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Personality regulation of students' cognitive states during sports and educational activities

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ABSTRACT

The article is devoted to the study of cognitive mental states and personality properties relationship during educational activities. In practical terms, the most important task in the field of educational psychology is to develop methods for updating and regulation of cognitive states. The study of cognitive states carried out in various forms of educational activity: in an ordinary situation (a lecture) and in a tense situation of training (an exam). N = 90, 1-st year students at the Kazan Federal University. During the research used different questionnaires to diagnose the personality traits and the intensity of students' cognitive states, such as interest, reflection, concentration, mental stress etc. The data analysis included frequency analysis, the polar group method and the MANOVA method. Revealed that in an everyday situation of educational activity (lecture) the most often experienced states are thoughtfulness, interest and concentration, while in a tense situation of an exam - mental stress, doubt and concentration. In everyday situations, a state of thoughtfulness is observed in individuals with high Conscientiousness, and prevails in friendly, open-minded and emotionally stable students with a focus on the task. During the exam students with high activity, extraversion, and focus on the task experience the state of mental stress. Results of this research will find application in educational systems increasing the effectiveness of educational, scientific and creative activities, through the updating of students' positive cognitive states. Cognitive states stimulate and regulate cognitive activity, performing the function of development of cognitive processes and intellectual abilities. The influence of personality properties on cognitive states is mediated by both the intensity of educational activity and the interaction of the personality traits.

Keywords: Cognitive state; Educational activities; Sports activities; Personality trait; Regulation.

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INTRODUCTION

The study of mental states led by N.D. Levitov (1964) concluded that it was necessary to single out the states associated with the process of cognition and the cognitive sphere of the subject, in general, the cognitive states. The question of the content of cognitive states, their structure, functions, dynamics, connections with other mental phenomena (processes and properties), including the states of other classes, is still open.

The emergence of states goes in conjunction with subjectively significant situations that can be characterized as unusual, new, uncertain, hypothetical, with the activity of higher levels of cognitive reflection and regulation - mental structures (semantic, reflexive, feelings, mental experience), as well as components of I-System. As a separate class of mental states, cognitive states act as an integral functional structure, organizing somatic, mental and meta-psychological processes (integrated mental processes: goal-setting, decision making, monitoring and others) (Prokofieva et al., 2018; Vinogradova et al., 2018; Prokhorov & Chernov, 2019). The mental states interact with the structures of consciousness, associated with intellectual abilities (cognitive styles, properties of intelligence, learning, creativity) and other personal traits that are necessary for an effective process of cognition (Prokhorov, Chernov & Yusupov, 2019). The “*procedural and informative*” complexes of cognitive states manifestations (cognitive, metacognitive, and other processes, personal characteristics, intellectual abilities, etc.) are fixed and stored in the structure of mental experience (Prokhorov, Yusupov & Chernov, 2016; Mukhametzyanova et al., 2018; Zhgenti et al., 2018).

Positive states (peace, interest, joy, etc.) are considered as an important factor in increasing the intellectual efficiency of a person (Fredrickson, 2000; Isen, Daubman & Nowicki, 1987). B.L. Fredrickson (2000) showed that positive states increase the intellectual efficiency. Such positive experiences expand the intellectual repertoire of thinking-action, and they improve an individual's social, intellectual and physical resource. F. Efkliides (2002), studying the metacognitive states, notes that the states accompanying the problem solving process, for example, the “*sense of complexity*” of the problem being solved, has a significant impact on the students' productivity. In another study revealed that the negative-deactivating emotions associated with participation in science tests were more intense than those experienced by simply studying science (Chiang & Liu, 2014). I. Blanchette and A. Richards (2010) suggest that focusing on some of the constituent mechanisms involved in interpretation, judgement, decision making and reasoning provides a way to link some of the diverse findings in the field. The research shows complex effects of emotion on decision making and reasoning, with emotion sometimes hindering normatively correct thinking and sometimes promoting it.

Other research are devoted to the relationship of psychological properties of personality and mental states in Russian psychology. In the studies, conducted by A.O. Prokhorov (1991), were established some regularities of mental states and personality traits relationship in learning activities. There was a tendency to more connectedness of personality traits of a higher level of hierarchy, compared with properties of a low level of hierarchy. This indicates the dominance of socially determined properties in the functional structure of states. At the same time, the mental states reflect the character traits of the subject, as a combination of stable individual personality characteristics. At the same time, self-regulation encompasses skills such as paying attention, inhibiting reflexive actions, and delaying gratification (Berger, 2011).

A.V. Makhnach (1993) discovered that there is a close relationship between the two-dimensional state space (positive - negative) and the two-dimensional personality space, decorated by factors of extraversion and neuroticism. A.V. Makhnach (1993) considers the relationship of mental states and personality traits as the result of the interaction of internal (physiological, mental) and external (social and natural) factors. The author concludes that mental states are determined by stable personality traits that determine the specificity of

mental states' symptom complex. V.A. Bodrov (2000) notes the importance of intellectual characteristics and, in general, personal qualities of an individual (motivational, volitional, temperamental) in the occurrence, development and manifestation of psychological stress. In another study shown that in some domains, the human capacity to introspect is plastic and can be enhanced through training (Baird et al., 2014). N. Garnefski, V. Kraaij and P. Spinhoven (2001) revealed that cognitive coping strategies were found to play an important role in the relationship between the experience of negative life events and the reporting of symptoms of depression and anxiety.

Interesting results were obtained by T.N. Vasilyeva (2009) in a study aimed at identifying features of the relationship between mental states and personality motivation. Only the desire to master the profession can really affect the mental states of students and cause certain experiences in the process of learning activities. The study of the influence of the locus of control on mental states showed that the level of subjective control, as a property of a personality, mediates the mental states of a subject, depending on the situation, actualizing other properties, causing a definite reaction.

However, nowadays, in psychology there is a gap in research that reveals the relationship between cognitive mental states and personality traits during educational activities. The most important task in the field of psychology is to develop methods for updating cognitive states, as well as determining their functions in the course of human activity.

METHODS OF RESEARCH

The main purpose of the study is to identify personality traits that affect students' experiences of cognitive states during every day and intense forms of educational activity.

The study involved 90 students, aged 19-22 years (both sexes), the Institute of Psychology and Education, Kazan Federal University. The study of cognitive states was conducted in the course of students' educational activities: during lectures and exams, when the lesson was interrupted. In addition, was measured the intensity of experienced states on a ten-point scale. For the data analysis was used the SPSS 19.0 program: frequency analysis, the polar group method, the MANOVA method. During the research were used the following techniques:

1. The temperament structure questionnaire by V.M. Rusalov (Posokhova & Solovyova, 2008). The questionnaire designed for the diagnosis of the energy level, plasticity, pace (speed) and emotionality in the subject and social areas. The questionnaire of the temperament structure is used to diagnose the properties of the "subject-activity" and "communicative" aspects of temperament.
2. Big Five personal questionnaire by P.T. Costa and R.R. McCray (1992). A psychological model that describes the structure of personality by means of five common, relatively independent traits. It contains 5 scales: Extraversion/ Surgency, Agreeableness, Conscientiousness, Emotional Stability, Intellect/ Openness.
3. Orientation questionnaire by B. Bass (1967). This technique allows to identify three types of personality orientation: for oneself, for relationships and for the task (business orientation).
4. Questionnaire of cognitive states A.O. Prokhorov and M.G. Yusupov (2015). The questionnaire studies the experience frequency of 24 main cognitive states: interest, reflection, concentration, inspiration, thoughtfulness, boredom, dullness, mental stress and doubt.

RESULTS

Consider the results of the study of cognitive states in students with different level of personal traits. It is noted that the most typical mental states in the everyday lecture situation are states of thoughtfulness, interest and concentration. Table 1 presents the frequency of cognitive states experience by students with different level of Conscientiousness, affection, extraversion, Openness, and emotional instability in a lecture situation.

Table 1. The frequency of cognitive states experience by students with different level of personality characteristics during the lecture.

Mental cognitive states	Intensity	1	2	3	4	5
Thoughtfulness	High	56%	67%	89%	33%	67%
	Low	44%	33%	11%	67%	33%
Interest	High	71%	71%	71%	43%	43%
	Low	29%	29%	29%	57%	57%
Concentration	High	71%	86%	57%	57%	43%
	Low	29%	14%	43%	43%	57%

Note: 1. Extraversion, 2. Agreeableness, 3. Conscientiousness, 4. Emotional instability, 5. Openness.

The most significant influence of personality traits is noted in terms of affection and Conscientiousness, as well as Openness and extraversion. The state of thought is mainly observed in students with high Conscientiousness, and also prevails in friendly, open-minded and emotionally stable students. Such students are restrained and diligent and during the lecture they memorize information better than others, they can listen to the teacher for much longer/ The state of interest is often experienced by students with high extroversion, Agreeableness, and Conscientiousness. Such students are very energetic, sociable and approach the process of learning with great interest. The same pattern characterize the concentration state.

The study results of temperament characteristics in a lecture situation allow us to determine that the state of thoughtfulness is experienced by students with a high level of plasticity and social affectivity. The state of interest tends to be experienced by students with high social energy and social pace. Concentration is often experienced by students with high energy factor.

Let's turn to the features of cognitive states experience depending on the individual orientation. The state of thought is more often experienced by students with a high focus on the task. Students with a high level of focus on themselves are more likely to experience a state of interest, such students are trying to get as much knowledge as possible.

Table 2. The frequency of cognitive states experience of students with different level of personality characteristics during the exam.

Mental Cognitive States	Intensity	1	2	3	4	5
Mental Stress	High	75%	67%	67%	67%	67%
	Low	25%	33%	33%	33%	33%
Concentration	High	17%	17%	67%	50%	67%
	Low	83%	83%	33%	50%	33%
Doubt	High	50%	50%	50%	50%	75%
	Low	50%	50%	50%	50%	25%

Note: 1. Extraversion, 2. Agreeableness, 3. Conscientiousness, 4. Emotional instability, 5. Openness.

As it is shown in Table 2, the most typical cognitive mental states in a stressful exam situation are states of mental stress, doubt and concentration. Here the characteristics of extraversion, Agreeableness and Openness have the greatest impact.

Thus, on the exam, students with high introversion, openness and conscientiousness and low agreeableness more often experience concentration. In contrast to concentration, mental stress tends to be experienced by students with high Agreeableness and extraversion. Students experience a state of doubt with a high degree of Agreeableness.

The state of mental stress is most often experienced by students with high energy level, lability and social affectivity, as well as students with low social pace. Concentration is often experienced by students with a high level of lability and social affectivity and a low level of social pace. State of doubt is experienced by students with a high emotional pace and social affectivity.

Interesting patterns of cognitive states experience are established depending on the orientation of personality. The state of mental stress during the exam is experienced by students with a high focus on the task and a low focus on themselves. The state of concentration, in turn, does not depend on the type of focus, whereas the state of doubt is more often experienced by students with a high focus on themselves and a focus on interaction.

Let us turn to the results of personality traits study during concentration on a lecture and on exam (Figure 1).

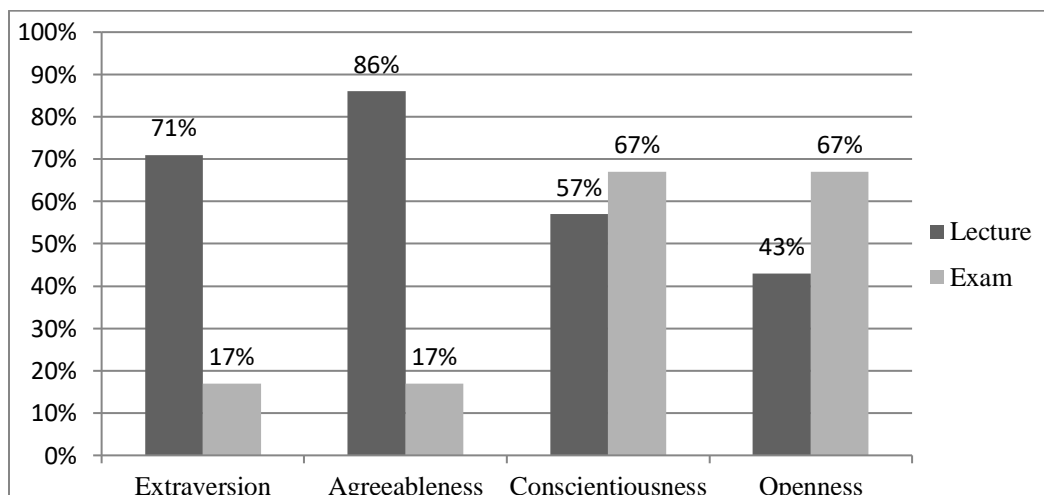


Figure 1. Personality traits during concentration on a lecture and an exam.

As it is shown in the figure, during a lecture, students, who experience concentration are dominated by such characteristics as extraversion and Agreeableness, which is not typical for the exam situation (only 17% of extraverts are in a state of concentration). At the same time, high level of Conscientiousness and Openness in the exam determine the state of concentration more than in the lecture. Specificity of an orientation of the personality influence on concentration was not established.

Thus, during a lecture in a concentration state, students often encounter such personal characteristics as energetic and social energetic, extraversion and Agreeableness. During the exam, students demonstrate: a high level of Conscientiousness and flexibility in communication with others.

Further, to reveal the influence of personality traits on positive cognitive states of interest and concentration, analysis of variance was performed. In the situation of both the lecture and the exam, the influence of indicators of Conscientiousness and social pace on the state of interest and concentration was established. The model of analysis of variance selected for the lecture situation has a high level of significance ($p < .36$), and the influence of the interaction of these variables reaches $p < .004$. The separate influence of these variables does not reach the required level of significance.

The results of the cumulative effect of Conscientiousness indicators and social pace are shown in Figure 2.

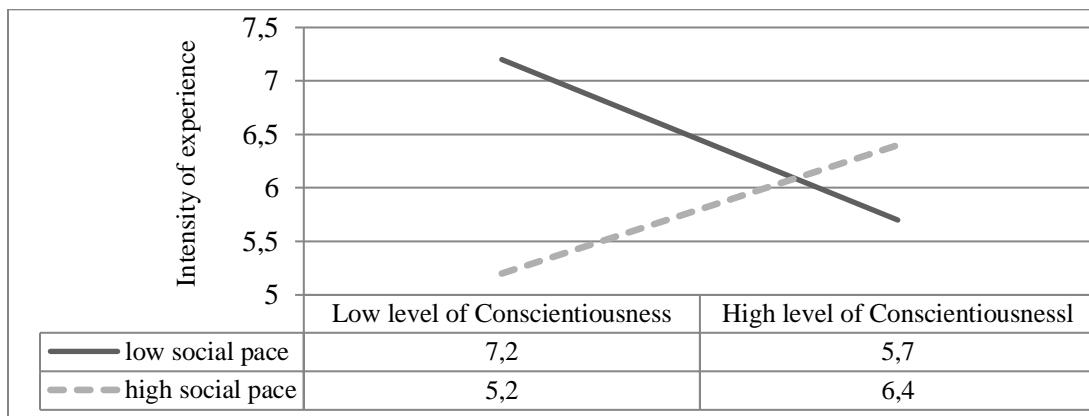


Figure 2. The influence of Conscientiousness and social pace on the intensity of interest experience in lectures.

As it is shown in Figure 2, the most intense state of interest in the lecture is manifested at a low level of social pace and Conscientiousness. However, with an increase in Conscientiousness, the intensity of interest experience decreases. Students with a high level of social pace demonstrate another trend: while increasing of Conscientiousness increases the intensity of interest experience. It is noted that a high level of ability to verbalization in combination with a low level of Conscientiousness determines the least intense of an interest state.

Also were found several other patterns for the concentration state during the exam (Table 3).

Table 3. The impact of Conscientiousness and social pace on the state of concentration on the exam.

Source of variability	Dependent variable (mental state structure)	Sum of squares	df	Average square (MS)	F-value
Model	25.980	3	8.660	3.562	.020
Conscientiousness	2.927	1	2.927	1.204	.278
Social pace	4.450	1	4.450	1.830	.182
Conscientiousness * social pace	13.441	1	13.441	5.528	.022

Note: * - interaction of indicators.

The model of analysis of variance selected for the exam situation has a significance level of $p < .22$, and the influence of the interaction of these variables reaches a high level of significance ($p < .022$) (Table 3). As in the lecture, in the exam the independent influence of Conscientiousness and social pace does not reach the necessary level of significance (Figure 3).

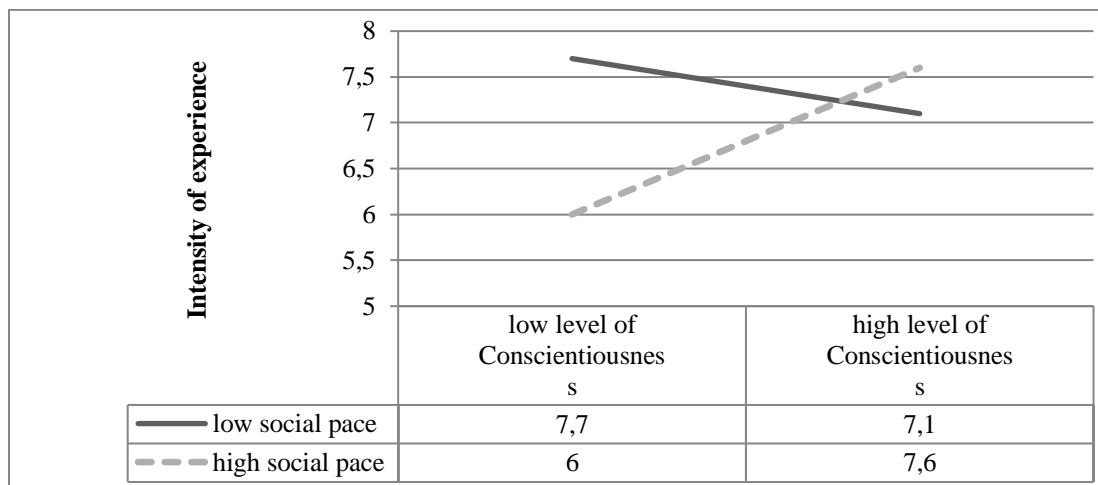


Figure 3. The influence of Conscientiousness and social pace on the intensity of concentration on the exam.

As it is shown in Figure 3, the social pace and Conscientiousness influence on concentration state on the exam. This influence is similar for the state of interest in the lectures. However, there are a number of features. This state is most intensely experienced in the case of equally low or high rates of social pace and Conscientiousness. Students with a low level of social pace and high level of Conscientiousness experience a low intensity of concentration state. At the same time people with a high level of Conscientiousness and social pace demonstrate an increase in the intensity of concentration experiences.

DISCUSSION AND CONCLUSIONS

According to the results of the study, the following conclusions can be drawn:

1. It is revealed that in the everyday situation of educational activity (lecture) students mostly experience: thoughtfulness, interest and concentration, whereas in a tense situation of the exam - mental stress, doubt and concentration. The state of concentration is typical for both situations of educational activity.
2. Established the experience frequency of students' cognitive states with high and low severity of personality traits in everyday and stressful situations. In an everyday situation, the state of thoughtfulness is observed in individuals with high Conscientiousness, and also prevails in friendly, open-minded and emotionally stable students with a focus on the task. The state of interest is experienced by students with high social energy level, social pace and focus on themselves.

At the same time, in the exam situation the cognitive state of mental stress is experienced by students with increased energy level, extraversion, and focus on the task. The state of concentration correlates with high liability, Conscientiousness and Openness. Doubts during the exam are experienced by students with a high social Agreeableness, social pace, Openness and focus on interaction.

3. The state of concentration is experienced in both situations of learning activity: exam and lecture. In a lecture situation, the cognitive state of concentration correlates with: energy and social energy, extraversion and Agreeableness, whereas in the exam situation: liability and social Agreeableness, high Conscientiousness and Openness.

4. Revealed the influence of Conscientiousness and social pace influence on the interest state in lectures and concentration state on the exam. The most intense state of interest on the lecture is manifested at a low level of social pace and Conscientiousness. However, with an increase in the level of Conscientiousness, the intensity of interest experience decreases. In turn, the state of concentration is most intensely experienced in the case of equally low or high rates of social pace and Conscientiousness among students.

As a result of the research, we can propose some recommendations that find application in labour, scientific and creative work and in education. This research contributes to the psychology of creativity and scientific activities. The cognitive states induce, direct and regulate cognitive activity, performing the function of cognitive processes and intellectual abilities development. Research in this area is designed to improve the effectiveness of educational, scientific and creative activities, by actualization of positive cognitive states of the personality. Apparently, the influence of personal traits on cognitive states is mediated by both the intensity of learning activities and the interaction of the personal traits themselves.

Limitation and study forward

This study was conducted only on lectures and exams. While this research can be done on another forms of training to get more accurate results.

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REFERENCES

- Baird, B., Mrazek, M.D., Phillips, D.T. & Schooler, J.W. (2014). Domain-Specific Enhancement of Metacognitive Ability Following Meditation Training. *Journal of Experimental Psychology: General*, 143(5), 1972-1979. <https://doi.org/10.1037/a0036882>
- Bass, B.M. (1967). Social behavior and the orientation inventory: A review. *Psychological Bulletin*, 68(4), 260-292. <https://doi.org/10.1037/h0025075>
- Berger, A. (2011). *Self-Regulation: Brain, Cognition, and Development (Human Brain Development Series)*. Washington: American Psychological Association. <https://doi.org/10.1017/S1355617713000040>
- Blanchette, I. & Richards, A. (2010). The influence of affect on higher level cognition: A review of research on interpretation, judgement, decision making and reasoning. *Cognition & Emotion*, 24(4), 561-595. <https://doi.org/10.1080/02699930903132496>
- Bodrov, V. A. (2000). *Information stress*. Moscow: Per Se.
- Chiang, W.W. & Liu, C.J. (2014). Scale of academic emotion in science education: development and validation. *International Journal of Science Education*, 6(36), 908-928. <https://doi.org/10.1080/09500693.2013.830233>
- Costa, P.T. & McCrae, R.R. (1992). *Revised NEO personality inventory (NEO-PI-R) and NEO five-factor inventory (NEO-FFI): Professional manual*. Odessa: Psychological Assessment Resources.
- Efklides, F. (2002). *The Systemic Nature of Metacognitive Experiences*. Boston: Springer. https://doi.org/10.1007/978-1-4615-1099-4_2
- Fredrickson, B.L. (2000). Extracting meaning from past affective experience: The importance of peaks, ends, and specific emotions. *Cognition and Emotion*, 14, 577-606. <https://doi.org/10.1080/026999300402808>

- Garnefski, N., Kraaij, V. & Spinhoven, P. (2001). Negative life events, cognitive emotion regulation and emotional problems. *Personality and Individual Differences*, 30(8), 1311-1327. [https://doi.org/10.1016/S0191-8869\(00\)00113-6](https://doi.org/10.1016/S0191-8869(00)00113-6)
- Isen, A., Daubman, K.A. & Nowicki, G.P. (1987). Positive affect facilitates creative problem solving. *Journal of Personality and Social Psychology*, 52, 1122-111. <https://doi.org/10.1037/0022-3514.52.6.1122>
- Levitov, N.D. (1964). *On Human Mental States*. Moscow: Prosveshchenie.
- Makhnach, A.V. (1993). Personal determinants of mental states' dynamics in extreme conditions of activity: abstract of PhD Thesis. Moscow: Institute of Psychology RAN.
- Mukhametzyanova, L.Y., Aleksandrova, N.S., Greek, A.D., Zatsepina, M.B., Prokopyev, A.I., & Gaidamashko, I.V. (2018). Culture-oriented component scientific and methodical support of students' humanitarian training in university. *XLinguae*, 11(1), 230-241. <https://doi.org/10.18355/XL.2018.11.01.19>
- Posokhova, S.T. & Solovyova, S.L. (2008). *Handbook of practical psychologist*. Moscow: AST. <https://doi.org/10.22363/2313-1683-2017-14-4-440-450>
- Prokhorov, A.O. & Chernov, A.V. (2019). Cognitive states dynamics of students with different levels of reflection. *Siberian journal of psychology*, 74, 110-125.
- Prokhorov, A.O. & Yusupov, M.G. (2015). Phenomenological features of the cognitive states of students of different courses of education. *Education and self-development*, 45(3), 39-46.
- Prokhorov, A.O. (1991). *Mental states and their manifestations in the educational process*. Kazan: Kazan University Publishing House.
- Prokhorov, A.O., Chernov, A.V. & Yusupov, M.G. (2019). The interaction of reflection, regulatory abilities and mental states in the educational activities of students. *ARPHA Proceedings 1, Proceedings IFTE-2019*, 1443-1450. <https://doi.org/10.3897/ap.1.e1370>
- Prokhorov, A.O., Yusupov, M.G. & Chernov, A.V. (2016). The Relationships of Mental States and Intellectual Processes in the Learning Activities of Students. *International Journal of Environmental and Science Education*, 11(6), 1031-1037.
- Prokofieva, E.N., Erdyneyeva, K.G., Galushkin, A.A., Prokopyev, A.I., Prasolov, V.I., Ashmarina, S.I., Ilkevich B., & Kubiato, M. (2018). Risk based ecological economics to engineering students. *Eurasia Journal of Mathematics, Science and Technology Education*, 14(3), 753-764. <https://doi.org/10.12973/ejmste/80903>
- Vasilyeva, T.N. (2009). *Personal determinants of mental states*. Kazan: Otechestvo Publishing House.
- Vinogradova, G.A., Akhmedieva, R.Sh., Konovalova, V.M., Spirina, E.V., Kalugina, O.A., Erdyneeva, K.G., Popova, N.N., & Mashkin, N.A. (2018). Releasers as Factor of Student Ecological Focus Formation. *Ekoloji*, 27(106), 1409-1415.
- Zhgenti, I.V., Kuznetsova, V.V., Savinov, A.M., Gribova, O.E., Sidyacheva, N.V., & Prokopyev, A.I. (2018). Modern integration processes influence on educator's professional growth. *Espacios*, 39(2), 13.

