ısrar ettiklerini göstermiştir.

Anahtar Kelimeler: 5E modeli, çoklu zeka etkinlikleri, öğretim yöntem ve teknikleri, ölçme-değerlendirme teknikleri

1. Introduction

The "Science" curriculum in elementary schools and primary schools, which are the primary educational institutions in our country, was renewed in 2013. One of the most important features of the renewed program is based on a research-based learning approach (MEB, 2013). Accordingly, in the context of the renewed curriculum, the teachers prepare and organize the activities that they will or will do in the school according to the "research-inquiry based" learning approach. Research-inquiry-based learning is an approach that is based on constructivist theory and is effective in the learning of learners and in the development of high-level thinking skills (Minner, Levy and Century, 2009). Constructivist theory expresses research-inquiry based learning as one of the most powerful ways of learning. The target gains are learned with the practices and inquiry-based methods guided by the teacher and these gains become a part of the knowledge structure of the learners (Thier and Daviss, 2001).

In classrooms where the research-inquiry based learning approach is adopted and applied, a classroom environment is created in which students can freely express their views (İlter and Unal, 2014). Research-inquiry based learning is defined as the process of asking questions, analyzing and analyzing information to transform learning

and giving information into useful information (MEB, 2013; Perry and Richardson, 2001). Models have been developed for the teaching and learning process of constructivist learning theories (Ozmen, 2004). One of these models is the 5E Model.

Constructivist approach The 5E model application is the most useful mode. This model consists of stages of engage, exploration, explanation, elaborate and evaluation (Wilder and Shuttleworth, 2005; Keser, 2003). Within the 5E Model, many methods and techniques can be used in stages (Hirca, Seven and Azar, 2012). The first stage of the 5E model, the stage of engage, consists of activities such as teaching, measuring and evaluating techniques and techniques that students can use to extract the pre-existing information in their minds, to ask interesting questions about the subject, to read a remarkable story, to make a video or an experiment demonstration. (Boddy, Watson and Aubusson, 2003). In the stage of exploring, the teacher can use teaching methods and techniques such as experiments, group discussions, sightseeing and observation. This step is student-centered, the teacher is a guide who follows the students, provides them with the time and materials needed, and asks the groups questions for discussions (Ozmen, 2004). Teacher is most active in the explanation step which is the third step of the model. In this step which the scientific words and concepts related to the topic are explained by the teacher; Lectures, video demonstrations or discussion teaching methods and techniques can be used. (Wilder and Shuttleworth, 2005). While the emphasis of elaborate stage by Bybee (2003) is emphasized, "*5E model is expressed as the most basic purpose of deepening step, generalization of process, skills and concepts*". The teacher can use question and answer, collaborative learning, group discussions and analogy teaching methods and techniques (Ozmen, 2004). During the evaluation stage, the teacher tries to determine the level of understanding the subject or concept at this stage and at the same time prepares the students to evaluate themselves. At this stage, the teacher can use teaching methods such as multiple choice questions, open-ended questions, problem solving, project-based presentation, performance drawing, concept map and diagnostic tree (Ozmen, 2004). Keser (2003) and Ozturk (2008) stated that the 5E model should not be the last stage but should include various activities based on performance and spreading throughout the process to take into account the other stages.

In order for the students to realize meaningful learning in the science education in the Science Education Course Program renewed by the Ministry of National Education in 2013, the students will be able to use the traditional teaching methods and techniques based on problem solving, project, performance, argumentation and cooperation, It is suggested that complementary assessment and evaluation techniques be used (Karadag, Deniz, Korkmaz and Deniz, 2008; MEB, 2013). It is stated that the use

of complementary assessment and evaluation techniques considering individual differences requires multiple evaluations to show the knowledge, skills and attitudes of the students. Accordingly, besides multiple choice, paired, short answer, open ended exams, observations, rubrics, self assessment scales, performance assignments, portfolios, structured grid; It is necessary to use the measuring instruments which measure the process. (MEB, 2013; Ozsevgec and Karamustafaoglu, 2010).

Another point that the program emphasizes is that students are taught according to their individual differences and accordingly, the selection and evaluation methods and techniques are selected (MEB, 2013). For this reason, the program emphasizes the multiple intelligence approach. There are those who think that the multiple intelligence approach is a teaching method. However, the multiple intelligence approach is not a teaching method or learning model. The multiple intelligence approach is a theory that advocates the use of multiple areas of intelligence for people to develop different approaches to learning and teaching, and simply expresses certain principles of active learning and other student-centered learning approaches based on how the brain works (Saban, 2002). The 5E learning model is one of the learning models in which teachers can use multiple intelligence theories in their lessons. In the Modern Intelligence Approach, which is a modern intelligence approach, it has eight different intelligence domains, namely, Logical-Mathematical, Visual-Spatial, Verbal-Linguistic, Musical-Rhythmic, Bodily-Kinetic, Social-Peculiar, Naturalist and Inner-Specific, It is stated that one or more of these areas of intelligence dominate the others and that individuals may be more successful in areas that are interested in the dominant intelligence field (Gardner, 2004; MEB, 2013; Patterson, 2002).

Constructivist approach as regards the implementation of the 5E learning model, it is seen that the teachers do not internalize the 5E learning model and its applications (Baskan, Alev and Atasoy, 2007; Bozdogan and Altuncekcic, 2007), the 5E learning model has a positive effect on learning products (Buntod, Suksringam and Singseevo, 2010; Campbell, 2006; Hirca, Seven and Azar, 2012), there are views of teacher or teacher candidates about the 5E learning model (Ayvacı and Bakırcı, 2012; Yalcın and Bayrakceken, 2010), relationships between the stages of the 5E learning model were investigated (Metin and Ozmen, 2009; Kurnaz and Calık, 2008), stage of engage (Ozsevgec, 2007; Wilder and Shuttleworth, 2005; Yaman, Demircioğlu and Ayas, 2006), explanation stage (Turk and Calık, 2008), elaborate stage (Calık, 2006; Nas Er and Cepni 2015), evaluation stage (Keser, 2003; Trowbridge, Bybee and Powell, 2004) many studies have been carried out that deal with the model in different ways.

As regards the application of teaching methods and techniques, there are studies in which the level of readiness of teachers towards student-centered teaching is

inadequate (Maden, Durukan and Akbas, 2011; *Aydm, Tunca and Sahin 2015*). Teachers continue to use teacher-centered traditional teaching methods and techniques such as straight expression, question-answer, and demonstration (Gecer and Ozel, 2012; Keys, 2005; Simsek, Hirca and Coskun, 2012). There are also studies examining the effects of teaching materials developed on the basis of enriched 5E learning model by using different teaching methods and techniques in combination (Orgill and Thomas, 2007; Sahin and Cepni, 2012).

Regarding the use of measurement and evaluation techniques, although teachers accept the functionality of measurement and evaluation techniques according to constructivist approach, they appear to be under the influence of traditional measurement and evaluation techniques (Calık, 2007; Erdal, 2007; Orbeyi, 2007). Teachers do not have sufficient knowledge and skills about the use of complementary assessment and evaluation techniques (Adanalı, 2008; Gok and Sahin, 2009; Yayla, 2011). During their higher education, teachers did not have enough information about assessment and assessment techniques (Saglam-Arslan, Avcı and Iyibil, 2008). Teachers see complementary assessment and evaluation techniques as time consuming (Acat and Demir, 2007; Gomleksiz and Bulut, 2007). The culture that teachers have about measurement and evaluation techniques can not be changed (Cansız-Aktas and Baki, 2013). There are studies in the literature on teacher views on complementary assessment and evaluation techniques (Bal, 2009; Okur, 2008). In the literature, it is seen that researches about the perceptions of teacher candidates about measurement and evaluation techniques competence are made (Gurbuz and Birgin, 2008; Kilmen, Kosterelioglu and Kosterelioglu, 2007).

Regarding the theory of multiple intelligences, it appears that many studies have been done indicating that the applications based on multiple intelligence theory are important and that student success is positively affected (Akamca and Hamurcu, 2005; Demirci and Yagcı, 2008; Gardner, 2004; Goodnough, 2001; Gurcay and Eryılmaz, 2003). In the literature, there is no study on the application of multiple intelligence theory with the teaching, measurement-evaluation methods and techniques that class teacher candidates use in every step of the constructive approach 5E model application in science class. Accordingly, it is considered that the study will contribute to the literature on the use of multiple intelligence theory and teaching methods, measurement and evaluation methods and techniques, which will be the original of the study.

In the study, it was aimed to determine the applications of teaching, measurement-evaluation methods and techniques and multiple intelligence theories that 5E model students used in the course of science lessons of science teacher

candidates. In line with this goal, the constructive approach of classroom teacher candidates is within the 5E learning model;

- What are the teaching methods and techniques they use?
- What are the measurement and evaluation techniques they use?
- What are the types of multiple intelligence theories they use? the answers were searched.

2. Method

This study is a descriptive research within the qualitative research tradition. Descriptive research aims to systematically examine the meanings stemming from their experience by focusing on the specific language, meaning and concepts used by the researchers (Strauss and Corbin, 1998; Ekiz, 2003). Participants of the study were a total of 43 persons, 19 male and 24 female, who were educated in the third year of the Classroom Teaching Program of a Faculty of Education belonging to the state university. The plans prepared by the candidates regarding 5E Model were collected and examined by "document analysis" method (Hodder, 2000). Documents are documents such as diary, personal letter and area notes, and are formally prepared for personal reasons (Lincoln and Guba, 1985).

Teacher candidates were taken from the application files they created during their teaching practices. The lesson plans prepared by teacher candidates according to the 5E learning model were examined on "theoretical sensitivity" (Strauss and Corbin, 1998). The theoretical sensitivity is expected from qualitative researchers to obtain meaning about the situation investigated and to give specific meaning to the data. The theoretical sensitivity researcher is believed to have the ability to create creative meanings about the data and provide the means to transform the data into more meaningful and meaningful data (Ekiz, 2006). The data were analyzed according to "continuous-comparative analysis" proposed by Glaser and Strauss (1967) in order to establish common subjects or categories. In this way, general issues that are relevant to the individual situation of the candidates have been revealed and tested against multiple comparison groups (Huberman and Miles, 2002; Yin, 1994). Accordingly, the lesson plans of all candidates are examined one by one and taken to the same categories that show similarities to each other. The data are presented in three general chapters: a) teaching methods and techniques b) measurement and evaluation methods and techniques c) multiple intelligence activities reflected in each step of 5E model of teacher candidates. In this analysis, the materials were taken as Unal (2013) for teaching

methods and techniques and Bahar et al. (2012) for measurement and evaluation methods and techniques.

In the presentation of the data, the codes were used instead of the names of the teacher candidates in terms of ethical rules. As a result of this study, it is not aimed to make generalizations as in the qualitative researches which are the nature of qualitative researches. It has been taken into consideration that emotions, thoughts and perceptions of events, phenomena or participants that occur in one place may occur in other places or persons (Bassey, 1999), and The nature of qualitative research can be found in "natural generalizations" (Lincoln and Guba, 1985).

3. Findings

The categories obtained after analyzing the teaching methods and techniques that teacher candidates use in the 5E learning model and the activities of multiple intelligence theory applied by the measurement-evaluation techniques are presented under three headings.

A) Teacher candidates' teaching methods and techniques used in each stage of the 5E learning model are given in Table 1.

Table 1: Frequency Values Related to Instructional Methods and Techniques Used in Practice*

Methods and techniques used in 5E learning model		Engage (f)	Explore (f)	Explain (f)	Elaborate (f)	Evaluate (f)
Teaching Methods	Expression	-	-	33	-	1
	Discussion	18	15	6	8	6
	Case study	27	15	5	23	5
	To show	3	21	2	8	2
	Problem solving	-	-	-	10	30
	Individual study	-	1	-	-	1
Group Teaching Techniques	Brainstorming	7	7	1	3	1
	Show	22	16	3	10	1
	Question answer	23	23	19	21	37
	Drama	2	4	3	5	0
	Educational Game	1	-	-	7	1
Individual Teaching Techniques	Programmed Teaching	-	1	-	1	1
	Computer Aided Instruction	9	6	4	1	1
Out of Class Teaching Techniques	Observation	-	6	2	3	2
	Homework	-	-	-	-	4
	Exhibition	-	-	-	2	-

* Teacher candidates have used more than one teaching method at each stage of the 5E learning model.

The results of the analysis showed that most of the students in the 5E learning model prefer to use case studies, discussion and problem solving methods but they did not use student centered methods. Candidates have used the most exemplary case and the method of discussion later in the process of attracting attention. For example, the candidate teacher with code CT₅: *"Think that you are in the car and all the cars are honking at the same time when traffic is jammed. How do you feel and feel uncomfortable? Would you listen to high class music? Or what do you feel when you open two music at the same time? Will you close your ears? Why do you close? Asks questions like."* He preferred the method of case study and question-and-answer technique in the stage of engage. In the stage of exploration, the most commonly used method is demonstration, discussion and case method or technique. For example, candidate teacher with CT₁ code: *"Teacher class brings materials such as magnet, spoon, rubber screw, key, needle, wood, iron pencils, nylon, bag, fabric iron money. He puts it on the table mixedly. The students take turns in order. He gives the magnet to the student's hand and tells each item to move closer to the magnet in his hand. The pupil looks at things like this. By experimenting with your findings in your mind about the subject, it produces an experiment result. The experiment continues on the material of the banquet."* He preferred to use the show-and-make teaching method and demonstration technique during the exploration stage. It is a method / technique of expression which is frequently used in the explanation stage. For example, candidate teacher with CT₁₄ code: *"... firstly, ask students what they know about the magnet and their polarity. According to the answers, I will correct the mistakes of the students and then clearly explain what the magnet is, its purpose of use, its poles and where it is used. I can watch a video about them."* showed that the 5E learning model preferred the narrative method and the question-and-answer technique in the explanation stage. The most preferred teaching method in the elaborate stage is the case study method. For example, CT₂₇ coded teacher candidate is seen to use the sample-event teaching method and the drama technique in the elaborate stage: *"The student is given everyday examples of daily life. The teacher chooses five students and uses the drama technique to reinforce them. This drama tells a small child to see in his dream five sensory organs. Organs start fighting among themselves. They all try to get superior to each other because I am better and better. Then they all come out one by one and say their tasks. The little boy watches all his organs with astonishment, he can not decide which organ is better, and all of you are very much in love with me. Then the organs hold hands, we have five sense organs, they begin to dance by singing their song."* It has been seen that teacher candidates prefer the most frequently used method or technique, problem solving teaching method and question-answer teaching technique in evaluation stage. An example of the application of the CT₃₃ teacher candidate is as follows: *"This stage also helps students to learn new concepts and to evaluate themselves by*

asking them daily questions that they can answer about the topic by distributing questions filled with spaces, correct mistakes and tests."

In the 5E learning model, classroom teacher candidates preferred group-teaching techniques to the most question-answer, followed by demonstration and brain storming. However, it has been seen that the teacher candidates have used educational play and drama technique very little with the group. Classroom teacher candidates preferred teaching techniques with the most questions and answers in the stages of engage, exploration and elaborate and with the most question and answer in the stages of demonstration, explanation and evaluation. Candidate teachers preferred the most computer-assisted teaching techniques to individual teaching techniques and the most observational-based and out-of-class teaching techniques than non-class teaching techniques. Classroom teacher candidates preferred to use the out-of-class teaching method based on observation at other stages except 5E model's engage stage, during the homework evaluation stage and during the elaborate stage of the exhibition technique.

B) The data related to the traditional assessment and evaluation techniques used in the stage of interest and evaluation of the 5E learning model of the prospective teachers are given in Table 2.

Table 2: Frequency Values Related to Measurement and Evaluation Techniques Used
 During the Points of Engage and Evaluation

Methods and techniques used in 5E learning model		Engage (f)	Evaluation (f)
Traditional Measurement and Evaluation Techniques	Written Polling	-	1
	Short Question-Answer	16	16
	True/False	-	7
	Multiple choice	-	9
	Pairing Questions	-	6
Modern Measurement and Evaluation Techniques	Word association	-	1
	Performance	16	6
	Problem solving	23	17
	Observation of the class	3	2
	Concept Maps	-	5
	Interview	-	2

From the analysis results, it was observed that the 5E learning models of the teacher candidates preferred the most short question-answering, the most problem solving from complementary-modern techniques and then the performance-based assessment evaluation techniques from the traditional techniques in the stage of engage and evaluation.

Teacher candidates seem to prefer other conventional measurement and evaluation techniques in the process of engage stage, but rarely in the evaluation stage. For example, a teacher candidate with the code CT₂₄ says; *“Measures what the teacher has learned about the magnet with questioning questions that the students have prepared to understand what they are learning. Copper, nickel, gold, silver, cobalt, wood, porcelain plates, etc. on the other side of the magnet on one side of the prepared parallel queries. Put the items and students are asked to match if they think that the magnet has taken them. Thus, it will be measured how the learner learns about the concept at the end of the subject.”* In the evaluation stage, it has been seen that traditional methods of assessment and evaluation are preferred. Teacher candidates have also seen little preference for other modern assessment and evaluation techniques. For example, teacher candidate with code CT₃₈ says; *“I close the eyes of the students for 15 seconds. I ask what they are and how they feel. I’m squeezing the room perfume. I ask about the smell of the room perfume that I shook the students. We listen to music in class with low, moderate and loud music. I ask them if they heard the music I played with a soft voice. I ask if they hear the music I played with the middle voice. I ask you to hear the music I played with a loud voice. I want students to distribute chocolates and eat. Then ask how the chocolate tastes are children. I put cotton, an eraser, a game dough in a bag. I would like the student to put his hand in the bag and touch the inside of the bag. I get feedback for all events from students. I do not make corrections to students’ answers.”* It has been seen that in the process of engage stage, performance-based complementary modern measurement and evaluation techniques are preferred.

C) The data on the multiple intelligence theories used at each stage of the 5E learning model of the prospective teachers are given in Table 3.

Table 3: Frequency Values Related to Multiple Intelligence Theory Activities Used in Practice

Multiple intelligence theories used in 5E Models		Engage (f)	Explore (f)	Explain (f)	Elaborate (f)	Evaluate (f)
Multiple Intelligence Theory Events	Linguistic-Verbal	7	5	40	19	31
	Logical-Mathematical	40	33	15	29	25
	Bodily-Kinetic	4	7	8	12	3
	Musical-Rhythmic	3	3	1	2	1
	Visual-Spatial	26	28	10	18	16
	Conservationist	13	7	14	11	3
	Social-Social	-	6	5	1	1
	Self-assured/Individual	-	6	-	1	6

*Teacher candidates have used more than one multiple intelligence activity at each stage of the 5E learning model.

From the analysis results, while it is preferred to present the most logical-mathematical, then linguistic-verbal and visual-spatial intelligence types in the 5E learning model of the classroom teacher candidates, presenting with socio-social, inductive-individual and musical-rhythmic intelligence types is very little. Classroom teacher candidates use the most logical-mathematical and later visual-spatial in the stages of engage and exploration of the 5E learning model, using the most linguistic-verbal in the explanation phase, the logical-mathematical in the elaborate stage and the linguistic-verbal and logical-mathematical intelligence in the evaluation stage preferred to make presentations.

In the stage of engage of the 5E learning model of classroom teacher candidates, a preference for an CT₂₂ prospective teacher musical-rhythmic intelligence is as follows; *"At this stage, we listen to a music about solid-liquid-gas."* In the stage of explore, it was seen that the teacher candidate with the code CT₃ preferred activities for logical-mathematical and visual-spatial intelligence; *"I will make small-scale experiments for my students at this stage. By dividing my students into groups I give them weight with the scales I have brought to class. I try to attract their attention because the masses of the weights are different. Ask them various questions about the mass. I direct them in response to the answers given by the students."* In the course of the explanation, it has been seen that the teacher candidate with the code CT₉ prefers activities for linguistic-verbal and natural intelligence; *"Students write compositions written by students. The compositions are compared and a common result is obtained. Teacher here is the definition of cleanliness; -Applications to be done to protect against any kind of rust, dust, dirt, etc. that will damage my health- the teacher explains that you need cleanliness for our health."* In the stage of elaborate, it has been seen that the candidate teacher with the code CT₁₆ prefers activities for logical-mathematical and bodily-kinetic intelligence; *"At this stage students are divided into three groups and asked to form a circle. This time the cross is held in hand and students will inadvertently go into different directions while attracting each other."* During the evaluation stage, it was seen that the teacher candidate with the code CT₃₅ preferred activities for linguistic-verbal and inductive-individual intelligence; *"I want reminders for learners who are missing from the students, I want to get homework and get samples from the circles and say things."*

4. Discussion, Conclusions and Recommendations

In the study, it was aimed to determine the teaching, measurement-evaluation methods and techniques and the applications of multiple intelligence theories that 5E learning models used in the course of science lessons of classroom teacher candidates.

When the findings of the study were examined at the level of sub-problems, it was seen that when the teaching methods and techniques reflected in the entry stage of the 5E learning model of the candidate teachers were examined, they used the most sample case and the discussion method at this stage and the group with the most question-answer and demonstration techniques. Teacher candidates at this stage as stated by Ekici (2007), instead of getting correct answers from the students, they encouraged them to ask questions by providing them with different ideas. However, this question-and-answer method used by teacher candidates is still teacher-centered. Teacher candidates at this stage, except for the question-and-answer technique, were found to prefer the most problem-solving and performance-based assessment-evaluation techniques to modern techniques. Teacher candidates have shown little preference for other modern assessment and evaluation techniques.

Ozmen's (2004) explore stage, the findings of the study showed that most of the candidate teachers showed the most to show and do the method of discussion and the most to use the demonstration technique with group teaching techniques, although they did not indicate that the teacher could use teaching methods and techniques such as experiments, group discussions, sightseeing and observation. Teacher candidates also preferred teacher-centered methods and techniques during the discovery phase, which should be the most independent of the student. At the stage of explanation, the most commonly used method / technique is the method of narration and question-answer technique. The findings of Wilder and Shuttleworth (2005) are in agreement with findings obtained by the teacher in explaining scientific words and concepts related to the subject, and using the methods and techniques of lecture, video demonstration or discussion teaching in this step.

Although Ozmen (2004) stated that the teacher could use question-answer, collaborative learning, group discussions and analogy teaching methods and techniques in the stage of elaborate, teacher's most preferred teaching method / technique case method and question-answer technique.

Bybee's (2003) evaluation stage although the teacher states that it can use teaching methods, measurement-evaluation methods and techniques such as multiple choice questions, open-ended questions, problem solving, project-based presentation, performance drawing, concept map and diagnostic tree, teacher candidates are limited in this way to modern method and techniques. However, as Keser (2003) and Ozturk (2008) point out, the evaluation phase is not the last stage of the 5E learning model. The evaluation stage spreads throughout the process to take account of the other phases and includes a variety of performance-based activities. The methods and techniques applied

by prospective teachers do not include the process evaluation when examined from this point of view.

Findings of the study suggest that constructive approach 5E learning model, which aims to *"learn the target achievements by means of applications and inquiry-based methods guided by the teacher's guidance"* but also insists on using teaching-techniques such as teacher-centered expression and assessment- methodology techniques such as question-answer. These results are similar to the results of the studies conducted by Gecer and Ozel (2012), Keys (2005), Simsek, Hirca and Coskun (2012) that teachers do not give up teacher-centered teaching methods and techniques. This is the result of the 5E learning model and the student-centered active teaching of the candidate teachers of Maden, Durukan and Akbas (2011) and Aydin, Tunca and Sahin (2015) for ready-to-learn teacher-centered traditional teaching methods and techniques can be explained by the results that the levels of presence are inadequate.

In the literature although teachers accept the functionality of measurement and evaluation techniques according to the constructivist approach (Calik, 2007; Erdal, 2007; Orbeyi, 2007), and that they are under the influence of traditional measurement and evaluation techniques in practice teachers did not have sufficient knowledge and skills on using modern assessment and evaluation techniques (Adanalı, 2008; Yayla, 2011), teachers have not got enough information about the measurement and evaluation techniques during their higher education (Saglam-Arslan, Avcı and Iyibil, 2008), that teachers see modern measurement-evaluation techniques as time consuming (Acat and Demir, 2007; Gomleksiz and Bulut, 2007) and the inability of the teachers to change the cultures they have of the measurement-evaluation techniques (Cansız-Aktas and Baki 2013).

It is very important to make presentations with the social, individual and musical intelligence types that the teacher candidates prefer to present with logical-mathematical, linguistic-verbal and visual-spatial intelligence types in the 5E learning model most of the teacher candidates' analysis results from the analysis results related to the multiple intelligence activities of the teacher candidates less preference. According to this, Demirci and Yagcı (2008) and Goodnough (2001) teachers should take into account the individual differences such as personality traits, hobbies and phobias, intelligence levels of the students during science education activities according to their intelligence in lectures can be said that there is a similarity between them.

When the constructivist approach 5E learning model is introduced to teacher candidates in the direction of the results obtained in the research, it should be explained and applied examples that this model is not a method and can include many methods

and techniques. Similarly, Gardner's multiple intelligence approach can be presented to teacher candidates, where each teaching method or technique is not a teaching method or technique, but is actually addressed to an intelligence field. For this reason, it is possible to apply the teaching methods and techniques of the teacher candidates about the multiple intelligence areas.

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