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Self-Regulation of Students' Psychological States: Its Mental Mechanisms

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Abstract

The widespread use of online education all over the world inevitably leads to problems of self-regulation, since the effective development of online education is impossible without mastering the skills to control and correct one's activities. Conscious self-regulation is of particular importance for managing the learning process. The article aims at studying the mental mechanisms of self-regulation of students' states in the course of the educational process. The study revealed the typical characteristics of psychological states at lectures, seminars and exams, showed the specifics of the states, depending on the forms of education. We have shown that the effectiveness of self-regulation of students' mental states significantly affects the productivity of passing exams. Among the mental states of highly effective students, such cognitive states as interest, thoughtfulness and concentration are particularly important. The regulatory properties of the personality (adequacy, awareness, independence and assertiveness) ensure high efficiency of self-regulation. In addition, students with high self-regulation efficiency are more likely to turn to regulatory means. The study confirmed the original hypothesis about the central role of the characteristics of consciousness in the regulation of mental states. For students, regardless of the conditions of the educational activity (lecture, seminar, exam), we identified four leading factors that represent the characteristics of the mental states. The study of self-regulation of cognitive states will be useful for general and educational psychology. It can also find an application in the management of students' cognitive activity.

Keywords: self-regulation, learning, mental states, consciousness.

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Introduction

The problems of distance and mixed learning revived the interest of teachers in the psychology of self-regulation since the effective development of online education requires a combination of external control and freedom of self-regulation. To manage the learning process you need to know about the mental mechanisms of self-regulation. The structures of consciousness provide the ways of self-regulation in the learning process, as well as the development of the regulatory abilities of students. The results of research in this area will make it possible to develop the regulatory abilities of students in the educational process.

Early studies of the regulation of mental activity were carried out within the framework of traditional approaches (mainly in line with the cybernetic approach). The subject is included in the process of self-regulation as a medium of target and operational components of self-regulation. The result of these studies is the development of structural-functional models of regulation, which reveal the most common structure (components, levels) and functions of the mental regulation system. Theoretically, the problem of the regulation of mental states remains less developed. Previous studies of the self-regulation of mental states revealed the similarity of its structure with the structure of self-regulation of arbitrary activity. The specifics of the self-regulation of mental states lies in the fact that it is more related to the functional blocks of control and correction of certain characteristics of the state (qualitative originality, duration, polarity and intensity) (Prokhorov, 2020). At the same time, states, their role in learning, as well as the possibilities for their regulation have not been studied enough. The issues of regulation are solved mainly in the field of various controversial theories of learning through the development of external means of influence on the states of students. As a consequence, issues of self-regulation of psychological states have been poorly investigated; there is no conceptual framework explaining and describing the mechanisms of human states regulation.

Purpose and objectives of the study

The purpose of the study is to describe the patterns of organization of consciousness structures that ensure the regulation of psychological states of students. Based on a systematic approach, the leading components of consciousness that determine the mental regulation of mental states will be identified. This is important for the development of students' regulatory abilities.

Literature review

The structure of the regulatory process includes the goal of the activity accepted by the subject, a subjective model of significant conditions, a program of performing actions, a system of subjective criteria for achieving the goal, monitoring and evaluating real results, as well as decisions on correcting the regulatory system (Konopkin, 1980). In the context of this theory, the concept of "individual style of self-regulation" is being developed (Morosanova, 2010). The psychological level of behavior regulation which implements the individual resources of a person's mental organization provides a balance between internal capabilities and external goals. Control is a unified system that includes cognitive control, emotional regulation, and volitional control. Their integration forms an individual pattern of self-regulation (Sergienko et al., 2010).

In modern psychology, self-regulation is seen as an ability or skill that develops as you perform appropriate exercises or naturally, in the course of achieving various goals of life (Baumeister et al., 1998; Schmeichel & Baumeister, 2004; Vohs & Heatherton, 2000). The main concepts in regulation are "feedback" and "the hierarchy of goals" of the individual (Carver & Scheier, 1998). Recent works on self-regulation tend to take into account individual differences and social context (Berger, 2011).

Self-regulation models are based on the idea that personality processes are the primary determinants of behavior. These processes are connected with self-respect (Vohs & Baumeister, 2016), attention to oneself and one's health (De Ridder & de Wit, 2006), and self-control skills (Muraven & Slessareva, 2003). The concept of self-regulatory learning is actively developing (Schunk, 2005). Here motivational characteristics, goal setting, choice of learning strategy, regulation of behavior come to the fore (Calkins & Howse, 2004).

In the late '90s of the 20th century, the concepts of self-regulation that were popular in world psychology were developed: control over action (Kuhl, 1987), the model of state regulation by Pulkinen (1992), the cognitive-motivational concept of coping by Lazarus (1999).

At the same time, an essential condition for self-regulation of states is a person's awareness of the need for changes. In the field of regulation of states regulation is a specific type of activity of the subject, which is characterized by a certain relationship with activity. The main motive of this activity is the avoidance of negative and the pursuit of positive mental states (Dikaya, 2003). In practical terms, the literature dedicated to self-regulation of states presents a wide variety of various methods of mental states regulation, which are autogenous and psycho-muscular training, methods of active relaxation, positive thinking, religious practices, etc. (Carver & Scheier, 1998).

Analysis of research on mental mechanisms of self-regulation shows that research is focused on the study of mental experience. A meaningful knowledge about the possibilities of self-regulation is a support for a person in developing his own life strategies (Prokhorov, 2009).

In psychology, researchers are most interested in metacognitive experiences, represented by mental structures that allow for both involuntary and voluntary regulation of intellectual activity (Garner, 1987; Garner & Alexander, 1989; Gottman et al., 1996). Much attention is also paid to the intentional component of mental experience, represented by a wide range of human relationships (personal meanings, values, etc.).

Methodology

The self-regulation function is so important that it is impossible to imagine the target action without consciousness. Self-regulation affects cognitive processes, states, behavior, activities of students. The study of consciousness in self-regulation of states is significant for understanding the mental organization of a person.

The theoretical basis of the study is the model of the structural and functional organization of mental states regulation (Prokhorov, 2020). Model components are mental (subjective) experience, semantic structures, reflection, experiences, mental representations, target characteristics, situations, cultural space, lifestyle, regulatory actions, feedback, time factors.

Following the model, we have investigated the patterns of mental regulation of students' states. It is assumed that the development of students' self-regulation mechanisms (which afterwards form stable structures - regulatory abilities) is carried out in the educational process. The process of development is connected with the need to overcome conditions that hinder effective learning.

The typical methods and techniques of self-regulation of states, as well as the influence of mental structures (meanings, reflections, etc.) on students' self-regulation, have been studied. To solve the problems we have used standardized psychological tests (23 methods, 303 indicators). The research involved 105 psychology students and 101 mathematics students; the average age is 18 years.

To solve this problem, we have developed and tested the following techniques:

• Questionnaire of students' mental states. It includes a list of 104 mental states and allows you to assess the presence and severity of the proposed states in students on a 5-point scale.

• Questionnaire of students' regulatory properties, consisting of 63 indicators.

It is aimed at diagnosing personal qualities that allow students to manage their mental states in the course of educational activities.

• Questionnaire of students' self-regulation methods, including 25 characteristics.

The study used the following standardized methods: "Relief of the mental state", self-assessment of experiences, the method of studying the effectiveness of self-regulation of states (Prokhorov, 1998, 2009, 2020), the questionnaire "Style of behavior's self-regulation" (Morosanova, 2010), the method "Questionnaire of the severity of self-control" (Nikiforov, 1989), the questionnaire of coping strategies by Lazarus (Kryukova & Kuftyak, 2007), the test "Life-meaning orientations" (Leontiev, 1992), the method for diagnosing the level of reflexivity development (Karpov & Skityaeva, 2005), the method "Global attitude towards oneself and the world" (Baturin, 1997), the method of studying self-attitude (Pantileev, 1993), the questionnaire "Scales of academic motivation" (Gordeeva et al., 2014), the method of studying the system of life meanings (Kotlyakov, 2013), the method "Value orientations" (Rokeach, 1972).

The techniques "Relief of the mental state", "Self-assessment of experiences" and "The effectiveness of self-regulation of mental states" have been carried out three times - in the context of lectures, a seminar and an exam, separately for students-psychologists and students-mathematicians.

Each of the methods was transformed into google forms to obtain the necessary data online. To prove the main provisions of the model, we conducted a factor-analytical study. Statistical data processing was carried out using the factor analysis procedure (principal component analysis, promax rotation) in the SPSS 20.0 program.

Results

At the first stage, we investigated typical mental states, methods and techniques of self-regulation of states, as well as regulatory properties in everyday and stressful conditions of the educational process in first-year students.

The research was carried out in the course of three main forms of educational activity: lecture, seminar and exam. The developed techniques were tested in the course of the research.

Studies have shown that as the intensity of educational activity increases, the intensity of mental states of excitement, doubt and grief also becomes stronger. These conditions reach their peak in the exam.

It was also found that the greatest intensity, regardless of the major of students and the form of educational activity, are cognitive states: interest, thoughtfulness, concentration.

At lectures for students of both majors, the most intense states are cognitive activity, interest and thoughtfulness.

The study of the regulatory and personal properties of students, which are the basis of the ability to manage their own states, revealed the most typical properties that manifest themselves regardless of the forms of education: they are adequacy, tolerance, independence, reflexivity, responsibility, and awareness.

The greatest differences in the structure of regulatory properties among students of various majors are observed in the conditions of the exam: student-psychologists most often demonstrate responsibility, seriousness, and self-criticism. Mathematicians tend to have adequacy, thoughtfulness, awareness, and self-criticism.

The study of the methods of self-regulation of mental states in the course of studying among students showed that in all three forms of educational activity students most often use such methods of regulation as introspection (withdrawal), self-control, the use of logic, a positive attitude and high search activity. The methods of regulation used in seminars and lectures are largely similar (introspection and logic). Specific ways to regulate negative and preserve positive mental states at a lecture are humor and communication, at a seminar - high search activity (search for a solution to the problem).

Then we examined the relationship between the quality of subject training of students, regulatory abilities and states. We have investigated the features of mental states, methods of self-regulation and regulatory properties in individuals with different levels of self-regulation efficiency in exams.

The samples were being formed according to the level of self-regulation efficiency. The first sample included students with a high level of self-regulation efficiency, the second - with a low one. The results of diagnostics of the level of self-regulation efficiency were compared with the final scores of students in the exam.

According to the results of the study, it was found that the groups with high and low levels of self-regulation significantly differ in the score obtained in the exam ($p < 0.008$) (Student's t-test). Thus, the productivity of passing the semester exam as the main indicator of the quality of subject training is associated with the effectiveness of self-regulation of students' mental states. Moreover, this pattern is typical for both mathematicians and psychology students.

We have examined the main differences in mental states experienced by students with high and low efficiency of self-regulation. With high efficiency of self-regulation, the most marked are the cognitive states of thoughtfulness**,** as well as the states of activity and faith. In the case of low efficiency of self-regulation, the most represented states are of doubt and anxiety, as well as anxiety and uncertainty. The obtained data confirm the assumption that the level of self-regulation efficiency significantly affects the state of students. Among the mental states of highly effective students, cognitive states of particular importance are interest, concentration, thoughtfulness.

Then we investigated the relationship between the effectiveness of self-regulation and the regulatory properties of the individual. The results showed that such personality traits as assertiveness, cheerfulness, confidence and perseverance allow students to effectively cope with examination stress and demonstrate high productivity of educational activity. We found that students with high efficiency of self-regulation of mental states are characterized by adequacy, awareness and independence. Individuals with low efficiency of self-regulation have high rates of self-criticism and responsibility. Thus, the results show that there are regulatory personality traits that contribute to the high efficiency of self-regulation of mental states. Among them, the most significant in the exam are assertiveness, adequacy, awareness, and independence.

Also, we have investigated the interrelationships between the effectiveness of self-regulation of mental states and the methods of students' self-regulation in the exam. It has been found that students with high efficiency, in general, are much more likely to use a wide range of methods and techniques.

Low-performing students are more likely to use non-constructive forms of regulation, such as relaxation, discrete communication (avoidance of contact), and complacency. These methods of self-regulation are distinguished by the general passivity of behavior and actions, the unwillingness of a person to solve a problem. Students showing high efficiency of self-regulation prefer to use other methods of regulation in the exam. Their prevailing methods are increasing search activity, using logic and increasing their own motivation. These methods of self-regulation should be classified as constructive when students are looking for ways to overcome the problem that has arisen.

The results of the conducted studies fully confirmed the initial assumption about the interconnection between the choice of effective methods of self-regulation, the manifestation of stable regulatory personality traits, and the severity of productive mental states. The latter with a high degree of significance correlates with the productivity (success) of passing exams by students.

At the third stage of the research, we studied the influence of mental structures (semantic, reflexive, representative structures, experiences, mental experience) on self-regulation and regulatory abilities of first-year students.

The solution to this problem is connected with the empirical verification of the conceptual model of mental regulation of the subject's mental states, developed based on multi-year research of the relationship between mental states and structures of consciousness.

The results of the study fully confirmed the hypothesis about the central role of the characteristics of consciousness in the regulation of mental states.

For the students of both, regardless of the conditions of the educational activity (lecture, seminar, exam), the first four factors represent the characteristics of the mental organization. They explain 50% of the variance of the variables. In total, we performed six factorization procedures - in three learning situations. In all these cases, the 10-factor models represented the best solutions (explaining about 70% of the total variance).

The first factor (25% of the variance) includes indicators of self-regulation ability, meaningfulness of life, emotional activity, positive self-attitude, as well as productive coping strategies. The analysis of factor loadings shows that the central role in the organization of this factor is played by the indicators of awareness of one's own "I", the meaningfulness of life, as well as various characteristics of the "I-concept". The value of these variables indicates that this factor in its meaning is a factor of mental (conscious) regulation of states in learning. The second factor includes various indicators of reflection (auto-reflection, socio-reflection, etc.) and explains 10% of the variance of the variables; the third factor (7%) contains various regulatory actions - from relaxation to self-hypnosis and active thinking; fourth (6%) - indicators of perspective reflection and planning process.

It should be noted that no fundamental differences were found in the factorial structure among mathematicians and psychology students; the content of the identified factors varies slightly.

We have revealed the structure of factors in different learning conditions. At lectures, the central factor of mental regulation correlates to the greatest extent with the factors of reflection, self-control and the factor of predicting and evaluating learning outcomes.

During the seminar, the factor of mental regulation interacts with factors of reflection, factors of motivation for learning (self-esteem and motives for self-development, achievement, cognition) and the effectiveness factor of self-regulation of mental states.

In exams, the factor of mental regulation is connected with factors of reflection and a motivational factor (the key indicator is the motive of self-respect). Indicators of learning success (score for the exam) form a single factor with indicators of mental states and the effectiveness of their self-regulation. Moreover, this factor correlates with the central factor of mental regulation.

These patterns show that various types of educational and cognitive activities form a special system of relationships between the components of the mental organization, mental states, regulatory actions and the effectiveness of self-regulation.

Discussion

Our results correspond to the main trends in the development of psychology. The conducted studies are theoretically substantiated, they rely on a model of mental regulation of mental states and take into account various factors of student learning success (features of the educational situation, motivation for educational activities, actual mental states in learning, methods of self-regulation, etc.). In our research, we implement a new approach to the self-regulation of states based on the concept of a person's mental experience. We obtained a set of results that not only correspond to the available scientific data but also substantially supplement them. The conducted research is original and has no analogues in the existing research practice. Direct comparison of the results obtained with the available data is rather difficult due to the following circumstances.

Such studies in psychology are carried out quite rarely. In particular, the bulk of research relates to the field of self-regulation of emotions, where the cognitive component plays a key role (Zeidner, 2007). Research on self-regulation of mental states from the perspective of the mental organization of the subject is clearly insufficient (Barrett, 2017). The available studies in the framework of educational psychology and practical pedagogy do not reveal the main issues of the structure, mechanisms of regulation and optimization of mental states in the course of the educational process.

In classical psychology, the development was primarily given to structural and functional models of regulation which revealed the most general structure (components, levels) and functions of the mental regulation (Lomov, 2006; Konopkin, 1980). Previous studies have dealt mainly with a separate group of states - psychophysiological states (Dikaya, 2003).

Besides, in modern concepts of self-regulation, the main "support" is the psychological qualities of the individual, while the vector of the regulation process is activity or behavior. For example, the influence of personal characteristics on regulation processes is being investigated by Morosanova (2010).

The author highlights the regulatory and personal properties that affect the entire system of mental regulation (flexibility, independence, etc.). At the same time, the least developed in these concepts is the mental component of the regulatory process: the relations between the regulatory process and the structures of consciousness have not been studied enough, as well as the contribution of the latter to changes in the states of the subject, their role and significance in the regulatory process. In our proposed approach we pay the main attention to the mental regulation of mental states.

In the course of the research, we faced the problem of insufficient awareness by students of their own mental states and regulatory processes in general. This may be due to both the level of development of reflexive processes and the peculiarities of educational activity. It is known that in complex intellectual activity there are few opportunities to switch attention to self-control processes. In part, this problem was solved through special instructions aimed at enhancing self-analysis in the classroom.

In practical terms, our study shows that achieving high productivity of educational activity is associated not only with the ability to use some techniques and methods of self-regulation during the educational process but also with the development of certain qualities of the student's personality. As our research shows, the main role in the process of self-regulation of states is played by the ability to "see oneself from outside" (reflection). In the system of higher education, the ability to "reflect" and manage one's own studies is included in the number of those skills that are required for students to master. Therefore, it is important that students acquire the skills of independent management of states, which in turn ensure the productivity of learning due to their reflective nature. These skills will also make it possible to assimilate more productively academic material, select methods and techniques of educational and cognitive activity adequate to the tasks to be solved, and control negative emotions that arise in the course of educational activity. At the same time, students get the opportunity to solve independently issues of their own cognitive activity in the course of classes.

Conclusion

We revealed the regulatory and personal properties of students that influence the self-regulation of states. The research showed that this influence is mediated by the form and level of training intensity, as well as by the profile of educational activity. We found the correlations features between the quality of students' subject training, regulatory abilities and mental states. It indicates that the effectiveness of self-regulation of students' mental states significantly affects the productivity of the semester exam. This is true for both samples of respondents, for students-mathematicians and students-psychologists. Among the mental states of highly effective students, the cognitive states have particular importance.

We established the properties of the personality which provide high efficiency of self-regulation. These are adequacy, awareness, independence, and assertiveness. It was found that students with high self-regulation efficiency often use a wide range of regulatory means. The study of the influence of the mental structures (semantic, reflective, experiences, etc.) on self-regulation and regulatory abilities of first-year students confirmed the hypothesis according to which characteristics of consciousness play the central role in the regulation of mental states. For the students, regardless of the conditions of the educational activity (lecture, seminar, exam), we identified four leading factors that represent the characteristics of the students' mental organization.

Acknowledgments

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