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The use of interactive technologies in the formation of students' subjectivity: innovative practices

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Abstract. *Introduction.* The development of human potential is an important direction of the state policy of the Republic of Kazakhstan in the field of ensuring the economic security of the country. In this regard, special attention is paid to the growth of human potential and its responsibility for the self-development and self-realisation of a new generation of citizens. *Aim*. The present research *aimed* to present innovative practices of the formation of students' subjectivity during the educational process through the use of special diagnostic and correctional-developmental tools. *Methodology and research methods*. The research was based on systemic, subjective, activity-based, and axiological approaches. The study extensively utilised methods for modelling the educational process. *Results.* It has been determined that the use of interactive technologies in the implementation of innovative practices contributes to the active formation of subjectivity of students during the educational process. *Scientific novelty.* Based on systemic, subjective, activity-based, and axiological approaches, the authors have developed a system for forming students' subjectivity during the educational process by actively utilising interactive technologies. *Practical significance.* The proposed system can be used by college and university teachers in practice to establish interaction with students.

Keywords: subject position of personality, formation of students' subjectivity, interactive educational technologies, reflexive and innovative training

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Применение интерактивных технологий в становлении субъектности студентов: инновационные практики

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Аннотация. *Введение*. Развитие человеческого потенциала является важным направлением государственной политики Республики Казахстан в области обеспечения экономической безопасности страны. В этой связи особое внимание уделяется росту человеческого потенциала и его ответственности за саморазвитие и самореализацию нового поколения граждан. *Цель* статьи – представить инновационные практики становления субъектности студентов в ходе образовательного процесса посредством использования специальных диагностических и коррекционно-развивающих инструментов. *Методология, методы и методики.* Исследование базировалось на системном, субъектном, деятельностном и аксиологическом подходах. В исследовании широко использовались методы моделирования хода учебного процесса. *Полученные результаты.* Определено, что применение интерактивных технологий при реализации инновационных практик способствует активному становлению субъектности студентов в ходе образовательного процесса. *Научная новизна.* На основании системного, субъектного, деятельностного и аксиологического подходов разработана авторская система становления субъектности студентов в ходе образовательного процесса с активным использованием интерактивных технологий. *Практическая значимость.* Предложенная система может быть использована преподавателями колледжей и вузов в практике для установления взаимодействия с обучающимися.

Ключевые слова: субъектная позиция личности, становление субъектности обучающихся, интерактивные образовательные технологии, рефлексивно-инновационное обучение

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El uso de tecnologías interactivas en el desarrollo de la subjetividad estudiantil: prácticas innovadoras

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Abstracto. *Introducción*. El desarrollo del potencial humano es uno de los enfoques importantes de la política estatal de la República de Kazajstán en lo que tiene que ver con garanztizar la seguridad económica del país. En este sentido, se presta especial atención al crecimiento del potencial humano y su responsabilidad en el autodesarrollo y realización de las nuevas generaciones. *Objetivo.* El propósito del artículo, es presentar prácticas innovadoras, que permitan desarrollar la capacidad subjetivida e los estudiantes durante el proceso educativo, con ayuda de herramientas especiales de diagnóstico, corrección y desarrollo. *Metodología, métodos y procesos de investigación.* La investigación se basó en enfoques sistémicos, subjetivos, de actividad y axiológicos. El estudio utilizó ampliamente métodos de modelación del proceso educativo. *Resultados.* Se ha determinado que el uso de tecnologías interactivas en la implementación de prácticas innovadoras contribuye al desarrollo activo de la subjetividad de los estudiantes durante el proceso educativo. *Novedad científica.* A partir de enfoques sistémicos, subjetivos, activos y axiológicos, se ha desarrollado el sistema de autoría para desarrollar la subjetividad en los estudiantes durante el proceso educativo a partir del uso activo de tecnologías interactivas. *Significado práctico*. El sistema propuesto puede ser utilizado por profesores de colegios y universidades en la práctica para establecer una interacción con los estudiantes.

Palabras claves: posición subjetiva del individuo, formación de la subjetividad de los estudiantes, tecnologías educativas interactivas, aprendizaje reflexivo e innovador

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Introduction

Today, the current century can rightfully be called the century of "informatisation", characterised by an active transition from the technogenic to the information and humanitarian level, where the question of the ability to possess information comes first [1]. Development of human capital is a natural phenomenon necessary for the formation of subjective personality qualities, in particular the ability to self-development and self-realisation. In turn, the disclosure of the internal subjective potential affects not only an individual, but also society. Creating a situation of freedom with established rules for an individual can change his/her focus in all spheres of life, and to a greater extent in education. Creation of favourable environment for the development of personal meanings, values and goals for the advance of a student's personality is currently a priority of education. So, the portrait of a future professional may include the following: understands the dynamism of the world; is able to model stochastic situations, that is, makes decisions promptly.

Issues of professional preparation of a student for designing and its implementation in activities arouse real scientific interest in higher education, which is the "alma mater" in creating conditions for the advance of subjective activity of an individual. The phenomenon of "personality subjectivity" in the current realities of higher education can be called the driving force of personal and professional growth. Consequently, we confront the issue of revealing the character of the "subjective position of the personality" of a student in the learning process as well as the features that are characteristic to the category of the subject in education.

The article *aims* to reveal the concepts of subjective personality characteristics and to present diagnostic and correctional-developmental methods for the formation of students' subjectivity using interactive technologies at the university.

Research objectives:

– to carry out a theoretical as well as methodological analysis of approaches to the study of the subjective characteristics of the personality and its formation using interactive educational technologies;

– to determine the specific, integral components of the formation of a student's subjectivity via exploiting interactive educational technologies;

– to select and develop valid and reliable diagnostic tools for conducting experimental research;

– to approve and experimentally test the "Model of the formation of students' subjectivity using interactive educational technologies"; and

– to develop and empirically test the effectiveness of the authorial system that ensures the formation of students' subjectivity by means of interactive educational technologies.

Research hypothesis. The study of the subjective characteristics of personality and the formation of subjectivity of students will be effective if a model of the formation of subjectivity of students using interactive educational technologies is introduced into the pedagogical process, which includes the authorial system "En-

suring the Formation of Students' Subjectivity Using Interactive Educational Technologies" (A. D. Kariyev) and diagnostic tools.

Limitations of the study. A limitation was introduced into the study: students of higher educational institutions aged 17–22 years of Kazakhstan and Bulgaria took part in this work, which is due to the need to take into account data in a relatively short period of a person's life path. The next limitation in this work is the use of interactive educational technologies as a condition for the formation of subjectivity of university students.

Literature Review

The structure of the process of students' professional development in the frame of student's "personality subjectivity" is of key importance. It is a necessary condition for the implementation of a new concept in the development of vocational education, adopted in many countries. Simultaneously, it is the weakest link that can create problems in the conditions of its implementation. Therefore, D. Lee, Y. Huh, Ch. Y. Lin and Ch. M. Reigeluth consider personality-oriented education in human development dominates in modern pedagogy, which indicates the humanisation of educational processes [2]. Pedagogical psychological research has enriched science with a powerful set of competencies, due to which strategies and conditions for the "students' subjectivity" formation in the education are being improved and appropriate innovative technologies are being developed. In modern science and practice, researchers have identified the components of "subjectivity" and the conditions for its formation. A. D. Kariyev characterises subjectivity of a student as an integrative personal quality, which is by the student's activity, primarily an internal focus on himself, i.e. the definition of goals, tasks, the formation of motives for activity, etc., as well as a focus on the outside world, which is determined in the willingness to make the right decisions in nonstandard life situations [3]. B. E. Fishman notes the importance to focus on the factors that determine the formation of subjectivity of modern students in the educational activities of the university [4]. V. I. Panov and I. V. Plaksina point at the need for wider use of active teaching methods of pedagogical university students in the development of subjective qualities [5].

"Personality subjectivity" is expressed through attitude to the world, system of personal relationships with people. It is also expressed through attitude to oneself. The study in the cognition sphere acquires significant relevance within the concept formation of a students' "subjectivity" or "agency" (in Western literature). One of the manifestations of the cognition sphere lies in the ability to learn. We support the opinion of A. D. Kariyev who states, "the ability to learn manifests itself directly in the ability to overcome one's own 'framework', to look forward, changing one's circle of thinking, the ability to make oneself 'better', and not only in the conscientious assimilation of knowledge transmitted by the teacher" [3]. These abilities allow the student to show an attitude to him/herself as "I am a student" and the image of "I am a future professional", which will allow self-realisation in life. There-

fore, we consider the "subjectivity" of the student in this study through the prism of the education.

Concept of "subject" is interdisciplinary. It is evidenced by its wide application in such sciences as philosophy, psychology, logic, pedagogy, etc. Concepts of different disciplines that define this concept do not always complement each other, but in most cases they contradict (giving it different definitions and meanings). The deeper we try to study the concept of "subjectivity", the more unresolved issues and problems arise before us, as new directions, questions, and areas of research are discovered during the study. Researchers M. H. Stenalt, B. Lassesen [6], U. E. Torres Castro, C. Pineda-Báez [7] trace the evolvement of student agency at the level of universities. Student agency is explored in research focused on globalisation and internationalisation in the work of A. Boni and C. Calabuig [8]. The review made by K. Inouye, S. Lee, and Y. I. Oldac synthesises conceptualisations of international student agency presented in the literature into an integrative framework [9]. J. H. Nieminen, J. Tai, D. Boud and M. Henderson focus their attention on the theoretical frameworks of student agency as well as the implications these frameworks for feedback [10]. D. Casanova, G. Alsop and I. Huet consider the use of digital assessment and feedback in the framework of learner agency [11]. Knowledge production is the scope of investigation of N. Hopwood [12] and P. Jääskelä [13]. The organisation of learning includes both compliance and non-compliance with norms in the classroom, which makes it much more subtle than just meeting expectations. Researchers K. Zeiser, C. Scholz and V. Circks measure student agency to enhance academic performance of students from different backgrounds [14].

J. Charteris and D. Smardon [15] discuss new generation learning environment as well as cognitive and affective capacities of an individual student, believing that learner agency may strengthen and enhance learner's positioning in relation to their learning. The authors develop taxonomy of agency in education settings, distinguishing sovereign agency, relational agency, ecological agency, and material agency.

M. Heikkilä, H. Hermansen, T. Iiskala et al. investigate the relationship of knowledge production and agency in the sphere of student teachers' engagement with research skills [16].

In general, as G. V. Maralov, A. D. Kariyev, O. V. Krezhevskih et al. state "subjectivity as a personal characteristic of a future specialist is characterised by activity and awareness of students' actions in realisation of their personal functions and personal growth" [17]. In particular, according to researchers, its components are called: emotional-semantic, which provides the functions of self-understanding and self-development, determines the moral and moral foundations of the worldview; activity-value, which provides the functions of self-esteem, self-determination and self-development; behavioural-normative, thanks to which self-realisation and self-affirmation of the individual occurs in educational activities [17].

A. V. Gvozdeva analyses another approach to students' subjectivity (namely the integrative-differential) and determines that this structure includes the following

components as: cognitive, activity and personal, and also types of educational, organisational, cognitive, self-analytical, search-creative, individual-personal, emotional-value and professional-activity subjectivity of personality [18].

Scientific research shows that it does not fully reveal the macrostructure of the students' subjectivity. The components should be considered from two perspectives: the first (to reflect the students' integrative personal quality), the second (to determine the formation level of the subjectivity of the students). Based on the above, when developing the components of the student's subjectivity, these positions were taken into account.

We can emphasise that the student's "subjectivity" manifests itself in student's educational and cognitive activity, self-knowledge, and communication and is an integrative category. We propose to qualify the student's "subjectivity" as a combination of two main structural complexes: personal and activity. The personality complex contains macro-components that characterise the personal potential of a young person: individual-creative, motivational-value, reflexive-regulatory, and cognitive-competent. The following macro-components are recognised in the activity complex, which ensure the realisation of the personal potential of a young person in the activity: emotional-volitional, prognostic-target, and organisational-communicative.

Thus, the importance of the students' subjectivity is considered by N. M. Borytko, O. A. Mackajlova:

– from the position of self-development: promotes the process of personality formation as well as self-development of the individual;

– from the perspective of the educational process: promotes the development of activity and creativity of the student;

– from the standpoint of professional and pedagogical activity: the subjectivity of the teacher contributes to the students' subjectivity enhancement [19].

The analysis of the views of scientists on the concept of "subjectivity" and according to the goal we set, allowed defining "subjectivity" as a systemic property of personality that units the ability and readiness for self-manifestation in society; the realisation and search of the manifestation of one's own activity; the wish for self-improvement in activity and also the ability to perceive oneself as a "producer" of one's own life for the purpose of investing in the future.

A. D. Kariyev, Zh. Sultanova, T. Yeralieva et al. while analysing recent studies and publications highlight the significance of interactive educational technologies as formative means for main structural complexes of students' subjectivity [20].

As for determining "subjectivity" of a student in pedagogy and higher education psychology, M. Milistetd, W. Neves Salles, J. V. Nascimento adhere to a humanistic approach [21]. At the centre of this approach, there is the student's personality, characterised by its individuality, subjective experience, and the desire to reveal its own potential. Teacher's role in this case is only to create the necessary pedagogical conditions for the personality development.

In our opinion, the subjectivity of a student is a system of relations of subjects of learning to each other, and to the ways and conditions of developing their own cognitive activity. Their cognitive activity can be expressed in educational, professional, life activity. We define the students' subjectivity as an indicator of readiness for self-change that shows the degree of personal and professional self-development.

A. D. Kariyev states that interactive educational technologies are pedagogical technologies based on the humanisation and democratisation of pedagogical relations, as well as activation of students' activities [22].

Interactive educational technologies are based on a direct teacher-student dialogue, and among students themselves. During such training, students learn the ability to communicate democratically, think critically and creatively, and make informed decisions. All participants of the process are involved in this group work. They work in groups using materials prepared by the teacher beforehand, in compliance with the procedure and regulations, in an atmosphere of trust. As A. N. Slizhevskaya suggests, interactive educational technologies are changing traditional forms to dialogical ones based on interaction and mutual understanding [23].

Thus, interactive educational technologies allow fostering educational process basing on active, continuous and positive interaction of all participants. Here, teachers and students are equal subjects of learning, actively interacting in collective, group, and individual forms. This educational process will create an atmosphere of collaboration, and the teacher, in turn, will become a real mentor of the team. As follows, we believe that applying interactive educational technologies in the framework of our research is necessary in order to form two main structural complexes of students' subjectivity.

Methodology, Materials and Methods

The theoretical as well as methodological basis of this study was the system-subjective approach introduced by E. A. Sergienko [24], according to which a person as a subject of his/her activity, relationships and development acts simultaneously as a carrier of consistency in interaction with the surrounding reality. The following methods are used: a) theoretical (analysis, synthesis, generalisation, systematisation, modelling, design); b) empirical (questionnaire, testing, survey); c) experiment; d) interactive creative methods; e) interactive correctional and developmental methods; f) mathematical methods of data processing.

At the ascertaining stage of the experiment, we used methods that have confirmed their effectiveness (validity and reliability) and are widely used not only for scientific, but also for practical purposes. The following methods of data collection were used: questionnaire for "Identifying the Level of Subjectivity of a Future Teacher: Part I and II" (A. D. Kariyev)[1]; questionnaire "The Need to Achieve a Goal"

[1] Kariyev A.D. Formation of student subjectivity using interactive educational technologies at the university. Dissertation for the degree of candidate of pedagogical sciences: (13.00.08). Makhachkala: Dagestan State Pedagogical University; 2020. 210 p.

(Yu. M. Orlov) [25]; D. Johnson's "Creativity Questionnaire" (D. Johnson, adaptation of E. E. Tunik) [26].

During the formative stage of the experiment, interactive educational technologies were used; information and communication technologies; interactive creative methods: moderation, brainstorming, Delphi method, discussion, debate, etc.; interactive correctional and developmental methods: active socio-psychological training, reflexive and innovative training, counseling, etc.

The implementation of the "Formation Model of the Subjectivity of a Student Using Interactive Educational Technologies" was carried during the research (A. D. Kariyev)[1].

During the formative experiment, the authorial system "Ensuring the Formation of a Student's Subjectivity Using Interactive Educational Technologies" (A. D. Kariyev)[2] was implemented.

According to the findings of ascertaining and formative stages of the experiment, mathematical and statistical processing of empirical data was carried out using mathematical methods:

– Pearson's criterion, or criterion $\chi 2$ (Chi-square). We rely on the work by A. D. Nasledov, who describes the experience of use of mathematical methods in psychological research [27].

– Factor and correlation analysis using SPSS computer programs (version 23), relying on the experience of A. D. Nasledov in using computer data analysis in psychology and social sciences [28].

For the convenience of comparing the results of empirical data and the correct application of mathematical statistics methods, all data on all scales of diagnostic tools (questionnaires, tests) were transferred to a five-point scale.

The research and experimental work was conducted in four stages during January–September 2022. It consisted of four stages. At the first stage, theoretical and methodological analysis of the problem was carried out and an empirical research programme was developed. The second stage was the ascertaining stage. It was aimed at empirical verification of the array of empirical data. Mathematical and statistical data processing was performed. The third stage was the initial stage of the experiment, aimed at the development and carrying out special psychological training: interactive correctional and developmental tools, educational programmes of special psychological training, instructional and methodological materials and guidelines, manuals, etc. At the fourth stage, generalisation and comparative analysis of the study results was carried out.

Experimental base of the study. The research was accomplished with university students of Kazakhstan and Bulgaria. The total sample size: a total of 81 full-time and part-time students of pedagogical and psychological-pedagogical departments of training took part in the study, 66 (81%) women, 15 (19%) men. The average age is 20.7 years. 42 of them are students of the Kazakh National Women's Pedagogical

[1] Ib.
[2] Ib.

University (Almaty, Kazakhstan). 39 participants are students of the Sofia University St. Kliment Ohridski (Sofia, Bulgaria). The study was conducted from September 2021 to September 2022 on a voluntary basis. The ascertaining stage of the study lasted from September to October 2021. This stage was aimed at identifying the formation level of students' subjectivity, understanding empirical data, their analysis and generalisation. The formative stage was implemented from November 2021 to May 2022. The final stage was held from June to September 2022. The results of experimental activities, analysis and processing of the empirical data that were obtained in the experimental group and control group were then summed up during the final stage of the experiment.

The limitation of this study is the limited sample (81 participants). It may be advisable to conduct subsequent studies on the material of a larger number of study participants with the involvement of a wider geographical coverage.

Results

The reliability and probability of the results obtained in this study is provided by the theoretical validity as well as the methodological analysis of the initial provisions of the study; the congruity of the selected methods to a specific goal, objectives and subject of the study; sufficient representativeness of the sample; adequate application of mathematical statistics methods.

This publication focuses on the presentation of the empirical study results of the level of students' subjectivity, creativity, and the need to achieve the goal. For this purpose, in order to carry out the initial diagnosis (at the stage of the ascertaining experiment) and the final diagnosis (at the formative and summing up stage of the experiment) after the corrective action during implementation of training programmes (providing the effective formation of the students' subjectivity using interactive educational technologies), we have selected and used valid and reliable psychological and pedagogical diagnostic tools:

– questionnaire "The Need to Achieve a Goal" (Yu. M. Orlov) [25];

– D. Johnson's "Creativity Questionnaire" (D. Johnson, adaptation of E. E. Tunic) [26];

– questionnaire on "Identification of the Level of Future Teacher Subjectivity" (A. D. Kariyev)[1].

During formative stage, work was accomplished in the experimental group to implement our system that ensures the effective formation of the students' subjectivity using interactive educational technologies. Learning activities in the control group were carried out in the standard mode adopted at the university. The final diagnosis of the level of formation of the students' subjectivity was carried out at the final stage of the research (the end of the academic year of the group).

1. The final diagnosis results of the creativity level by D. Johnson, adaptation of E. E. Tunik, are presented in Figure 1.

[1] Ib.

The results presented in Figure 1 clearly demonstrate the trends of a significant transition of students from a low level (a decrease in the low level by 26%) to an average (in the experimental group). At the same time, we can observe the transition from an average (an increase in the high level by 13%) to a high level of creativity formation. Taking into consideration the control group, we can observe more moderate results: a decline in the low level was 2%, and at the same time an increase in the high level was 3%.

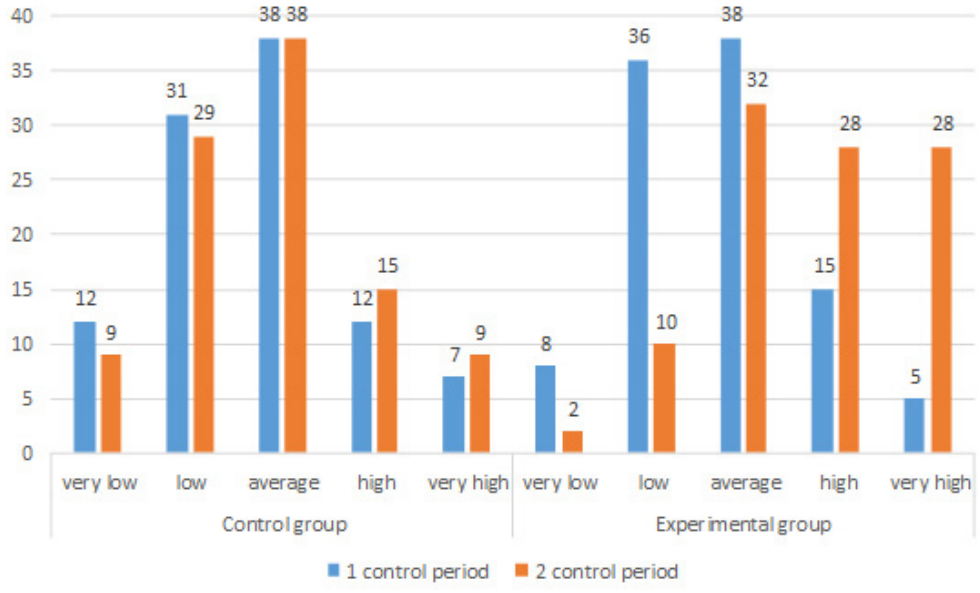

Fig. 1. Dynamics of level changes in creativity level of students in the experimental and control groups before and after the training

A comparison of the data obtained during the final diagnosis using the chi-square criterion determined that in the experimental group the creativity level turned to be higher than in the control one. The following analysis accesses whether this difference is statistically significant. The value of $\chi 2 = 11.01$. Since the indicators of creativity diagnostics are D. Johnson's (adaptation by E. E. Tunics) are characterised by four degrees of freedom ($\chi 2 = 7.78$ at $\alpha = 0{,}1$), i.e. $\chi 2 < \chi 2$, then the difference fell into the zone of significance at the level of 0.9. This suggests that the final diagnosis results of creativity in both groups contain statistically significant differences with a confidence probability of 90%.

2. Final diagnosis results of the level of need to achieve the goal are presented in Figure 2.

Results of the final measuring of the level of need to achieve the goal showed that the experimental group students significantly increased the level of need to

achieve the goal. At the initial diagnosis, 1 student (3%) had a high level of need to achieve the goal, 15 students (38%) had an average level, and 16 students (41%) had a low level. At the final diagnosis, changes were found: 9 students (23%) had a high level, 16 students (41%) had an average level, and only 3 students (11%) had a low level of need to achieve the goal. In the control group, this indicator did not change significantly: 5 students (12%) had a high level of need to achieve the goal during primary diagnosis, 17 subjects (40%) had an average level, and 15 students (36%) had a low level. At the final diagnosis, the high level did not change, the average level in 18 students (43%) and 14 students (33%) had a low level.

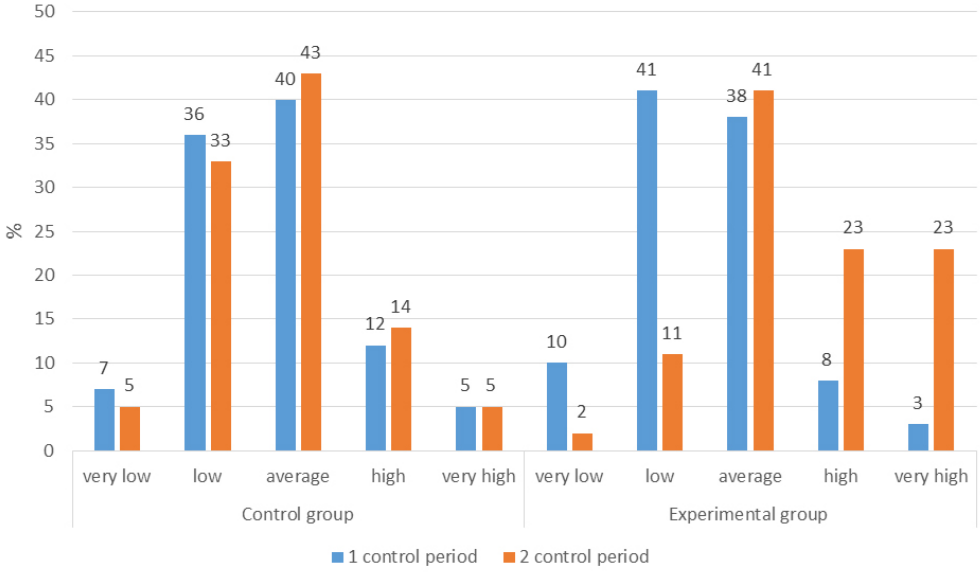

Fig. 2. Diagnostic results according to the level of need to achieve the goal according to Yu. M. Orlov in the control and experimental groups

The results show that the level of need to achieve the goal in the experimental group increased compared to the control group. The following analysis accesses whether there are statistically significant differences between the levels of need to achieve the goal in these groups. The chi-square criterion revealed that the value of $\chi 2emp = 10.96$. Since the diagnostic indicators of the need level to achieve the goal are characterised by four degrees of freedom ($\chi 2cr = 7.78$ at $\alpha = 0,1$), i.e. $\chi 2emp < \chi 2cr$, the difference fell into the zone of significance at the level of 0.9. This indicates that the final diagnosis results of the level of need to achieve the goal in the experimental as well as in control groups contain statistically significant differences with a confidence probability of 90%.

The results that were obtained in the final diagnosis of the student's subjectivity level by individual creative, motivational-value, reflexive-regulatory and cognitive-competence macro components are reflected in Table 1.

According to the Table 1, the level of subjectivity in the macro components under consideration has changed as follows: in the control group, there is not a significant increase in the high level (by 1%) with a decrease in the low level by 5%; a significant increase in the high level (by 25%) and at the same time a simultaneous decrease in the low level by 23% are observed in the experimental group. As final diagnosis results indicate, the formation level of students' subjectivity in the control group is higher than in the experimental group.

Table 1

Dynamics of level changes in students' subjectivity by individual-creative, motivational-value, reflexive-regulatory and cognitive-competence macro components

Groups	***Control group (42)***			***Experimental group (39)***		
	Levels, %					
	Low	Average	High	Low	Average	High
Individual-creative macro component						
Control period 1	28	43	29	33	41	26
Control period 2	24	45	31	13	36	51
Dynamics of changes	–4	+2	+2	–20	–5	+26
Motivational-value macro component						
Control period 1	38	1	21	38	42	20
Control period 2	33	43	24	15	41	44
Dynamics of changes	–5	+2	+3	–23	–1	+24
Reflexive-regulatory macro component						
Control period 1	45	41	14	46	41	13
Control period 2	38	45	17	18	49	33
Dynamics of changes	–7	4	+3	–28	+8	+20
Cognitive competence macro component						
Control period 1	38	43	19	36	49	15
Control period 2	31	48	21	13	38	49
Dynamics of changes	–7	+5	+2	–23	–11	+34
The final result for macro components						
Control period 1	37	41	22	38	43	19
Control period 2	32	45	23	15	41	44
Dynamics of changes	–5	+4	+1	–23	–2	+25

The following analysis accesses whether this difference is statistically significant. Chi-square criterion determined that the value of $\chi 2 = 20.78$.Since the indi-

cators of the diagnosis level of subjectivity for the studied macro components are characterised by two degrees of freedom ($\chi 2 = 4.60$ at $\alpha = 0{,}1$), i.e. $\chi 2 < \chi 2$, the difference fell into the zone of significance at the level of 0.9. Consequently, the final diagnosis results of the level of subjectivity for the considered macro components in the experimental as well as control groups have statistically significant differences with a confidence probability of 90%.

The final diagnosis results indicating the level of students' subjectivity formation according to the emotional-volitional, prognostic-target and organisational-communicative macro components are presented in Table 2.

Table 2

Results of diagnostics of the students' subjectivity level by emotional-volitional (EV), prognostic-target (PT) and organisational-communicative (OC) macro components in the control and experimental groups

Macro component	**Control period 1**				**Control period 2**			
	CG		EG		CG		EG	
	1. Not developed	2. Developed	1. Not developed	2. Developed	1. Not developed	2. Developed	1. Not developed	2. Developed
Emotional-volitional	55	45	54	46	48	52	21	79
Prognostic-target	59	41	56	44	52	48	23	77
Organisational-communicative	64	36	67	33	55	45	26	74

Note. Control period 1 – data obtained at the beginning of the academic year; control period 2 – data obtained at the end of the academic year).

Gradations used: 1 – the macro component is not developed, 2 – the macro component is developed.

Final diagnosis results indicated that in the experimental group the level students' subjectivity in the studied macro components is remarkably higher compared to the control group. The following analysis determines whether there are statistically significant differences. Using the chi-square criterion showed that the value of $\chi 2emp = 20.96$. Since the diagnostic indicators of the students' subjectivity level for the considered macro components are characterised by one degree of freedom ($\chi 2cr = 2.71$ at $\alpha = 0{,}1$), i.e. $\chi 2emp < \chi 2cr$, the differences are significant at the level 0.9. Consequently, the final diagnosis results of the students' subjectivity level by macro components in the experimental and control groups with a confidence probability of 90% have statistically significant differences.

Table 3 presents the final diagnosis results of the students' subjectivity level by individual creative, motivational-value and reflexive-regulatory macro components.

The results obtained (Table 3) display significant changes that took place in the experimental group. An increase in the high level of subjectivity for the macro components under examination amounted to 24%, the low level decreased by 31%.

There were also changes in the control group. These changes, however, were not so significant (compared to the experimental group). Findings suggest that in this group the low level of students' subjectivity in the macro components under consideration decreased by only 5%, the increase in the high level was 3%.

Table 3

Dynamics of level changes in students' subjectivity according to individual-creative, motivational-value and reflexive-regulatory macro components

Groups	***Control group (42)***			***Experimental group (39)***		
	Levels, %					
	Low	Average	High	Low	Average	High
Individual-creative macro component						
Control period1	31	40	29	31	41	28
Control period 2	26	43	31	10	44	46
Dynamics of changes	−5	+3	+2	−21	+3	+18
Motivational-value macro component						
Control period 1	36	43	21	36	41	23
Control period 2	31	45	24	10	46	44
Dynamics of changes	−5	+2	+3	−26	+3	+23
Reflexive-regulatory macro component						
Control period1	48	36	16	49	38	13
Control period 2	40	38	22	13	41	46
Dynamics of changes	−8	+2	+8	−36	+3	+33
Final result for macro components						
Control period1	38	40	22	42	37	21
Control period 2	33	42	25	11	44	45
Dynamics of changes	−5	+2	+3	−31	+7	+24

In the experimental group, the level of the students' subjectivity formation in the studied macro components differs significantly from the level of the students' subjectivity in the control group. The following analysis determines whether this difference is statistically significant. The chi-square criterion showed that the value of $\chi 2emp = 19.43$. Since the diagnostic indicators of the formation level of the students' subjectivity for the studied macro components are characterised by two degrees of freedom ($\chi 2cr = 4.60$ at $\alpha = 0{,}1$), i.e. $\chi 2emp < \chi 2cr$, the difference fell into the zone of significance at the level of 0.9. This indicates that the final diagnosis results of the formation level of the students' subjectivity in the experimental as well as control groups contain statistically significant differences with a confidence probability of 90%.

The final diagnosis results of the students' subjectivity level by cognitive-competence, emotional-volitional, prognostic-target and organisational-communicative macro components in two groups are presented in Table 4.

Table 4

Diagnosis results of the students' subjectivity level by cognitive-competence, emotional-volitional, prognostic-target and organisational-communicative macro components in the control (CG) and experimental (EG) groups

Macro component	Control period 1				Control period 2			
	EG		CG		EG		CG	
	1. Not developed	2. Developed	1. Not developed	2. Developed	1. Not developed	2. Developed	1. Not developed	2. Developed
Cognitive-competence	59	41	61	39	55	45	23	77
Emotional-volitional	57	43	56	44	52	48	21	79
Prognostic-target	55	45	59	41	50	50	18	82
Organisational-communicative	62	38	64	36	57	43	26	74

Note. Control period 1 – data for the beginning of the academic year; control period 2 – data for the end of the academic year.

Gradations used: 1 – the macro component is not developed, 2 – the macro component is developed.

Thus, in the experimental group, the level of students' subjectivity of the considered macro components is significantly higher than in the control one. The following analysis accesses whether this difference is statistically significant. Using the chi-square criterion showed that the value of $\chi 2emp = 34.57$. Since the diagnostic indicators of the students' subjectivity level according to these macro components are characterised by one degree of freedom ($\chi 2cr = 2.71$ at $\alpha = 0,1$), i.e. $\chi 2emp < \chi 2cr$, the difference fell into the zone of significance at the level of 0.9. This suggests that the final diagnosis results of the students' subjectivity for the macro components which have been discussed above in the experimental and control groups have statistically significant differences with a confidence probability of 90%.

Discussion

Presented results of the experiment suggest that there were significant positive changes in the formation level of students' subjectivity in the experimental group.

As part of the formative experiment, the authorial system was implemented that ensures the formation of a students' subjectivity formation by means of interactive educational technologies at the university.

Authorial system, which has provided the effective formation of the students' subjectivity using interactive educational technologies, includes blocks that characterise its target orientation.

Presented authorial system contains five consistently implemented lines of joint teacher-students extracurricular activities: stimulating the community of the student group and developing motivation for pedagogical activity; students' awareness of their personal and professionally significant qualities; understanding one's subjectivity in future pedagogical activity; reflection of personal and professionally significant qualities; diagnostics and monitoring of the state of students' subjectivity.

Our system is an integral system of significant concepts that are built in a strict sequence and are directly interrelated with interactive classes.

In addition, the authorial system includes measures for the development of socio-psychological competencies that allow solving the tasks listed below:

– to develop personality subjectivity (the ability to analyse, compare, contrast situations and behaviour of both group members and individuals);

– to master the ability to adequately perceive oneself and others (that is, the ability to develop and adjust the norms of one's own behaviour and in the process of interpersonal interaction);

– to develop emotional stability (the ability to act in critical situations, the ability to adapt);

– to master the techniques of getting rid of psychological trauma (that is, the ability to master the ways of getting rid of fear, anxiety, phobias, negative memories);

– to master the technology of resolving interpersonal contradictions and overcoming conflict situations;

– to develop communicative competence (possess the necessary tools of interaction with others);

– to develop flexibility of reaction (the ability to react to a situation, easily adjust in real conditions);

– to master the technology of adequate self-assessment (the ability to evaluate oneself and a sense of confidence);

– to develop the value-motivational sphere of personality (create conditions for motivation development);

– to master decision-making strategies and setting strategic and tactical objectives [22].

For the purpose of determining authorial system effectiveness, experimental work was carried out to identify the conditions for the formation and development of students' subjectivity through interactive educational technologies. The purpose of the empirical study is to diagnose and monitor the validity of the provisions put forward earlier in the study justification.

The experiment results prove the completeness and practical significance of the developed authorial system. It is determined that with the gradual and systematic implementation of pedagogical conditions, the effective formation of the students' subjectivity will be ensured.

Thus, there are full grounds to assert that this study completely solved the tasks set.

The results of the performed research do not exhaust all aspects of the problem under consideration. It seems that the subject of its further research may be the study of subjectivity formation in students of master's and doctoral studies.

Conclusion

Summarising the ideas of many scholars, we note that subjectivity of a person is expressed in his/her activity, integrity, autonomy, i.e. a system capable of constant independent development. The subjectivity of a student's personality is a qualitative and dynamic characteristic of a person [29]. It represents an individual style of activity and a "whole self-image" of activity encompassing a set of professional value-volitional attitudes.

Analysis results of scientific sources in relation to personality-oriented pedagogy indicate that the theory of student-centred learning is leading in foreign pedagogy and relevant in the pedagogy of higher education in Kazakhstan.

As results show, after the implementation of the authorial system "Ensuring the Formation of Students' Subjectivity Using Interactive Educational Technologies" (A. D. Kariyev), the level of students' subjectivity formation in the experimental group has significantly changed in a positive way. In the control group, there is a situation in which the level of subjectivity formation has either not significantly improved, or there is a regression of the students' subjectivity formation.

Our system has been developed in compliance with the modern educational paradigm in which the position of the teacher in relation to the student is changing, where the teacher loses the signs of a translator of knowledge and a leader in relations with students. Interaction in education acquires partnership, where the teacher's role is seen in assistance, coordination, counselling, and provision of conditions for students' subjectivity formation.

We consider the prospects for further research in this direction to be the study of favourable conditions for establishing and supporting partnerships of learning subjects being an important factor in sustaining the effectiveness of education.

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