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ERGONOMICS DESIGN AND MANAGEMENT: THEORY AND APPLICATIONS

Ergonomics *and* Psychology

Developments in Theory and Practice

Edited by

Olexiy Y. Chebykin

Gregory Z. Bedny

Waldemar Karwowski



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Ergonomics Design and Management: Theory and Applications

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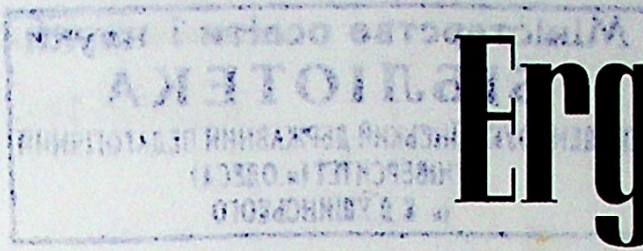
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Contents

Preface	ix
Acknowledgments.....	xiii
Editors	xv
Contributors.....	xvii

Section I Work Psychology and Ergonomics

1 Ecological Ergonomics	3
<i>Marvin J. Dainoff</i>	
2 Integrating Cognitive and Digital Human Models for Virtual Product Design.....	29
<i>Daniel W. Carruth and Vincent G. Duffy</i>	
3 Time Study during Vocational Training	41
<i>Gregory Z. Bedny and Waldemar Karwowski</i>	
4 The Laws of Ergonomics Applied to Design and Testing of Workstations	71
<i>V.F. Venda, V.K. Kalin, and A.Y. Trofimov</i>	
5 Day-to-Day Monitoring of an Operator's Functional State and Fitness-for-Work: A Psychophysiological and Engineering Approach.....	89
<i>Oleksandr Burov</i>	

Section II Modular Processes in Mind and Brain

6 Identification of Mental Modules	111
<i>Saul Sternberg</i>	
7 Identification of Neural Modules	135
<i>Saul Sternberg</i>	

Section III Psychophysiology of Work

- 8 **The New Interface of Brain, Mind, and Machine: Will the Emergent Whole Be Greater than the Sum of the Parts?**..... 167
Chris Berka, Daniel J. Levendowski, Gene Davis, Vladimir T. Zivkovic, Milenko M. Cvetinovic, and Richard E. Olmstead
- 9 **The Interaction of Sleep and Memory** 189
Jeffrey M. Ellenbogen
- 10 **Attention, Selection for Action, Error Processing, and Safety**..... 203
Magdalena Fafrowicz and Tadeusz Marek

Section IV Activity Theory and Ecological Psychology and Their Application

- ✓ 11 **Activity Theory: Comparative Analysis of Eastern and Western Approaches**..... 221
Waldemar Karwowski, Gregory Z. Bedny, and Olexiy Y. Chebykin
- 12 **Discourse in Activity** 247
Harry Daniels
- 13 **Movements of the Cane Prior to Locomotion Judgments: The Informer Fallacy and the Training Fallacy versus the Role of Exploration**..... 267
Gregory Burton and Jennifer Cyr

Section V Emotional Regulation of Activity and Education

- 14 **Emotional Intelligence: A Novel Approach to Operationalizing the Construct**..... 303
E. L. Nosenko
- ✓ 15 **Emotional Regulation of the Learning Process**..... 325
Olexiy Y. Chebykin and S.D. Maksymenko
- 16 **Emotional Resources of the Professional Trainer**..... 341
G.V. Lozhkin

Section VI Personality

17 Good Judgment: The Intersection of Intelligence and Personality..... 357
Robert Hogan, Joyce Hogan, and Paul Barrett

18 Relational Self in Action: Relationships and Behavior 377
Susan E. Cross and Kari A. Terzino

Index 397

Preface

One of the main questions of psychology is concerned with the relationship between different fields and schools of psychology and their influence on theoretical and applied studies. The aim of this book is to give the reader representative ideas of the most successfully applied basic approaches in psychology, ergonomics, education, training, etc.

Such issues as interaction and mutual influences of the diverse schools of psychology on each other become particularly important during the globalization of the world economy and science. There is a fundamental need to understand what is positive and negative in different directions of psychology, and how we can overcome what is negative and utilize what is positive in our theoretical and applied studies.

The cognitive approach has been a dominant one in the United States for a long time now. Fundamental theoretical data and multiple techniques adopted for the study of mental rather than manual work have been developed, and new theoretical concepts of learning and instruction have been suggested utilizing this approach. However, no one scientific approach can be considered as a perfect one and as an absolute truth in psychology. Every approach has its positive and negative aspects. This is also true for cognitive psychology. As a result, new approaches in psychology and an attempt to utilize them in practice have emerged in the United States and other countries. To these approaches one can relate ecological psychology, situated cognition, action theory, activity theory, etc. Often, representatives of the new approaches start with overemphasizing negative aspects of other approaches and attempting to exaggerate advantages of their own approach. This negatively affects objective analysis of the advantages and disadvantages of different directions in psychology and the possibilities of utilizing them in practice. Therefore, there is a need to integrate different directions in psychology to further their successful application.

The purpose of this volume is to demonstrate that different scientific approaches are tightly interconnected and their uniqueness is relative. Areas of psychology that can successfully accommodate the achievements of other directions and modify them can later be significantly developed and efficiently applied in practice.

In this volume we present chapters by scientists who work in different directions of psychology and, particularly, in cognitive psychology, ecological psychology, and activity theory. Interaction and interdependence of these directions of science can be traced in the work of a variety of authors in this book. For example, one of the leading specialists in cognitive psychology, Saul Sternberg, who presents his research in this book, developed the additive factors method from the late 1970s through the early 1980s, facilitating the discovery of the existence and distinctiveness of different stages of the

information processing. These stages are of a very short duration in time and can be measured in milliseconds. The results of his study were not only utilized in engineering psychology in the United States but also accumulated and were elaborated upon in activity theory. As a result, microstructural methods of the analysis of human cognitive actions have been developed in activity theory.

Here is another example: Cognitive processes in activity theory are always considered as "mental processes." However, such concepts as sensory memory, short-term memory, long-term memory, etc., were transferred into activity theory from cognitive psychology. At the same time, in general and systemic-structural activity, theory cognition is considered not only as a process, but also as a system of cognitive actions and operations. On the other hand, systemic-structural activity theory outlines different stages of activity analysis based on this data. Some directions of Western psychology such as German action theory, situated cognition, ecological psychology, etc., have been influenced by activity theory. For example, the works of Berenshtein on self-regulation of motor actions and movements was an important source for development of the ecological psychology.

Representatives of not only various scientific approaches, but also representatives of different countries contributed to this volume. Most of the authors are scientists from the United States and the Ukraine. The Ukraine is no longer just a republic of the former Soviet Union but is an independent country now. Disintegration of the Soviet Union was associated not only with the changes in the political climate in the Ukraine and other republics, but also with the drastic deterioration of the economy. The political turmoil in the region also negatively affected the cooperation of scientific communities of the former republics. All of this, in turn, negatively influenced Ukrainian science. However, we can now observe that the economy and science are moving forward in Ukraine. It was a pleasure to see how enthusiastically Ukrainian scientists took part in the development of this volume. We want to note that some contributors who live in the United States present data gathered in Ukraine (see, for example, the work of Susan E. Cross and Kari A. Terzino). The cooperative work of scientists from the United States, the Ukraine, and other countries will promote the further development of science.

This book is the collective achievement of scientists in diverse areas of psychology and ergonomics. Papers that are presented in this book allow the readers to develop their own vision and concept about psychological issues and apply them in ergonomics, education, and other important areas of human activity.

The book touches on major recent developments in psychology and their application. The major areas covered in this book are cognitive psychology and psychophysiology, activity theory and ecological psychology, emotion regulation, social psychology and personality, work psychology and ergonomics. The authors who have contributed to this volume are leading scientists in their respective fields.

Section I of the book, "Work Psychology and Ergonomics" provides a review on studies of human work from different perspectives. It has brought together experts in the field from diverse branches of ergonomics and psychology. This section lays the foundation for demonstrating the possibilities for future research by utilizing different approaches in psychology.

In Section II of the book, "Modular Processes in Mind and Brain," a method for the modular decomposition of mental and neural processes is discussed, together with examples of its application to behavioral data (Chapter 2.1) and neural data (Chapter 2.2). A special case of this approach, the method of additive factors (AFM), was first described by Sternberg in 1969, as a way to use reaction-time data to analyze mental processes that are organized as a sequence of processing stages. The AFM has been applied in numerous experiments in cognitive psychology, and has also triggered studies in activity theory. The more general process decomposition approach of Section II can be applied to a far wider range of measures and process structures.

Section III, "Psychophysiology of Work" presents some recent discoveries regarding the cognitive and neural processes that can take place during performance of different kinds of tasks. We believe that a solid grasp of theory in these basic branches of psychology provides a strong base for the development of the efficient methods in the study of human work.

Section IV, "Activity Theory and Ecological Psychology" includes three chapters: two of them are related to activity theory and one to ecological psychology. It is worth noting that activity theory influenced ecological psychology; hence these two related topics will logically appear in the same section.

Section V is titled "Emotion Regulation of Activity". The purpose of this section is to demonstrate theoretical and experimental justifications of emotions during the study of human work, learning, and training.

Section VI called "Personality" includes two chapters in which the authors consider such theoretical and applied aspects of psychology as personality and individual differences. These areas of applied psychology study human activity or behavior through the prism of personality.

The book can be of use for a broad spectrum of scientists, practitioners, and students who work in such areas as psychology, human factors and ergonomics, education, and other areas of research. The presented studies performed from various theoretical perspectives have not only their specific methods but also have some common principles.

Presenting the variety of research methods and approaches in one book allows the reader to achieve a broader perspective on how these approaches can benefit from each other.

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15

Emotional Regulation of the Learning Process

Olexiy Y. Chebykin and S.D. Maksymenko

CONTENTS

15.1 Introduction.....	325
15.2 Purposes and Methods of Our Study	328
15.3 Method of Emotion Regulation in the Learning Process	331
15.4 Verification of the Emotion Regulation Method	333
15.5 Conclusions.....	337
References	337

15.1 Introduction

Emotions and cognitive processes are closely linked. Their interaction constitutes the most important of psychic regulations. Understanding the mechanisms that influence emotions involved in human cognitive activities is one of the major challenges of modern psychology (Chebykin, 1999).

Our mind operates in three ways: cognitive, affective, and motivational. The cognitive includes functions such as memory, reasoning, judgment, and abstract thought. Affective includes emotions, moods, evaluations, and other feeling states. Motivational is the sphere of the personality, including a biological urge or learned goal-directed activity. Cognition and affect together make up emotional intelligence (EQ).

The concept of EQ derives partly from earlier ideas about social intelligence, which was first identified by Thorndike who defines social intelligence as the ability to understand people. EQ was included in Gardner's description of inter- and intrapersonal intelligences in his theory of multiple intelligences in 1983. Gardner (1983) presented seven types of intelligence, namely, verbal, musical, logical, spatial, kinesthetic, interpersonal, and intrapersonal. Afterwards, he added naturalist and existential dimensions. The interpersonal intelligences consist of the ability to understand others. Intrapersonal intelligence is the ability to develop an accurate model of the self and use it effectively to operate throughout life. Moreover, he described these

skills as necessary for social interaction and the understanding of one's own emotions and behaviors. However, Salovey and Mayer (1995) re-conceptualized interpersonal and intrapersonal intelligences under a broader label of EQ and proposed a more comprehensive framework of EQ.

Many research disciplines are useful in the study of education, such as ethnographic research, case studies, grounded theory, participative inquiry, clinical research, and phenomenological research (Mertens, 1998). Interpretive approaches such as phenomenology focus on understanding the nature of reality through people's experiences via subjectively constructed processes and meanings. This tends to generate an epistemology where phenomena have defined realities. The phenomenological approach emphasizes the subjective processes of the situation. The aim of this approach is to determine what an experience means for those who have had the experience and are able to provide a comprehensive description of it. This approach is interested in ways in which a phenomenon is experienced, rather than in the nature of the phenomenon itself (Altricher and Somekh, 1993; Mertens, 1998; Pring, 2000; Scott and Usher, 1996).

Saarni (1990) outlines the following eleven components and skills of emotional competence:

1. Awareness of one's emotional state
2. Ability to discern others' emotions
3. Ability to use the vocabulary of emotion and expression
4. Capacity for empathic involvement in others' emotional experiences
5. Ability to realize that inner emotional state need not correspond to outer expression
6. Awareness of cultural display rules.
7. Ability to take into account unique personal information about individuals and apply it when inferring their emotional state
8. Ability to understand that one's emotional-expressive behavior may affect another
9. Capacity for coping adaptively with aversive or distressing emotions by using self-regulatory strategies
10. Awareness that the structure or nature of relationships is in part defined by both the emotional immediacy or genuineness of expressive display
11. Capacity for emotional self-efficacy

According to Denham (1998), emotion understanding is knowledge of the causes and consequences of emotions. This understanding has many important implications. For instance, research has found that emotion understanding aids in self-control, as well as in the development of a child's theory of mind (Saarni, 1990). The understanding of emotion allows children to tie

situations, subjective emotional states, and expressive signals together into coherent emotional experiences (Denham, 1998). The understanding of emotion involves the following aspects described by Denham (1998):

1. Labeling emotional expressions
2. Identifying emotion-eliciting situations
3. Inferring the causes and consequences of emotion-eliciting situations
4. Using emotion language to describe their own emotional experiences and clarify those of others
5. Recognizing that their own emotional experiences can differ from others' emotional experiences
6. Awareness of emotion regulation strategies
7. Knowledge of emotion display rules
8. Knowledge that more than one emotion can be felt at the same time, even if they conflict
9. Understanding of complex social and self-conscious emotions such as guilt

Studies of the regulation of emotions use the main achievements in psychology for understanding emotions and EQ. They lead to fundamental results in teaching technologies. The main aim in this field is to promote the active participation of a student's emotional sphere in the learning process. Unfortunately, nowadays this is still far from being achieved.

Seval Fer (2004) claims that in contrast to IQ, which is considered relatively stable and unchangeable, research (Ashforth, 2001; Cherniss and Goleman, 1998; Cooper, 1997; Goleman, 1995) has indicated that EQ is acquired and developed through learning and repeated experience at any age. This understanding of EQ and mental development in general is derived from Vygotsky's (1978) idea about the zone of proximal development (ZPD). He first applied this idea in the context of testing and instruction. He asserted that the ZPD is the difference between a child's "actual development as determined by independent problem solving" and the level of "potential development as determined through problem solving under adult guidance." Application of this concept to education in general and to EQ in particular have become known in the West. In this context, EQ skills are becoming more important as society creates new challenges for youth. We can shape our EQ by learning not only well-developed intellectual abilities, but also social and emotional skills. Intellectual ability is essential for being successfully educated and for being a contributing member of society. EQ is also equally essential, and can help people study to their potential and develop healthy interpersonal relationships. Understanding one's own emotional processes can have far-reaching effects for social functioning and the quality of life. However, Richardson (2000) indicates that young people who lack social and emotional competence might end up becoming self-centered and unable to empathize

and relate to others. According to Goleman (1995), the most troubling findings were in national surveys in the United States, in which more than 2,000 children were rated by parents and teachers in a longitudinal study. The results indicated that children had become more impulsive, disobedient, angry, lonely, and depressed. Parents had less time to spend with children, children spend more time in front of a TV or computer, and they were not getting the basic needs for the emotional foundation that they needed. The teen crime rates, drug-abuse rates and so on are only now helping us realize that this situation makes the young emotionally more at need. Moreover, longitudinal studies indicated that children with social deficiencies suffered both socially and academically (Chebykin, 1999).

Proceeding from the above statements, we conducted investigations into the emotional state of students in various stages of learning. According to Bedny and Karwowski (2006) cognitive, emotional, and motivational components of activity are integrated into the holistic self-regulative process. Emotions and motivation are considered as functional mechanisms or functional blocks of the self-regulative process. The emotionally evaluative block is involved in the evaluation of the significance of task or situation. The motivational function block determines what aspects of activity will be induced. These two function blocks interact with other functional mechanisms and particularly with such functional mechanisms as "goal" and "assessment of difficulty of situation." For example, if a student evaluates a goal as not being personally significant (emotionally evaluative stage) and very difficult due to his low self-efficacy, this decreases motivation (the inducing component of activity) and the student can avoid the goal. A model of self-regulation of activity elucidated not only the natural manifestation of different emotions but tried to discover ways of regulation. Our study along the lines of the theoretical data presented by Bedny and Karwowski demonstrates that there is a possibility to control the emotions of students during the learning process and to shift emotions in the necessary direction.

Further development of the system of education is linked to the increasing informational flow and consequently to the sharp intensification of the learning process. In these conditions the positive emotional components in the learning process become very significant. However, we claim that traditional learning techniques result in the increase of negative emotions among students and therefore in the decrease of teaching effect.

15.2 Purposes and Methods of Our Study

The purposes of our studies were to demonstrate the influence of emotions on the learning process and to find the effective methods to provide the optimal emotional regulations in teacher–student interaction.

We suggested that the understanding of emotional regulations mechanisms and their correlations with informative and dynamic characteristics of the learning process would allow:

- Development of a model of emotional regulations to structure conditions promoting the learning process
- Determination of a set of positive emotions that would lead to increasing the effectiveness of learning
- Working out of adequate teaching techniques for emotional regulations during the learning process

We studied the experimental groups of students with emotional states in a wide range of parameters. The standard techniques were used: external observation and introspection, questionnaires, and psycho-physiological and psychological methods of investigations.

Psychological components of emotion regulation in the learning theory can be divided into three groups:

Situational-relevant. In this group can be integrated emotionally charged situations in the learning process such as "dramatizing," "overcoming obstacles," "novelty" (Vygotsky L., 1978, 1981, 1987, Leont'ev A. N., 1978). Our study demonstrates that such situations are mainly necessary for the intensification of the learning process.

One-way oriented. A concept that mostly relied on the motivational characteristics of learning processes at all stages, based either on the effect *ional* or cognitive components (Rogers, 1961). In this case, the specially selected didactic material and specific techniques have to be used by the teacher.

Purpose oriented. This deals with the meaning of individual emotional characteristics of the learning process (Rubinshtein, 1959, etc.) or trying to understand the entire set of emotions appearing during this process (V.V. Davydov, 1986).

Our analysis of well known results and the recent data on the interrelations between the emotions and motivation, goal-formation, analysis of cognitive processes, and conscious and unconscious components of activity (Bedny and Karwowski, 2006) allowed us to evolve the structure of emotional regulations of the learning process (see Table 15.1).

The table shows three stages of learning process.

- At the initial, *approximately-motivated stage* (orientation stage) the motives that are determined by the external didactic material dominate.
- At the second, *executive stage* the motives are connected with surrounding things and phenomena.
- At the third, *reflective-evaluated stage* the objective-oriented systems are developed.

TABLE 15.1

Levels of Emotional–Motivational Regulation in the Learning Process

Basic Components of Development Training	Level of Regulation		
	Motivate	Emotional	
		General	Specific
Approximately motivated	Prevalence of effective external motives directed at didactic material	Emotions are like a dynamic characteristic	Initial analysis of learning tasks is emotionally identified and is either consolidated in one's consciousness or not
Executive	Prevalence of an inner motive involving general goals, dealing with facts, understanding the qualities of things and phenomena	Correlation of emotional and cognitive processes	New emotions catalyze gnostical functions of induction and correction of learning operations
Reflective–evaluative	Prevalence of an inner motive; elaborating objective systems of general and concrete phenomena; establishing main principles	Inclusion of emotions into gnostic process of consciousness	Display of heuristic functions of learning practical operations

This scheme determines our strategy of research aimed to classify emotions and to elucidate the regulation methods.

Further we tried to determine situations, in which emotions are caused that provide a successful regulation in the learning. We tested students of high school of different levels, students of pedagogical colleges and the educators. Special procedures to investigate the emotions were developed. As a result of this investigation, the following emotions linked to the learning process were identified: surprise, curiosity, boredom, resentment, perplexity, doubt, inspired, indifference, enthusiasm, interest, inquisitiveness, delight, disappointment, joy, anger, fear, shame. *We claim that these emotions are typical for the education process.*

At the first stage of learning the emotionality is caused by the dynamic characteristics of a person.

At the second stage of the learning process an internal motive is formed linked to the general goals of learning. This provides the intensification of the interaction between the emotional and cognitive processes.

At the final stage the domination of the inner motive takes place. We suggest that the emotions are actively engaged here into the Gnostic functions of the consciousness. It shows the interest, inquisitiveness and enthusiasm. We denoted these emotions as “desirable” (wishful).

At all stages of the learning process we observed so-called "experienced emotions." They include not only positive emotions, but also negative ones as well as boredom, perplexity, doubt, indifference, disappointment, anger and fear. In real practice of the learning process the correlation of emotions has a complex and occasionally an ambivalent nature.

The determination of the optimum role of specific emotions in the learning process demands an accurate emotions diagnosis and further correction of emotions by teacher. We suggested that the teacher's accuracy in recognizing emotions depends on his ability to analyze the particular features of emotion expression.

To verify the hypothesis 71 teachers were invited to take part in the experiment. Two groups of features were identified: expressive and subjective ones. It was found that there are 19 subjective features of individual emotions, and the expressive ones have 12 features. Besides that it was shown that individual emotions have one to three identical expressive features. The main expressive features are perplexity and surprise, surmise, doubt, boredom, indifference, disappointment, curiosity, inquisitiveness and interest, enthusiasm and inspiration, anger and fury, joy and delight.

The characteristic features are following:

Perplexity—widely open eyes and raised brows with partly open lips

Indifference—blank and indifferent look, yawning, fiddling and quiddling

Curiosity—bright and shining eyes, fixed look with partly open lips

Enthusiasm and interest—animation and shining eyes, swiftness, and unresponsiveness to external actions

Anger and fury—knitted brows, screwed up eyes, slightly parted lips

Joy and delight—smile, shining eyes, merry and joyful look

The expressive changes in the eye and mouth area are mostly often indicators of emotions. We widely used photos of students in experiments. As a result it was found that the process of actual recognition of emotions by teachers can be improved during the teaching process.

Each set of similar emotions contains some features (surprise, boredom, interest, doubt, fury, joy, dread, shame, and resentment), which can be recognized by a teacher (see Table 15.2).

15.3 Method of Emotion Regulation in the Learning Process

Recent findings in emotional intelligence support the concept of confluent education, which holds that effective learning develops in the interaction of

TABLE 15.2
Discerned Peculiarities of Emotions

EMOTIONS GROUPED ACCORDING TO SIMILAR AFFECT	Perplexity Astonishment	BASIC EMOTIONS DISCERNED IN A FACIAL EXPRESSION	
	Pleasure		
	Boredom Apathy		Boredom
	Inquisitive Interest Curiosity		Interest
	Anger Malice		Malice
	Doubt Guess		Doubt
	Joy Pleasure Enthusiasm		Joy
	Dread Terror		Dread
Offense Disappointment	Offense		

cognitive and emotional domains. Therefore, effective educational practice requires attention to the development of many forms of intellect through formal teaching practice as well as informal teaching practice. Current research and practice both firmly demonstrate that the growth of ethical or principle driven behavior—a critical component of emotional intelligence—develops through numerous informal interactions both in and out of class.

The experience of leading teachers in this field were the basis of formulating general methods for students' emotional sphere regulation. The following methods are used:

- Active correction, such as expressive, intonational, contact, confidentiality, encouragement, attention switching, etc;
- Increase of the emotional effect by preparation in advance of purpose-oriented didactic material, vivid emotional signs, improvised topical commentaries, dramatization, musical effects, etc.

Our system of emotional regulation methods includes:

- The self-regulating correction of the emotional states of the teacher (autogenic training)
- The control of emotional sphere of students

It is necessary also to underline two additional interrelated groups of regulation methods:

- The expressive intonation, trope and stylistic methods
- The use of traditional lore, humor, parables, catch words, etc.

15.4 Verification of the Emotion Regulation Method

In another experiment, 54 teachers (with 1100 students) were involved. More than 100 lessons on various subjects were conducted. The experimental lessons were conducted by postgraduate students.

The observed discrepancy between actually experienced and desirable emotions of the students at the final (and partly at the performance) stages of the educative process can be explained by different abilities of students for achieving learning at a fixed stage. It was found in the final stage that the reduction in diversity of manifested emotions with the majority of students was due to the dominance of arbitrary forms of self-regulation at that stage.

The 6- to 7-year-old children showed a higher rate of surprise in comparison with 7- to 8-year-old pupils. The studies show that described methods were helpful to control student's emotions during the teaching process. The creation of situations of suddenness, brightness, and contrast was used in order to excite surprise and other emotions. At the performance stage the theatrics, success-and-encouragement, and comfort techniques were applied. These produced empathy in the pupils.

In another study, we observed 98 teachers, and studied 46 experimental and 52 control lessons. A range of selected emotions (indifference, anger, dread, resentment) was chosen. It was found that negative emotions were revealed less frequently in the experimental studies than in the control groups. A detailed analysis of data has revealed that there are some students in each group who more strongly manifested negative emotions in certain situations than other children. This must be taken into consideration by teachers in their work.

In experimental studies when our methodology is used, negative emotions of all levels and types can be corrected. In the case of a quantitative indication of diagnosed emotions after correction in experimental and control studies, statistically reliable differences were obtained. The effective correction of negative emotions was achieved due to quick detection and employment of adequate control actions.

We found that in the process of realization of our methodology, any activity that is carried out with too high an intensity for a long period inevitably results in deterioration of the psychic conditions of students. This is mainly manifested by children of the lower grades. The age difference of students

in the process of realization of our emotion regulation methodology plays a significant role in providing positive results.

We have been led to conclude that a creative teacher must:

- Pay attention to the activity and moods of students under different teaching conditions
- Follow the peculiarities in changes of functional states of students before and after the application of regulation methods

The efficiency of rehabilitation of emotional conditions during the teacher process is determined by the shifts in the moods and activity caused by the regulation method. The greatest shift in the diagnosed parameters was observed at experimental studies in comparison with control studies in mathematics and reading. These data were obtained for children in the beginning grades. For the second grade students these differences were more expressed at studies of natural history. For the third grades students for all diagnosed data (with the exception of the lessons of mathematics) statistically reliable differences in all diagnosed parameters were noted.

We found that the important factor in the rehabilitation of emotional state of students in the learning process is the following regulation techniques (the corresponding effectiveness in percents is shown):

- Switching of attention to another activity (75%)
- Different combinations of motor and cognitive actions (50–68%)
- Combination of cognitive and motor actions with a commentary (72%)

The largest drop in indicators of functional abilities of students in conditions of our methodology using was observed at studies of mathematics and natural history. In these cases they varied from low to medium levels. At the same time it has been revealed that the use of our rehabilitation methods effectively improves the abilities of children. The most effective rehabilitation techniques are different combinations of cognitive and motor actions.

We investigated psycho-physiological and psychological characteristics (60 parameters) for 120 students. The study was aimed to determine three key factors: self-regulation (self-control, confidence, etc.); expressivity (emotionality, psychomotor tonus, etc.); and empathy (introversion, concern, trustfulness, anxiety, etc.). The experimental data are consistent with our long-term observations in teacher colleges. The most important task was to find the elements determining emotional stability of the teacher and the ways to diagnose this stability.

We also developed a procedure for the diagnosis of emotional maturity of teachers. Such procedure must be valid and reliable, providing a simple treatment of the results, and manageable. Out of 800 considered assertions 36 were selected related to self-regulation, expressiveness, and empathy. Later, six more questions were added to test the sincerity of answers. The

questions were general, and only a small percentage (1–3%) of answers in different samples were insincere. The validity of the procedure was confirmed by the agreement of testing results for the diagnosed indicators with the preliminary self-assessment by each subject. The reliability of testing was assessed by repetitive experiments with the same group of subjects (140 persons). The stability of results in various cases was moderate at the level of statistical significance.

A special workshop, "Principles of Emotional Regulation in the Educative Process," was organized. The program comprised two main parts.

The first one was devoted to teaching students about behavior under conditions that lead to emotion-provoking situations. Typical emotions of children and the signs to recognize them were analyzed. We showed typical examples of emotion-provoking situations that appear in the teaching of mathematics, physics, and social science disciplines. The second part of the seminar was devoted to the techniques of simultaneous self-control and control of the emotions of students. We have seen that the participants of seminars do not always exhibit the necessary abilities to satisfy these requirements.

In our study we utilize also formative experiments. This method of study, which was suggested by Vygotsky (1981), emphasized that the activity of a subject involved in an experiment can be developed under the guidance of the person conducting it. This experimental method emerged from study of the relationship between development and learning, according to the Vygotsky learning guide on mental development. He introduced the concept of the zone of proximal development, defined as the gap between a child's actual performance and the level achievable with the help of an adult. From this it follows that the task of the teacher is to move ahead of the student's development, leading him or her into a zone of proximal development and increasing the efficiency of the learning process. In our study we paid attention first of all to the emotionally motivational aspects. Analysis during the process of development helps scientists and practitioners better understand the activity of subjects. Only through analysis of the acquisition stage can we discover better methods to employ in the teaching process. In the formative experiment related to the approbation of our methods for emotion regulation, 62 students of the teaching faculty were engaged. In the framework of the experiment the emotional maturity of students were diagnosed in terms of their motivation to learn in the field of their chosen profession, and their abilities to perform the main types of emotional regulation required in the teaching process (predictive, procedural, and final).

The following results were obtained: 31 students showed domination of the procedural type of emotional regulation, 23 students exhibited the domination of the final type of the emotional regulation. Index of emotional stability in all groups changed mainly between 7.08 and 8.38 with the maximum value of 12.0. After the formative experiment the values of the mentioned parameter increased by 4.1 points in comparison with the initial values and this difference was statistically significant.

The results showed that the most effective methods of self-control and control of the emotions of students included self-command ($90\pm 4\%$), switching attention ($87\pm 0.4\%$), and ideomotor training (79 ± 0.5).

Thus, after the initial experiment with students the visible changes in the development of basic types of emotional regulation, emotional stability, and motivation were observed. Among the favorable conditions that lead to the best results were:

- Adequate simulation of emotionally-provocative situations, which were necessary for students to understand different emotion-regulating techniques
- The individual work of a psychologist, a specialist in didactics, and a teacher during lesson preparation and for final assessment of the results.

A general analysis of the results of emotional regulation in the educative process showed that the most important factor is the ability of students to foresee an emotion-provoking situation (i.e., to suggest several alternatives to its possible development and to suggest several methods of control) and the development of the pupils' skill to maintain a cheerful and productive atmosphere during the lesson. Systematic development of emotional stability against a background of clearly expressed empathy indicates that the pupils have acquired the necessary techniques of self-control. Emotional control affects the development of students' expressiveness. We found that the most important emotional training for students is the formation process of emotion regulation. So it can be argued that emotional maturity is an important diagnostic characteristic of students' (entrants included) preparedness to master the teaching profession.

In conclusion it can be mentioned that a multidimensional study of the control of emotions in the educative process led to a useful insight in the problem of linking emotional intelligence to the educational process. We determined the nature of psychological mechanisms and conditions for the emotional regulation of teaching and learning processes. We defined specific emotions of their changes at typical stages of the educative process. The principles of the emotional regulation method have been identified. The signs of emotional expression have been described. We underlined the necessity to combine the control of emotions of students and self-control of the teacher.

Our studies have revealed that emotional regulation in the learning process can not be performed separately from the motivational and cognitive components of activity. The cognitive component comprises the informative and dynamic characteristics of the educative process. The motivation component is the dominating director of the activity; and the emotional component, the interaction of the emotional with the evaluative aspects of the activity.

15.5 Conclusions

As a result of the analysis of obtained results it can be concluded:

1. The system of application of the methods of psychic regulation of emotional state of students in the learning process is developed.
2. Methods of emotional regulation include, first, blocking of mechanisms of interaction of the motives with typical emotional processes and, secondly, blocking of conditions that cause emotion-provoking situations.
3. The unrealized emotional potential of students in the learning process is due to the discrepancy between actually experienced and desirable emotions at different stages of the process.
4. An analysis of subjective and expressive signs of specific emotions of students makes it possible to identify the groups of equivalent emotions. The existence of such groups of emotions easily recognized at the level of expressive signs.
5. The conditions have been determined that provide emotional regulation in the learning process with using didactic material that leads to the increased emotional charge, correction of situational emotions, and changing their functional role.
6. Increased emotional charge of the didactic material at the motivational stage of the learning process was achieved by insertion conditions into the process such as suddenness, brightness, and contrast. At the performing stage other situations were more useful, such as the use of theatrics, success and encouragement, and comfort techniques. At the reflection and assessment stage, the emotion-provoking situations were complemented by the extremality, deficit of assessment criteria, and disinformation.
7. Control of the functional states of the pupils in order to rehabilitate their capacity to work in learning conditions is achieved through psychomotor techniques (motor reactions combined with speech and music, etc.) conducive to comforting emotions.
8. Emotional regulation in high school can be successfully performed by teachers who review the special psychological training that we have outlined.

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Professional Trainer

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CONTENTS

Abstract	339
16.1 Formulation of the Concept of Professional Trainer	341
16.2 Methodical Principles of Training	345
16.3 Results	348
16.4 Conclusions	349
References	350

Abstract

In this chapter a general psychological approach to the study of the professional trainer is proposed. The author analyzes the method, the activity of the trainer, the psychological level. Also, the author has identified that among the levels of the professional trainer, the level of the person's activity is the most important. The author is analyzing the emotional factors that influence the trainer during their professional activity. The author is also conducting the analysis of the phases of the training process. The analysis of the phases of the training process is carried out. Personal characteristics of the trainer and the occurrence of the "burnout" syndrome are also analyzed.

16.1 Formulation of the Concept of Professional Trainer

Training of high-level sportsmen is a complex process that requires a systematic, organization of teaching material, stimulation, planning, and control.