

Contribution of Faculty Education to Teaching with Respect to Teachers' Views*

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Abstract

Purpose of this study is to evaluate the contribution of the faculty education to the teaching skills of science teachers with respect to teachers' opinions. Sample of the study consisted of 10 elementary science teachers working in Diyarbakır in Turkey during 2017-2018 instruction seasons. Purposive/convenience sampling method is used for the study. Phenomenological research design is applied for the study. Interview method which is one of qualitative methods is used for research purpose. Research revealed that most of the elementary science teachers think faculty education is useful in improving teaching skills. However, it is also revealed by the study that teachers lack to apply obtained knowledge in to practice. Several themes are determined by the study. Determined themes by the study are; school theme, family and guidance service theme, theory and practice theme, providing students' needs and interests' themes, individuality of student's themes, teacher experience upon the classroom and students theme and teacher guidance for student activity theme. The most significant outcome of this research is that although teachers know theoretical aspects of instructional methods yet, they lack in philosphical aspects of methods and skills in using them.

Introduction

Education is the process of developing an individual's positive skills through inquiry, understanding the environment in daily life situations (Eroğlu, 1998; Gürdal, 1998). This means an individual should have the capacity of intellectual development which is acquired by developing the cognitive skills (Peters, 1966). This phenomenon drives the idea that students should develop positive cognitive skills along with positive social skills (Hancer et. al., 2003). Students should have science literature and the habits of questioning the information presented by the media (Stocklmayer & Gilbert, 2003). In fact, this idea is already in the focus and countries make constant regulations on their national education curriculums (Gürses et. al., 2004). Through curriculum changes it is believed that students will comprehend the science and scientific phenomenas, their relationship with daily life. It is also hoped that through inquiry, students' questioning, critical thinking and problem-solving skills will Received: 24 March 2022

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develop (Maharg, 2000). Applied changes transforms teachers' role from teaching into guidance defining teachers' roles as facilitator who teaches how to the reach the information instead of giving the information (Akyüz, 2006).

To sum up, teachers' responsibilities are not limited with only teaching, or guidance but also developing skills for the students for obtaining the knowledge and presenting it along with social developments. Thus, it is important for the teachers to use techniques and methods effectively in order to reach the students and improve the desired outcomes effectively (Çelikgöz & Çetin, 2004; Sarıtaş, 2001; Ulfatun, 2021). For that reason, teachers started having different roles. For example, guide to reach the information, a psychologist who knows the components and elements of psychology, a model presenting humanistic approach and behaviors. Teachers should exhibit enough capacity to solve the problems, exhibite creative and innovative approaches,

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should be open to new information and changes (Özbay, 2015). For that reason, it is important for a teacher to know his/her students' weaknesses and strengths along with his/her own (Sarıtaş, 2001; Turgut et al., 1997). As a consequence, a science teacher should be aware of recent developments and should be open to them (Niemi, 2021; Tezcan, 1997) while using teaching techniques, planning the new instruction. exhibit good classroom management skills, using time efficiently and ability on continuous assessment (Green, 2004). Teacher Education in Turkey

First attempt for Turkey to have skillfulll teachers, might be said that had started in 1926 by forming constitutions for teacher training (Öztürk, 1996). But although number of teachers increased, the quality of teachers did not show a promising future. Thus, Turkey started to send teacher candidates to Europe for gaining further perspectives on teaching and developments on teaching (Yüksel, 2012). For example, John Dewey was invited to Turkey for his recommendations on the issue and his advice were taken into account (Ergün, 2006). (2004)Additonally, Kılınç noted that educational constitutions were established based on Dewey' suggestions however political concerns caused those suggestions on halt. However, constant changes made upon the constitutions prevented quality since reforms did not create long term effects. Consequently, the number of teachers and teacher institutions increased but same trend wasn't observed in the quality of teachers (Azar, 2011). For that reason, in order to preserve and increase quality of teachers, teacher training responsibility was given to education faculties. In addition, Turkish Ministry of Education defined a successful teacher's qualifications as having the knowledge %15-20 general culture, specific pedagogical field knowledge %50-60. knowledge %25-30 (MEB, 2018). All the efforts were then focused on training the teacher candidates who would not only specialize on a specific subject but also on other topics as well. These skills were to gained by the teacher candidates through education faculties (Y1lmaz, 2007). Moreover, accreditation efforts aimed to increase the quality of teachers. On the other hand, researches carried out are still focusing on education faculties rather than observing what happens in the field (Adıgüzel, 2008).

Studies done in Turkey for different areas of teacher education revealed some perspectives. For example, Unlu (2018) notes supporting critical thinking curriculum would benefit teachers at all levels. Bayram et. al. (2019) also noted benefits of critical thinking approaches on teacher candidates. Çoklar & Akçay (2018) self-efficacy factor in teaching area are indicators of success of teacher candidates. Akin & Ok (2021) noted that although teachers think that they are equipped with professional knowledge they still lack on professional development.

Science teachers

Science teachers serve as a keystone for countries to continue their development and be aware of developments. Through their science teachers, students learn how to apply scientific laws into real life settings, improve their scientific thinking skills and exhibit those features in their daily lives. Studies indicate that individuals, who research, question, produce technological products and conduct scientific researches are mostly motivated and acquired such skills through their teachers. For that reason, science teachers should direct and encourage their students to carry out in scientific researches, producing technological Additionally, products. gaining positive attitudes and behaviors related to science and technology should be encouraged by the teachers and students should be motivated in such directions. In this context, science teachers should be aware of the most up-to-date information and include changing technologies and innovations in their professions (Anderson, 2000; Avas, 1995; Drymiotou et al., 2021; Hançer et al., 2003; Siddiky & Akter, 2021; Tezcan, 1997; Ünal, 2002).

There are a few attributes of good science teachers such as trying to be aware of new formations and developments, responding to new formations and developments in education, exhibiting the love of science and scientific researches, motivating students to love science and scientific researches. Science teachers should also provide technologically enriched environments to their students. For that reason, science teachers are also required to have technological and professional competence (Frågåt et al., 2021; Meriç, 2004; Yıldırım, 2021a). Science teachers having



sufficient professional attributes use more student-centered approaches and try to use inquiry-based teaching since permanent learning is achieved by student-centered approaches. The role of teachers in education has revealed the importance of teachers' education, proficiency levels and training (Cooke-Nieves et. al., 2022; Ramdani et al., 2021; Schriver & Czerniak, 1999).

Importance of study

There are many researches done on teaching and efficiency of teaching. However, most of those studies either focused in a view of faculties' perspectives or management issues at schools. Competencies of teachers were tried to be measured via affective domains of teachers (Yıldırım, 2013). For example, a study from Malaysia revealed teachers' cognitive skills with personality and interpersonal skills might indicate the quality of instruction in the classrooms (Abd Hamid et al., 2012). Other method to assess the quality of teaching is via students (Broder & Dorfman, 1994; Ferguson, 2012). Thus, concerns on teacher trainings have been an increasing issue. On the other hand, in order to determine efficiency of education, teachers' voices need to be heard (Basinger, 2000). In fact, studies focusing on teaching quality could reveal surprising facts by involving teachers. Such studies may also indicate where and when studies fail and reveal the factors buried under ground (Polikoff & Porter, 2014). In that sense, quality of instruction possessed by the teachers is due to quality of education given by the education faculties and, teachers' opinions could reflect the effectiveness of the education given at faculties (Darling-Hammond, 2017; Jenset et al., 2018; Puustinen et al., 2018). Studies on active and candidate teachers and curriculum designs are effective on teaching by shaping the pedagogical education given by the education

Table	1.

faculties. However, field researches would help to achieve a better understanding upon the case (Darling-Hammond, 2020; Gibbons & Farley, 2020; Koubek et al., 2020; Martin & Spencer, 2020). For that reason, importance of this study is that the study was carried out with elementary science teachers who are actively working and it provides current perspectives of the science teachers. Thus, purpose of this study is to examine the effectiveness of education given at education faculties with respect to teachers' opinions.

Method

Research model

Research design of the study is phenomenological research. Phenomenological research design helps researchers to gain perspectives on the individuals/cases who/which are in the center of purpose of the research (Yıldırım & Şimşek, 2006).

Sampling method

Purposive sampling method was used for the study since it eased to carry out the study (Miles & Huberman, 1994). Researcher visited elementary schools based on proximity and asked elementary science teachers whether they would want to participate in the study. Ten elementary science teachers agreed to participate in the study.

Study group

Sample of the study consisted of ten elementary science teachers who were currently working at eastern part of Turkey in Diyarbakır. Demographic information of the science teachers was given in Table 1.

				Demographics of the teachers					
Graduation	Professional	Age	Gender	Education Level					
	seniority								
Science education	10	34	Male	Bs D					
Science education	8	33	Female	Masters Degree					
Science education	22	45	Female	Bs D					
Science education	11	39	Male	Bs D					
Science education	24	51	Male	Bs D					
Science education	15	40	Male	Bs D					
-	Science education Science education Science education Science education Science education	seniorityScience education10Science education8Science education22Science education11Science education24	seniorityScience education1034Science education833Science education2245Science education1139Science education2451	SeniorityScience education1034MaleScience education833FemaleScience education2245FemaleScience education1139MaleScience education2451Male					



ST7	Science education	19	42	Male	Bs D
ST8	Science education	1	26	Female	Bs D
ST9	Science education	2	27	Female	Bs D
ST10	Science education	2	27	Female	BsD

Data collection tool

For the purpose of the study a semi structured interview form was prepared by the researcher. For a better analysis of the data, five research topics are determined and represented in interview questions (Table 2). These topics are instruction techniques, classroom management, assessment and evaluation, daily life and knowledge engagement.

Table 2.

Interview quest	ions
Question 1	Would you define a good classroom and bad classroom?
Question 2	Which problems do you encounter in classrooms?
Question 3	How do you solve them? Do you think courses such as classroom management, guidance and school experience offered you at faculties contributed you in the classroom? Why?
Question 4	Was there a classroom for you seem to handle hard? Did you use different techniques to handle the classroom?
Question 5	Were you able to apply the techniques you learned at faculties in the classroom?
Question 6	Do students comprehend the daily life and knowledge taught in the classroom? How do you help them?
Question 7	Did courses offered at faculties help you in that? (regarding previous question)
Question 8	How do you assess students' learning? Can you give few examples?
Question 9	Do you ask consultation of other teachers on the topics we discussed?
Question 10	How do think other science teachers on the topics we discussed?

Validity analysis

Prepared draft survey was analyzed by 3 experts who have researches on the teacher education and work at university at full time. Survey questions aimed to reveal the ideas of science teachers related to efficiency of education given at education faculties. After getting the opinions of the experts and finalizing the draft survey, it was decided to conduct pilot study.

Pilot study

After finalizing the survey, a pilot study was done with two elementary science teachers. Results of pilot study indicated that survey questions worked and hence interview could be conducted with science teachers.

Reliability analysis

Interviews were recorded to a voice recorder then transcript into text. Teachers' sentences were shown in "" alongside with italic font type. Then, data coding determined with respect to revealed data. Two researchers analyzed the transcript and agreed upon the coding.

Findings and Discussion

Topics were determined as based on codes through the content analysis. For that reason, cumulative codes appearing under same or similar content were given under topics which are listed below

Good or bad classroom

It has been revealed by the study that science teachers define "good or bad classroom" based on student attributes such as



"Motivation towards lecture, engagement with course, focusing on the instruction".

For example, out 24 definitions done by science teachers, 17 were related to student attributes as stated above. A science teacher made the definition as

"If students are motivated to course and engaging with it then, it may be defined as a good classroom while the opposite case might be defined as a bad classroom".

However, conditions and requirements for desired attributes seemed to be missed by all science teachers except only one, who stated the case as

> "It is possible to engage the students with the course by taking their interests and needs into account".

Providing the students' interests and needs also create the core of classroom management as stated by the science teachers

> "Having the motivated students also makes it easy in classroom management".

Some of teacher statements on the issue were shown below.

"If number of students is high who have readiness toward lesson and their eagerness to learn"

"A class who have high score on exams is a good classroom while opposite is bad classroom"

"If classroom has academic success then it is a good classroom but if it doesn't have academic success then it is a bad classroom"

Interestingly, one science teacher made a statement as

"a good classroom only defines a classroom with good physical attributes".

Similar to last science teacher's statement Papanastasiou (2002) already states that in order to have academic achievement, physical attributes of classrooms also play an important role along side with readiness level, learning and school environment.

Classroom management and instruction techniques

Few of the science teachers indicated importance of classroom management. They also indicated that how active learning methods contributed to the "good classroom". For example,

"When students are active, I get positive feedbacks"

"When students took active roles active in the classroom, it also helped classroom management"

"I tried to make students active when they started to get bored or showed signs of boredom"

"Methods and techniques which take interest of students might be used to engage them"

Students benefit from active learning methods in which they are actively engaged. For that reason, it is recommended that teachers create an active learning environment and engage students to lessons (Keles & Tonga, 2014; Uzun, 2007). Aslan & Babadoğan (2005) stated that when students are active in the classroom, it also creates a harmonic learning environment, and eventually decrease the classroom management problems. It is understood from science teachers' responses that most of the teachers miss out the core essence of the classroom management. In fact, providing the students' needs and interests also help teachers to motivate the students towards courses. As a consequence, teachers have less classroom management problems (Altın, 2014; Duatepe & Cilesiz, 1999).

For in depth analysis, one of the survey questions was what problems do science teachers encounter in classrooms and how do they eliminate them? Most of the science teachers responded that low motivation towards



school also causes less engagement in classroom and increase disturbing behaviors of students. For example, one science teacher commented as

> "Students with low motivation also disturb other students in the classroom"

while other science teacher also stated that

"Students, who don't pay attention to lessons, always try to speak with their classmates and prevent teacher to give the lecture".

Moreover, one of the teachers indicated that

"Problems between the students which happens outside of the classroom environment, might easily transferred to the classroom environment".

Goodboy, Martin & Goldman (2016) indicated that problems between the students cause low motivation toward to attendance. Thus, there is negative relationship between the motivation towards school and bullying (relational-verbal, cyber, physical and culture based bullying) cases. Lack of motivation towards lesson also indicated by teachers as

"Students are not interested towards lesson; they don't pay attention to it"

"Negative things might happen in the classroom such as attention deficit or low motivation".

One of the teachers indicated that lack of motivation might be because of

"Abstract topics in science education"

and another teacher also pointed out similar conclusion by indicating that

"Having low motivation as due to nature of science courses which have abstract topics. Abstract topics makes it hard to comprehend the topics for students".

Topics which do not have concrete bases cause lack of interest towards lesson and

hence, decrease level of motivation and academic achievement (Aslan & Babadoğan, 2005). Various instructional methods have been developed to eliminate problems caused by abstract topics. Through those instructional methods students can transform abstract information and into concrete base since, the main reason for low academic achievement is the inability of students to transform abstract information to solid grounds (Saygin et. al., 2006).

Students' interests and needs

Taking students' interests and needs into account can develop better motivation towards courses. If students' interests and needs are not provided then, they are not engaged with courses (Baram-Tsabari, Sethi, Bry & Yarden, 2010). A science teacher already confirmed the case with

> "After music or physical activities courses, it is really very hard to engage the students towards the course".

Students' needs and interests provided at music or physical activities courses. Naturally, students are engaged more into those courses than science courses (Humphries, Bidner & Edwards, 2011).

Another reason stated by the teachers for lack of motivation of students was their transition period.

"Since students are in their puberty era, they tend to come to classroom without prepared and making objections to teacher"

In order to prevent undesired situations, it is revealed that only 4 science teachers try to determine the reasons for the disturbance. Those science teachers also stated that "Creating a democratic classroom environment and using negative and positive reinforcements" help them to eliminate the problems. Sarıtaş (2006) stated that determining the class rules with students help teachers. In that case, students try to obey the rules. On the other hand, as stated previously, students have the tendency of



"Bringing outside problems into the classroom" and only three science teachers out of 10

"Use guidance service and inform families about their children's situation"

Guidance service and families

Guidance service is one of the useful methods to reach out the students. Yaman et. al. (2009) stated that guidance service could eliminate the problems encountered in educational settings. In addition,

> ".... contacting families" and "being in continuous touch with families" for "the solution I get better results"

Since, families and teachers

"find a common agreement on the issue"

to eliminate the problems. Families are interested in their children's education so, they try their best and guidance service might help students to cope with the problems they have. Studies indicate that families' involvement into educational settings could bring benefits (Fantuzzo, Tighe & Childs, 2000). However, if there are families not being aware of that their children go to classroom

"Without preparations such as pen and notebook"

they can't help their children. So, informing the families about the situation of their children and lack of materials, then it is possible to engage the families more efficiently into education settings. Researchers already state that families could help their children to have motivation towards learning (Doğan, 2004). For that reason, asking

"... help from management and guidance service"

Might benefit teachers, families and students. Additionally, different techniques could be used to solve the problems since those techniques develop positive social skills of students alongside with cognitive development. Using instructional methods efficiently may provide both a safe learning environment and create fun during the course (Hopp et al., 2000; Rubin-Vaughan et al., 2011). In fact, fourth question of the survey was aiming to determine whether science teachers use different techniques to avoid problems or not.

Instructional methods and teaching

It is a well-known fact that different methods and techniques are used to increase cognitive, affective or psychomotor abilities. For example, cooperative learning method has proved its value by increasing cognitive skills and affective skills such as developing good relationships with other students (Akkus, 2013; Butera & Buchs, 2019; Kim, 2018). Most science teachers responded that they are using different techniques for the desired purposes. On the other hand, none of the science teachers revealed any details on the issue. They responded mostly in general responses which clearly indicated that science teachers might be neglecting the attributes of the techniques. In that case, it might be said that teachers aren't fully aware on how to apply the techniques. A few examples shown below would point out the situation.

> "I didn't use different techniques. I believe the best way to manage a classroom is being good on your area"

> "I used different techniques but that didn't get me to solution"

"I didn't use different techniques. Every student has different and need so I give different assignment and homework to them"

"I had sometimes hard time to focus students on the lesson and motivate them towards lesson. Sometimes I call graduate students to classroom to be an example for them. I used different techniques"

"Sure, I used. The most frequent thing I encountered that students didn't want anything from the lesson. I act authoritarian in some classes, sometimes talk the student in private,



sometimes I make house visit to parents"

"I encountered problems. Students were from different regions and there was nothing common among the students.... Rules, punishment don't work. I tried to be friend with them"

"I used different techniques ... with respect to student attributes"

"I always found a technique to get students interests, you can't leave even a single student behind in education"

Even a science teacher responded as

"I use different assignments and home works for each student since every student has different interest".

However, science teachers also complained about

"Crowded classrooms"

as an inhibitor effect for using different techniques. Moreover, assigning different home works for each student indicates that science teachers actually give personalized education without realizing that fact. Thus, it is regarded that science teachers are not fully aware of techniques i.e how and when to use them. For example, a science teacher responded as

> "I use cooperative learning method at few hours to increase the collaboration"

yet, cooperative learning method needs a careful planning phase. Students get used to method after sometime, and using cooperative learning techniques requires more time than few lecture hours. That case is also an indication that teachers are not aware of the techniques. They confuse the simple group works with cooperative groups (Akkuş & Doymuş, 2018; Khalid & Embong, 2019; Koutselini, 2008).

In fact, not giving a detailed example on the assignments or used techniques are indications pointing that science teachers are not fully aware of the methods. For example, a science teacher stated that "I can only use different methods such as inquiry, project based learning, question and answer technique if classroom is not crowded. In less crowded classrooms I can use the mentioned techniques". and other statements were

> "Classrooms are too crowded, physical conditions are not good enough" "it is hard to implement instructional methods in crowded classrooms"

Ironically mentioned techniques might be also used in crowded classrooms if teachers are prepared. Additionally, a student has the capacity of learning from another student. Vygotsky's zone of proximal development suggests that a student observing another student responding to the teacher then, learning is possible (Ellington, 2000; Oppong-Nuako, et al., 2015; Senemoğlu, 2013).

Furthermore, those responses indicate that science teachers neglect the lesson planning and planning the instructional methods. Being unprepared to classroom naturally causes chaotic classroom environment. In return teachers miss the core problem and think used techniques fail. Such cases, perhaps occur due to the will of teachers to control the classroom. Teachers think that an ideal classroom is the one where all students enjoy the learning environment in peace and quite where everything is in order (Maba & Mantra, 2018; Zazkis, Liljedahl & Sinclair, 2009). Even one teacher stated that

"Every student has different need and interest"

so, s/he doesn't use instructional methods. That teacher assumed using an instructional technique would help few students but wouldn't be fair for the whole classroom. However, teaching does not necessarily requires creating a silent environment. Every student engages learning through different means. This is why a constructivist classroom defined as chaotic since each student uses his/her way of learning and teacher plays his/her role as facilitating agent (Bature, 2020; Kotzee, 2010; Muller et al., 2018). Studies indicate that creating learning groups and facilitating them to work with respect to needs and interests of



students, in return, will bring the academic and social improvements (Bayraktar, 2011; Crosswell & Beutel, 2017; Jalilifar, 2010; Yasmin et al., 2019; Zakaria et al., 2013). Yet, almost all of the science teachers indicated that they use different techniques however, their examples only consisted of answer and question, brain storm and concept maps. This is also an indication that teachers use traditional approach and assume they are using modern techniques. Table 3 indicates teachers' responses to questions on using different techniques.

Table 3.

Teachers' responses towards different techniques usage

		Responses (f)		
	Yes	No	Partially	
Question 3	5	2	3	
Question 4	9	1	-	
Question 5	2	-	8	

Question 3 was aiming to determine teachers' opinions towards benefits of faculty education in the classrooms, question 4 was aiming to determine teachers' usage of different techniques and question 5 was aiming teachers' opinions towards effectiveness of techniques used in the classroom. Dramatic differences between the responses (Table 3) are an indication of how well teachers use techniques in the classrooms. From another aspect, it may be also claimed that results are an indication of how well teachers are aware of the techniques. For example, a science teacher stated the reason for not using other techniques as

"40 minutes course hours make it hard to use techniques"

Above statement is also an indication of that science teacher assumes techniques are one time applicable solutions and s/he missed the point that instructional methods require more than one course hour and thus require a careful planning (Honebein & Honebein, 2015).

Another reason for not using modern methods stated as

"Having crowded classrooms".

However, different methods could be simply applied easily in crowded classrooms. Consequently, teachers are not fully aware of upon the techniques which in return also is an indication of the quality of education given by the faculties since those techniques are learned during faculty education (Brendefur, Thiede, Strother, Bunning & Peck, 2013; Koellner & Jacobs, 2015).

Faculty education and teaching

Faculties do not provide enough experience on different techniques and applications of different instructional methods. Professors enjoy the teaching as an instrument of instruction rather than letting teacher candidates experimenting the methods. As a result, teacher candidates lack the experience of real life simulations (Amoo & Swart, 2018; Devadoss & Foltz, 1996; Steinert et. al., 2006a; Steinert et. al., 2016b). For example, a teacher stated that s/he

"learned teaching through experience"

and another science teacher indicated similar case as

"I learned teaching on the way, bachelor degree helped me nearly about half".

Similar arguments shared by other science teachers.

"Sure, I benefited from faculty education but being in the kitchen is completely different"

"I relearned how to be a teacher after graduation when I entered to classroom" *"Faculty education was helpful but it didn't help enough in the teaching"*

"I completed all the courses and graduated but when I started to do my profession, it was different"

"I learned a lot from faculty but couldn't transfer my knowledge into practice in the classroom"

"I learned a lot from faculty but theoretically and didn't do any practice. So, didn't have any idea on what problems would emerge in the classroom"

Erden (2001) also confirmed science teachers' statements by indicating that graduates from faculties don't have necessary experience and hence required qualifications. Although most of the science teachers admitted that they had benefits from faculty education, yet, benefits were mostly related to classroom management. Other statements were

"Teaching is a process you learn while doing it"

"faculty education did not help me at all, not benefited, not useful"

"partially"

Theoretical science courses given at faculties aim to help teacher candidates to understand the facts and comprehend the knowledge for future profession. For example, airbags are used in automobiles, electric current helps mobile phones working etc. On the other hand, teachers give simple examples related to science and its relation with daily life. Used examples in the classroom were simple demonstrations such as

"Wheelbarrow" or "scissors"

A lack of comprehension of science and daily life relationship also indicates instructions at faculties were not effective enough since teachers' opinions were

"instructional methods and techniques are not coherent with physics, chemistry and biology topics taught at

faculties. We teach way more simple things"

Thus, theoretical aspects of science courses at faculties were not mostly embraced and indicated as

"Way above the necessary".

Reason for such definition might be due to instruction methods given at faculties. Most faculty professors tend to use traditional instructions rather than engaging students in real time settings (Sunal, et.al., 2001). Understanding the basics of chemistry and physics could help a teacher candidate to understand the scientific phenomena with daily life. Thus, when candidates start their profession, teaching, then can easily relate the knowledge with daily life. The reason for recent trends on stem education could be regarded in that concept. For instance, stem education is not only given to elementary school students but also to teacher candidates at faculties and teachers (Shernoff, Sinha, Bressler & Ginsburg, 2017; Taylor & Hutton, 2013; Yıldırım, 2019; Yıldırım, 2021b).

Gaining experience through the faculty education plays an important life in teaching profession. Teacher candidates experiencing the obstacles during their bachelor education life also learn how to manage and solve the problems. Such experienced teacher candidates show better problem-solving skills in the classrooms than the teacher candidates who do not similar experiences. This is why school experience courses are carried out under supervising of an experienced teacher (Akyüz, 2006; Bıkmaz, 2002; Bilal & Chen, 2019). For example, there is a positive linear relationship between classroom management skills with vears of teaching (Gülsen & Sevratlı, 2014). On the other hand, if teachers lack the experience required then, they may have classroom management issues (Sağırlı & Gürdal, 2002; Mitchell et al., 2017). Be that as it may, science teachers already are aware of the situation and pointed it out they

> "Realized the importance of school experience courses" and "Take advice of experienced teachers"



Science teachers might lack

knowledge about the usage of techniques. On

the other hand, when they learn from faculties

what they need to know then, they apply their

knowledge into practice such as assessment and

evaluation instruments (Schaefer & Zygmont,

2003). Table 4 shows science teachers'

preference on assessment instruments.

of

Hunzicker (2017) pointed out taking advice from experienced colleagues, inexperienced teachers could develop their professional skills. Similar arguments were proposed also proposed by other researchers (Nguyen & Hunter, 2018; Supovitz, 2018; Turner et al., 2018).

Teaching and student assessments

Table 4.

Science teachers' preference on assessment and evaluation

science teachers code Type f Multiple choice 9 EST1, EST2, EST3, EST4, EST5, EST6, EST8, EST9, EST10 7 EST1, EST2, EST3, EST4, EST5, EST6, EST8 Open ended True-False 7 EST1, EST2, EST4, EST5, EST7, EST8, EST9 7 EST1, EST2, EST3, EST5, EST6, EST7, EST8 Engagement in class Fill in blanks 6 EST1, EST2, EST3, EST4, EST5, EST8 Matching 4 EST1, EST2, EST3, EST9 Question-Answer 4 EST2, EST5, EST6, EST10 Concept Map 3 EST3, EST8, EST9 **Project Assignments** 3 EST1, EST7, EST8 2 **Ouestion-Answer on Visuals** EST2, EST8 2 Oral Exams EST9, EST10

Although Daniel and King (1998) report that teachers do not use different means of assessment techniques it is obvious from this study that science teachers mostly try to use different means of assessment. This argument is also supported by Mellati & Khademi (2018).

It is clear from Table 4 that science teachers are mostly aware of that

> "Evaluation should not be solely depending on exams" and hence, they try to use different means to observe the students and assess learning outcomes. "I don't use one type of exam", "I also try to observe students' performance". *"Exams are not the only utility to asses"* students' success" "I also give projects to assess overall performance"

are example statements of teachers. Science teachers try to use different tools to assess students' performance. An evaluation or assessment should utilize the scores thus, different methods should be used for assessments (Akbulut, 1999). If students are prepared for different type of exams then, developments in cognitive skills also increases through different means of assessment (Demirdelen & Yapıcı, 2007).

Conclusion

It is concluded by the study that although faculties give education and training to teacher candidates yet, teachers still need to comprehend methods. Most teachers are aware of the theoretical facts yet, they lack the practical skills of the methods. In addition, it was revealed by the study that although gender, years spend in profession or age of teachers differed still, none of them attracted the point of interest. Based on the interview results it was concluded that teachers need guidance in implementing the methods and how to use them in the classroom environment. Practical involvement of teachers to workshops or scholars' inclusion to national education ministry system could benefit to teachers. Lastly, it was concluded that faculty structures and department curriculums should support more practical courses.



Limitation of the study

This study was only carried out with limited number of teachers who were working in same city. Also sampling method might have impact on the results. For that reason, a more comprehensive study might be carried out.

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