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Mental Regulation of Students' Mental States in Everyday and Stressful Learning Situations

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Abstract

Introduction. In modern conditions of life, the problem of regulation of mental states and behavior of the personality is of particular relevance. Today Individual style of behavior self-regulation, or self-regulation of functional states consider existing approaches and concepts as a specific type of personality activity. The central place is occupied by the structures of consciousness: semantic, reflective, representative, etc. in the concept of mental states' regulation developed by the authors. The functional organization of the structures of consciousness is formed in connection with the specifics of complexes consisting of mental structures, mental states and operational means of regulation. **Methods.** 132 students took part in the study (average age – 19 years, second-year students of the Institute of Psychology and Education of the Kazan (Volga Region) Federal University). We studied the intensity of manifestations of mental states and the effectiveness of their self-regulation on the mental structures in everyday (at lectures) and in stressful (at exams) situations of learning activity. Separately, we studied the severity of each component of the mental structure: semantic structures, reflection, self-attitude in the regulatory process. We studied mental structures using standardized methods and specially developed author's questionnaires. **Results.** The situational conditionality of the effectiveness of students' mental states regulation is revealed. In an everyday situation, the key elements of the functional regulatory structure are the reflection of states, the emotional richness of life and the acceptance of people around. In a stressful situation, students' confidence in their abilities, satisfaction with self-realization and a low level of reflection on experience come to the fore. **Discussion.** The results confirm the concept of mental states' regulation, denoting the significant role of the consciousness structures

(reflective, semantic, self-system) in the regulation of mental states of students. The results are also consistent with the studies of other authors who deal with this problem.

Keywords

everyday situation, stressful situation, mental state, mental regulation, regulation efficiency, reflection, self-system, semantic structures

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Introduction

The problem of regulation and self-regulation of states and behavior comes to the fore in modern conditions of life. Research in this area is represented by various approaches and concepts. Attention is focused on the individual characteristics of self-regulation and the analysis of situational factors associated with the conditions of activity in the works of V. I. Morosanova: the "individual style of self-regulation" is being studied, regulatory-personal properties are distinguished that affect the entire system of mental self-regulation (Morosanova, 2012).

In the concept of behavior control E. A. Sergienko (2018) shows the psychological level of behavior regulation, which implements the individual resources of a person's mental organization and provides a balance between internal capabilities and external goals. Control is considered as a single system that includes three subsystems of regulation: cognitive control, emotional regulation, volitional control, the integration of which creates an individual pattern of self-regulation.

A significant contribution is made by the works of L. G. Dikaya (2003) and A. B. Leonova (2007) in a study on the regulation of mental states. According to L. G. Dikaya, mental self-regulation of functional states acts as a specific type of activity of the subject, which is characterized by certain relationships with professional activity, and its development determines the formation of the adaptive properties of the subject and the effectiveness of professional activity. In turn, the structural-integrative approach to self-regulation of functional states by A. B. Leonova are based on the activity paradigm of A. N. Leontiev. It

analyzes self-regulation at the levels of operational and technical support for activities (operations); changes in the target structure of activities (actions); change in the dominant motivational orientation of the subject of labor (activity in general).

In foreign studies, the problem of self-regulation is considered as an ability that develops during exercise or in the process of achieving various life goals (Schmeichel & Baumeister, 2004; Vohs & Heatherton, 2000). As in domestic psychology, the main concepts in regulation are "feedback" and "hierarchy of goals" of the individual, and in addition, much attention is paid to individual differences and social context (Berger, 2011). Models of self-regulation based on the idea that they are nutritional, personal processes, primary determinants of behavior that are associated with attention to oneself and health (De Ridder & de Wit, 2006), self-control skills (Muraven & Slessareva, 2003). The concept of self-regulated learning (Pintrich, 2000), which includes motivational characteristics, setting goals, choosing a learning strategy, and regulating one's own behavior, is also actively manifested (Calkins & Howse, 2004).

The central place is occupied by the structures of consciousness: semantic, reflective, representative, etc. in the concept of the structural and functional organization of the mental regulation of mental states that we are developing. (Prokhorov, 2020, 2021). According to the conceptual model, the totality of the regulatory complex is an integral part of the subjective (mental) experience of a person. Subjective (mental) experience integrates the semantic structures of consciousness (personal meaning, values, semantic attitudes and orientations), mental representations included in the knowledge structure (associative, evaluative, conceptual, figurative characteristics), experiences, reflective structures, processes of understanding. The organization of consciousness structures is formed in connection with the specifics of complexes (blocks) consisting of states, means of regulation and mental structures that are formed in the range of current time and in conditions of repetitive situations of life activity.

An analysis of research in the field of mental mechanisms of self-regulation shows that only a few works are a study of the contribution of consciousness structures to the regulation of mental states. Let us look at them in sequence.

The semantic system of consciousness is a link that mediates the influence of various factors of the subject's life. It is a "perceived determinant" of the mental state, through which any influence on the personality is refracted (Alekseeva, 2006). The specificity of the semantic self-regulation of the individual is determined by emotional discomfort, subjective distress, adaptability, conscious activity planning, which affects professional health (Ryabova, 2015). In the work of N. I. Naenko (1976) shows that the different personal meaning of the performed activity causes different forms of mental tension. M. V. Ermolaeva (1984) found the dependence of changes in the emotional side of functional states on semantic characteristics when the motive of activity and the conditions for its course change.

The involvement of reflexive mechanisms is determined by the goal of regulation – the need to change the mental state as inappropriate for the situation and conditions of life (Golitsyn, 1987). There is an assessment, awareness and comparison of the current state with the desired one due to reflection and, further, if necessary, the subject makes a correction to the methods and techniques of regulation used. It is noted that the need to change the mental state and the process of self-knowledge by the subject of states is realized through reflection (Vasilevskaya, 2017). M. G. Yusupov (2014) found that reflection affects the processes of information processing, performing metacognitive actions in the process of regulating cognitive processes. As L. A. Savinkina (2000) notes, the reflexive self-regulation of a person's mental states is a system of influences on the mental state, the peculiarity of which is its awareness, verbalization and systemic nature.

The relationship between mental states and the system of the Self is studied separately. Research is focused in the field of medicine, where the role of the self-system in the treatment of depression is shown (Strauman & Eddington, 2017). The connection was determined between the adequacy of self-esteem and the experience of loneliness in adolescents (Koshkarov, Borodina & Kadetova, 2013). A positive self-attitude counteracts the development of professional burnout (Vodopyanova & Gusteleva, 2010). In our study, it was revealed that with an increase in the tension of the situation from lecture to exam, the role of the components of self-attitude in the regulation of both individual substructures and the mental states of students as a whole also increases.

The purpose of the study: to reveal the influence of mental structures on the effectiveness of the applied methods of regulation of mental states in everyday and stressful situations of educational activity.

Research objectives:

1. To identify mental states that are characteristic of students with different efficiency of self-regulation in everyday and stressful situations of educational activity. Consider the features of the selected states, their intensity, modality, sign.
2. Consider the typology of self-regulation of the mental states of students with high efficiency of self-regulation in situations of activity different in intensity.
3. Establish the role of each of the mental structures (semantic, reflexive, the system I) in the effectiveness of self-regulation of the mental states of students in everyday and stressful learning situations.

Methods

132 people took part in the study (all are 2nd year students of the Institute of Psychology and Education of Kazan Federal University, studying in the areas of "Psychology" and "Clinical Psychology"). The average age of the respondents was 19 years old. Studies of the intensity of manifestation of each substructure of mental states and the effectiveness of their self-regulation were carried out in everyday (at lectures) and in stressful (at exams)

situations of educational activity. The severity of each component of the mental structure was studied separately: reflection, meanings, self-attitude.

The following methods were used in the research process:

1. Questionnaire "The effectiveness of self-regulation of mental states" of A. N. Nazarov, A.O. Prokhorov (2018).

2. Methodology "Relief of the mental states of the individual (short version)" (Prokhorov & Yusupov, 2011), reflecting the intensity of manifestation of the main components of the mental state: cognitive processes, behavior, feelings and somatic reactions.

3. Methodology for the study of self-attitude of S. R. Pantileev (MIS) (1993), including 9 main scales: closeness, self-confidence, self-guidance, reflected self-attitude, self-worth, self-acceptance, self-attachment, internal conflict, self-accusation.

4. Questionnaire of reflexivity of A. V. Karpov and I. M. Skityaeva (2005). Allows you to measure the overall level of development of reflexivity, as well as the level of reflection in different times: retrospective, current and prospective.

5. Methods for diagnosing reflexive processes: recognition, awareness and identification of A. O. Prokhorov and A. V. Chernov (2019). It is aimed at diagnosing the reflection of the image of the mental state.

6. Methodology "Typology of self-regulation of mental states" of A. O. Prokhorov and A. N. Nazarov (2019). It is used to identify preferred ways of self-regulation and includes 8 types of self-regulation states.

7. Test of meaningful life orientations (SJO) of D. A. Leontiev (2000). It includes a general indicator of meaningfulness of life, as well as five subscales (goals in life, the process of life, the result of life, the locus of self-control and the locus of control - life).

8. Methods of self-assessment of the level of ontogenetic reflection (Fetiskin, Kozlov & Manuilov, 2002).

9. Questionnaire "Style of self-regulation of behavior" of V. I. Morosanova (2001).

In the course of the study, the following were used: analysis of mean values, frequency analysis of data, Student's T-test for independent samples, correlation analysis by the Spearman method. Further, based on the results of the analysis of the interrelations of indicators, the structure organization index (SSI) was calculated (according to A. V. Karpov), where 1 point was assigned to connections at the level of statistical significance $p < 0.05$, $p < 0.01$ – 2 points and $p < 0.001$ – 3 points. To analyze the obtained data, we used the methods of mathematical and statistical analysis contained in the standard SPSS 23.0 software package.

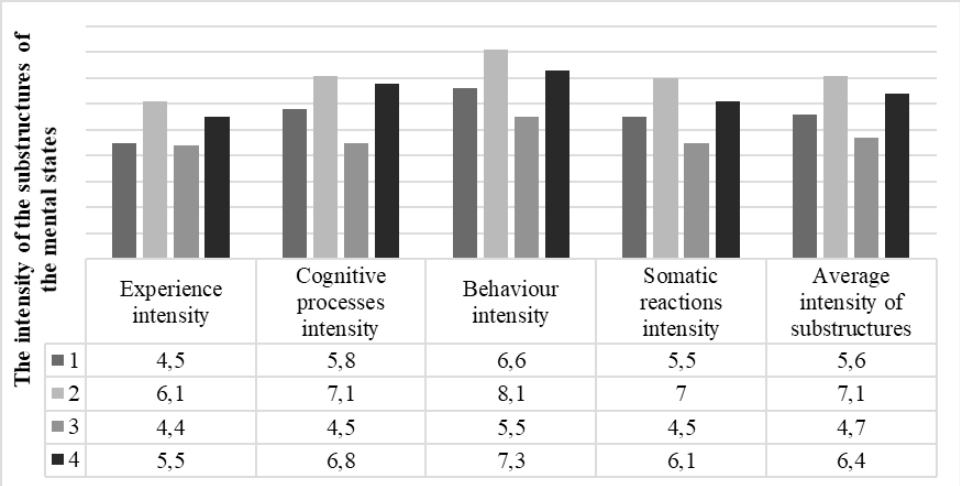
Results

During the study, the respondents indicated their current mental state in the course of everyday (lecture) and stressful learning situations (exam). During the lecture, students with a high level of efficiency of self-regulation experience mainly states of calm, cheerfulness – 48%, or cognitive (interest, inspiration, concentration) states (42% of respondents). Only 10% of the respondents had low-intensity states (fatigue, boredom, lethargy). At the same time, students assigned to the low-performance group showed other characteristics: 33% of the respondents experienced low-intensity states (boredom, lethargy, etc.), 31% experienced states of medium intensity (calmness, cheerfulness), and only 36% noted the presence of positive cognitive states. Thus, students with high efficiency of self-regulation are dominated by positive states that contribute to productive learning activities, while low-effective students have a significant proportion of states that prevent the successful mastering of educational material.

In the process of passing the semester exam, students mainly experience states of excitement, anxiety, and tension. In this case, both groups of subjects designate the experienced states, overall, in the same way, however, the intensity of these states and the activity of individual substructures of the states differ significantly. For a visual illustration of this pattern, let us turn to Figure 1.

Figure 1

The intensity of the mental states' substructures of students with different level of their self-regulation effectiveness in everyday and stressful learning situations



	Experience intensity	Cognitive processes intensity	Behaviour intensity	Somatic reactions intensity	Average intensity of substructures
1	4,5	5,8	6,6	5,5	5,6
2	6,1	7,1	8,1	7	7,1
3	4,4	4,5	5,5	4,5	4,7
4	5,5	6,8	7,3	6,1	6,4

Note. *Legend: 1 – students with low efficiency of self-regulation of states in everyday learning situation, 2 – students with high efficiency of self-regulation of states in everyday learning situation, 3 – students with low efficiency of self-regulation of states in a stressful learning situation, 4 – students with high efficiency of self-regulation of states in stressful learning situations.*

Figure 1 shows that students with a high level of subjective effectiveness of self-regulation of mental states demonstrate a higher activity of all substructures of mental states. Significant differences in the groups for all studied indicators were found both in everyday and stressful learning situations. Regardless of the situations of learning activity and the level of effectiveness of self-regulation, the indicators of behavior have the highest activity, and the least - indicators of the activity of experience. An interesting fact: students with high efficiency of self-regulation in the exam show a higher intensity of all substructures of mental states than students with low efficiency of self-regulation in lectures, which indicates the importance of effective regulation of states in the course of learning activities.

Let us consider the differences in the regulatory properties of the personality, as well as in the methods of self-regulation of states used by respondents with different levels of self-regulation efficiency in everyday and stressful situations of educational activity (Table 1).

Table 1

Differences in the ways of self-regulation and regulatory properties of personality among students with different efficiency of self-regulation *of states*

Everyday learning situation			
Methods of self-regulation and regulatory qualities	*Low efficiency of self-regulation of states*	*Significance of differences*	*High efficiency of state self-regulation*
Self-hypnosis / self-orders	10,5	0,045	11,9
Mute/switch	10,8	0,018	12,8
Modeling	4,6	0,003	5,7
Flexibility	5,8	0,005	6,7
General level of self-regulation	28,4	0,004	31,3

Stressful learning situation			
Actualization of positive images and memories	10,1	0,050	11,9
Mute/switch	11,3	0,037	13,2
Modeling	4,8	0,013	5,7
Flexibility	5,8	0,001	6,8
General level of self-regulation	28,9	0,030	31,1

We compared the indicators of the personality regulatory properties and the operational means of self-regulation among students. It was revealed that, regardless of the intensity of the educational activity situations, students with a high efficiency of self-regulation of states are characterized by a greater severity of the regulatory property of flexibility. Similar patterns identified for the general level of students' self-regulation. Apparently, it is the formation of an individual system of conscious self-regulation and flexibility, as the ability to rebuild one's own system of self-regulation, that act as the most important determinants of effective self-regulation of states. In addition, students with high efficiency of self-regulation demonstrate a higher ability to identify significant conditions for achieving the goal (modeling), and more often use muting (switching) as an operational means of self-regulation of negative mental states. We also note that in a stressful situation of an exam, people with high efficiency of self-regulation are characterized by a more frequent use of such a method as updating positive images and memories, while in an everyday situation such respondents often resort to self-hypnosis and self-orders.

Next, a correlation analysis of the data was carried out in order to identify the relationship between the applied methods of self-regulation and mental structures (reflexive, semantic, self-relationship) in different learning situations with students with different efficiency of self-regulation of states. In each selected group and in each individual form of education, the structure organization index (IOS) was calculated, which is the result of calculating the number and strength of correlations. IOS allows us to draw conclusions about the general structure of relationships, as well as highlight the system-forming (leading) elements in each structure. Table 2 shows the structure organization indices for different ways of self-regulation of states in stressful and everyday learning situations. We note a greater number of significant relationships for the group of students with low efficiency of self-regulation. The latter testifies to the significant contribution of mental structures to the regulation of states and the low efficiency of the use of

operational regulatory tools in educational activities. It is also worth noting a significant number of negative relationships in the case of low efficiency of self-regulation, which is an indicator of the disintegration of the regulatory structure.

Table 2

Indices of the organization of structures (IOS) of the relationship between the methods of mental states' self-regulation and mental characteristics (reflection, self-attitude and meaning-life orientations) in learning situations of different intensity

Methods of self-regulation / effectiveness of self-regulation of states	Low self-regulation efficiency	High self-regulation efficiency
Everyday learning situation		
Passive rest	7	2
Actualization of positive images	7	8
Self-hypnosis / self-orders	7	**13**
Active discharge	**19**	2
Reflection / reasoning	12	5
Mute/switch	8	0
Communication	14	6
Passive discharging	8	3
Stressful learning situation		
Passive rest	7	0
Actualization of positive images	10	6
Self-hypnosis / self-orders	7	**17**
Active discharge	10	9
Reflection / reasoning	12	6
Mute/switch	5	2
Communication	**13**	2
Passive discharging	6	0

In Table 2, in the everyday situation of learning, the leading structure of self-regulation methods associated with mental structures is active discharge (IOS = 19), means of communication (IOS = 14) and reasoning (IOS = 12). At the same time, for persons with a high efficiency of self-regulation, such a structure is self-hypnosis and self-orders (IOS = 13) and the actualization of positive images (IOS = 8). In a stressful situation of an exam, in persons with high efficiency of self-regulation, self-suggestion / self-order is still the leading method (IOS = 17), the role of active discharge increases (IOS = 9). At the same time, for students with low efficiency of self-regulation during the exam, communication becomes the leading method of regulation (IOS=13). It is noteworthy that active relaxation, being unproductive in everyday learning situations, acts as a system-forming element during a stressful exam situation.

Let us turn to the results of studying the connection between mental structures and the revealed methods of self-regulation of mental states in students with high and low efficiency of self-regulation in learning situations of different intensity (Table 3). High self-confidence acts as a leading structure of the self-system in everyday and stressful learning situations in individuals with low self-regulation efficiency. Among the reflexive processes, the greatest connections between the methods of self-regulation have been established with the level of socio-reflection, which is aimed at reflecting others and does not contribute to the choice of optimal methods for regulating the states of students. In addition, in a stressful situation, the general level of reflexivity also has a significant impact on the choice of methods of self-regulation. Among the semantic structures, the highest IOS of the effectiveness of life should be singled out, which reflects the assessment of the passed segment of life, that is, the feeling of how meaningful they lived part of life was.

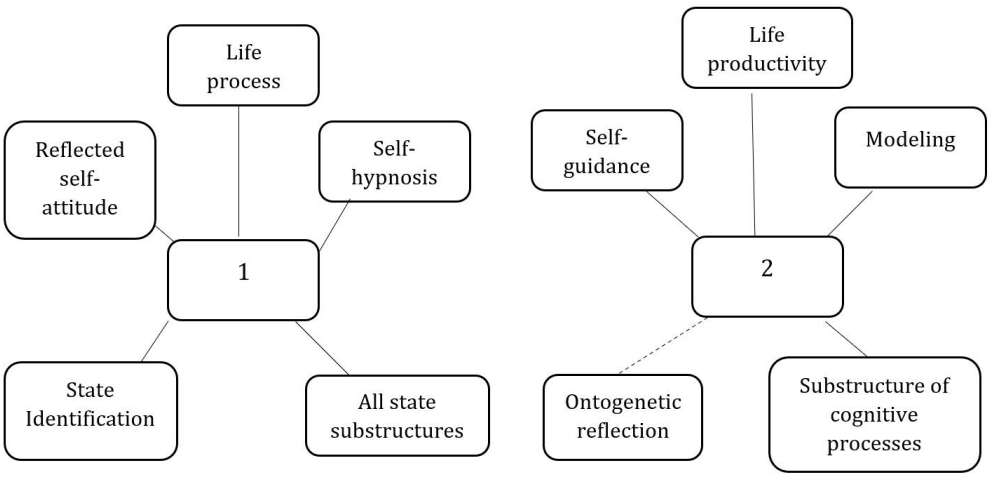
In persons with high efficiency of self-regulation of states, in contrast to students with low efficiency, the presence in the life of the subject of goals in the future comes to the fore, which makes life meaningful. Among the reflexive structures, the largest number of interconnections of self-regulation methods can be identified with perspective reflection, which is associated with the ability to analyze upcoming activities, behavior, and the ability to plan. These components of the mental structure are equally significant for "highly effective students" in both everyday and stressful learning situations. However, in an everyday situation, in addition to the noted structures, the ability to understand one's own states and experiences (self-reflection) also plays a significant role. As for the components of self-attitude, there are differences in the number of connections with methods of self-regulation depending on the level of training tension. In an everyday situation, self-guidance, which reflects the internal locus of control, has the greatest weight, while in a tense situation, the level of internal conflict of the subject is more important. The more often the student resorts to effective methods of self-regulation of states.

Table 3
Leading substructures of the mental states' regulation of students with low and high efficiency of self-regulation in everyday and stressful learning situations

	The tension of learning	*Operational means of self-regulation*	*The structure of self-attitude*	*Reflective structure*	*Semantic structure*
High efficiency of mental states self-regulation	*Everyday situation*	Self-hypnosis / self-orders; Activation of positive images	Self-guidance	Self-reflection	Goals in life
	Stressful situation	Self-hypnosis - self-orders; Active discharge	Low internal conflict	Perspec-tive reflection	Goals in life
Low efficiency of mental states self-regulation	*Everyday situation*	Active discharge; commu-nication	Self confidence	Socio-reflection	Life productivity
	Stressful situation	Commu-nication; meditation	Self confidence	Socio-reflection	Life productivity

Let us consider the operational means of self-regulation of the structures of consciousness (reflection, meaning-life orientations, self-relationships) and substructures of mental states associated with the effectiveness of self-regulation of states in everyday and stressful learning situations. Figure 2 shows the structures that have the strongest relationship with the overall effectiveness of self-regulation of students' states.

Figure 2
Indicators of mental regulation that determine the effectiveness of self-regulation of students' mental states in everyday and stressful situations



Note. *Legend: 1 – the effectiveness of self-regulation of mental states in everyday situations; 2 – the effectiveness of self-regulation of mental states in a tense situation. The solid line indicates the direct relationship; the dotted line indicates the reverse.*

In an everyday learning situation, the effectiveness of self-regulation is associated with each of the components of the mental structure. The strongest connections were established with indicators of reflected self-attitude (r=0.396 at p<0.001), which indicates that self-perception has a positive effect on self-regulation of states, and as a result, on the productivity of students' educational activities. Important for effective self-regulation is the student's ability to identify his state, to be aware of his own experiences (r = 0.352 at p <0.001). In addition, we note that the interest and emotional saturation of students' lives play a significant role here (r = 0.187 at p <0.05): high meaningfulness of life contributes to effective regulation of states in everyday situations of activity. Among the operational means of self-regulation, the key is the use of self-hypnosis and self-orders by students (r = 0.266 at p <0.01), and among the structures of the mental state, the most significant relationships were established with average values (r = 0.303 at p <0.01). The latter indicates that the high efficiency of self-regulation in a lecture situation significantly affects all components of mental states.

Let us turn to the consideration of the structure of relationships between the effectiveness of self-regulation of mental states and mental components in a tense

situation of the exam. In contrast to the everyday form of education in this case, the structure of relationships is different. Self-attitude in the structure is represented by the indicator of self-guidance ($r = 0.353$ at $p < 0.001$), reflecting students' confidence in their abilities, their independence. At the exam, the indicator of life effectiveness comes to the fore ($r = 0.276$ at $p < 0.01$), therefore, the effectiveness of students' self-regulation depends on satisfaction with self-realization, meaningfulness of the lived segment of life. We also note the importance of reflection of experience in the effectiveness of self-regulation of states ($r = -0.245$ at $p < 0.01$). It is noteworthy that the high severity of this type of reflection negatively affects the self-regulation of states, which, apparently, is associated with the "self-digging" and "looping" of students on the negative experience of passing the exam. Among the regulatory structures, the development of modeling processes among students is of great importance ($r=0.296$ at $p<0.001$), i.e. the ability to highlight the essential conditions for achieving the goal, their awareness and adequacy. We also note a significant relationship between the effectiveness of self-regulation of states and the substructure of cognitive processes ($r=0.503$ at $p<0.001$), since the result in a tense exam situation largely depends on their activity.

Discussion

The results reflect the influence of mental regulation of mental states and confirm the significant role of the structures of consciousness (reflexive, semantic, the self-system) in the regulation of students' mental states (Prokhorov, 2021). In addition, the identified patterns are combined with earlier studies (Prokhorov and Chernov, 2016), where it was shown that the intensity of the form of education is a significant factor in the reflexive regulation of mental states. The results of the study are also consistent with the works of M.I. Kartasheva (2022), which shows the role of the self- system in the structure of mental regulation of the mental states of students' learning activities. The situational determination of the actualization of semantic structures in the regulation of states was also revealed in the works of E.M. Alekseeva (2006).

Conclusion

The nature of the relationship between mental structures, operational means of self-regulation, substructures of mental states and the effectiveness of self-regulation of states depends on the intensity of learning situations.

1. Mental states characteristic of students with different efficiency of self-regulation in different training situations were revealed. In a everyday situation, students with high efficiency of self-regulation mainly experience conditions that contribute to productive learning activities (interest, concentration), while students with low

efficiency of self-regulation often experience conditions that prevent the successful mastering of educational material (fatigue, boredom). In a stressful learning situation, students of both groups designate the experienced states in general in the same way (excitement, anxiety), however, persons with high efficiency of self-regulation on the exam show a higher intensity of all substructures of mental states.

2. A typology of self-regulation of mental states of students with high and low efficiency of self-regulation has been established. In a tense exam situation, people with high efficiency of self-regulation are characterized by frequent use of actualization of positive images and memories, while in everyday situations such respondents often resort to self-hypnosis and self-orders than students with low efficiency of self-regulation of states. These methods of self-regulation are leading in connection with mental structures (semantic, reflexive, the system of the Self) in both learning situations.

3. The leading mental structures that determine the effectiveness of self-regulation of mental states in training situations of various tensions have been discovered. In an everyday situation, the high efficiency of self-regulation of students' states is associated with self-guidance, self-reflection and the presence of goals in life. For students with low efficiency of self-regulation, the leading substructures are self-confidence, socio-reflection and life effectiveness. In a stressful situation of learning, the high efficiency of self-regulation of states is associated with the presence of significant goals in life, reflection of the future, and a low level of internal conflict. The low efficiency of self-regulation in this situation is determined by the same mental structures as in the everyday situation.

4. In an everyday situation, in general, the effectiveness of self-regulation is associated with each substructure of states, and suggestion is the leading method of self-regulation. Such structures of consciousness as the meaningfulness of the life process, reflection of one's own state and reflected self-relationship are of high importance. In a stressful exam situation, the structure of relationships takes on a different form: the substructure of the cognitive processes of mental states comes to the fore, and the regulatory process of modeling the situation becomes the leading one. The leading mental structures are represented by a high level of students' self-confidence, satisfaction with self-realization and low rates of reflection of experience.

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Conflict of Interest Information

The authors have no conflicts of interest to declare.