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Technologies used in teaching children with special educational needs by future chemistry teacher

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Abstract

This study was carried out to investigate the technologies that are used by future chemistry teachers in teaching children with special educational needs. Accordingly, the study was carried out in the 2021–2022 spring semester. A total of 246 teacher candidates participated in the study. The quantitative research model was used in this study. In the study, 4 weeks of chemistry, technology and digital content training were given to the people participating in the study. In order to collect data, the 'technology and special education' measurement tool developed by the researchers was used in the study. The data collection tool used in the study was delivered and collected by the online method. The analysis of the data was carried out using the Statistical Package for the Social Sciences programme; frequency analysis was performed using the *t*-test; and the results obtained were added to the study accompanied by tables. As a result of the research, it was found that information about special education was formed in teacher candidates, while it was concluded that the technologies used for the chemistry course were dominated.

Keywords: Chemistry teachers, distance education, technology, special education students;

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1. Introduction

In the most general sense, education is the process of educating individuals according to the desired goals and educational practices are organised entirely in accordance with these goals. In these goals and regulations, it is essential that students are educated in accordance with the political, economic and social expectations of society and the state (Giaconi, Bianco, D'Angelo, Halwany, & Capellini, 2021). It is necessary that most educators are aware of and informed about social changes. It is known that today the teacher is the focal lens of the philosophy of life of societies of the educational, scientific and technological age (Schellini & Rahimi, 2022). It is also known that solutions are being sought with rational and scientific approaches if this is how the behaviour of a modern teacher will be and how these behaviours should be acquired. In developing countries, attempts are being made to link teaching with new principles, from candidate selection to pre-service and in-service training (Sahli & Belaid, 2022). In addition to the central examination for admission to teacher institutions, oral interviews and psychological tests are also required to be conducted. Candidates who have successfully passed these exams can enter institutions that provide teacher training. After graduation, a central examination is conducted, but after passing the four-stage oral examination, they begin their profession on a 1-year contract. In the early years, the candidate's ability and knowledge are constantly monitored and it is expected that they will generate reports (Ozaeta, Perez, & Rekalde, 2022). In order for a teacher to have continuity in his profession, he must also complete some courses. A general teaching certificate is required; a certificate obtained from a certain field of study is also required for him to work in secondary schools and high schools. Teacher certificates are of two types: permanent and temporary. While normal certificates are valid throughout the country, temporary certificates are valid only within the borders of the province where they are issued (Turan & Atila, 2021). It is known that teachers receive continuous in-service training that will allow them to carry out roles that constantly question, redesign the programme, constantly changing role expectations, learning theories, pedagogical methods and so on (Kartimi, Gloriat & Anugrah, 2021).

In this context, solid education programmes underlying the behavioural approach, with a constructivist approach in order to perform a conversion to enter into a change in the programme and this transformation was observed (Jdaitawi & Kan'an, 2022). The aim of the programmes, which will be implemented in the future academic years, is to know that generations will be raised in accordance with the developing and changing world paradigms. However, the important thing here is the education of teachers who can implement these programmes and be pioneers of change (Okeke, Onyishi, Nwankwor, & Ekwueme, 2021). However, as teacher training institutions, the faculties of education have also undergone a restructuring process and are striving to train teachers in accordance with the developing technology and science (Salama, Uzunboylu, & Alkaddah, 2020). But science is in such rapid development and change that the teacher's education must continue after finishing the programmes that train teachers. The inadequacy of pre-service education in the application of new knowledge and advanced technology to life in developing societies necessitates a planned and continuous implementation in professional groups. This also applies to the teaching profession (Kramarenko, Bondar, & Shestopalova, 2021). In order to refresh the knowledge of teachers, to ensure that their competencies regarding the teaching profession are not blunted and to increase their motivation, in-service trainings are of great importance.

Although experience is important for teachers to be able to effectively conduct their profession, it is still not enough. It is known that the personal efforts of teachers who want to improve themselves are not always enough to ensure professional development (Oliveira, Grenha Teixeira, Torres, & Morais, 2021). It is only possible to provide teachers with opportunities to develop themselves during their

professional lives through in-service training. In this study, the aim of future chemistry teachers is to be in a better position and in line with the progress.

1.1. Related studies

In the study conducted by Badilla-Quintana, Sepulveda-Valenzuela, and Salazar Arias (2020), the research problem suggested the need to study educational opportunities and the effect of augmented reality on academic success provided by integrating it into the curriculum, especially by creating a diverse classroom on chemistry. This study included 60 participants without special educational needs, and 3 attempted to address the question. As a result, it was observed that technology school-age students for special education and inclusive education and social justice accepting the use of appropriate and sustainable technology can improve their cognitive abilities.

Gavronskaya, Larchenkova, Kurilova, and Gorozhanina (2021) determined the specifics of the conducted online training, namely the use of virtual laboratories. The existing online courses for students with special educational needs benefit them and allow them to adapt to the intended development of a laboratory model. As a result, a laboratory model was developed for hearing and eyesight impaired people with disorders of the skeletal system. Thus, each category of users was offered several options for implementing the educational process in the virtual laboratory. It seems that it reached a conclusion that the theoretical model allows creating a virtual laboratory for teaching students with special educational needs.

Gybas, Kostolányová and Klubal (2017), in their studies in the field of education, tried to define human and nature as a 'basic chemistry' with the support of information technology learning options for students with special educational needs. As a result, they gave very effective results and gave positive results in the success of primary school special experiments in the field of education and technology with the help of appropriate tools with students with moderate mental retardation.

1.2. Purpose of the study

In this study, it is aimed to investigate the technologies used in the teaching of future chemistry teachers to children with special educational needs and to find answers to the following questions related to the problem situation and the general purpose:

1. What is the technology usage time of the participants participating in the study?
2. What is the asynchronous distance education monitoring time of the participants participating in the study?
3. What are the technology opinions of the participants participating in the study?
4. What are the opinions of the participants participating in the study on the field of special education?
5. Is there a difference between the technology situations of the participants participating in the study according to the gender criterion?

2. Method

In this section, information about the method used in the study, the group of students who participated in the study, the type and source of the data in the study, the data collection tool and the statistics used in the study are included and organised.

2.1. Research model

In the study, it is seen that research methods are used with the help of a quantitative research model, and if support is given from a quantitative research model within the study, previous objects can be used to change the size of facts and events (Çelik & Uzunboylu, 2022). In this study, gender was defined according to the variables of educational duration when determining the use of technology by future chemistry teachers for special needs children through the quantitative research method.

2.2. Working group/participants

It is seen that the group included in the study consists of future chemistry teacher candidates who continue their education in the Kazakhstan region. The measurement tool used in the study was applied to and accepted by 246 participants with the help of an online questionnaire.

2.2.1. Gender

In this section, the differences of the participants in the study according to their gender are given in Table 1.

Table 1. Distribution of the participants in the study according to the gender variable

Gender	Male		Female	
	F	%	*F*	%
Variable	125	50.81	121	49.19

As can be seen from Table 1, the distribution of the participants participating in the study according to the gender variable is determined and examined by considering the information. In this context, 50.81% of the participants (125 people) were male and 49.19% (121 people) were female. In the gender section, the findings reflect the actual gender distribution.

2.2.2. Technology usage times of the participants participating in the study during the day

In this section, the daily usage time periods during the day were investigated and examined for the participants participating in the research. Detailed information is given in Table 2.

Table 2. Technology usage times of the participants participating in the study during the day

The use of technology	1–3 hours		4–7 hours		8 hours and above	
	F	%	*F*	%	*F*	%
Variable	23	9.35	152	61.79	71	28.86

Table 2 shows the students' daily usage time periods during the day. In this context, 9.35% (23 people) used technology for 1–3 hours, 61.79% (152 people) used technology for 4–7 hours and 28.86% (71 people) used technology for over 8 hours. It is seen that most participants preferred using technology for 4–7 hours during the day.

2.2.3. Asynchronous distance education training monitoring times of the participants in the study

In this section, asynchronous distance education monitoring times of the participants participating in the research regarding the problem of the research were investigated and detailed information is given in Table 3.

Table 3. Asynchronous distance education or training monitoring times of the participants in the study

Daily asynchronous distance learning use	1–3 times		4–7 times		8 hours and above	
	F	%	*F*	%	*F*	%
Variable	19	7.72	112	45.53	115	46.75

When Table 3 is examined, we see that the surveyed participants' asynchronous distance education or training monitoring times are investigated. In this context, 7.72% (19 people) expressed spending 1–3 hours, 45.53% (112 people) expressed spending 4–7 hours and 46.75% (115 people) expressed spending over 8 hours on remote training and induction training. It is seen that most participants preferred spending more than 8 hours on asynchronous distance education or training.

2.2.4. Age status

In this section, the age information of the participants participating in the study was examined and detailed information is given in Table 4.

Table 4. Distribution of the participants participating in the study according to their age status

Age	18–22		23–27		28 and above	
	F	%	*F*	%	*F*	%
Variable	65	26.42	173	70.33	8	3.25

In Table 4, data on the age status of the participants participating in the study are examined and the relevant information is added. In this context, 26.42% (65 people) are in the 18–22 age range, 70.33% (173 people) are in the 23–27 age range and 3.25% (8 people) are 28 years and above. The findings in this section reflect the actual distribution.

2.3. Data collection tools

When the data collection tool is considered, it is seen that the measurement tool is developed by the people who created the problem situation of the research. The data collection tool was examined by experts in the special education dimension of future chemistry teachers and the items that were not suitable were removed from the tool and verified. A personal information form, called the 'Technology and Special Education' measurement tool, was used, which was applied to the participants participating in the study, developed by the researchers. The validity of the scope of the developed measurement tool was examined by seven experts with the title of Professor and who have been working on special education, technology and distance education platforms; unnecessary items were removed from the measurement tool and rearrangements were made.

1. Personal information form (demographic data): In the personal information form, information such as age, gender, technology use and daily asynchronous distance education use are provided.

2. Technology and special education data collection tool: A 5-point Likert-type questionnaire was prepared to obtain information about technology and special education views of future chemistry teachers. 22 items of the measurement tool consisting of a total of 26 items were used and 4 items were removed from the measurement tool, thanks to the experts' opinions. The opinions of the participants participating in the study from two factorial dimensions, such as 'technology education usage' and

'special education', were applied to the participants participating in the study. The Cronbach alpha reliability coefficient of the measurement tool as a whole was calculated as 0.87. The measurement tool was rated as 'I strongly disagree' (1), 'I disagree' (2), 'I am undecided' (3), 'I agree' (4) and 'I definitely agree' (5). The measurement tool was also collected from people participating in the study in the form of an online environment.

2.4. Application

In this section, the researchers selected participants who continue their studies and training in the Kazakhstan region through live events with the help of zoom video conferencing and live courses conducted by people who are experts in the field. When the activity part is completed, it was planned to show videos and content for special education and technology use and zoom video conferencing and education to the people participating in the research from time to time. During the 4-week training, the participants of the study were given live lessons on 'special education' via 'zoom' and this information was transferred to the participants of the study in the form of distance learning. The participants were expected to participate in the sessions every week. After 4 weeks of training, a data collection tool and an information form were applied to the participants, and the data obtained are given in the form of tables in the findings section. Zoom video conference application was the most used in education through the programme distributed to more than 130 participants, and each was limited to a designated section set up. Every week the training programme eetkinlik lasted for 45 minutes and in total 60 minutes. The timeframe for questions and answers was 15 minute. In the online training, the participants were expected to attend the training using their tablets, phones, computers and microphone. The measurement tool applied to the groups of participants was collected through an online questionnaire and transferred to the Statistical Package for the Social Sciences programme by coding them in the environment of calculation programmes.

2.5. Analysis of the data

In the analysis part of the data, statistical data obtained from university students were analysed in the Statistics programme using frequency (*f*), percentage (%), mean (*M*), standard deviation (SD) and *t*-test with IRA. The data obtained from the programme are given in tables accompanied by numerical values, findings and comments.

3. Findings

In this section, the numerical findings obtained as a result of the analysis of the statistical data obtained in the study are added in the form of tables, and various interpretations are included in accordance with the findings.

3.1. Technology opinions of the participants participating in the study

The findings regarding the technology opinions of the participants are given in Table 5.

Table 5. Technology opinions of the participants participating in the study

No.	Opinions on technology	*M*	SD
1	I was happy to use the technology at this size	4.47	0.49
2	When I entered the technology system, I found the system useful	4.58	0.52
3	I was able to access all the materials through the technology system	4.62	0.62

4	I was able to get technical support when I had problems with the technology system	4.52	0.51
5	I was able to access the technology from almost any device I wanted	4.62	0.61
6	With the technology, I was able to share files via the system to my other friends	4.58	0.49
7	During my time using technology, I connected to the Internet whenever I wanted	4.53	0.53
8	I got the data I wanted with the technology from where I wanted	4.61	0.51
9	I was able to communicate with the instructor who participated in distance education with technology	4.63	0.50
10	I can find anything I want through technology.	4.57	0.51
11	I would like to see this technology I have seen in my other courses	4.49	0.52
	Overall average	4.56	0.52

When Table 5 is examined, the statistical findings of the survey regarding the opinions of the participants participating in technology are shown and each one carries a different meaning after the events of the answer. Although the values are high on the basis of the views, it can be said that the most obvious expression was 'I was able to access the technology from almost any device I wanted', with a value of *M* = 4.62 finding. In addition, another obvious statements of the study was 'I was able to access all the materials through the technology system', with a value of *M* = 4.62. While it is seen that the opinions of the participants participating in the study on technology were quite high, another finding was 'I was able to communicate with the instructor who participated in distance education with technology', with a value of *M* = 4.63. Another finding of the study was 'I got the data I wanted from where I wanted with technology', with a value of *M* = 4.61. Finally, an overall average of *M* = 4.56 was reached.

In this context, it can be said, based on the findings, that technology has positive meaning for the participants because all the values in Table 5 are high.

3.2. Opinions of the participants participating in the study on the field of special education

The findings related to the field of special education of the participants participating in the study are given in Table 6.

Table 6. Opinions of the participants participating in the study on the field of special education

No.	Opinions on special education	*M*	SD
1	I believe that the field of special education is more effective with online courses	4.53	0.51
2	Taking classes in the field of special education allowed me to devote more time to myself in my daily life	4.80	0.64
3	Instant correspondence and asking questions with a teacher who tells about the forehead of special education is a very effective method	4.59	0.52
4	Special education repeats the lessons that are processed on the forehead later and allows me to consolidate the lesson	4.76	0.62

5	It is an advantage for me to be able to learn the information in my field courses whenever and wherever I want with the special education field	4.81	0.64
6	In the live course environment in the field of special education, I do not experience any disconnections when processing the course	4.71	0.61
7	I have the opportunity to learn how to use it for the next generation to take courses in the field of special education	4.54	0.62
8	I can't wait to tell the next generation about the course materials in the field of special education	4.78	0.64
9	I found the dimensions of the forehead of special education to be structured and understandable	4.55	0.49
10	Combining special education with technology has benefited my field	4.48	0.48
11	I would be happy to see the special education area in my other activities and classes	4.61	0.54
	Overall average	4.65	0.57

Table 6 shows the statistical opinions of the participants when examining the findings in relation to the field of special education. Each answer carries a different meaning after the events regarding the opinions on the field of special education. Although the values are high based on the opinions, the most obvious expression was 'My knowledge of the field of special education course with a field where I want and when I want to be an advantage for me being able to learn', with a value of *M* = 4.81. In addition, another obvious expressions of the research was 'I can't wait to tell the next generation about the course materials in the field of special education', with a value of *M* = 4.78. Another finding of the research work in the field of special education was 'Taking courses helped make more time for myself in my daily life', with a value of *M* = 4.80, and 'Special education allows you to learn the lesson and repeat lessons later on his forehead processed', with a value of *M* = 4.76. In addition, another value of the research was 'I do not experience any disconnection during the course processing in the live course environment in the field of special education', with a value of *M* = 4.71. Finally, an overall average of *M* = 4.65 was reached.

In this context, it can be said, based on the findings, that all the values in Table 6 are useful in the field of special education for groups of participants because they have a positive meaning.

3.3. Technology situations of the participants according to the gender criterion

The technology status of the participants according to the gender variable was examined and information about whether there is a significant difference is given in Table 7.

Table 7. The technology status of the participants according to the gender criterion

	Gender	*N*	*M*	SD	Df	*t*	*p*
Technology situations	Male	125	4.38	0.17	246	−577	0.512
	Female	121	4.32	0.22			

In Table 7, the technology status of the participants according to the gender variable is examined and it was found that there was no significant difference according to the gender criterion [t (246) = −577, p < 0.05]. When the technology status of the participant groups was examined, it was seen that the

average score of male participants in this field was *M* = 4.38, while the average score of the female participants in technology education was *M* = 4.32. In this context, it can be said that there is no difference between the technology scores of male participants in this study compared to the female participants in the findings of the research.

4. Discussion

Çakır and Korkmaz (2019) aimed to establish the effectiveness for individuals with special educational needs in the work they have done with augmented reality environment designs and development. As a result, they provided children with special educational needs real-life experiences in this field, contributing to their development in terms of technology. They found that teachers achieved more appropriate and useful courses. In this context, the value of future chemistry teachers when combined with the results of the research of the field of special education students reached the conclusion that they cannot wait for the future. In this context, it is seen that special education and technology in the field of research are of benefit.

Dieker, Rodriguez, Lignugaris/Kraft, Hynes, and Hughes (2014) provided a summary of the evolution of simulation in teacher training and intended for it to be considered for the further development. As a result, in the simulation, when using a standardised tool, the teacher can find ways to collaborate to improve practice. Teachers also enjoy that they achieved the results when combining the values with the results of the research technology of future chemistry teachers. In this context, it can be said that they benefit teachers and students according to the dimensions of this field and that they are strengthened by adding innovation in the field.

Zimmermann, Melle, and Huwer (2021) carried out a study on how chemistry teacher candidates could improve the work they have done and thus investigated how the effective use of educational technology in the teaching of chemistry is intended to provide qualifications. As a result, they love the chemistry teachers and receive training in pedagogy using technology to obtain information about the subject didaktig, also having opportunities to advance at a time when educational technology and internships are in direct connection with studies suggesting that they would know they observed for many years. In this context, when the values of the research and the results are combined, it is seen that the results of the future chemistry teachers exist within the field of special education in each technology used and that the future chemistry teacher would find meaning and benefit in education.

Every research is examined and it is seen that the area provides benefits. In this context, this study is expected to provide benefits for teachers and the field of chemistry; most of these studies for students and teachers are made by considering all data in the research.

Ieker et al. (2014) provided a summary of the evolution of simulation in teacher training and intended for it to be considered for further development. As a result, in the simulation when using a standardised tool, the teacher can use to find ways to collaborate to improve practice in this field are also teachers that they enjoy that they achieved the results they reach this value, when combined with the results of the research technology future chemistry teachers when they use the information they want at any time we have reached the results they have reached it. In this context, it can be said that they benefit teachers and students according to the dimensions of this field and that they are strengthened by adding innovation to the field.

5. Conclusion

The results of the study partially show the number of participants; they serve a purpose in the research and data. As a result, the number is an excellent source for data collection. In this context, this research consisted of 246 participants. Another value of the research is that the technology time zones used during the day were investigated to increase the size of technology for special needs students. As a result, it was concluded that they prefer using technology mostly for 4–7 hours. Another outcome of the research discussed the problem of education and induction in relation distance education tracking the status video applications on the basis of hours. As a result, the majority of participants preferred up to 8 hours of usage.

Another value of the research discussed the participants surveyed regarding their opinions of statistical findings, and future research with students regarding technology showed that they can very easily use technology where ever they want to and also they can connect from any device using technology irrespective of time and place. Another important statistical finding of the study participants in the survey and who researched the area of special education is that the result appears to be ilisikli information on his forehead, while they are also impatient for the next generation to pass on to the gains that they have learned in this area and which they have found useful and helpful for their area of special education as they wish as they learned the dimensions of the area; it is observed that this is positive information. When the final result of the research is considered, the technology status of the participant groups according to the gender variable is examined, and it is seen that there is no significant difference according to the gender criterion.

In addition, it can be said from the results of the study that male participants have high scores, they have added themselves to this field of innovation, and also that the scores of female participants are high, but there is no difference between the technology scores of the male participants and the female participants in the results of the study.

References

Badilla-Quintana, M. G., Sepulveda-Valenzuela, E., & Salazar Arias, M. (2020). Augmented reality as a sustainable technology to improve academic achievement in students with and without special educational needs. *Sustainability, 12*(19), 8116. https://doi.org/10.3390/su12198116

Çakır, R., & Korkmaz, O. (2019). The effectiveness of augmented reality environments on individuals with special education needs. *Education and Information Technologies, 24*(2), 1631–1659. https://doi.org/10.1007/s10639-018-9848-6

Çelik, B., & Uzunboylu, H. (2022). Developing an attitude scale towards distance learning. *Behaviour & Information Technology, 41*(4), 731–739. https://doi.org/10.1080/0144929X.2020.1832576

Dieker, L. A., Rodriguez, J. A., Lignugaris/Kraft, B., Hynes, M. C., & Hughes, C. E. (2014). The potential of simulated environments in teacher education: Current and future possibilities. *Teacher Education and Special Education, 37*(1), 21–33. https://doi.org/10.1177/0888406413512683

Gavronskaya, Y., Larchenkova, L., Kurilova, A., & Gorozhanina, E. (2021). Virtual lab model for making online courses more inclusive for students with special educational needs. *International Journal of Emerging Technologies in Learning (iJET), 16*(2), 79–94. Retrieved from https://www.learntechlib.org/p/218942/

Giaconi, C., Bianco, N. D., D'Angelo, I., Halwany, S., & Capellini, S. A. (2021). Cultural accessibility of people with intellectual disabilities: A pilot study in Italy. *International Journal of Special Education and Information Technologies, 7*(1), 16–26. https://doi.org/10.18844/jeset.v7i1.7013

Gybas, V., Kostolányová, K., & Klubal, L. (2017). Experimenting with support of mobile touch devices for pupils with special educational needs. *International Association for Development of the Information Society.* Retrieved from https://eric.ed.gov/?id=ED579201

Jdaitawi, M. T., & Kan'an, A. F. (2022). A Decade of Research on the Effectiveness of Augmented Reality on Students with Special Disability in Higher Education. *Contemporary Educational Technology, 14*(1). , https://doi.org/10.30935/cedtech/11369

Kartimi, K., Gloria, R. Y., & Anugrah, I. R. (2021). Chemistry online distance learning during the COVID-19 outbreak: Do TPACK and teachers' attitude matter? *Jurnal Pendidikan IPA Indonesia, 10*(2), 228–240. https://doi.org/10.15294/jpii.v10i2.28468

Kramarenko, T., Bondar, K., & Shestopalova, O. (2021). The ICT usage in teaching mathematics to students with special educational needs. *Journal of Physics: Conference Series* (vol. 1840, no. 1, p. 012009). IOP Publishing. Retrieved from https://iopscience.iop.org/article/10.1088/1742-6596/1840/1/012009/meta

Okeke, F. C., Onyishi, C. N., Nwankwor, P. P., & Ekwueme, S. C. (2021). A blended rational emotive occupational health coaching for job-stress among teachers of children with special education needs. *Internet Interventions, 26*, 100482. https://doi.org/10.1016/j.invent.2021.100482

Oliveira, G., Grenha Teixeira, J., Torres, A., & Morais, C. (2021). An exploratory study on the emergency remote education experience of higher education students and teachers during the COVID-19 pandemic. *British Journal of Educational Technology, 52*(4), 1357–1376. https://doi.org/10.1111/bjet.13112

Ozaeta, L., Perez, I., & Rekalde, I. (2022). Interactive storytelling for the retelling of autobiographical memory in children: A social robotics approach. *Global Journal of Information Technology: Emerging Technologies, 12*(1), 43–50. https://doi.org/10.18844/gjit.v12i1.7111

Sahli, N., & Belaid, L. (2022). The incarnation of global citizenship education in an Algerian secondary education textbook. *Global Journal of Foreign Language Teaching, 12*(1), 01–10. https://doi.org/10.18844/gjflt.v12i1.6489

Salama, R., Uzunboylu, H., & Alkaddah, B. (2020). Distance learning system, learning programming languages by using mobile applications. *New Trends and Issues Proceedings on Humanities and Social Sciences, 7*(2), 23–47. https://doi.org/10.18844/prosoc.v7i2.5015

Schellini, M., & Rahimi, A. (2022). Color application in vernacular architecture in Southern India: An intangible cultural phenomenon? *Global Journal of Arts Education, 12*(1), 19–33. https://doi.org/10.18844/gjae.v12i1.6837

Turan, Z., & Atila, G. (2021). Augmented reality technology in science education for students with specific learning difficulties: Its effect on students' learning and views. *Research in Science & Technological Education, 39*(4), 506–524. https://doi.org/10.1080/02635143.2021.1901682

Zimmermann, F., Melle, I., & Huwer, J. (2021). Developing prospective chemistry teachers' TPACK – A comparison between students of two different universities and expertise levels regarding their TPACK self-efficacy, attitude, and lesson planning competence. *Journal of Chemical Education, 98*, 1863–1874.