

Conditions of adaptation in teaching environmental disciplines at the university

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Abstract. Students are a special social group united by approximately the same age and specific working and living conditions. The intensive and rather long-lasting learning process imposes strict requirements to the adaptive mechanisms of their organism. The article presents the results of a study of the pedagogical conditions for student adaptation to studying at the university. We examined 90 first-year students majoring in Pedagogy at the Faculty of Foreign Languages of Mari State University. Several groups were composed of the students who came to study from the former USSR countries. We determined a number of core indicators such as cardiac rate, the systolic and diastolic pressure value, the cardiovascular response to breath hold and psychoemotional stress. Also we studied the adaptation potential (AP) value, conducted the 'individual minute' test. We calculated some hemodynamic parameters according to the Baevsky formula. It has been established that differentiated and personality-centered education is an important factor of the effectiveness of student adaptation to the learning process. The study found that the implementation of specified conditions contributed to the effectiveness of student adaptation to the learning process at the university. A comparative analysis of the results showed that the indicators in the experimental group exceeded the similar indicators in the control group by the specified criteria.

1 Introduction

Preservation of students' health against the backdrop of the science and technology boost becomes a persistent problem in the difficult social, economic and environmental conditions. As we know, students are a special social group united by approximately the same age and specific working and living conditions. The intensive and rather long-lasting learning process imposes strict requirements to the compensatory and adaptive mechanisms of their organism [1, 4, 8]. Students, when changing their place of residence, moving from a village to a city or a foreign country to study, start adapting not only to university studies, but also to new socio-economic and environmental conditions. Besides, students are under permanent mental stress [7] during the whole period of study. To cope with this stress, their organism has to keep the parameters of functional systems within certain limits and adapt to a new environment, which requires mobilization of different organs and systems and the cardiovascular system in particular.

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Most often, the learning activity management in the first year of study does not ensure student adaptation to specific conditions of professional school as far as is necessary. Unreasonable approaches to management of the pedagogical process aimed at completing the student adaptation tasks, incoherence of teachers' actions, and lack of supervisors' attention to solving this issue make student adaptation to the learning process rather difficult.

The analysis of papers on the issue allows us to make a conclusion that they deal with only specific aspects of the adaptation process. Moreover, the essence of adaptation as an objective and natural process with its inherent structure is not clearly determined. The studies do not focus on the fact that the central figure of the adaptation process is a student who acts not as a passive object of pedagogic management and a simple accumulator of transferrable knowledge, but, first of all, as an active process owner who determines the results of the process to a considerable degree.

The purpose of the study is to determine the pedagogical conditions for student adaptation to studying at the university.

2 Materials and methods

We examined 90 first-year students majoring in Pedagogy at the Faculty of Foreign Languages of Mari State University. Among the examined students, several groups were composed of the students (40 people) who came to study from the former USSR countries. The universal indicators of adaptation processes occurring in the human organism are hemodynamic indicators [10]. While studying the cardiorespiratory system functions, we determined a number of core indicators such as cardiac rate, the systolic and diastolic pressure value, the cardiovascular response to breath hold and psychoemotional stress. To determine the degree of human adaptation to the external conditions, we studied the adaptation potential (AP) value. To evaluate AP of the cardiorespiratory system, we tested the timed inspiratory capacity (maximum breath hold after inhale). Also, to evaluate the general state of student's health as well as adaptation and disadaptation phenomena during the initial period of university studies, we conducted the 'individual minute' test. We calculated some hemodynamic parameters according to the formulae: adaptation potential of the cardiorespiratory system (AP) according to the Baevsky formula.

3 Results and discussion

After arrival, every international student experiences 'culture shock' to one degree or another. People experience culture shock when they get into a different socio-cultural environment which is unlike their familiar and native environment [2, 3, 5]. International students coming to study in the Mari El Republic must adapt not only to the university and a foreign language, not only to the aspects of living in the dormitory, but also to life in a foreign country: to the existing conventional system of standards and values, its traditions and culture. Besides, almost all international students are far from their families and close friends and lack their support. According to Fig. 1, adaptation potential of students from the former USSR countries is characterized to a greater extent as unsatisfactory (60%), which requires more focused attention from educators.

Adaptation Potential Indicators (%)

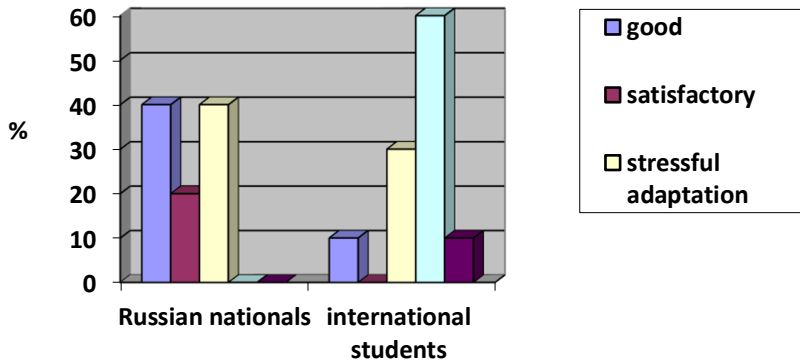


Fig. 1. Adaptation Potential Value Indicators in First-Year Students (%)

The 'individual test' minute is a criterion for evaluation of the general state of student's health as well as adaptation and disadaptation phenomena during the initial period of university studies. On the one hand, the time sense adequacy study allows us to form an opinion about the state of the central nervous system. On the other hand, the time sense is one of the criteria for the quality evaluation of the organism adaptation [6, 9]. The time evaluation adequacy is a necessary precondition for the organism's successful adaptation to diverse external conditions.

Table 1. Indicators of the Mean Value of Individual Minute in First-Year Students (M±m)

IM	Russian nationals	International students
	63.64±2.15	34.91±1.65*

Note: * - the differences between the indicators in the compared groups are statistically reliable ($p \leq 0.05$)

The results of this study confirmed an assumption about the difficulties experienced by the international students at the initial stage of studying at the university. In this category of young people, the individual minute values were only 35 sec on average (Table 1), whereas the students studying in their native language and living mostly in their families showed the results characterizing them as adaptable.

A substantial proportion of the examined students from the former USSR countries studying at the university are the students with a shortened individual minute (93%). A shortened individual minute can indicate depressed mood, emotional overload, and high anxiety. As for the students from Russia, the smallest group was composed of the students with a normal individual minute – 18 %, 36% of students had a shortened individual minute, and the largest group was composed of the students with an extended individual minute (45.5%).

The cardiorespiratory reserve was evaluated by the following parameters: – more than 50 s – good result; 40 – 49 s – satisfactory result; – less than 40 s – unsatisfactory result. We evaluated the cardiovascular response to breath hold to determine the state of the students' cardiorespiratory reserve. In the international student group, the number of students with reduced cardiorespiratory reserve was 50%, whereas there were only 18% of such students in the local student group.

To identify first-year students' psychological discomfort caused by their new learning environment, we evaluated the indicator of the cardiovascular response to psychoemotional stress. In the international student group, the number of students with low stress tolerance of the cardiovascular system was more than half of the group (57%), whereas there were no such students at all in the local student group.

Thus, according to the results of the control stage of the study, first-year students show a decrease in most indicators of adaptation reserve, which manifests itself in the values that are below the physiological standards by such parameters as the values of adaptation potential, an individual minute, the maximum breath hold value as well as the cardiorespiratory response to breath hold and psychoemotional stress.

At the formative stage, we used the pedagogical technologies based on personal orientation of the pedagogical process such as the pedagogy of cooperation, individually oriented training, and game technologies. The pedagogy of cooperation provided for joint elaboration of the purpose and content of the lesson, and evaluation of the process in the state of collaboration. For example, as part of the course "Developmental Anatomy, Physiology and Hygiene" (the topic "The Musculoskeletal System Structure"), students were given the task to draw a diagram of the skeleton sections. In particular, students were given freedom of choice and were offered options such as to list the sections and submit them for review; to draw a diagram with a presentation and pictures, to make a mental map, or to do skeleton mapping, etc. Based on the literature analysis, we made a conclusion that the factors contributing to successful academic adaptation of students were: 1. The uniform requirements for the evaluation of first-year students' academic labor and their personal development results. 2. The coordinated activity of the teaching staff, including knowledge development; the inclusion of the learning process management forms (group and individual types of activity); the integration of the study material for various subjects around the problems that have a professional aspect; joint educational efforts of first-year students' advisors. 3. The maximum use of active and interactive teaching methods promoting interest in the subject and the teacher's personality, encouragement of students' independence and search activity in the learning process. 4. The introduction of the system of differentiated and individual work of teachers, advisors, and parents to offset objective and subjective factors hindering successful academic adaptation. 5. The use of the adaptation workshops system for first-year students; 6. The enhancement of advisors' role in adapting students to the university's learning environment.

The effectiveness of the implemented set of pedagogical conditions to increase first-year students' stress tolerance during their initial training period was tested at the control stage of the study.

According to the findings, the students' AP value changed towards the positive direction: the number of first-year students from Russia with satisfactory AP increased almost by 17%, and the number of students with stressful adaptation decreased by 20%. The students from the former USSR countries also show positive trends: the number of students with good adaptation potential increased by 17%, and the number of first-year students, whose adaptation was stressful, decreased by 10%. There were only few students left with unsatisfactory adaptation, and the students, whose adaptation was disrupted, almost disappeared (Fig.2).

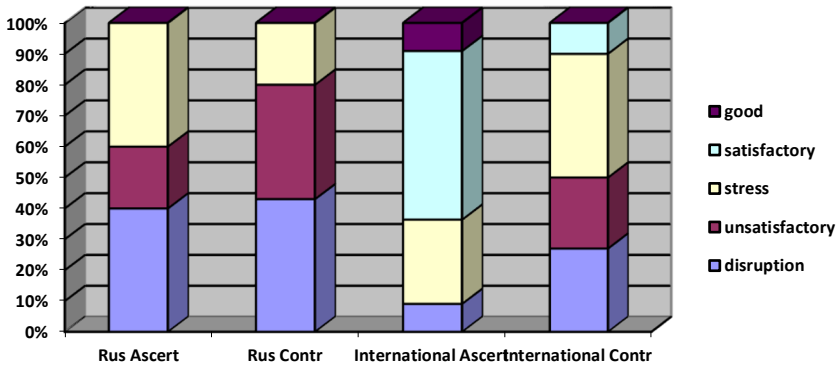


Fig. 2. Adaptation Potential Value Indicators (%) in First-Year Students at the Ascertain and Control Stages of the Study

The results of the study of the mean value of the first-year students' individual minute after the formative work also indicate positive trends in both groups. Focused work with the students from the former USSR countries had an effect on the increase in the mean value of an individual minute in this group almost by 15 sec ($p \leq 0.05$).

Table 2. Individual Minute Value Indicators in First-Year Students ($M \pm m$)

IM	Russian nationals		International students	
	Ascertain stage	Control stage	Ascertain stage	Control stage
	63.64 \pm 2.15	61.84 \pm 2.04	34.91 \pm 1.65	49.75 \pm 1.85*

Note: * - the differences between the indicators in the compared groups are statistically reliable ($p \leq 0.05$)

The value of maximum breath hold after the conducted work increased in both groups of examined students, by 6% in Russian nationals and almost by 17% ($p \leq 0.05$) in international students (Table 3)

Table 3. Cardiorespiratory Reserve Value Indicators in First-Year Students ($M \pm m$)

Russian nationals		International students	
Ascertain stage	Control stage	Ascertain stage	Control stage
51.92 \pm 0.04	57.91 \pm 0.09	33.62 \pm 0.06	50.94 \pm 0.14*

Note: * - the differences between the indicators in the compared groups are statistically reliable ($p \leq 0.05$)

The cardiorespiratory reserve is known to be evaluated by the following parameters: more than 50 s – good result; 40 – 49 s – satisfactory result; – less than 40 s – unsatisfactory result. Consequently, the mean values indicate improvement of the cardiorespiratory reserve indicators.

When analyzing the percentage ratio of the indicators of the cardiovascular response to breath hold in distribution of the students in the compared groups, we can clearly see in the groups under study a decrease in the percentage of students with low indicators of the

cardiovascular response to breath hold (by 9% in Russian nationals and by 28% in international students).

The cardiovascular response to psychoemotional stress in first-year students living in the Mari El Republic remained at the level of the organism's good stress tolerance. The indicators in this student category did not exceed 1.3 and were 1.02 on average. In the first-year students, who came to study from the former USSR countries, the value of the cardiovascular response to psychoemotional stress at the ascertaining stage exceeded the value of 1.3, decreased after formative work, but still remained higher than physiological parameters (1.38), which indicated that stress tolerance of the cardiovascular system was still low and that psychological discomfort still persisted in this category of first-year students.

4 Conclusion

Thus, student adaptation is an objective, dynamic and coherent process of setting up a correspondence between the actual and required levels of proficiency, communication styles, mode of activity in a new learning environment at the university. The adaptation structure is a set of psychological and didactic, everyday life, socio-economic and physiological components. It has been found that differentiated and personality-centered education is an important factor of the effectiveness of student adaptation to the learning process at the university.

The specified pedagogical conditions increase the level of stress tolerance in first-year students, which manifests itself in improving the adaptation potential indicators (the adaptation stress level decreased by 10-17%); in reducing the emotional overload and high anxiety; in improving the indicators of the cardiorespiratory response to breath hold and psychoemotional stress.

The study found that the implementation of specified conditions contributed to the effectiveness of student adaptation to the learning process at the university. A comparative analysis of the results showed that the indicators in the experimental group exceeded the similar indicators in the control group by the specified criteria.

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