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Simulation Technologies in Preparing Teachers to Deal with Risks

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ABSTRACT

The modernization of the current education system, socio-economic shifts in society and increasing migration call for changes in teacher education as today's teachers need to be mobile, adaptable and capable of anticipating and neutralizing negative factors that arise from various risk factors in the field of education. In view of this we argue that noxological preparation is an important component in teacher education. In this study our main objective is (1) to identify the problematic areas in the psycho-pedagogical and methodological components of teacher education in a multicultural setting and (2) to test the effectiveness of simulation technologies in preparing teachers to deal with risks. Our main research methods were pedagogical modeling and the project-based approach which enabled us to create a model of working students in problem-focused groups with the use of simulation technologies and to create an assessment complex which helps evaluate the preparedness of future teachers to work under risks in a multicultural environment. Moreover, we have developed an assessment complex tool which enables to assess if teachers are prepared to work in the context of increased migration. This tool helps establish the ethnic identity types of future teachers as well as evaluate their coping strategies. We have evaluated the increasing potential of simulation technologies and how they can be used for effective multicultural teacher education; we have established the criteria for teacher competences and preparedness to deal with risks; we have identified the conditions of the effective use of simulation technologies in the informational space of a university. In order to develop the noxological competence of future teachers we have developed an educational model which aims to develop the preparedness of teachers to deal with risks with the use of simulation technologies. The materials of this study represent practical value for the specialists working in the field of teacher education in a multicultural environment.

Keywords: noxological competence, pedagogical riskology, simulation technologies, forum theatre, simulation games, informational university space, multicultural educational environment

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State of the literature

- Increasing migration levels in the Russian Federation call for certain adjustments in all public spheres of life. The field of education needs a lot of attention; especially teacher education requires modernization in order to ensure that local students are prepared to welcome migrant students.
- The issue of migrant adaptation has been thoroughly developed in international pedagogical and socio-psychological literature. In Russian literature, however, this issue in view of its novelty has not been researched sufficiently.
- Migrant children can be viewed as a source of a special risk zone for teachers and their professional activities. In view of this it is necessary to develop a technological component which could be purposefully applicable in teacher preparation for work with risks in a multicultural educational setting.

Contribution of this paper to the literature

- We are presenting a complex of assessment tools which is designed to evaluate the preparedness level of future teacher to work under risk in a multicultural educational environment.
- We have identified the problematic zones in the area of teacher preparation (the areas in which future teachers need additional support in order to prepare for work in a multicultural educational environment).
- We have developed a teacher preparation model so that to ensure that new teachers are prepared to deal with risks in a multicultural environment. This model involves organizing the work of students in problem-focused groups with the use of simulation technologies.

INTRODUCTION

There is a wide range of factors that influence the modernization process of the education system in Russia: gradual democratization, expanding variety of choices, dynamic economic development, increasing competition, decreasing numbers of jobs needing unqualified manual labor, growing professional mobility and other fundamental changes in the sphere of professional employment that require people to be always prepared for continuing professional development (Matyunina, 2015). All of these factors are calling for higher education institutions that are involved in teacher training to prepare teachers so that they can be adaptable, proactive and mobile. Currently teacher education is organized in accordance with the competence-based model in Russia. The competence-based model involves extensive and diverse in nature preparation that allows student teachers to acquire the necessary set of competences and enter the teaching profession as effective educators (Masalimova, Tararina & Sokolova, 2016). One of the features of this model is that it divides competences in two distinctive groups – general professional competences (psychological, pedagogical, normative, reflexive competences and others) and specialized competences (subject, methodological and other competences that distinguish a particular teacher from other types of educators).

Latest research in the field professional says that there has to be a noxological component in teacher education. This is explained by the fact that the educational field is becoming charged with potential risks. The current process of educational modernization in Russia is characterized by the growing number of migrant children and other types of at-risk children – the educational system needs to transform to become truly inclusive to all children. We understand the noxological competence as an integral personal teacher's characteristic that allows teachers to predict situations and implement professional measures to prevent any risks and danger at school. At the moment noxological preparation is present in the educational programmes in Russia that prepare school teachers in the subject 'health, wellness and safety' (Devisilov, 2011; Simakova, 2010). Moreover, noxology is one of the main subjects in technical education and according to the academic staff of technical universities the quality of graduates has improved significantly since noxology was introduced to their educational programmes. The noxological teacher education requires a special approach to the organization. It is possible to develop the teachers' noxological competence effectively if a practice-orientated activity-based approach is adopted. In order to realize this we propose to use simulation technologies in teacher education.

The main objective of this research project is to study the developing field of simulation technologies, to assess their educational potential for preparing teachers to deal with risks and to determine the conditions for the effective use of these technologies in the context of university education.

LITERATURE REVIEW

Simulation technologies are actively used in a wide range of professional education programmes, these technologies allow to model the quasi-real environment of different professional fields simulating possible (typical as well as non-typical/emergency) situations that can arise at work. In the system of teachers' noxological education simulation technologies can facilitate the effective development of skills necessary for working in risky conditions. The theoretical and methodological framework of our research project was developed based on the works in the field of competence-based teacher education (Devisilov, 2011; Abramova, 1996; Sabinina, 2011; Mikhailova, 2010; Arlamov, 2010; Gao et al., 2017; Prichinin, 2014; Polovneva, 2011). V.A. Devyasilov (2011) was one of the first Russian scientists who singled out the issue of risks in professional activities as a specific area of research. He studied risks as real and potential threats to a child's life and health. I.G. Abramova (1996) highlighted the multifaceted nature of risks as a concept and developed the theory of a reasonable pedagogical risk in which she viewed risks as a condition for the development of pedagogical scholarship. This theory was then developed in the works of N. N. Sabinina (2011), E. N. Mikhailova (2010), A. E. Prichinin (2014) who specified and extended the original taxonomy of educational risks.

The issues of simulation-based technologies and their use in professional spheres were developed in the works of both international authors (Duke & Duke, 1983; Middlewick, Kettle & Wilson, 2012) and Russian authors (Verbitsky, 2004; Panfilova, 2006; Plaksina, 2004; Kurkovskiy & Mandi, 2008). R. Duke and K.M. Duke in the collective monograph 'Operational Gaming' (1983) argued in favor of using simulation-based technologies in view of their effectiveness in educational activities. He also proposed a set of practical recommendations on how to use games as an effective teaching method. Y. Middlewick, T.J. Kettle & J.J. Wilson (2012) empirically approbated the method of forum theatre and tested its effectiveness in the process of developing the communicative skills of students. In the Russian pedagogical scholarship the theory and practical use of simulation-based technologies in education are presented in the works of A.P. Panfilova (2006) and I.V. Plaksina (2004). These authors underline the effectiveness of such technologies and offer practical recommendations on how to organize educational processes with their use.

The theory and praxis of multicultural education and migrant adaptation have been developed in the works of many international scholars (Genkova et al., 2014; Chan & Birman, 2009; Gao & Wang, 2017; Ho, 2010; Harris, Ravert & Sullivan, 2015; Prevoo et al., 2016). In their works they propose various approaches to migrant adaptation. A.G. Genkova et al. (2014), J. Ho (2010) argue that acculturation is the most effective model of migrant adaptation. The use of this model ensures the psychological safety of newcomers achieved through their gradual acceptance of the values and culture of their host country. However, the model of acculturation is not typical for the Russian migration policies. The policies that are related to interethnic relations are based on the preservations and development of the various cultures of people residing in Russia. This approach is reflected in the works of Russian scholars (Fahrutdinova, 2016; Gabdulchakov, Galimovaa & Yashinaa, 2016; Khukhlaev, Kuznetsov & Chibisova, 2013).

METHODS

The 1st and 3rd year students of the Institute of Psychology and Education (Kazan Federal University) enrolled in elementary education programmes took part in our research project. All in all, the project had three main stages: ascertaining experiment, formative experiment and control experiment. In order to conduct the ascertaining and control stages we used the survey to identify types of ethnic identities designed by Soldatova and Ryzhova and the coping strategies test developed by Heim.

The survey to identify types of ethnic identities designed by Soldatova and Ryzhova. This survey allows to gain an insight into people's ethnic identities and the process of their transformation under conditions charged with

interethnic conflicts. Our participants were offered to complete this survey that contains 30 questions and uses 6 different scales measuring how pronounced the following ethnic identity types are: ethno-nihilism, ethno-indifference, positive ethnic identity (the norm), ethno-egoism, ethno-isolationism, ethno-fanaticism. In the context of multiethnic society the first three types are considered to be positive and normal and usually the overwhelming majority of the population hold one of these three types. However, when relations among ethnic groups deteriorate the following types become more common in the population: ethno-egoism, ethno-isolationism, ethno-fanaticism (Dmitriev, Belov & Parfenov, 2010).

The coping strategies test developed by Heim. This test helps determine a person's stress management method. There are three sections and three groups of strategies in this method: cognitive, non-adaptive and behavioral. For each section respondents can give answers that indicate the following types of behavior: adaptive, non-adaptive and conditionally adaptive. Within each group respondents can select only one statement (Rogov, 1999).

At the formative stage of our research we employed *the methodology of pedagogical modeling and projection*. Our formative experiment involved organizing educational noxology-oriented activities for students enrolled in elementary education programmes. In collaboration with students we examined different simulation technologies that can be used to prepare teachers to work in risky situations. Moreover, in order to select the content-related materials for simulation technologies we used comparative analysis.

RESULTS

One hundred sixty three (163) persons have taken part in our experiment at this stage: sixty five (65) 1st year students and ninety eight (98) 3rd year students. Their educational programmes are designed in the following way: psycho-pedagogical courses are available from the second year and practical training sessions start from the second term of the first year. By the time 3rd year students took part in our research they had completed 6 practical training sessions and completed a number of psycho-pedagogical courses.

The goal of this part of our research project: is (1) to establish if psycho-pedagogical courses help prepare students to act in risky situations, (2) to establish if practical training sessions help prepare students to act in risky situations, (3) to establish if the ethnic identity type of a person relates to his/her level of stress, (4) to determine if noxology is a necessary subject that has been introduced to teacher education programmes.

Ethnic Identity Survey

Our findings indicate that the students belong to ten different ethnic groups (**Figures 1 and 2**). Tatarstan is a multiethnic region of Russia. It is worth noting that some of the respondents identified themselves as 'mixed' (saying that they are Tatar-Russian or Russian-Udmurt, for example). However, there are a lot more mixed families in the region. But not only the ethnicity of one's family members influence how one identifies oneself ethnically – people's religious views also play an important role in ethnic identity formation. **Figures 1 and 2** show the results of our ethnic composition survey.

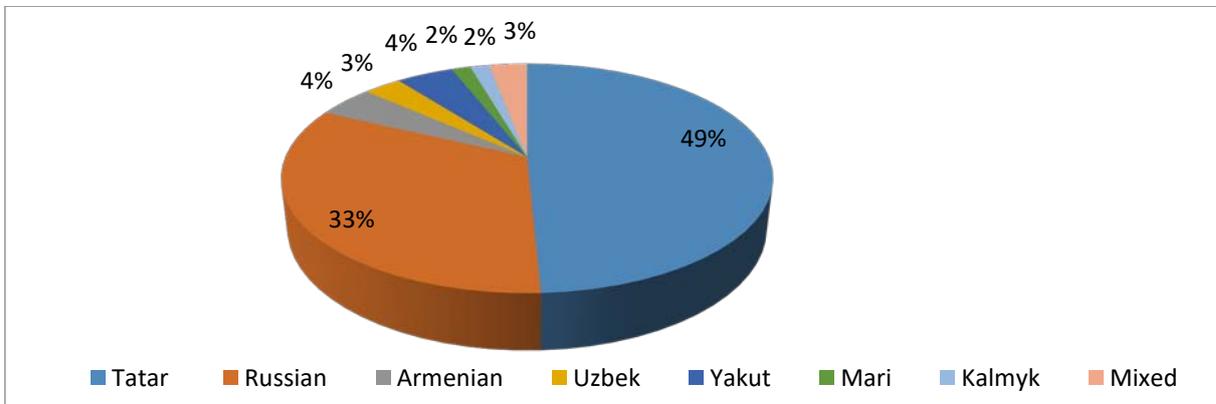


Figure 1. Ethnic composition (1st year students)

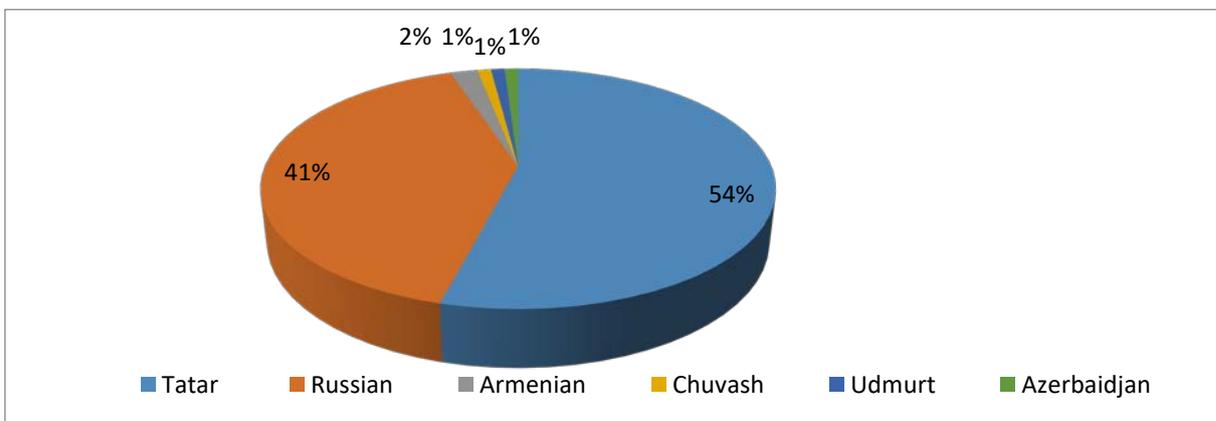


Figure 2. Ethnic composition (3rd year students)

Our ethnic identity survey showed the following results (Figure 3):

1. The majority of students belong to the ethno-nihilism type and to the norm (positive ethnic identity). We see these results as very reassuring – when these types dominate in society it is characterized by understanding and peaceful relations among ethnic groups. In addition, in accordance with federal policies Russian society is working to preserve and maintain ethnic minority cultures. People can identify themselves with particular ethnic groups but at the same time it is possible for them to respect other groups and coexist with them. Helping young people to form positive ethnic identities is extremely important. Using the American migrant integration model as an example D. Birman (2014) showed that the acculturation model (ethno-nihilism and ethno-indifference in our methodology) is an effective method to decrease the number of interethnic conflicts in the context of increasing migration.
2. We have identified the manifestation of the destructive identity types. We see higher numbers of people with these identity types in the older group (3rd year students). By the time the older group of students completed the survey they had completed 3 practical training sessions in schools where migrant children are present. They see migrant children as an extra responsibility. They mostly differentiate people as ‘my’ and ‘others’ using civic characteristics rather than national or ethnic. The results of the ethnic identity evaluation are presented in Figure 3.

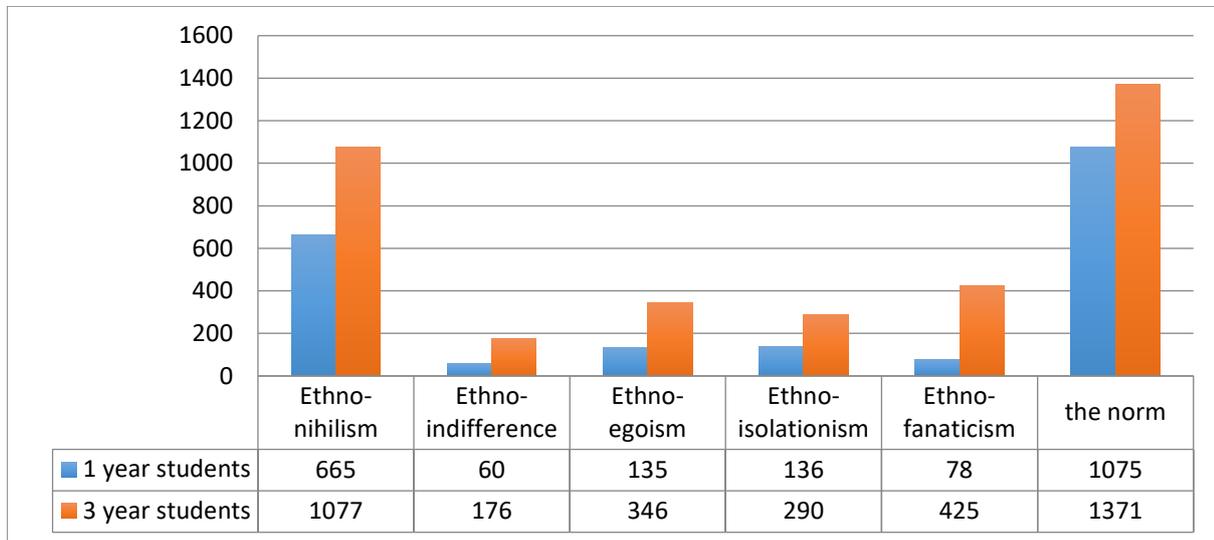


Figure 3. Types of ethnic identities among respondents (1-3 students)

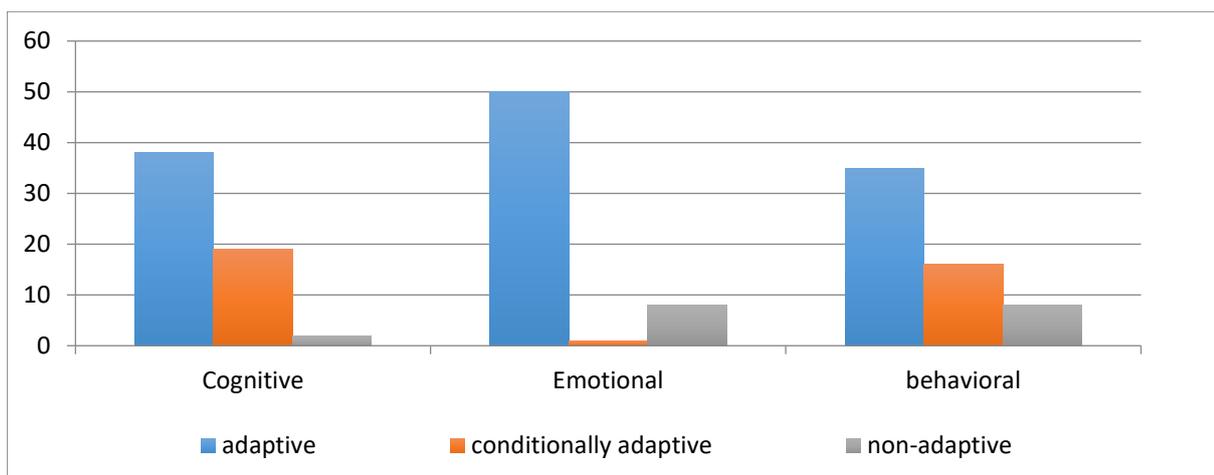


Figure 4. Coping strategies of the 1st year students

Coping Strategies Test

All of the respondents demonstrated adequate cognitive coping-strategies (adaptive and conditionally adaptive). However, emotional and behavioural coping-strategies to a large degree are non-adaptive in our case. It indicates that student teachers would benefit from noxological preparation. Figures 4 and 5 show the results obtained with the coping strategies test.

Students were studying educational simulation technologies (ESTs) as a part of their term research assignment. The main goal for them in this assignment was to evaluate the potential of ESTs and propose how it can be used effectively in teacher education to prepare teachers for risky conditions. The results of our comparative analysis can be seen in Table 1.

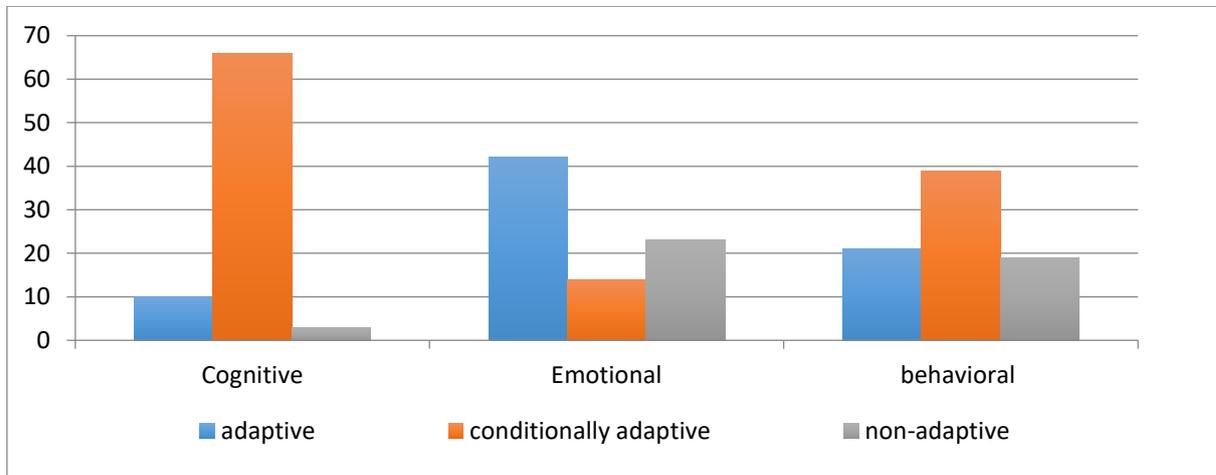


Figure 5. Coping strategies of the 3rd year students

Table 1. Comparative analyses

The disadvantages of the traditional teaching methods	The potential of ESTs
Verbal communication, group-orientated. The teacher works with everyone at the same time but without using the learning group’s potential to facilitate the individual advancement of every student.	Practice-orientated activity-based educational approach, non-verbal, the learning group starts thinking collectively.
Passive acquisition of knowledge – the teacher delivers information. This way knowledge is received formally but students do not develop (Panfilova, 2006).	The learning process is based on simulation game-based modeling; it is orientated towards the recreation of situations more or less potentially possible in real life (Panfilova, 2006).
The educational process is mostly theory-orientated without aiming to develop any emotional attachments or feelings.	Outcomes are generally more impressive and they are practice-orientated in nature (studying real-life cases).

When simulation technologies are used in the educational process the following principles are followed (Panfilova, 2006):

- a) Problem-based principle. ESTs are based on group work - educational problems are solved collectively. In the process of discussing real-life situations students actively join the learning process. This way the learning process becomes stimulating and meaningful.
- b) Personal interaction principle. In the traditional educational process the participants of the educational process (teachers and students) work ‘near’ each other without interacting on a personal level. The organization of effective education requires all of the participants to actively engage in the educational process together, they need to ‘live’ through simulated situations together.
- c) Unity of an individual’s and group’s development principle. (Collaborative education). Group interaction is a way to develop everyone’s personal qualities that cannot be formed in pair work. For instance, developing empathy through organizing pair conversations is hardly effective. In order to enhance someone’s empathy he/she needs to experience certain situations.
- d) Self-education based on reflection principle. The work of all individual participants of the educational process needs to be based on self-awareness, adequate self-assessment and self-control because being engaged in the collective thinking process enables everyone to play a specific role. For instance, participants can take the roles of a leader, idea generator, opponent, etc.

Based on this analysis we can reasonably argue that ESTs in the system of competence-based teacher education can play an important role. Having assessed the ESTs’ potential we can see how they can be employed

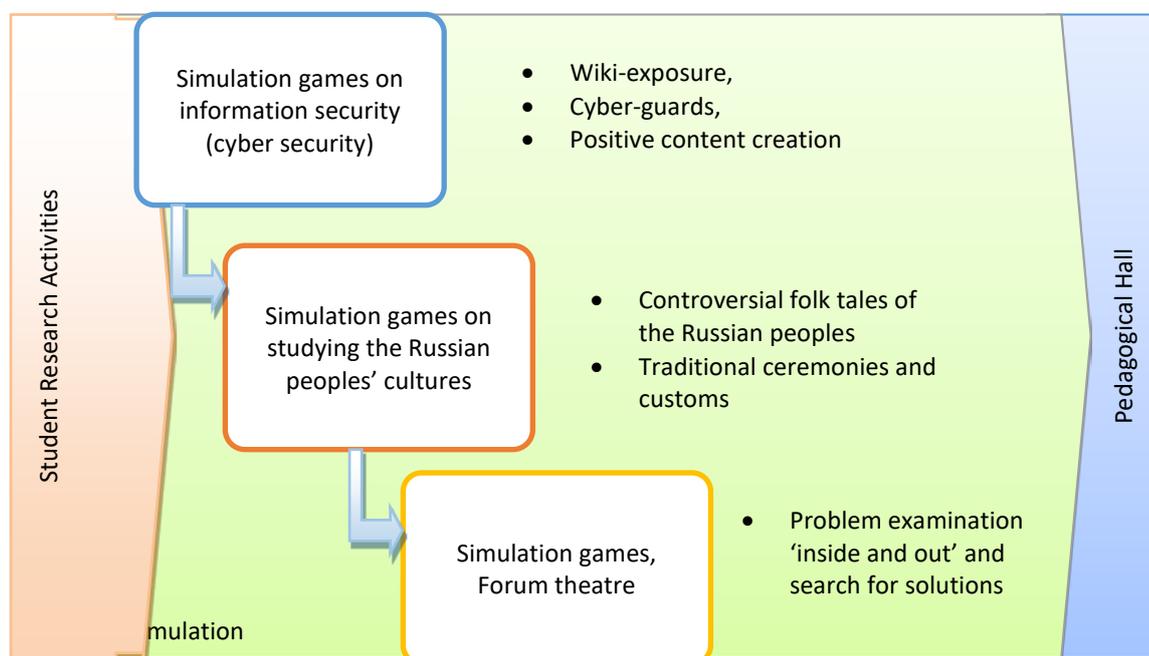


Figure 6. The model of work in the problem-orientated student group 'Safe educational environment'

effectively. In order to introduce a noxological component to teacher education and prepare future teachers to work with migrant children in a multiethnic environment we set up a problem-orientated student group 'Safe educational environment'. We have been working with this group on an extracurricular basis using ESTs.

The group's work involved the use of simulation games, the forum theatre method, research activities. The logical interrelations of educational components are presented in **Figure 6**.

The work of the group consisted of three main stages: research, simulation, Pedagogical Hall.

At the first stage different research topics were assigned (for group and individual works). Each topic was developed by students throughout the whole duration of our formative experiment. The second stage (simulation stage) involved the use of game-based technologies and other types of technologies that could facilitate and enhance noxological preparation (information security games, culture learning games, forum theatre).

Simulation games on information security (cyber security) were designed to enhance students' critical thinking skills, to improve their data handling skills and to form positive content creation skills. The main problem that we encountered in the process of multicultural preparation of teachers was that student teachers cannot work with information. In the world today the volume of information is growing – we are inundated with information and in view of this it is often difficult to navigate through it and understand which information is reliable and can be used. This is the reason why there is so much misinformation and fake news circulating in the media. This often leads to conflicts (including international and inter-ethnic conflicts). In order to develop students' information culture we (1) organized our collective work through Wiki-exposure (fact-checking of the information available on Wikipedia), (2) organized the work of cyber-guards and (3) organized our collective work aimed at creating positive content in relation to international and inter-ethnic relations.

Simulation games on studying the Russian people's cultures were designed to promote tolerance towards other ethnic groups and nationalities. The first impression of other cultures often comes from reading folk tales. Folk and fairy tales often describe high-risk situation that are typical for the people of that culture and they also describe how characters deal with those situations. Having conducted the preliminary analysis of the folk and fairy tales of different ethnic groups living in Russia we conclude that some of them are controversial in nature. For

example, Tatar folk tales ('Shurale', 'A goat and a sheep') often convey the message that cunning and deceitful behaviour is the best way to deal with high-risk situations whereas in the Russian folk tales ('Morozko') cunning and deceitful behaviour is deemed unworthy – sly characters usually get a punishment in the end of a Russian folk tale. Moreover, we noticed that throughout times folk tales present different types of danger and high-risk situations. Folk tales created in the middle ages often portray villains (witches, sorcerer, vampires, etc.) who are metaphors for famine, plague and other disasters (i.e. risks are natural in nature). But folk tales that appeared later in time show oppression, exploitation, abuse and violence (social problems are the main source of risk). With that tales in different cultures are very different in their representation of childhood and child problems.

Forum theatre is a relatively new but already widely used in professional education approach. D.Freshwater and T. Stickleby (2004) write that professional education has to develop 'emotional competence' that can give confidence in a variety of situations. Y. Middlewick et al. (2012) show that in the field of medical education the use of the empirical theatre method (forum theatre) encourages students study and practice different ways of acting in unpredictable circumstances.

This technique is used effectively in teacher education in accordance with the principle 'understand – accept – come to love'. We are planning to employ this method by working in collaboration with the Tatartan Theater MUVI. The forum theatre MUVI is a new type of initiative for the national policy. Students will be studying how theatrical performances are organized, playing out different situations on stage (including situations based on international and inter-ethnic conflicts). The main objective of this all is to expose and eliminate stereotypes.

Our final initiative is the work of the group in the Pedagogical Hall. The first Pedagogical Hall took place in December 2016. Professor V.G. Zakirova and her assistant L.R. Kayumova organized this event (in the form of a student conference) (2016). The Pedagogical Hall is new approach to teaching. It integrates different technologies to help students develop their professional, communication and personal skills. Within this project students gain their first teaching experience. When looking for a topic students also decide on the right way to present. In the Pedagogical Hall students are teachers and they create and present educational materials themselves. Moreover, the Pedagogical Hall also helps students see potential risks and address them in an adequate way.

DISCUSSIONS

The noxological competence is a crucial component in the teaching profession. In view of its novelty and the complexity of its structure a reliable assessment system for this competence has not been theoretically developed and empirically tested yet. We have developed our own system – a diagnostic complex designed to evaluate if future teachers are ready to work under risk in a multicultural environment. The diagnostic complex includes the survey which establishes people's types of ethnic identities (this diagnostic complex was initially designed by Soldatova and Ryzhova and then described in the work of M.G. Dmitriev (2010)) as well as Heim's test for coping strategies (this test is presented in the work of E.I. Rogov (1999)). The use of both methods enabled us to identify the following problematic zones:

1. A positive ethnic identity and ethnic indifference are relatively stable characteristics of respondents, however there is still a dangerous possibility that destructive types of behavior can be manifested in situations of risk.
2. Respondents showed satisfactory results in the area of cognitive coping strategies, though their emotional and behavioral coping strategies are non-productive.
3. The psychological and pedagogical modules that students completed should have influenced their coping strategies, however the results of first year and third year students are only insignificantly different.

Thus we came to the conclusion that it is necessary to offer special courses that can purposefully and systematically prepare future teachers to work under risk. Having analyzed the use of simulation-based technologies and the outcomes of our assessment we have developed our educational model which prepares student teachers to deal with risks with the use of simulation-based technologies. This model involves organizing

students into problem-focused groups. This helps reduce formality in the educational process and ensures that students accept the values on which the model is based.

CONCLUSION

As one of the criteria against which the preparedness of a teacher can be assessed noxological competence is a relatively new concept in educational scholarship. Thus there is no common assessment system yet which could be used to assess the noxological competence of teachers. We have developed an original complex of assessment tools and tested it to see if student teachers are ready to work under risk in a multicultural environment. Moreover, we have attempted to identify those characteristics of a teacher which ensure his/her effectiveness in a multicultural context. A positive ethnic identity and an effective set of coping strategies are among those characteristics. We conducted our experiment with student teachers. In future we plan to compare our data with how professionally successful these teachers will be once they enter the teaching profession.

Within the Russian system of professional education simulation technologies are usually employed in IT and technical education. Simulation technologies are the leading educational tool in medical education. Interestingly there is evidence that forum theatres are being effectively used in medical education abroad as they can emotionally prepare future professionals for a demanding job (Freshwater & Stickley, 2004). However, Russia does not have any experience in strategically preparing teachers to work under risk with the use of simulation technologies. The first stage of our experiment confirmed that it is necessary to introduce simulation technologies into our teacher education.

Our research has been devoted to the effective use of simulation technologies in the area of noxological teacher education. We have conducted the comparative analysis of how traditional methodologies and simulation technologies can be used in teacher education. We think that it is reasonable to argue that the use of simulation technologies facilitates the development of emotional and behavioural teacher competences necessary to deal with risks. In the course of our study we have developed a model of teacher education which helps teachers prepare to work under risk in a multicultural educational environment with the use of simulation technologies.

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