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Intellectual Risk Taking When Learning about Technology: Case of Prospective Science Teachers*

Teknolojiyi Öğrenirken Zihinsel Risk Alınması: Fen Bilgisi Öğretmen Adayları Örneği

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ABSRTACT

Learning about technology in a classroom environment necessitates intellectual risk taking because intellectual risk taking involves active participation in learning. Hence prospective science teachers should adopt high intellectual risk-taking levels when learning about technology to improve their participation in learning. By determining their level of intellectual risk taking and ways of promoting such risk taking, we can decide on the degree of intellectual risk taking of prospective teachers and which ways of increasing intellectual risk taking are effective in learning about technology. Accordingly, this study explores the intellectual risk-taking levels of prospective science teachers when learning about technology and ways of increasing intellectual risk taking during their learning. The participants comprised 207 prospective science teachers from departments of science education at universities in Turkey. For the data collection, three "intellectual risk-taking questionnaires about learning technology" and "personal information forms" were utilized. For analyzing data, inductive content analysis was used. The findings revealed that the intellectual risk-taking level of prospective teachers was higher than their avoidance of taking intellectual risks. The findings also showed that conditions of intellectual risk taking are an important factor in taking intellectual risks when learning about technology. This study provides implications for shaping an environment in which to take the required level of intellectual risk in learning about technology in teacher education programs and presents examples of intellectual risk taking.

Keywords: *Intellectual risk taking, Learning about technology, Prospective science teachers, Teacher education.*

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ÖZ

Her öğrenmede olduğu gibi teknolojiyi öğrenme sürecinde de, zihinsel risk alma ve dolayısıyla öğrenme sürecine aktif katılım gerekmektedir. Bu nedenle, fen bilgisi öğretmeni adayları, teknoloji hakkında öğrenme sürecine katıldıklarında, yüksek düzeyde ve nedenleri belli şekilde zihinsel risk alma sürecini deneyimlemelidirler. Öğretmen adaylarınca gösterilen zihinsel risk alma düzeyleri ve bu tür riskleri alma yollarını belirleyerek, öğretmen adaylarının zihinzel risk alma derecesine ve zihinsel risk alma süreçlerini hangi yollarla geliştireceklerine dair kararlar verebiliriz. Bu çalışmada, fen bilgisi öğretmeni adaylarının zihinsel risk alma düzeyleri araştırılmıştır. Çalışmanın katılımcılarını Türkiye'deki iki farklı üniversitede eğitim gören fen bilimleri eğitimi bölümlerinden 207 öğretmen adayı oluşturmuştur. Veri toplama sürecinde "teknolojiyi öğrenme sürecinde zihinsel risk alma durumu anketleri" ve "kişisel bilgi formları" kullanılmıştır. Verileri analiz etmek için tümevarımcı içerik analizi kullanılmıştır. Bulgular, öğretmen adaylarının teknoloji öğrenirken zihinsel risk alma etkinlikleri açısından oldukça farklı örnekler sergilediklerini göstermiştir. Bulgular ayrıca, zihinsel risk alma koşullarının, teknolojiyi öğrenirken zihinsel risklerin alınmasında önemli bir faktör olduğunu göstermiştir. Bu çalışma, öğretmen eğitimi programlarında, teknoloji hakkında öğrenme sürecinde gerekli olan zihinsel risk alma koşullarının neler olduğu ve zihinsel risk almanın ne gibi örneklerinin olduğu konusunda kanıt sağlamaktadır.

Anahtar Kelimeler: *Zihinsel risk alma, Teknoloji hakkında öğrenme, Fen bilgisi öğretmeni adayları, Öğretmen eğitimi.*

INTRODUCTION

In recent studies on technology use by prospective teachers, it has been emphasized that teacher education programs should help prospective teachers establish a sound knowledge base about technology and its pedagogical practices, along with technology skills (Koehler and Mishra, 2008; Mishra and Koehler, 2006). Moreover, teacher education programs should select and implement the most effective ways of preparing prospective teachers to use technology effectively in their teaching (Goktas, Yildirim, and Yildirim, 2008). In spite of the emphasis on increasing the knowledge and skills of prospective teachers regarding technology, Kay (2006) revealed that prospective teachers do not feel ready to integrate and use technology in their teaching. Moreover, prospective teachers are not familiar with the advantages of educational technologies, so this problem causes a lack of technology literacy and insufficient use of technology in teaching (Besoluk, Kurbanoglu, and Onder, 2010; Turkmen, Pedersen, and McCarty, 2007). Overcoming these problems necessitates designing effective courses about

technology in teacher education programs. On the other hand, designing such courses is not enough to achieve effective outcomes since opportunities for active participation of prospective teachers in learning processes should be provided. One of the most important factors in active participation is intellectual risk taking during learning, since learning in classrooms involves uncertainties and risks (Byrnes, 1998). In such an environment, the learner should take risks such as asking questions, sharing thoughts and doing different things in order to learn effectively. Beghetto (2009) defined one type of risk taking as "intellectual risk taking" and his definition referred to intellectual risk taking as engaging in adaptive learning behaviors that place the learner at risk of making mistakes or appearing less competent than others. Intellectual risk taking is different from a non-adaptive form of risk taking because it is adaptive risk taking that is associated with student learning and achievement (Cakir and Yaman, 2015; Streitmatter, 1997). Also, intellectual risk taking is necessary for promoting higher-order thinking and learning about different subjects (de Souza Fleith, 2000). By supporting intellectual risk taking in classrooms for prospective teachers, learning about technology might be provided by an effective teaching process. However, determining existing intellectual risk-taking levels and examples of prospective teachers and then finding their suggestions for improving intellectual risk taking are needed to provide effective ways of increasing intellectual risk taking in learning about technology.

In previous studies, it was found that intellectual risk-taking levels of prospective teachers were associated with study skills, the fear of receiving negative criticism, active participation in courses, knowledge construction and the development of moral imagination (Brown, Parsons and Worley, 2005; Cetin, Ilhan and Yilmaz, 2014; Ilhan, Cetin, Oner-Sunkur and Yilmaz, 2013). Ilhan et al. (2013) investigated the association between study skills and the intellectual risk-taking levels of prospective teachers. The study involved 221 prospective teachers and the researchers collected the data by applying two different scales. The results showed that study skills and the intellectual risk-taking levels of prospective teachers were significantly associated with each other. Cetin et al. (2014) also investigated the association between the intellectual risk-taking

levels of prospective teachers and another variable: the fear of receiving negative criticism. Their study involved 215 prospective teachers and the data of their study were collected based on two different scales. Their findings revealed that the intellectual risk-taking levels of prospective teachers were negatively associated with the fear of receiving negative criticism. By focusing on prospective science teachers, Oner Sunkur (2015) investigated the association between the intellectual risk-taking levels and anxiety levels regarding the chemistry laboratory. The research involved 127 prospective chemistry teachers and the data were collected based on two different scales. The results showed that the intellectual risk-taking levels of the prospective teachers explained 39% of the variance in the anxiety levels. The literature represented above used only quantitative methods (canonical correlation and regression) to investigate the association between intellectual risk taking and different variables, and the studies did not focus on the association between intellectual risk taking and learning about an extensive and important subject such as computer technology.

Appropriate integration of technologies into a course is an expected ability for prospective teachers (Koksal, Yaman and Saka, 2016). So developing the competence of prospective teachers through courses in teacher education programs is crucial if they are to use technology effectively in their future courses. In fact, undergraduate courses in technology, like other courses, involve uncertainties and risks (Byrnes, 1998). In these courses, prospective teachers should take intellectual risks to learn about technology (Beghetto, 2007a; Beghetto, 2007b; Beghetto, 2008; Beghetto, 2009). At the same time, active participation in courses, knowledge construction and the development of moral imagination necessitate prospective teachers taking intellectual risks (Brown et al., 2005). Moreover, taking intellectual risks is beneficial for enhancing perceived competence (Deci and Porac, 1978) and maximizing satisfaction (Atkinson, 1957). Intellectual risk-taking and innovative behavior are also found to be associated (Kontoghiorghes, Awbrey and Feurig, 2005). In particular, integrating and using technology in courses in innovative ways involves new learning and accepting technological changes, which means taking intellectual risks. As Styhre (2006) stated,

accepting innovation and integrating innovative technology must imply some kind of risk taking. In learning about technology the emphasis is on "intellectual risk taking". While learning about technology, prospective teachers might ask questions, share thoughts and do different things to learn effectively and use technology in their teaching (Beghetto, 2009). These activities are examples of intellectual risk taking and they are also indicators of participation in learning.

In considering its potential, some researchers (Cohen and Barnes, 1993; Fullan, 1995) suggested teaching how to effectively take intellectual risks in teacher education programs. Kontoghiorghes et al. (2005) revealed that the strongest predictor of adaptation to a change is appropriate orientation toward intellectual risk taking. By improving the intellectual risk-taking levels of prospective teachers, they might be more comfortable with uncertainty in their learning about technology (Cohen, 1998). Before designing and implementing instruction to develop the intellectual risk-taking levels of prospective teachers regarding learning technology, it is necessary to determine their existing intellectual risk-taking levels and their suggestions to improve intellectual risk taking. Hence the purpose of the study is to determine the existing intellectual risk-taking levels of prospective science teachers, the examples of their intellectual risk-taking behaviors, and their suggestions to improve their own intellectual risk taking.

METHOD

In this study descriptive research method was used (Fraenkel and Wallen, 2009). Open-ended survey questions (n=18) were used to collect data in this study. The questions were asked in three different questionnaires: trial of intellectual risk taking and examples (n=6), Factors affecting intellectual risk taking (n=6) and Factors facilitating intellectual risk taking (n=6). The open-ended questions are in the appendix. The questions were determined through a literature search (Beghetto, 2009; Clifford, 1991). For validity of the instruments, literature and expert view about suitability of the questions for the purposes were investigated. Both the content and structural validities were supported by the views and literature. Also the agreement between two researchers

was also investigated to increase validity of the instruments. Nature of open-endedness was a limiting factor to establish reliability, but determining the questions based on the literature was a support for internal consistency of the instruments. The data were collected at the end of the semester in which they took practice courses. In this survey study inductive content analysis was used to analyze data. Therefore the researchers read the data several times. Then they tried to find codes and to group them under high-level categories. They first decided about codes reflecting different aspects of intellectual risk taking such as conditions, examples and factors and then they grouped them under categories based on their similarities and differences in terms of explaining intellectual risk taking in learning about technology. Based on the categories, interpretive writing was carried out by the researchers (Elo and Kyngas, 2008). The reliability of the analysis was evaluated by two researchers who analyzed the data and by calculating the percentage of agreement between them. The agreement value was found to be 0.83. Non-agreement was overcome by discussing the data again and grouping each response under the related category. For representing the data, categories and the frequencies of each category, and example responses were used.

Participants and Study Context

The participants of the study comprised senior prospective science teachers (n=207) in teacher education programs of two different universities in Turkey. The majority of the participants were females (n=158) aged between 17 and 26. They were selected for the convenience of the researchers. The participants took courses about technology in computer laboratories. In the courses they were trying to improve their basic abilities about using computers by making applications directed by the course director. One hundred eighteen of them had a personal computer, however, 173 did not have a tablet. Moreover, 190 of them had a smartphone.

FINDINGS

The analysis results showed that six categories emerged from the data. In the following pages, the categories, the frequencies of categories and three examples of the categories are presented. The six categories are "intellectual risk-taking action", "conditions of intellectual risk taking", "avoiding intellectual risk taking", "reasons for intellectual risk taking", "conditions of avoiding intellectual risk taking" and "not applicable". The frequencies regarding categories and examples of these are represented in Table 1. Table 1 reveals the answers to the questions regarding the group, the trial of intellectual risk taking and examples.

Table 1. The Frequencies Regarding Categories and Examples (Questionnaire 1: Trial of Intellectual Risk Taking and Examples)

Category	**f**	**Examples**
Intellectual risk-taking action	31	I asked my classmates questions
		I made negative and positive criticisms about ideas
		I tried to learn about new features of computers
Conditions of intellectual risk taking	265	If everybody is similar to me in terms of learning, I try to learn
		If I have enough time to learn, I try to learn
		I am aware of my weakness in the subject
Avoiding intellectual risk taking	4	I dislike taking risks and so I cannot take risks in general
		I avoid making comments even if nobody knows the subject well enough
		If I feel I cannot reach a solution, I do not struggle to find one
Not applicable	15	I can adapt to every environment
		Teachers should give more support when students struggle
		A holistic approach is very important

Table 1 shows that the participants produced more explanations about "conditions of intellectual risk taking". They did not provide any explanations about "reasons for intellectual risk taking" or "conditions of avoiding intellectual risk taking". As seen in

the Table 1, conditions of intellectual risk taking is more considered than taking risks. Also they give examples of intellectual risk taking but their reasons of taking these risks during learning about technology are not explained by none of the participants. Table 2 presents the answers to the questions regarding the group in terms of factors affecting intellectual risk taking.

Table 2. The Frequencies Regarding Categories and Examples (Questionnaire 2: Factors Affecting Intellectual Risk Taking)

Category	**f**	**Examples**
Intellectual risk-taking action	19	I participated in trials even if I knew the result would be negative
		I shared it when I found a new way of doing something
		I asked my friends when I was curious about something
Conditions of intellectual risk taking	56	If I study in small groups I can try to do new things
		If the teacher makes it possible to fail I can try to do new things
		If the study is enjoyable I can try to do new things
Avoiding intellectual risk taking	5	I would not share any knowledge due to my weakness in technology
		If I am not sure about the result I would certainly not try to do new things
		I do not try anything when I am sure that I do not understand the subject
Reasons for intellectual risk taking	7	I try to do new things to be better in the subject
		Risk taking is needed just for producing new products
		I try to do new things to reinforce my previous knowledge about the subject.
Conditions of avoiding intellectual risk taking	14	If I am not sure I can do it I avoid doing something
		If a computer program does not grab my attention I avoid trying to do something about learning it
		If I do not have enough knowledge about a subject, I avoid doing something about it
Not applicable	18	I cannot possibly fail
		I like to learn new things

Anxiety about evaluation

Table 2 indicates that the participants gave explanations and examples regarding all categories. They provided the highest number of answers to "conditions of intellectual risk taking". This result is similar to the answers for the questionnaire Trial of intellectual risk taking and examples, in spite of the low frequency of the answers. As seen in the Table 2, conditions and examples of intellectual risk taking have also highest frequency of explanations. However, the reasons of taking these risks during learning about technology are explained by only 7 of the participants. Number of answers regarding "not applicable" is another important finding since they are in higher frequency than reasons and avoiding categories and also they are answers out of scope of this study. The final group of answers was about the questions in the questionnaire Factors facilitating intellectual risk taking. Table 3 presents the answers to the questions in Questionnaire 3: Factors facilitating intellectual risk taking.

Table 3. The Frequencies Regarding Categories and Examples (Questionnaire 3: Factors Facilitating Intellectual Risk Taking)

Category	**f**	**Examples**
Intellectual risk-taking action	130	I made a blogger page and I shared my ideas through this page
		I shared my ideas with my friends
		I tried to do online electricity experiments by using new ways
Conditions of intellectual risk taking	5	If the teacher shows me how to do it before my trial, I will try to do it
		If a teacher or a friend drives me to do new things, I will try to do new things
		My risk taking depends on the classroom atmosphere
Avoiding intellectual risk taking	1	Every time I try the ways suggested by teachers
Reasons for	13	Learning by trial and error is a way of learning

intellectual risk taking		I think practicing in the classroom with others is a better way of learning new things
		I find solutions through trials in general
Not applicable	71	I think the others' ideas are not important for me
		People do not learn in the same ways
		I find solutions through reasoning and previous knowledge

According to Table 3, the participants mostly provided examples for intellectual risk taking. In answers to the group questions (Factors facilitating intellectual risk taking), no answer regarding the "conditions of avoiding intellectual risk taking" category was provided. In the Table 3, a different picture is seen since the frequency of "not applicable" category is very high and examples for "conditions" category is not as high as in previous questionnaire answers. In three groups of questions, the participants generally provided answers regarding "intellectual risk taking" and "conditions of intellectual risk taking". Table 4 summarizes all frequencies regarding the question groups.

Table 4. Summary of All Answers to The Questionnaires

Category	**f**
Intellectual risk-taking actions	180
Conditions of intellectual risk taking	326
Avoiding intellectual risk taking	10
Reasons for intellectual risk taking	20
Conditions of avoiding intellectual risk taking	14
Not applicable	104

Table 4 shows that the participants gave more answers in the categories “intellectual risk taking” and “conditions of intellectual risk taking”. However, the participants also gave answers that cannot be categorized under any category of intellectual risk taking. Their frequency is also higher than a hundred.

DISCUSSION AND CONCLUSION

The results of this study revealed that the participants took different intellectual risks when learning about technology in practice courses. Henriksen and Mishra (2013) stated that taking intellectual risks is fundamental in finding novel and interesting applications in learning. Beghetto (2009) and Clifford (1991) also revealed that taking intellectual risks that are supportive of creativity and meaningful learning is necessary for learning. The majority of the participants gave their own examples of taking intellectual risks. Previously, Beghetto (2009) gave some general examples of intellectual risk-taking: doing new things, sharing ideas, finding new ways of doing things, asking questions. In addition to these, we also revealed different intellectual risk-taking behaviors such as making criticisms and trying new features of computers. The examples in our study represented a wide variety of intellectual risks to be taken in technology courses.

The participants also referred more to their conditions for taking intellectual risks than their reasons for intellectual risk taking. Conditions for taking intellectual risks are actually ways of decreasing the probability of risk taking in learning about technology. In spite of the high number of examples of intellectual risk taking, the participants are still timid about taking different intellectual risks to learn about technology. This finding supported the importance of conditions in taking risks in learning. Beghetto (2009) showed that students’ intellectual risk taking was positively correlated with their perception of teacher support in learning. Moreover, Weingrad (1998) revealed that intellectual risks are taken in environments that are respectful of student reasoning. Tomlinson and Javius (2012) explained that taking intellectual risks requires feeling

safe in the course. In addition to these studies, we revealed different examples of conditions such as having enough time and being aware of personal weaknesses. The examples of conditions in our study represented a wide variety of conditions in which to take intellectual risks in technology courses.

One pleasing finding is the low frequencies of avoiding intellectual risk taking, since the participants are aware of the importance of taking intellectual risks in learning about technology. In spite of the difference in study groups, Beghetto (2009) reported that the participants were generally willing to take intellectual risks in learning about science. Yaman and Koksal (2014) conducted a study with 864 participants, and their findings revealed that the majority of their participants were willing to take intellectual risks when they learned about science. The similarity between this study and our study might be based on the common atmosphere of courses in technology and science. They are associated disciplines and so their contents are taught together. Hence teaching about technology and science might share common components.

In general, intellectual risk-taking studies have involved elementary-level students (Akdag, Koksal and Ertekin, 2017; Akkaya, 2016; Beghetto, 2009; Dasci and Yaman, 2014). Studies with adults and prospective teachers are rare in the literature (Clifford, 1991; Robinson, 2012). This study contributes to the previous rare studies involving prospective teachers. The study's results representing prospective teachers provided more explanation about intellectual risk taking than avoiding intellectual risk taking. The examples provided direct evidence of intellectual risk taking in learning technology. Hence it can be claimed that the participants experienced a supportive environment in their courses in terms of intellectual risk taking. The results of this study also provided different examples of intellectual risk taking in technology courses. Moreover, the conditions and reasons for taking intellectual risks are also explained in this study. These examples might give teacher educators a better understanding of intellectual risk taking. By using these examples, they can evaluate their courses in terms of the students' risk-taking behaviors.

Although the study has contributed to the literature on intellectual risk-taking studies by providing frequencies and examples of the intellectual risk taking of prospective teachers, the study also has limitations. The high frequency of the "not applicable" category is a limitation in this study because the participants give meaningless examples in spite of clear questions being provided. In future studies follow-up interviews to explain meaningless examples should be conducted. Also, the number of participants should be increased to enhance the variety of examples and explanations. Another important point is that using only questionnaires limits the quality of data, and in-class records and scales should be incorporated into the study.

Based on the findings it can be suggested that prospective science teachers represent different examples of intellectual risk taking in learning about technology. However, some examples are more frequently used in the courses. The number of examples might be increased by modelling less frequent examples during the courses about technology. At the same time, the participants gave less number of reasons to use different intellectual risk taking actions in spite of their active use of the actions. Modelling the use of different intellectual risk-taking actions with the reasons might contribute to informed use of them.

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APPENDIX

Open-ended Questions

Questionnaire 1-Trial of intellectual risk taking and examples

Would you try to do new things in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you are not very good? Could you give same examples?

Would you try to share your ideas in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you are not sure about their accuracy? Could you give same examples?

Would you try to do new things in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you don't know how to do them? Could you give same examples?

Would you try to find new ways of doing new things in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you know you will not reach a solution? Could you give same examples?

Would you try to learn new things in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you know you can fail to do them? Could you give same examples?

Would you try to ask questions in practice courses (computer labs, information technologies labs etc.) for learning about technology even if your classmates can think that you are not as smart as them? Could you give same examples?

Questionnaire 2- Factors affecting intellectual risk taking

Which factors are effective in your trial to do new things in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you are not very good? Could you give same examples?

Which factors are effective in your trial to share your ideas in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you are not sure about their accuracy? Could you give same examples?

Which factors are effective in your trial to do new things in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you don't know how to do them? Could you give same examples?

Which factors are effective in your trial to find new ways of doing new things in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you know you will not reach a solution? Could you give same examples?

Which factors are effective in your trial to learn new things in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you know you can fail to do them? Could you give same examples?

Which factors are effective in your trial to ask questions in practice courses (computer labs, information technologies labs etc.) for learning about technology even if your classmates can think that you are not as smart as them? Could you give same examples?

Questionnaire 3- Factors facilitating intellectual risk taking

Which factors facilitate your trial to do new things in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you are not very good? Could you give same examples?

Which factors facilitate your trial to share your ideas in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you are not sure about their accuracy? Could you give same examples?

Which factors facilitate your trial to do new things in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you don't know how to do them? Could you give same examples?

Which factors facilitate your trial to find new ways of doing new things in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you know you will not reach a solution? Could you give same examples?

Which factors facilitate your trial to learn new things in practice courses (computer labs, information technologies labs etc.) for learning about technology even if you know you can fail to do them? Could you give same examples?

Which factors facilitate your trial to ask questions in practice courses (computer labs, information technologies labs etc.) for learning about technology even if your classmates can think that you are not as smart as them? Could you give same examples?

TEKNOLOJİ ÖĞRENME SÜRECİNDE ZİHİNSEL RİSK ALMA DURUMU ENVATERİ

Açıklama: Değerli katılımcı aşağıda size yöneltilen sorular teknoloji öğrenme süreçlerinde zihinsel risk alma durumunuzu belirlemek için hazırlanmıştır. Vereceğiniz cevaplar araştırma amaçlı kullanılacak olup, izniniz dışında adınız kullanılarak paylaşılmayacaktır. Araştırmanın amacına ulaşması vereceğiniz detaylı cevaplara bağlıdır. Katılımız için teşekkürler...

SORULAR

1.Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) çok iyi olmasanız bile yeni şeyler yapmayı denediniz mi? Örneklerle açıklayınız.

2.Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) doğru olduğundan emin olmasanız bile fikirlerinizi paylaşmayı denediniz mi? Örneklerle açıklayınız.

3.Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) nasıl yapılacağını bilmeseniz bile yeni şeyler yapmayı denediniz mi? Örneklerle açıklayınız.

4.Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) bir sonuca ulaşamayacağınızı bilseniz bile bir şeyler yapmanın yeni yollarını bulmaya çalıştınız mı? Örneklerle açıklayınız.

5. Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) yanlış yapma ihtimaliniz olsa bile yeni şeyler öğrenmeyi denediniz mi? Örneklerle açıklayınız.

6. Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) diğer öğrenciler sizin onlar kadar zeki olmadığınızı düşünse bile sorular sormayı denediniz mi? Örneklerle açıklayınız.

TEKNOLOJİ ÖĞRENME SÜRECİNDE ZİHİNSEL RİSK ALMA DURUMUNA ETKİ EDEN ETMENLER
(Açık Uçlu Soru Formu)

Açıklama: Değerli katılımcı aşağıda size yöneltilen sorular teknoloji öğrenme süreçlerinde zihinsel risk alma durumunuza etki eden etmenleri belirlemek için hazırlanmıştır. Vereceğiniz cevaplar araştırma amaçlı kullanılacak olup, izniniz dışında adınız kullanılarak paylaşılmayacaktır. Araştırmanın amacına ulaşması vereceğiniz detaylı cevaplara bağlıdır. Katılımız için teşekkürler...

SORULAR

1.Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) çok iyi olmasanız bile yeni şeyler yapmayı denemeniz hangi durumlara bağlıdır? Yani ne olursa deneme yaparsınız? Ne olursa denemeden kaçınırsınız? Örneklerle açıklayınız.

2.Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) doğru olduğundan emin olmasanız bile fikirlerinizi paylaşmayı denemeniz hangi durumlara bağlıdır? Yani ne olursa deneme yaparsınız? Ne olursa denemeden kaçınırsınız? Örneklerle açıklayınız.

3.Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) nasıl yapılacağını bilmeseniz bile yeni şeyler yapmayı denemeniz hangi durumlara bağlıdır? Yani ne olursa deneme yaparsınız? Ne olursa denemeden kaçınırsınız? Örneklerle açıklayınız.

4.Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) bir sonuca ulaşamayacağınızı bilseniz bile bir şeyler yapmanın yeni yollarını bulmaya çalışmanız hangi durumlara bağlıdır? Yani ne olursa yeni yolları bulmaya çalışırsınız? Ne olursa yeni yolları bulmaya çalışmaktan kaçınırsınız? Örneklerle açıklayınız.

5. Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) yanlış yapma ihtimaliniz olsa bile yeni şeyler öğrenmeyi denemeniz hangi durumlara bağlıdır? Yani ne olursa deneme yaparsınız? Ne olursa denemeden kaçınırsınız? Örneklerle açıklayınız.

6. Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) diğer öğrenciler sizin onlar kadar zeki olmadığınızı düşünse bile sorular sormayı denemeniz hangi durumlara bağlıdır? Yani ne olursa deneme yaparsınız? Ne olursa denemeden kaçınırsınız? Örneklerle açıklayınız.

TEKNOLOJİ ÖĞRENME SÜRECİNDE ZİHİNSEL RİSK ALMA DURUMUNU KOLAYLAŞTIRAN FAKTÖRLER

(Açık Uçlu Soru Formu)

Açıklama: Değerli katılımcı aşağıda size yöneltilen sorular teknoloji öğrenme süreçlerinde zihinsel risk alma durumunuzu kolaylaştıran faktörleri belirlemek için hazırlanmıştır. Vereceğiniz cevaplar araştırma amaçlı kullanılacak olup, izniniz dışında adınız kullanılarak paylaşılmayacaktır. Araştırmanın amacına ulaşması vereceğiniz detaylı cevaplara bağlıdır. Katılımız için teşekkürler...

SORULAR

1.Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) nasıl bir ortam ya da yaklaşım sağlanırsa çok iyi olmasanız bile yeni şeyler yapmayı denersiniz? Örneklerle açıklayınız.

2.Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) nasıl bir ortam ya da yaklaşım sağlanırsa doğru

olduğundan emin olmasanız bile fikirlerinizi paylaşmayı denersiniz? Örneklerle açıklayınız.

3.Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) nasıl bir ortam ya da yaklaşım sağlanırsa nasıl yapılacağını bilmeseniz bile yeni şeyler yapmayı denersiniz? Örneklerle açıklayınız.

4.Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) nasıl bir ortam ya da yaklaşım sağlanırsa bir sonuca ulaşamayacağınızı bilseniz bile bir şeyler yapmanın yeni yollarını bulmaya çalışırsınız? Örneklerle açıklayınız.

5. Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) nasıl bir ortam ya da yaklaşım sağlanırsa yanlış yapma ihtimaliniz olsa bile yeni şeyler öğrenmeyi denersiniz? Örneklerle açıklayınız.

6. Teknoloji öğrenmeye yönelik pratik derslerinde (bilgisayar laboratuvarı, bilişim teknolojileri laboratuvarı vb.) nasıl bir ortam ya da yaklaşım sağlanırsa diğer öğrenciler sizin onlar kadar zeki olmadığınızı düşünse bile sorular sormayı denersiniz? Örneklerle açıklayınız.

GENİŞ ÖZET

Günlük hayatımızın ayrılmaz bir parçasına hâline gelen teknolojinin sınıf ortamında da kullanımı son derece önemlidir. Bu nedenle öğretmen adaylarının ve bu çalışmanın konusu olan fen bilgisi öğretmeni adaylarının da sınıf içinde teknoloji kullanımını öğrenmeleri elzemdir. Öğretmen eğitimi programlarının bu gerçekten hareketle geleceğin öğretmenlerini mesleklerinde teknolojiyi etkin biçimde kullanır hâle getirmek için en etkili yolları seçip uygulamaya koyması gerekir (Göktaş, Yıldırım, ve Yıldırım, 2008).

Ancak öğretmen eğitim programlarında öğretmen adaylarının teknolojiyi kullanabilmelerini sağlayacak ders içeriklerinin konması, istenir sonuçların elde edilmesi için tek başına yeterli değildir. Öğretmen adaylarının öğrenme süreçlerine aktif katılımlarının da sağlanması gerekir. Fen bilgisi öğretmen adaylarının öğrenme süreçlerine etkin katılımlarındaki en önemli faktörlerden biri de öğrenirken zihinsel risklerin alınmasıdır; çünkü sınıf ortamında öğrenmenin bazı belirsizlik ve riskleri de vardır (Byrnes, 1998). Alınan bu risklerden bir tanesi, Beggetto (2009)'un zihinsel risk alma diye adlandırdığı risk alma türüdür ve zihinsel risklerin alınması, farklı konuların öğrenilmesinde olduğu gibi üst düzey düşünme becerilerinin geliştirilmesinde de önemlidir (de Souza Fleith, 2000).

Öğretmen adaylarının teknolojiyi öğrenirken zihinsel risk almalarını arttıracak etkili yolların sağlanması için onların mevcut zihinsel risk alma düzeylerinin belirlenmesi, bunun ardından da zihinsel risk alma konusunda ilerlemelerine yönelik kendi önerilerinin saptanması gerekiyor.

Amaç

Bu çalışmanın amacı, öğretmen adaylarının mevcut zihinsel risk alma düzeylerinin ve zihinsel risk alma davranışı örneklerinin belirlenerek zihinsel risk alma konusunda onları ilerletecek kendi önerilerinin saptanmasıdır.

Yöntem

Türkiye'deki çeşitli üniversitelere devem etmekte olan, yaşları 17-26 arasında değişen 207 fen bilgisi öğretmeni adayına üç farklı ankette açık uçlu sorular verilerek yanıtlamaları istenmiş, araştırma verileri bu açık uçlu anket soruları (n=18) ile dönem sonunda toplanmıştır. Üç farklı anket şunlardan oluşmuştur: zihinsel risk alma denemesi ve örnekleri (n=6), zihinsel risk almayı etkileyen faktörler (n=6) ve zihinsel risk almayı kolaylaştıran faktörler (n=6). Elde edilen veriler tümevarımsal içerik analizi ile çözümlenmiştir. Bu amaçla veriler tekrar tekrar okunarak kodlar elde edilmiş, sonra bu kodlar üst düzey kategorilere ayrılmıştır. Daha sonra bu kategorilere dayalı yorumlar yazılmıştır (Elo ve Kyngas, 2008).

Bulgular

Analizler sonucunda veriden "zihinsel risk alma etkinlikleri", "zihinsel risk almanın koşulları", "zihinsel risk almama", "zihinsel risk alma nedenleri", "zihinsel risk almama nedenleri" ve "ilgisiz" başlıkları altında toplanan altı kategori elde edilmiştir. İlk ankete verilen cevaplara bakıldığında katılımcıların daha çok risk alma koşulları ile

ilgili örnekler verdikleri fakat neden risk alındığına dair örnek sunmadıkları belirlenmiştir. İkinci ankete verilen cevaplara bakıldığında tüm kategorilere ilişkin cevap verildiği, ilk ankete verilen cevaplara benzer şekilde, en fazla zihinsel risk alma koşullarına ilişkin örnekler verildiği görülmüştür. Üçüncü ankete verilen cevaplara bakıldığında ise en fazla risk alma etkinliği örneği verildiği, zihinsel risk alma koşulları ile ilgili herhangi bir cevap verilmediği görülmüştür. Üç ankete verilen cevaplar toplu olarak ele alındığında katılımcıların daha çok zihinsel risk alma etkinlikleri ve zihinsel risk alma koşulları ile ilgili örnekler sağladıkları belirlenmiştir. İlginç olan bulgu zihinsel risk almanın nedenlerine ilişkin örneklerin eksikliğidir. Bu durum sebepsiz zihinsel risk alma etkinlikleri gibi bir durumun ortaya çıkmasında önemli bir açıklayıcı olabilir.

Sonuç ve Tartışma

Elde edilen sonuçlar, uygulama derslerinde katılımcıların teknoloji hakkında öğrenirken farklı zihinsel riskleri aldıklarını göstermiştir. Araştırmaya katılanların çoğu, zihinsel risk alma konusunda kendi örneklerini vermişlerdir.

Ayrıca katılımcılar, zihinsel risk alma nedenlerinden ziyade zihinsel risk alma koşullarından bahsetmişlerdir. Diğer taraftan öğretmen adayları çok sayıda zihinsel risk almalarına rağmen, teknoloji öğrenme hakkında farklı zihinsel riskleri almalarının nedenleri konusunda yeterli açıklama yapamamışlardır. Bu bulgu öğrenirken risk alma konusunda koşulların önemini göstermektedir.

Literatürde zihinsel risk alma konulu çalışmalar (Akdağ, Koksal ve Ertekin, 2017; Akkaya, 2016; Beghetto, 2009; Dasci ve Yaman, 2014), genelde yetişkinlerle değil temel eğitim düzeyindeki çocuklarla ilgilenmiştir. Bu çalışma ise öğretmen adayları ile ilgili yapılmış olması ve teknoloji öğrenmeye odaklanması açısından, önceki çalışmalara katkı sağlayacaktır. Bulgular, öğretmen adaylarının zihinsel risk alma konusunda çok sayıda örnek verdiklerini göstermiştir. Örneklerin sayısının yanında çeşitliliği de oldukça fazladır. Katılımcılar ayrıca zihinsel risk almanın koşulları hakkında da örnekler sunmuşlardır. Fakat zihinsel risk almanın nedenlerine ilişkin yeterince örnek verememişlerdir. Verilen bu örnekler, eğitimcilerin zihinsel risk almayı daha iyi anlamalarını sağlayabilir; böylece derslerini öğrencilerinin risk alma davranışları bağlamında değerlendirmelerine katkı sağlayabilir.

Katılımcıların anlamsız örnekler vermeleri sonucunda "ilgisiz" kategorisinde frekansın yüksek çıkması, bu çalışmanın sınırlılığı olmuştur. Gelecekte yapılacak çalışmalarda bu gibi anlamsız örnekleri açıklayacak görüşmeler yapılabilir. Sadece anketlerin kullanılması da verilerin niteliğini kısıtlamaktadır. Bu nedenle sınıf içi kayıtlar ve ölçekler de yapılacak çalışmaya monte edilebilir.