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Research Article

Picture Your Science Educators:Through the Eyes of the Student Teachers*

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Abstract

This study was aimed to examine and compare the opinions of science teachers studying at undergraduate and master levels in Norway and Turkey towards their instructors. 22 students studying in science fields at a state university in Norway and 28 students studying in science fields at a state university in Turkey participated in the research. The students participating in the research were selected on the basis of a easily accessible sample. Research data was collected using a structured interview form consisting of 5 open-ended questions that questioned students' opinions about the instructors. The data obtained at the end of the research was analyzed using content analysis and descriptive analysis methods. Considering the findings, the themes of student opinions were obtained: 21st century skills of the science instructors, methods and techniques they use in the classroom, the effects of the science instructors on themselves, what I would do if I were a science educator, and role modeling. While some of the participating students in Turkey found the lecturers inadequate in terms of 21st Century skills, most of the students in Norway found the lecturers sufficient. While student teachers in Turkey emphasized that science instructors ' interaction and communication with students and a strong academic infrastructure are important, participants in Norway pointed out that science instructors have positive effects that contribute to being a good teacher. However, participating students in both groups stated that more traditional teaching methods were used in the classroom. It was determined that students had negative opinions as well as positive opinions. The two most important components of the university learning environment that are meaningful to each other are students and science instructors. Therefore, it is thought that more qualified teaching activities will be realized if science instructors care about what students think about them.

Keywords: Science educators, perceptions, student teachers

1. INTRODUCTION

Science education plays a vital role in societal development. As the importance of science education has been recognized in developed countries, Turkey has also witnessed a growing emphasis on it, alongside an increase in related studies (Güneş & Karaşah, 2016). As populations grow, educational needs rise in parallel. Effective science education hinges on qualified science teachers and teacher trainers. Qualified science teacher educators create a ripple effect, fostering qualified science teachers and, consequently, qualified science education. In higher education, teacher candidates guided by teacher educators equipped with contemporary science education practices play a key role in shaping the development and progress of future generations. Within these teacher training environments, student teacher candidates learn from teacher educators, who serve as instructors.

In any learning environment, teachers and students are two crucial, interdependent components. While the presence of students imbues the teacher's role with meaning, students may feel lost without a teacher's guidance. These two components exist in a dynamic relationship. Therefore, it is believed that students' opinions about their teachers hold significant value. When learning environments lack

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student participation, achieving productivity and effective learning becomes a challenge. This underscores the importance of considering student perspectives (Lamatokan, 2018). Positive teacher-student relationships can significantly impact student development. As one researcher aptly described, "*Imagine two teachers teaching the same lesson on poetic construction. One is very impatient with students and the other supportive. Knowing only that, we can probably guess which students learned the lesson better*" (Pelayo et al,, 2017). Both pedagogical and field knowledge competence of teachers have a demonstrably positive effect on student development.

1.1. Teacher Educators' Competencies

Teacher educators, who educate students in faculties of education, play a critical role in training qualified teachers and equipping them with the necessary competencies. A review of the relevant literature reveals that the expertise of teacher educators differs from that of regular teachers (Bullough, 2005). Training teachers in higher education necessitates a distinct approach compared to other fields. For teacher educators, effectively modeling how to teach is crucial for prospective teachers (Ulvik & Smith, 2019). In this context, teacher educators serve as role models in numerous aspects, including their classroom attitudes and behaviors, the methods and techniques they employ, their mastery of the field, and their possession of 21st Century skills. Additionally, familiarity with modern practices and educational technology is expected of teacher educators. However, it's crucial for educational theories to be grounded in practical applications. Some studies have indicated that teacher educators may attribute their practices less to theoretical concepts and more to personal experience, implicit theories, and common sense (Ruys et al. 2013; cited in Ulvik & Smith, 2019). This can make it challenging for teacher candidates to grasp the connection between educational theories and practical teaching. Aligning with these views, YÖK (2007) has emphasized the role of science instructors as models for university students. Especially teacher trainers gain additional importance at this point. YÖK (2007) outlines expectations for how teacher educators can fulfill this role. These expectations include entering and leaving classes on time, avoiding disruptions, offering make-up lessons when necessary, considering and addressing student concerns regarding exams, treating students fairly and with respect, and fostering a democratic environment where education can be achieved. Considering that the quality and quantity of teacher trainers significantly affects the training process, the most important responsibility of training qualified teachers falls on university teacher trainers (Işık et al., 2010). Academicians involved in teacher training must have some basic characteristics. These include fulfilling the requirements of the profession, being equipped and adaptable, embracing innovation, possessing expertise in various teaching methods and techniques, having sufficient pedagogical knowledge, following developments in education, creating a free and interactive classroom environment, demonstrating proficiency in the field, and effectively demonstrating expertise and communication skills. Additionally, they should be able to transform theoretical knowledge into practical applications and demonstrate competent and comprehensive performance in all situations (Bakioğlu & Yıldız, 2015, p.87; Cited in: Alan, 2019). Additionally, Mah and Ifenthaler (2017) identified comprehensive general skills for higher education studies, which were used as the basis for developing a conceptual model of academic competencies. The proposed model includes five academic competencies necessary for successful degree completion: time management, learning skills, self-monitoring, technology proficiency, and research skills. Time management is expressed as strategies used to organize tasks effectively in the work environment, to set long-term goals, to organize the workload independently, and for situations that need to be done in the academic field (Van der Meer, et al., 2010). Another important skill area, learning skills, refers to effective, situational and intentional learning strategies. Thanks to these skills; The individual selects, organizes, elaborates and recalls information, relates new information to old information, adapts the learning environment to individual needs, and copes with different tasks and demands (Boyatzis & Kolb, 1991). Self-monitoring is defined by Conley (2007) as "the ability to evaluate what worked and what

needs improvement in a particular academic task", such as students' interests, strengths, and areas that need improvement (cited in Mah & Ifenthaler, 2018). *"Research skills include elements such as academic writing, communication, and methodological knowledge, as well as statistical and qualitative analysis, information seeking, and problem-solving skills"* (Gilmore & Feldon, 2010; Cited in Mah & Ifenthaler, 2018). Technology proficiency is expressed as "being technology literate, being able to use technology in lessons, directing students to use technology effectively, organizing the learning environment in a way that students can use technology, and being able to collaborate with colleagues over the internet" (Akkoyunlu & Kurbanoğlu, 2002; Kelly& McAnear, 2002, cited in Baran et al., 2023). This model emphasizes the importance of comprehensive and integrated skill sets necessary for students to succeed in higher education (Schunk, 2012; Zimmerman, 2000).

1.2. The Connection Between Students' Views and Instructors' Performance

Since the 1970s, students' evaluations of faculty members' performance have been considered important in higher education (Murray, 2005). According to author these evaluations have of course made a difference. If instructors are aware of student opinions about them, it will have a significant impact on their revision and updating. However, despite all this, it is not possible to say that there will be a complete evaluation. Student evaluation systems are used extensively in universities in Turkey, Norway and other countries around the World. Many institutions in the United States use the student evaluation system to make decisions regarding tenure, promotion, merit pay, or faculty professional development in higher education. However, more research is needed to determine how to measure and ensure the validity and reliability of this assessment (Zhao & Gallant, 2011). For example, Shevlin et al. (2010) stated that evaluations made by students may also be affected by factors such as the physical environment and claimed that student ratings do not fully reflect the real teaching quality. Read et al. (2010) also stated that the factors that cause students' prejudices are ignored (Cited in Tsou, 2020). Considering these views, it is possible to say that academic studies on student evaluation of faculty members have more advantages in terms of validity and reliability. Generally, student evaluations made by universities are handled based on the results of quantitative data obtained with Likert-type scales. Although they have contributions, as said before, evaluations based only on quantitative data are thought to be insufficient. For this reason, it is thought that conducting student evaluations with qualitative data collection tools is beneficial in terms of deeper and more effective findings. It is thought that with qualitative data collection tools, students' prejudice and other factors arising from the physical environment cannot be ignored. Although a hundred percent reliable evaluation can never be made, but it is possible to say that results will go beyond the numbers. Instructors may consider differently to issues stated by students in their evaluation; "*some may view the responses as facilitating, while others may view the feedback as restrictive or coercive. Such different experiences and responses influence how the value of feedback, and particularly student feedback, is perceived and experienced. Therefore, inquiring about the connections between student feedback and faculty teaching practices may provide useful insights into faculty responses to such feedback. A useful perspective for investigating such connections is activity theory"* (Peterson et al.,2020).

1.3. Importance of the Research

Considering all these dimensions mentioned above, if teacher competencies are to emerge at the desired level, importance should be given to the quality of teacher education. Teacher competence is positively related to teaching quality, which in turn has an effect on student outcomes (Kunter et al., 2013; cited in Fauth et al., 2019). Teacher competence may serve as an important lever that can be used to improve the quality of teaching (Kleickmann, et al., 2016; cited in Fauth et al., 2019). Although the competencies that teacher educators have are important, it is also thought that what this means to the student or how the students see these competencies is also important. Although the competencies of science instructors working in education faculties are evaluated in many aspects, it is thought that students are not given enough space to evaluate these competencies. It is thought that this

research may have an impact on raising awareness and improving educational environments and academic quality by evaluating science instructors working in science fields in teacher training faculties from the perspective of teacher students. In this way, it is thought that it can contribute to the development of universities. However, it is thought that the findings to be obtained by comparing the opinions of the participants from Turkey and Norway will enable a more objective evaluation of positive and negative situations. In addition, no study has been found in the literature comparing the opinions of university students about science instructors across countries. In this respect, it is thought that this study will contribute to the relevant literature.

1.4. Purpose of the Research

In the qualitative evaluation of instructors at the university, the impression they leave on students is very important. For these reasons, it is thought that the perceptions of faculty members by students studying at education faculties should be determined by taking the opinions of different sample groups at certain intervals (Gündüzalp & Demirtaş, 2020). Based on this idea in this study, it was examined what the science student teachers studying at the faculty of education (Turkey) and the teacher education college (Norway) think about their instructors, what techniques the instructors use in the classroom, and how the instructors affect them. In line with these views, the differences and similarities between the views of the participants in both countries were also evaluated.

1.5. Problem of the Research

What are the opinions of science teacher students studying at a state university in Turkey and Norway about their academic instructors?

2. METHOD

In this study, phenomenological research, one of the qualitative research designs, was used to investigate the perceptions and explanations of science educators competencies possessed by science student teachers. Phenomenological research is important in terms of providing rich examples, explanations and experiences that can lead to a deeper understanding of a phenomenon (Yıldırım & Şimşek, 2013). Since the participants in the focus of this research have individual lived experiences, phenomenology was preferred as the most appropriate method.

2.1. Participants

The participants in this research were student teachers studying in Science Education programs at two state universities, one in Turkey (Diyarbakır) and one in Norway (Bergen). A total of 50 students participated, with 28 (undergraduate: 16 and master:12) from Turkey and 22 (undergraduate: 12 and master:10) from Norway. Participants were recruited based on easy accessibility. The decision to conduct the study at universities in both Turkey and Norway was based on the researchers' locations in these countries and cities.

2.2. Data Collection Tool

The semi-structured interview form developed by the researchers was used as a data collection tool in this study. The form consists of five open-ended questions designed to reveal the opinions of science student teachers about the competence of science instructors. The development process of the form included a stepwise approach. First, a literature review was conducted on the subject to create an item pool that could investigate students' perspectives on science educators. This pool of seven questions was later reduced to five questions based on experts feedback. One question was eliminated by the experts because its language was not clear enough. Another question was eliminated because it was similar to another question in the question pool. The clarity and comprehensibility of the interview form was further evaluated by conducting a pilot application with five science education students. This pilot application process also helped determine the estimated time required to

implement the interview form (approximately 40 minutes). After these steps, the final data collection tool was ready for implementation.

2.3. Collection of Data

Data were collected face to face and via email. Face to face interview forms were administered in the classroom. Data were obtained collectively in applications carried out in the classroom environment. Some of the data were obtained via email. The estimated completion time for the interview form was approximately 40 minutes.

2.4. Analysis of Data

Content analysis was employed to analyze the data obtained in this research. The analysis was conducted by the researchers along with another expert who possesses expertise in the field of education. As Punch (2005) highlights, coding is the initial and crucial step in qualitative analysis, aimed at identifying the core content within the data. Codes were then grouped into categories based on similarities, and themes were subsequently developed by grouping similar categories. Following this process, the data was first coded, and these codes were then used to generate themes in the final stage. In the coding process, seven codes were excluded from analysis done by the coders. Despite much discussion, no consensus has been reached on the appropriate application of these codes to the data. To ensure data analysis reliability, intercoder consensus was calculated using Miles and Huberman's (1994). This method is based on calculating the ratio between agreed upon codes and agreed and disagreed codes. In this study, the reliability coefficient was calculated as 0.91.

3. RESULTS

The opinions of student teachers regarding the adequacy of science instructors ' 21st century skills are presented in Table 1.

Table 1. Participating students' opinions on the adequacy of science instructors ' 21st century skills

Category	Codes	f (Turkey)	f (Norway)
Positive	Good skilss (without any deep explanation)	4	12
	Creativity	4	4
	Technological	8	3
	Innovative	2	-
	Media	-	1
	Flexibility	-	5
	Adapdability	-	2
	Critical thinking	-	4
	Cooperative	3	-
	Good Communication	5	2
	Problem solving skills	1	-
Negative	Insufficient overall (without any deep explanation)	6	-
	Bad communication	3	2
	Lack of creativity	1	2
	Lack of technolgical skills	10	2
	Single way	3	1
	Lack of flexilibity	-	2
Nötr	No idea	1	-

Based on the findings in the table, it was seen that the participating teacher-students from Turkey mostly emphasized technological competence (f = 8) and good communication (f = 5) in a positive dimension, while some of them, strikingly, stated that the science instructors did not have sufficient technological competence (f = 10). However, some participants stated that science instructors were generally lacking in this aspect (f = 6), while a smaller number of participants stated that they found them generally sufficient (f = 4). In addition, while there were codes of creativity, innovation and cooperation among the positive opinions, it was determined that there were codes such

as bad communication, one-dimensional teaching and not being creative in the negative aspects. Additionally, one person stated that he had no opinion.

Below are the opinions of some participants regarding this theme;

"So for some staff yes, for some staff no. Some of our teachers are older than they are. Some of our teachers are behind in technology because they do not know how to use it due to their age. Some of our teachers take us to the future because they know how to use technology and where it can be useful. Yes, they are preparing us for this." (Participant 2)

"*I don't think most of them have these skills. It has a completely classical course process, without using any activities or materials. This decreases our interest in the lesson. "The same things are repeated.*" (Participant 5)

Considering the opinions of the participants above, it can be said that the science instructors who take their courses do not find their 21st Century skills to be at a very good level, based on the statements "*they are behind in technology*" and "*I do not think most of them have these skills*".

According to the findings in Table 1, a significant majority of the participants studying at university in Norway stated that science instructors generally have 21st Century skills (f = 12). In parallel, some of the participants stated that the science instructors ' flexibility (f=5), adaptability (f=2), critical thinking (f=4), communication (f=2) and creativity skills (f=4) were sufficient. When looking at the negative characteristics, it was determined that a small number of students stated that their technological, creativity, flexibility and communication skills were insufficient.

Below are some participants' opinions on this theme;

"*They are good at creativity and flexibility. He/she is not very good at communication.*" (Participant 17)

"*I think the science instructors have 21st century skills, they have good computer knowledge. They taught us to think critically and creatively.*" (Participant 15)

"*Teachers seem to place great emphasis on critical thinking and theory, but I feel like there's a bit of a lack of dialogue between teachers and they need to pay better attention to students and understand that there are those who haven't taken these courses before.*" (Participant 11)

As can be understood from the expressions of "*creativity and flexibility*" and "*they taught critical and creative thinking*" in the opinions of the science instructors who taught the courses of Norwegian students, they also emphasized that the science instructors have these skills, but they are inadequate in communication and should care more about the students.

The opinions of student teachers regarding the methods and techniques used by science instructors are presented in Table 2.

Table 2. Participant students' opinions about the teaching methods and techniques used by science instructors

Category	Codes	f (Turkey)	f (Norway)
Student centered	Blended learning	1	-
	Students based activity	2	3
	Collaborative learning	1	1
	Outdoor teaching-Project	2	-
	Context based	-	1
	Inqury based	-	1
	Different methods (without any deep explanation)	5	-
Teacher centered	Traditional teaching	18	7
	Less focus on didactic methods	2	1
	Inadequate environmental conditions	1	-

According to the findings in Table 2, the participants from Turkey stated that science instructors mostly use teacher-centered methods and techniques (traditional; 18, less didactic methods). One student cited inadequate environmental conditions as the reason for this. Among the codes for student-centered practices, the code for different methods (f = 5) without detailed explanation attracted attention.

Below are some participants' opinions on this theme;

"*There is not a single way but different ways to solve the problem that centers on the student, and we need to use methods and methods to reveal this by using our creativity and originality. They use techniques. Methods can be improved a little more, of course, class size also affects this.*" (Participant 3)

"*We have teachers who use old-school teaching methods, many of whom try to innovate, but they are never enough. They train teachers, they scare the teachers with grades and make them teach. If an education is beneficial, students will want to attend it with pleasure. Many of them use the method of reading and passing from the slide, some of them read and pass the slide. He doesn't even share it with us. We have teachers who explain it in parts by quoting from different places. They traditionally ask for this information in exams, but they do not share this data with us*." (Participant 3)

Considering the opinions of the students participating in the research, it can be seen that the science instructors complain about their teacher-centered practices, as can be understood from the statements "*They use old-school teaching methods*" and "*The methods can be improved a little more*."

According to the findings in Table 2, it was determined that the majority of the participants from Norway in the research stated that teacher-centered methods and techniques (f = 7, f = 1) were applied. However, it was determined that some participants stated that student-centered activities (contex based (f=1), student based (f=3), group work (f=1), Inquiry based (f=1)) were also implemented.

Below are the opinions of some participants from Norway regarding this theme;

"*Lessons are generally based on teachers talking and giving information; It seems like there need to be methods for students to learn effectively.*" (Participant 8)

"*Most of the lessons continue with presentations and the opportunity for discussion is given occasionally.*" (Participant 2)

Looking at the opinions of the students above, the participants stated that the science instructors who take their courses use teacher-centered practices in connection with the statements "*based on speaking and giving information*" and "*Most of the courses are continued with presentations*".

The opinions of science student teachers regarding the effects of science instructors on them are presented in Table 3.

Table 3. Participating students' opinions on the impact of science instructors on them

Category	Codes	f (Turkey)	f (Norway)
Positive	Influenced in a good way (in order to be a good teacher)	12	16
	My curiosity and ability to use technology have increased	3	-
	Effect on my communication skills	1	-
	Doing research and new experiences	2	-
	All-round positive effect	2	-
Negative	No influence	5	3
	Influenced in a bad way	3	3
	Inaduquate guidance	1	-

Looking at the findings in Table 3, it was seen that the code "to be a good teacher" (f=12) emerged more frequently regarding the positive effects of science instructors on participating student teachers in students from Turkey. However, their opinions that it has no effect (f = 5) and that it causes a bad effect (f = 3) are also noteworthy.

Below are the opinions of some participants regarding this theme;

"*Of course, we are not where we started, I think it has improved us in many ways.*" (participant 6)

"*As a student who loves his profession very much, unfortunately my teachers did not help me much. I attend many classes just because of the fear of attendance and exams. I say this with sadness. After leaving many classes I ask myself and friends Unfortunately, I cannot get an answer to what we learned*." (Participant 7)

Considering the above statements, it was seen that the students stated that the science instructors improved them in many aspects and that they were "*not at the point where they started*", but some students expressed regret that the science instructors did not have a positive impact on them.

Looking at the findings in Table 3, it was determined that the participants from Norway mostly said that science instructors had positive effects on being a good teacher (f = 16). However, there are also participants who stated that it had no effect (f=3) and that it had a bad effect (f=3).

Below are the opinions of some participants regarding this theme;

"*They teach us very well how to integrate science into daily life. Learning by doing our applied lessons and experiencing it has a great contribution to us.*" (Participant 3)

"*In addition to their contributions to the acquisition of teaching skills, active participation in classes, getting excited while lecturing in front of the public, seeing how to communicate with students, and being able to think. I think they mostly contributed to my worldview and broadening my horizons. Providing active participation in the classroom while assigning multidimensional homework to students*." (Participant 1)

When we examine the above views of the Norwegian participants in the study, it can be said that science instructors have positive contributions to their students, based on the statements "*active participation in classes, not getting excited while lecturing in front of the public*" and "*learning by doing and experiencing has a great contribution to us*."

The answers of science student teachers to the question "if you were a faculty member" are presented in Table 4.

Table 4. Participating students' answers to the question "if you were a faculty member"

Category	Codes	f (Turkey)	f (Norway)
For students	Doing a European Union project with students	1	-
	Make students more engaged and active	13	2
	Try to understand students`reflection (after teaching)	3	2
	To focus on communication between students and teacher	10	1
	Grup work	1	1
For methods and tecniques	More pedagogical lessons	1	-
	Didactical and theory together	-	2
	More didaktical methods less theory	2	3
	Using more color	-	1
	More focus on research in master	-	1
	Board teaching	-	1
	Use socio-cultural learning	-	1
	Feedbacks before teaching	-	1
	To show clear expectations	-	1
	Different teaching methods	8	5
	Excursion, outdoor area, micro teaching	3	-
	Practical work (such as experiments)	2	1
For self improvement	Using technology more	1	-
	Follow scientific developments	2	-
	More research	2	-
	Be More engaged in his/her own teaching	-	1
	Work with the syllabus(curriculum) more creative	-	1
	Motivated	-	1
	New ideas	1	-
	Professional qualification	4	-

According to the findings in Table 4, some participants from Turkey stated that science instructors should make students more active (f = 13), while they also stated that the communication between teachers and students should be strengthened (f = 10). However, they stated that different methods and techniques (f = 8) should be used. Additionally, some participants stated that they would improve themselves more if they were science instructors; It was observed that they stated that they would follow scientific journals (f=1), keep their awareness and motivation high (f=4), create new ideas (f=2) and do more research (f=2).

Below are the opinions of some participants regarding this theme;

"*In order to ensure the permanence of theoretical knowledge and easier understanding, different methods and I would help students learn a lot of information practically by using techniques.*" (Participant 7)

"*Raising successful students at the university will be a concern and all efforts are needed to make this happen. I would mobilize my means. New things to the scientific world related to my field of expertise I would try to add it. Establishing positive relationships with university students and I would work solving their problems.*" (Participant 9).

Considering the above statements, it can be said that the participants have opinions that students should be more active and effective communication skills should be used, in connection with the expressions "*using different methods and techniques*" and "*establishing positive relationships.*"

According to the findings in Table 4, it was determined that some Norwegian participants had opinions such as activating students more (f = 1) and listening to students after teaching (f = 2) if they were science instructors. Regarding methods and techniques, it was determined that they stated that they would use different methods and techniques (f = 5) if they were science instructors. However, it was determined that some participants emphasized the code more didactic methods less theory (f = 3). Some participants also stated that they would try to improve themselves.

Below are the opinions of some Norwegian participants regarding this theme;

"*I wanted to give lessons by taking into account teaching methods and techniques and use these techniques in the lesson.*" (Participant 3)

"*I wanted to remove all communication barriers, I wanted to ensure that graduate students could reach me whenever they wanted. I knew all my students personally and evaluated their situations. Mutual empathy is very important. I agree that there should be a line, but communication barriers can sometimes cause misunderstandings.*" (Participant 22)

"*I would try to do practice rather than theoretical knowledge. I would even minimize theoretical knowledge and give practical tasks in class every week.*" (Participant 6)

It was observed that the students stated that there should be more student-centered methods and communication with students, based on the statements "*enabling them to reach me whenever they want", "doing more on practice than theoretical knowledge*" and "*mutual empathy*".

The opinions science student teachers regarding their science instructors being role models are presented in Table 5.

Table 5. Participant students' opinions on taking science instructors as role models

Category	Codes	f (Turkey)	f (Norway)
Academic features	Continuous self-improvement	2	-
	Having good knowledge and experience	9	1
	Using useful methods	4	3
	Precise answer	-	1
	Being understanding	1	-
	Motivated	1	-
	Having good lecturing skills	6	1
	Using useful methods	4	-
	Sharing his /her experiences	1	-
Effects on the students	Improved my questioning skills	1	-
	Making time for us outside of class	3	-
	Guidance	3	-
	Inclusive	-	1
	Positive	-	1
	Don't let students feel sorry even they are wrong	-	1
	Motivated	-	3
	Engaged	-	2
	Structured, clear, transparent	-	1
	Energetic	-	1
	Dressing and speaking	1	-
	Good communication	7	2
Nötr	No model	4	7
	Don't know		1
Other	Social responsibility projects	1	-

Looking at Table 5, it can be seen that the participants' from Turkey views on taking a role model come to the fore with the following codes: the faculty member being knowledgeable and experienced (f=9) and having effective communication (f=7). However, effective lessons (f=6) is another noteworthy code. There are also participants who stated that they did not take science instructors into account (f=4).

Below are the opinions of some participants regarding this theme;

"*Yes, there are role models because I see them as close to me and I like their teaching style. Also he/she provides equal conditions to everyone and his only goal is to make people love the lesson he/she teaches. I realized that this is exactly the situation I want to be in.*" (Participant 10)

"*There is. His/her self-improvement is due to the fact that he attaches importance to what the students say. He/she conveyed his knowledge to us very well and was a good help in revealing our creativity, he/she is a good guide.*" (Participant 11)

"*He/she is a nice teacher, has interest in social responsibility projects. I have a teacher who has a student relationship. I like the way he/she dresses and talks, His/her respect for the teaching profession can be seen in his/her eyes*." (Participant 1)

When we look at the participants' opinions above, it is seen that the students are influenced by the science instructors ' knowledge and their ability to convey it, from the statement "*He conveys his knowledge to us very well*". In addition, "*he pays attention to what students say*" and "*he is a nice teacher*"

As can be understood from the expressions "*having a student relationship*", it can be seen that communication is important in taking a role.

Looking at the findings in Table 5, it can be seen that a remarkable number of Norwegian students stated that they did not take science instructors as role models (f = 7). However, some participants stated that they took as an example the science instructors ' use of useful methods (f=3).

Additionally, some participants stated that they took as an example the science instructors ' motivation (f=3) and concern for students (f=2).

Below are the opinions of some participants regarding this theme;

"*Yes. They make me work harder at school and inspire me to accomplish various tasks.*" (Participant 20)

"*Yes, of course... Their knowledge, enjoyable lessons, attitudes, actions and behaviors, their approach with love, not being capricious, not belittling the students, trying to help in everything, etc*." (Participant 8)

From the statements of the above participants, it can be said that the students take the science instructors as role models in terms of both their approach to students and their academic characteristics, from expressions such as "*they are inspiring*", "*their knowledge, their enjoyable lessons, and the fact that they do not underestimate the students*".

4. DISCUSSION

As a result of the analysis of the data obtained, a significant portion of Norwegian participants stated that their teaching staff was generally good in terms of 21st Century skills, without providing detailed explanations. On the other hand, participants in Turkey stated that they found a significant number of science instructors lacking in 21st Century skills. Norwegian participants emphasized the critical thinking, flexibility and creativity of the science instructors in their departments. While participants in Turkey emphasized technological competencies, they also pointed out that the teaching staff was technologically inadequate. It has been determined that participants in Turkey emphasize the technological inadequacy of science instructors in 21st Century skills. This finding obtained from the research is thought to be very important. As of the age we live in, we are in intense interaction with technology. Especially these days during and after the Covid 19 pandemic, learning with digital technologies in higher education is normal and included in formal learning environments, in which the students are viewed as active participants in the search for knowledge (Damsa, 2019, cited in Rodrigues et al., 2021). Science instructors, who have a major role in teacher education, are expected to keep up with this technological change and development. As a matter of fact, participants in Norway, another country where the research was conducted, stated that they found the science instructors to be less technologically incompetent. In his study, Başıbüyük (2015) stated that science instructors had little technological knowledge. It was not surprising that the participating students in Turkey in the study also emphasized this. On the other hand, some of the participants from Norway and Turkey stated that the science instructors were only adequate or inadequate in terms of 21st Century skills, without making any explanation. Based on this, it can be concluded that students do not have deep knowledge of 21st Century skills. It is thought that it would be beneficial to investigate this finding with further studies. Some students in both groups participating in the research emphasized the poor communication of the instructors. Effective communication in learning environments has significant effects on students. It is thought that an instructor who does not have strong communication skills cannot be productive no matter how good his/her field knowledge is. It is thought that the communication of an educator who cares about students should be strong. Science instructors with strong communication skills can better interact with students, increase course efficiency, increase student satisfaction, and generally serve the development of universities more effectively. In higher education, instructor-student communication should take place in a qualified manner, in order for a sense of trust to develop between the instructor and the student, communication should be sincere and sufficient time should be allocated to the students. With effective communication, university students will contribute to their development in terms of both cognitive, affective or psycho-motor skills and values (Alan, 2019; Karip, 2002).

Regarding the methods and techniques used in learning environments in the research, participants in both groups emphasized that traditional teaching methods were mostly used. While participants in both groups stated that traditional methods were used in their learning environments, they stated that if they were instructors, they would focus on applied courses rather than theory. Again, participants in both groups emphasized that the instructors mostly influenced them to become better teachers. In both groups, the general positive, negative and neutral impact of science instructors was emphasized. When this finding is evaluated, the opinions of participants in Norway, which is known for its high quality education system, are surprising. As in other European countries, the education system in Norway is thought to be constantly updated and open to innovations. For this reason, it was not expected that teacher-centered practices applied in learning environments would be higher than student-centered practices among student opinions. In his study, İlter (2014) stated that prospective science and classroom teaching teachers used one-way, poor communication and teacher-centered methods. Similarly, in the study conducted by Murat et al. (2006), it was stated that the students of the faculty of education found the classroom activities of the instructors insufficient. Norwegian researchers (Finne et al., 2014, cited in; Ulvik & Smith, 2019) also found in their study that prospective teachers in Norway could not establish a connection between the information given on campus and field studies. In their study, Yılar et al. (2021) asked teacher candidates to empathize with instructors during the communication process, to be understanding and tolerant, to listen to their students effectively, to use oratory and body language effectively, to be respectful, to be unprejudiced, simple, clear, understandable and they found that they expected them to use self-esteem enhancing language.

4.1. Suggestions

In light of the findings of the research, the following suggestions are made:

- While some participants in both countries (more in Turkey) found science educators inadequate in terms of some 21st century skills, participants in Turkey emphasized technological deficiencies. Science instructors can use modern educational technology and educational tools to provide students with more effective learning experiences. This could be virtual classrooms, online resources or interactive educational platforms.

- A considerable number of participants from both countries stated that science educators apply teacher-centered methods in their courses. Therefore, it can be suggested that science educators review the teaching methods in their courses. It is beneficial for science instructors to use teaching methods and techniques that will include students in the process by taking their differences into account. Moreover, science fields instructors can include studies such as field work, laboratory and field trips that will put theoretical knowledge into practice.

-To improve communication between students and science educators, meetings or open office hours can be organized. This will affect communication positively.

- It is beneficial for science instructors to use various communication channels such as e-mail, social media or virtual office hours so that students can reach them.

-Some participants in both countries did not provide detailed information about 21st century skills for instructors. Therefore, it would be beneficial for science educators to focus more on 21st century skills in their courses in order to train qualified teachers.

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