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# Development of university students' metacompetence based on innovative technologies

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**Abstract**

Due to the effects of the COVID-19 virus, which started in Wuhan, China, and affected the world, on education / training areas since March 2019, digital transformation in education and online education issues have started to come to the fore. The general purpose of this study is to determine the development of metacompetence of university students based on innovative technologies. The research was implemented in the spring term of 2020–2021. It consists of 463 volunteer students according to the study in universities in Kazakhstan. The research description method was used. The interview form used in the study consists of 18 positive items developed by the researchers. The research data were collected via an online Google Form and analysed using the Statistical Package for the Social Science programme. According to the results of the study, it was determined that university students choose their smart devices for innovative education, use the Internet

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and smart devices every day for this method, enjoy the use of innovative technology, create metacompetence information with innovative education and change their old habits with innovative education. The results were reached by expressing that the interest increased, the use of innovative education with the blended learning method enabled them to understand the lesson better and that the innovative education created a connection with the teachers of the lesson. Finally, it is thought that repeating these studies with different methods for university students will benefit the field, the educator and the students studying at the university.

Keywords: Innovative education, metacompetence, technology, university, distance education, pandemic, coronavirus (COVID-19);

## 1. Introduction

Today, developments that are renewed with technology are seen to bring about many positive / negative changes in our learning style as we prefer and benefit from e-commerce, e-marketing and e-shopping sites (Sabaitytė, Davidavičienė, & Karpovičiūtė, 2020). The most important change in our world is experienced in the field of communication and technology, the developments in the field of technology primarily manifest themselves in the field of communication and it is seen that they appeal to education, people and students (Hendawi & Nosair, 2020). With this current innovative feature, it can be said that the introduction and use of computer technology and the use of online education among students is one of the most intense areas of education and training. In this period, teaching / learning has become possible through new technologies and smart devices, leaving the classroom environment (Sutiah, Slamet, Shafqat, & Supriyono, 2020). In the age of information and communication, a person is now able to recognise himself, think critically, manage his stress, communicate with people, make decisions and solve problems. In other words, student resources equipped with meta-efficacy behaviours are demanded (Özdoğru & Güçlü, 2020). This structure makes it a necessity for students to be supported in adapting to the needs of today's and society that differ (Bernatonyte, Ciburiene, Simanaviciene, & Startiene, 2019).

In the innovative, developmental and learning periods of university students, attention, concentration and learning decrease with the increase of their fears and concerns about the future and situations such as making mistakes in work, deterioration in human relationships and decrease in work efficiency can be observed (Demirsöz, Özel, Yonar, Tekin, & Tekindal, 2021). The opposite of this situation can lead students to failure. The concepts of education and technology occur with metacompetence in this section for university students.

### *1.1. Conceptual framework*

#### *1.1.1. Metacompetence*

Meta-efficacy is defined as the elements that have the ability to recognise and criticise people, students and individuals themselves in the information age, remove and shape their stress, communicate and decide between people, and finally have the ability to solve problems (Nazlı, Önal, Kiye, & Dönmezoğulları, 2018). When considered from both a pedagogical and technical point of view, the field of metacompetence is rapidly changing and developing. While technological developments enable the development of software and applications related to innovative programmes, it is seen that they constantly affect researchers and university students as they analyse the success of theories and concepts between media, technology and teaching strategies,

but researchers and educational technology have difficulty expanding the concepts about the necessity of attitudes (Devedzic & Devedzic, 2019).

The concept of metacompetence emerged in the universe we live in with counselling and psychological counselling services (PDR) 65 years ago, but today it is understandable that it has transformed from a traditional to developmental model and from treatment and crisis approaches to developmental and preventive approaches. In this time period, many factors such as the qualifications expected from human resources with the help of technology, professions and vocational training processes, student attitudes and learning have changed (Nadolinskaya, Rossinskaya, Dyadchenko, Trofimenko, & Anokhina, 2021).

Information on the concept of innovative technology is given below in detail.

*1.1.2. Innovative training*

Almost every moment of our day passes with technology and it is known that it makes our life easier, and innovative technologies have an undeniably important role in supporting information technology materials in our daily life, in our work, in the realisation of our activities. For example, Cloud systems are innovative technology; lectures live is an innovative technology; transferring money from end to end with mobile banking is an innovative technology; and education is expected to benefit university students with innovative technology (Aksin, 2021).

Raising individuals with knowledge, skills, attitudes and behaviours in parallel with these developments in students with rapidly changing shape, adapting to new lives and developing technology methods is gaining importance all over the world, in education, in the classroom, even in the room of a house (Arante, Sacay, Bocboc, & Baisa, 2020). In our world, the acquisition of new skills and their integration in courses, supporting 21st-century skills such as technological achievements and innovation, and gaining the ability to adapt to professions are of great importance in strengthening the economic and social structure, as well as strengthening the economic and social structure. Conducting studies that directly affect the expected roles of university students and individuals is thought to be necessary. In this context, innovative education is introduced in recent studies in the field of education (Kizilmese & Okur, 2020). As a result, evaluating the readiness of students in order to learn and teach with innovative technology is an important issue that many education and training institutions should analyse. While students' readiness for innovative teaching is related to technical skills in using computers, mobile phones and the Internet, it should be taken into account that it is also related to how students perceive online teaching, learning styles and preferences (Bello, Idris, & Bappayo, 2020).

According to all these expressions, it is seen in the literature that when metacompetence and innovative technologies combine, university students have a complete education method in every regard, although it is expected that every field of innovative technologies will benefit university students and students.

*1.2. Research on innovative technology and metacompetence topics*

In this section, studies involving innovative technology and metacompetence issues have been evaluated and formed according to their objectives and results.

Ustav's (2018) study aimed how metacompetencies differ when comparing entrepreneur and student groups and found that there is a change in students according to the phenomenological inquiry structure (their own ideas) in the results of the study. He also stated in his research that metacompetences often consist of practical use, and these practices will result positively for students.

Rustamova's (2019) study aimed at developing media culture (metacompetence) for secondary school students with the help of technology, and as a result, although she saw positive changes in secondary education students, she stated that improvements should be made to improve the mechanism and content of media culture. He also emphasised that the students were secondary education and continued their education in terms of metacompetence.

Komkova, Kobeleva, Stuchinskaya, and Krutko (2019) aimed to generalise the theory and practice for the development of metacompetencies in university students, which are interpreted as the super-subject foundations that determine the effectiveness of university students to realise more self-expression in a particular professional field, while the results of the research concluded that the level defines the content and can analyse it.

In the study conducted by Bogo et al. (2013), it was aimed to provide students with a better understanding of the concept of meta-efficacy as it is applied in social work. According to the results of the study, regarding the emotional reactions of the students, a differentiation was found in the students' ability to conceptualise practice and to use the concepts of diversity. Some students came to the conclusion that they stated that they were emotionally 'disorganised' and therefore could not use the information in practice.

Elifoğlu Kurt's (2015) study aimed to examine the quality features of a distance education system, perceived ease of use, perceived benefits and users' system use and satisfaction with the integration of the technology acceptance model and information systems success model, reaching 524 university students, according to the results of the study. It was found that service quality, information quality and perceived ease of use positively affect perceived benefit.

If we consider the studies in the related research section, there are not many studies in the literature if these deficiencies are taken into consideration, the shortage of articles, the unification of metacompetence and technology, not addressing the readiness of university students, not paying attention to the field of application etc. In this respect, it is thought that this study will benefit the literature, university students and educators.

Today, it has been observed that the beginning, middle and post-COVID-19 epidemic period has made the concept of education a common teaching tool in universities with the help of innovative technology. However, it is also important to question whether students are ready to be successful in a learning environment with innovative technology. According to the problem situation of this study, it is aimed to determine the development of metacompetence of university students based on innovative technologies.

## 2. Purpose of the study

In this study, it was aimed to determine the development of metacompetence of university students based on innovative technologies.

The following questions were sought for the general purpose determined:

1. How are university students using smart devices during the day?
2. Do university students enjoy using technology?
3. What are the smart use cases of university students during the day?
4. What is the purpose of computer and Internet usage of university students?
5. How are university students' views on innovative technology?
6. What are university students' views on innovative technology, before and after the study?

*2.1. Research model*

The description method was used in the research. This method is used in studies aimed at describing and explaining what events, objects, entities, ideas, certain groups and various areas are; it is also used to illuminate a situation, evaluate and describe the relationship between events (Akgül & Akdag, 2017).

*2.2. Participants*

The research was conducted in the 2020–2021 spring academic year. The data of the research consisted of 463 volunteer students studying at universities in Kazakhstan randomly. All of these students take their courses by distance education.

*2.2.1. Gender*

Table 1. Distribution of university students by gender

| Gender | *F* | % |
|---|---|---|
| Male | 230 | 49.68 |
| Female | 233 | 50.32 |
| Total | 463 | 100 |

As seen in Table 1, it is seen that 49.68% (230 people) of the teacher candidates are male and 50.32% (233 people) are female. The findings in this section reflect the actual gender distribution.

*2.2.2. Do you enjoy using technology in innovative education*

Table 2 shows the distribution of the university students participating in the research according to their enjoyment of using technology for innovative education.

Table 2. Pleasure distribution of university students participating in the study while using technological vehicles

| Technological tool pleasure when using are you taking it? | *F* | % |
|---|---|---|
| Yes | 457 | 98.70 |
| No | 6 | 1.30 |
| Total | 463 | 100 |

When Table 2 is examined, 98.70% (457 people) of the distributions found on the question do you enjoy using technology vehicles to the study group students answered yes, while 1.30% (6 people) answered no. It can be said from this table that the students are open to new technologies.

*2.2.3. Owning smart devices*

The smart device states that the university students participating in the study have or do not have been researched and given in Table 3.

Table 3. Smart device ownership status

| Smart device ownership status | *F* | % |
|---|---|---|
| There is | 463 | 100.0 |
| Nothing | 0 | 0.0 |
| Total | 463 | 100 |

In Table 3, the smart device ownership status of university students is examined and we see that university students are present with 100.0% and answered with 0.0 without. This situation is important for education.

*2.3. Data collection tool*

During the data collection process, the questionnaire form developed by the researchers, two of whom have the title of professor in the field of PDR and two of them have the title of professor in the field of Informatics, and the scope validity of the questionnaire, which was developed by the researchers by taking the opinions of a total of four different field experts who worked on these fields, and the reliability coefficient was found as $\alpha$ = 0.94. In addition, the tool we call 'innovative technology survey' was used in the name of the interview form. The interpretation of the scores obtained from the questionnaire consisted of 18 items in total. The range width of the scale ($a$ = array width / number of groups to be made) formula is used. The first part of the questionnaire form, which consists of two parts, consists of the question for determining demographic information, and the second part is for determining opinions about innovative technology. These views consist of satisfaction, motivation, enjoyment and learning.

*2.4. Application*

Live courses in a total of 8 sections were arranged for 453 university students continuing their education in Kazakhstan. Before the training started, the interview form was applied to the students and their data were taken. Within the 6-week training, the trainings were given with technology to create innovative technology and metacompetence of the students. What is metacompetence, where is innovative technology used, how these concepts are combined with the course etc., after the 6-week training, the students were re-interviewed and the data in the form of pre-test and post-test were given in the table of findings. The education is arranged on Google Meet, which is preferred by most universities, with a limited number of 100 people for each section, each lesson is taught in 40 minutes, and in the case of online education, university students are expected to participate in the lesson with video and microphone from their smart devices. The interview form applied to the students was obtained through Google Form.

### *2.5. Data analysis*

Descriptive statistical methods (f) frequency, (%) percentage and (X) arithmetic mean were used for the necessary statistical solutions of the data collected for the sub-problems within the framework of the general purpose of the study, and one-factor chi-square tests were used to determine the differences between independent variables. The data related to numerical developments were made into tables and interpreted, and whether there was a significant difference between independent variables was tested at the level of $\alpha$ = 0.04. The frequencies used for analysing the data related to the research are given in Table 4.

### *2.6. Limits used in data analysis*

Table 4.

| Weight | Borders | Alternative |
|---|---|---|
| 1 | 1.00–1.80 | I totally disagree. |
| 2 | 1.81–2.60 | I don't agree with that |
| 3 | 2.61–3.40 | I'm undecided. |
| 4 | 3.41–4.20 | Agree |
| 5 | 4.21–5.00 | I totally agree with that. |

Together with the values in Table 4, more values are interpreted and shared in the results section in tables.

## 3. Results

This section includes findings on the innovative educational use of university students. Each data of the research is presented in tables and presented in this section with comments.

### *3.1. Using cases of smart devices by using university students in their lessons of innovative education*

Table 5. Smart device usage cases of university students on innovative education

| Smart device use cases | *F* | % |
|---|---|---|
| Every day | 430 | 92.67 |
| Every week | 20 | 4.31 |
| Every month | 13 | 2.81 |
| Total | 463 | 100 |

When Table 5 is examined, smart device usage cases were calculated and the highest value was 92.7% (430 people) who answered every day, 4.31% (20 people) used it every week and 2.81% (13 people) used it every month. The answers in Table 5 reflect the true values.

### *3.2. Smart device usage purposes by using university students in innovative education courses*

Table 6. University students' smart device usage purposes on innovative education

| Internet use with smart devices | *F* | % |
|---|---|---|
| Distance education applications (live lesson) | 453 | 97.84 |

| | | |
|---|---|---|
| Other | 10 | 2.16 |
| Total | 463 | 100 |

When Table 6 is examined, among the findings of the use of smart devices and Internet, 97.84% (453 people) chose distance education applications and 2.16% (10 people) determined other applications. These results reflect the true findings.

*3.3. Results on innovative education attitude scores of university students*

Table 7. Innovative education attitudes of university students

| Innovative education attitude scores | *N* | *M* | *S* |
|---|---|---|---|
| I know | 451 | 4.60 | 0.88 |
| I don't know | 12 | 2.80 | 0.61 |
| Total | 463 | 3.70 | 0.74 |

When Table 7 is examined, the arithmetic mean of the innovative education attitude questionnaire scores of the university students participating in the study was searched and the answer of the university students 'I have knowledge' was determined as *M* = 4.60, while the answer 'I do not know' was 2.80. According to these findings, the innovative education attitudes of university students can be said to be high for metacompetence with innovative education.

*3.3. Innovative educational views of university students before and after study*

Table 8. Innovative educational views of university students before and after the study (Pre-test–Post-test)

| No | Innovative education survey | Test-1 | | Test-2 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | *M* | SS | *M* | SS | df | *t* | *p* |
| 1 | I can come up with new ideas with Innovative Education | 3.55 | 0.87 | 4.34 | 0.65 | 463 | −4.611 | 0.000 |
| 2 | I'm more interested in lessons when I come up with new ideas. | 3.75 | 0.83 | 4.41 | 0.63 | 463 | −4.033 | 0.000 |
| 3 | I am happy to participate in innovative education in my courses | 3.70 | 0.85 | 4.41 | 0.63 | 463 | −4.292 | 0.000 |
| 4 | I understand innovative education better thanks to technology | 3.67 | 0.82 | 4.34 | 0.69 | 463 | −3.930 | 0.000 |
| 5 | With innovative training, I work harder to succeed in class | 3.60 | 0.77 | 4.39 | 0.66 | 463 | −4.915 | 0.000 |
| 6 | I have the opportunity to learn the concepts of innovation in innovative education classes | 3.77 | 0.80 | 4.34 | 0.61 | 463 | −3.573 | 0.001 |
| 7 | I can express my ideas very easily with the help of technology in innovative education | 3.70 | 0.91 | 4.36 | 0.73 | 463 | −3.627 | 0.001 |
| 8 | I watch videos over and over again to be more successful in innovative training classes | 3.82 | 0.74 | 4.34 | 0.65 | 463 | −3.308 | 0.001 |
| 9 | I would love to see innovative education classes in different lessons | 3.70 | 0.85 | 4.41 | 0.63 | 463 | −4.292 | 0.000 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10 | I can connect to the innovative training from any smart device I want | 3.65 | 0.94 | 4.29 | 0.74 | 463 | −3.387 | 0.001 |
| 11 | Innovative training allows me to do it again | 3.57 | 0.90 | 4.36 | 0.62 | 463 | −4.600 | 0.000 |
| 12 | Innovative education The education I receive in classrooms allows me to improve myself | 3.62 | 0.83 | 4.46 | 0.63 | 463 | −5.080 | 0.000 |
| 13 | Innovative education changed my old habits | 3.62 | 1.10 | 4.60 | 0.58 | 463 | −5.037 | 0.000 |
| 14 | I take more responsibility to be more successful in innovative education classrooms | 3.72 | 0.81 | 4.43 | 0.63 | 463 | −4.403 | 0.000 |
| 15 | Using innovative education with blended learning method helps me understand the lesson better. | 3.95 | 0.87 | 4.48 | 0.55 | 463 | −3.313 | 0.001 |
| 16 | I believe that I have a positive connection with my teacher thanks to innovative education. | 3.55 | 0.95 | 4.48 | 0.63 | 463 | −5.194 | 0.000 |
| 17 | I can easily get used to every idea with innovative training | 3.70 | 0.89 | 4.36 | 0.73 | 463 | −3.627 | 0.001 |
| 18 | It is fun to study in the classrooms I attended with innovative education. | 3.82 | 0.65 | 4.34 | 0.65 | 463 | −3.308 | 0.001 |
| | Overall average | 3.69 | 0.85 | 4.40 | 0.65 | 463 | −4.611 | 0.000 |

From Table 8, it is seen that there are pre-test and post-test results about innovative education. It is seen that the post-test scores are higher than the pre-test and there is a significant difference ($p < 0.005$). Although there is a significant difference in all expressions, according to the post-test results, one of the most prominent expressions of the university students was 'Innovative education has changed my old habits', with a post-test score of $M = 4.60$ and a pre-test score of $M = 3.62$. Secondly, in the post-test, the most prominent expressions of the students were 'My interest in lessons increases when I produce new ideas' and 'Attending innovative education in my lessons makes me happy', with a post-test score of $M = 4.41$ each and post-test scores of $M = 3.70$ and $M = 3.75$, respectively. In addition, among the statements, it is seen that the post-test score average of 'Innovative education allows me to improve myself' is $M = 4.46$, while the pre-test score average is $M = 3.62$.

Although positive results were seen in each item of the study, among the opinions of the university students, 'Using innovative education with blended learning method makes me understand the lesson better' and 'I believe that I have a positive connection with my teacher thanks to the innovative education' had post-test scores of $M = 4.48$ each and pre-test scores of $M = 3.95$ and $M = 3.55$. It is obvious that some students have bonds with their teachers due to technology. In addition, among the opinions of university students, it is seen that 'Innovative education gives me the opportunity to do it again' had a post-test score average of $M = 4.36$ and a pre-test score average of $M = 3.57$. In addition, among the opinions of university students, it is seen that the post-test scores of 'I would like to see the innovative education classes in different courses' was $M = 4.41$, while the pre-test score average was $M = 3.70$. Finally, while the post-test average of university students is $M = 4.40$, it is seen that the pre-test score average is $M = 3.69$. Table 8 shows that the students' ideas develop positively with innovative education.

## 4. Discussion

Uçar and Uysal (2019) aimed to understand whether university students' self-efficacy perceptions and trait anxiety predicted their 'lifelong learning tendencies'. In the results of the study, it was concluded that students' academic and social competencies and trait anxiety significantly predicted lifelong learning tendency. When this value is taken into consideration with the results of the research, they stated that the university students understand the lesson better than the education blended with innovative education. These studies make sense for the students. Sarıtaş and Gunpowder (2020) aimed to determine the readiness of students for online education before online education begins in their study. According to the results of the research, it was concluded that students have readiness for online learning, but find themselves inadequate in terms of online learning control, and that online learning readiness differs according to the undergraduate students' classes and whether they have previous online learning experiences. According to these results, it can be said that students' feelings of meta-efficacy do not occur according to some situations. When this study is handled according to the results of the research, it is seen that the students who have knowledge about innovative education are high. According to this, it can be said that the education methods of the university students from the region or university have changed.

Komkova, Kobeleva, Stuchinskaya, and Krutko (2019) aimed to generalise the theory and practice for the development of metacompetencies in university students, which are interpreted as the super-subject foundations that determine the effectiveness of university students to realise more self-expression in a particular professional field, while the results of the research conclude that the level defines the content and can analyse it. When this value is considered with the results of the research, it is concluded that the students' innovative education and meta-efficacy values are high. It is important for educators to continue their education by searching for the most suitable model instead of choosing a single model for university students. It is also thought that this study will contribute to the literature. Bogo et al. (2013) aimed to provide students with a better understanding of the concept of meta-efficacy as it is applied in social work in their study. According to the results of the study, regarding the emotional reactions of the students, a difference was found in the students' ability to conceptualise practice and to use the concepts of diversity. Some students came to the conclusion that they stated that they were emotionally 'disorderly' and therefore could not use information in practice. When the results of the study were examined, it was concluded that the students formed a bond between their teachers and their teachers with innovative education. It was seen that this development was a positive feeling, even though the lack of emotional reactions in the study was bad, it can be thought that the education model was implemented incompletely, based on these results. It is thought that applying the right method to the students at the right time will benefit education and students. Every time a study is expected to give a positive result, it is a negative result and is of great importance for education.

The findings in the discussion part are important for the study because there are not many studies in the literature on innovative education and metacompetence. The fact that university students have to receive their education online with the effect of the COVID-19 in the period called pandemic is not a disadvantage for education, but an advantage for innovative education. It is thought that further studies on innovative education and metacompetence will strengthen these concepts.

## 5. Conclusion

Education develops every day and it is seen that it is replaced by innovative methods. New methods benefit both educators and students. The concept of education is now in our pocket is rising day by day and it is aimed to make education more understandable. According to the results of the study, 230 male and 233 female university students participated in the study. The concept of gender is always important, because whether one group is more or less than the other group may differ according to the results of the study. Smart devices are very important in innovative education; it is known that education continues, thanks to smart devices, during the pandemic period. Among the results of the research, it has been concluded that all university students have smart devices. It is shaped as a computer, tablet and phone, in light of this information, thanks to the smart device used by every university student in the research, it is expected that the students will continue their education as well as increase in knowledge, while it is planned to provide education online every day during the pandemic period. The planned education and the needs of the students will be met with this method, as expected to be on the devices of the students, and it is known that using smart devices not only for education but also for students to make themselves better in every sense; it is known that the research will be good for their personalities. According to the results, it has been found that the highest value of smart devices is 'every day', which is in direct proportion to meeting their educational needs and their own needs. Among the results of the study, an answer to the question of whether you are satisfied with using innovative technology was sought and it was concluded that most of the students were satisfied in this process; it is thought that using it for students who are called technology age always gives pleasure, happiness, education and success. During the COVID-19 period, technology entered every home and it is seen that it is indispensable for education to be sustained. Another result of the study is for what purpose the students choose their smart devices and their Internet. In this context, it has been concluded that the students mostly choose their smart devices and internet for live lessons.

The benefits of innovative education consist of terms (emotion, experience and readiness) that are called metacompetence in your day students. The university students did not use these concepts unknowingly; it is important for both their lessons and their lives. According to another result of the study, it was asked whether the university students were aware of their views on innovative education and it was found that most of the university students participating in the study had knowledge. This result shows that university students are open to innovative education and it is known that they can meet their educational needs. Innovative educational views are important for meta-efficacy and it is known that a negative thought will break all taboos because university students' opinions are directly proportional to the education they have received; the final result of the research is the pre-test and post-test scores of the university students, despite the innovative educational environments. When the results of the research are considered, it has been concluded that there is a significant difference between pre-test and post-test scores of the students. The results were achieved by stating that the old habits were changed with innovative education; the interest in the lessons increased when new ideas were produced; the use of innovative education with the blended learning method enabled them to understand the lesson better; and that thanks to the innovative education, the course was established with the teachers and educators.

Based on all these statements, it is said that the metacompetence levels of university students based on innovative technologies have improved, while it is seen that the educational needs

of university students are benefited in this context, and it is thought that repeating these studies with different methods for university students will benefit the field, the educator and the students studying at the university.

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