V International Forum on Teacher Education

Diagnostics of Metacognitive Involvement in the Activities of Students in the Learning Process at a University

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Abstract

The relevance of the problem under study is due to the need of the modern educational process in organizing independent cognitive activity of students, and as a result, the main task of the modern education system is to measure the level of metacognitive involvement in students' activities and explore the possibility of explicitly incorporating metacognitive knowledge into the process of learning specific subjects. The purpose of the article is to diagnose metacognitive involvement in the activities of students in the process of learning at university. The leading method for studying this problem is the Metacognitive Awareness Inventory questionnaire (Schraw & Dennison, 1998), which makes it possible to view this problem as a process of specialists' purposeful and conscious mastery of the skills to monitor the quality of education. This questionnaire is part of a fairly small number of methods that currently exist and investigate the metacognitive properties of a person. Its main goal is to trace the patterns of participation of meta-processes in the implementation of activities. The article presents the results of a dissertation research on the problem of metacognitive involvement in activities. The authors provide data on measuring the level of metacognitive involvement in the activities of university students and exploring the possibility of explicitly incorporating metacognitive knowledge into the learning process of specific subjects that affect the development of professional metacognition. Based on the questionnaire used, the article presents the measurements of two components of metacognition: metacognitive knowledge and metacognitive processes. According to the results of the study, metacognitive skills (processes), which are used less often by students, have been established; due to which the issue of applying data about students' metacognition in the practical activities of a teacher is discussed.

Keywords: metacognition, metacognitive involvement in activities, metacognitive knowledge, metacognitive processes, MAI questionnaire.

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Introduction

The topical issue of the modern education system is the measurement of the level of metacognitive involvement in students' activities and the study of the possibility of the explicit inclusion of metacognitive knowledge in the process of teaching specific subjects, which determined the purpose of the article: diagnosis of metacognitive involvement in students' activities in the process of learning at a university.

We are witnessing the emergence of the terms like "metacognition", "metacompetence". They set new requirements for the results of learning outcomes of students, which cause the need to change the content of training. The implementation takes place on the basis of the principle of meta-subject. It is considered as a condition for achieving high quality education.

It is assumed that the teacher today should become a construct of new pedagogical situations. They give new tasks aimed at the use of generalized methods of activity. Creates their own knowledge development products with students. An important component of this competence is the ability to learn - metacognitive involvement in activities.

In accordance with the State Program for the Development of Education and Science of the Republic of Kazakhstan for 2016-2019, the main areas of work to improve the quality of education are ensuring equal access for all participants in the educational process to the best educational resources and technologies; meeting the needs of students in obtaining education that ensures success in a rapidly changing world; formation of an intellectually, physically and spiritually developed citizen of the Republic of Kazakhstan in general education schools.

In order to prepare the student for life in such conditions, academic knowledge, functional skills, personal competencies and relationships are not enough. Absolutely new qualities are needed – metacognitions, metacompetencies (Instructive and Methodological Letter, 2017).

In the works of cognitive psychologists, educational psychologists, the concept of metacognition is usually defined by describing the component composition. In most cases, there are two main components in the structure of metacognition: metacognitive knowledge (knowledge of cognition) and metacognitive processes (monitoring and evaluation, control and regulation of cognition) (Kholodnaya, 2002).

The works of foreign and domestic researchers in the field of metacognition show a positive correlation between educational achievements and metacognitive inclusion in the activity (in particular, accuracy of metacognitive monitoring) of schoolchildren and students (Samoylichenko, Rozhkova, & Tokmakova, 2016).

American psychologists Schraw and Moshman (1995) note that most researchers in the field of metacognition agree that the ability to regulate their own knowledge increases the productivity of learning activities, including allowing students to more deeply understand the reasons causing difficulties in understanding educational material (Schraw & Moshman, 1995).

Many authors consider the explicit formation of metacognitive knowledge in the process of teaching subject content to be desirable. American educational psychologist Pintrich (2002) notes that the important point is the inclusion of disciplines in the work programs as goals - this is teaching metacognitive knowledge (Pintrich, 2002).

Schraw (1998) identifies four main directions of the formation of metacognition in terms of teaching the subject.

- teacher encouraging students to understand the importance of developing metacognition;

- improving knowledge on cognition;

- improving the regulation of cognition;

- teacher creating conditions that stimulate the metacognitive activity of students.

When choosing metacognitive knowledge and skills, the formation of which is advisable to include in the teaching process of the subject, it is necessary to take into account the current level of metacognitive involvement in the activities of students in the learning process.

Metacognition in the last twenty years has been a rapidly developing trend, which includes many more local directions. Since the 1990s the process of diversification of metacognition research has noticeably intensified.

Currently, most of them are carried out not in the general psychological way, but within the framework of applied psychological disciplines: pedagogy, developmental psychology, neuropsychology, psycholinguistics, management psychology, social psychology. On the one hand, it gave a powerful impetus to create more accurate psychodiagnostic tools, which allows quantifying the subject's ability to metacognition (Karpov, 2015).

The most pressing scientific problem in the framework of the metacognitive direction in recent years is the study of the role of metacognitive processes in learning. This problem is recognized by American authors as the most promising today. In this regard, the study of the relationship of learning as a general ability and metacognitive personality traits can make a significant contribution to the development of these modern scientific views (Karpov, 2015).

Despite the very large amount of research in the psychology of metacognitive processes conducted in the last decade, they by no means exhaust all the potential problems of metacognition (Karpov, 2015).

Problem Statement

The actual problem of educational practice is the measurement of metacognitive involvement of students and review of the possibility of metacognitive knowledge's explicit inclusion in the process of teaching specific subjects

Research Questions

The article discusses the use of students' metacognition data in the teacher practice

Purpose of the Study

Diagnostics of Pavlodar State University students metacognitive involvement

Methods / Methodological Foundations

In order to study the level and peculiarities of metacognitive involvement in activities, we conducted a survey of 1–4 year bachelor students. The experimental base of the research was S. Toraighyrov Pavlodar State University. 186 full-time students majoring in Education took part in the voluntary survey.

Metacognitive involvement in activities was measured using the Metacognitive Awareness Inventory questionnaire (Schraw & Dennison, 1998). The questionnaire consists of 52 questions and allows measuring two components of metacognition: metacognitive knowledge and metacognitive processes. Statistical processing of the results was performed in an Excel spreadsheet processor.

The average metacognitive awareness was 37.2 points out of 52, i.e. 72 percent. More than half of the students were above average. Metacognitive skills (processes), which are most rarely used by students, are established. The issue of applying data on students' metacognition in the practice of a teacher is discussed.

The questionnaire was translated into Russian and adapted by Karpov and Skitayeva (2005). The questionnaire contains 52 statements, for example: "I set specific goals for myself before starting the task." Usually the result for each item is estimated from 0 (completely disagree) to 5 (absolutely agree) points. We used a version of the questionnaire in which the answer can only be "truth" ("rather agree", 1 point) or "lie" ("rather disagree", 0 points), which is published on the website of the Canadian university Vancouver Island (Metacognitive awareness Inventory // Site of Vancouver Island University).

The choice of this assessment method is determined as follows:

- the use of the questionnaire does not require a significant investment of time, it is easy to use in terms of teaching practice;

- the questionnaire is generally accepted, it is widely used by both foreign and domestic researchers;

- the questionnaire allows to measure both components of metacognition - 17 questions fall into the category of metacognitive knowledge, 35 questions fall into the category of metacognitive processes.

Results

The average indicator of metacognitive involvement in activities was 37.2 points out of 52, i.e. 72 percent (chart 1). The minimum value of the indicator is 5 points (10%), the maximum is 52 points (100%). More than half of the students (98) were above average.
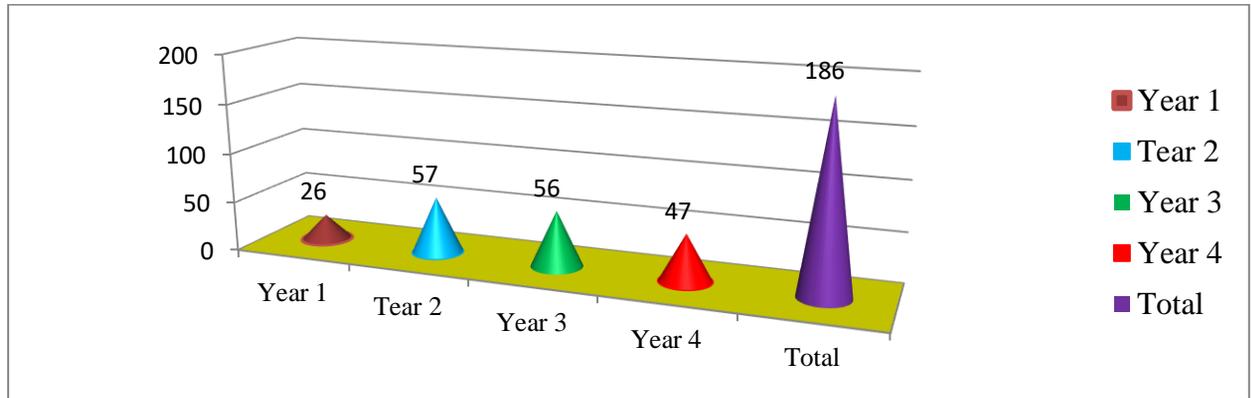
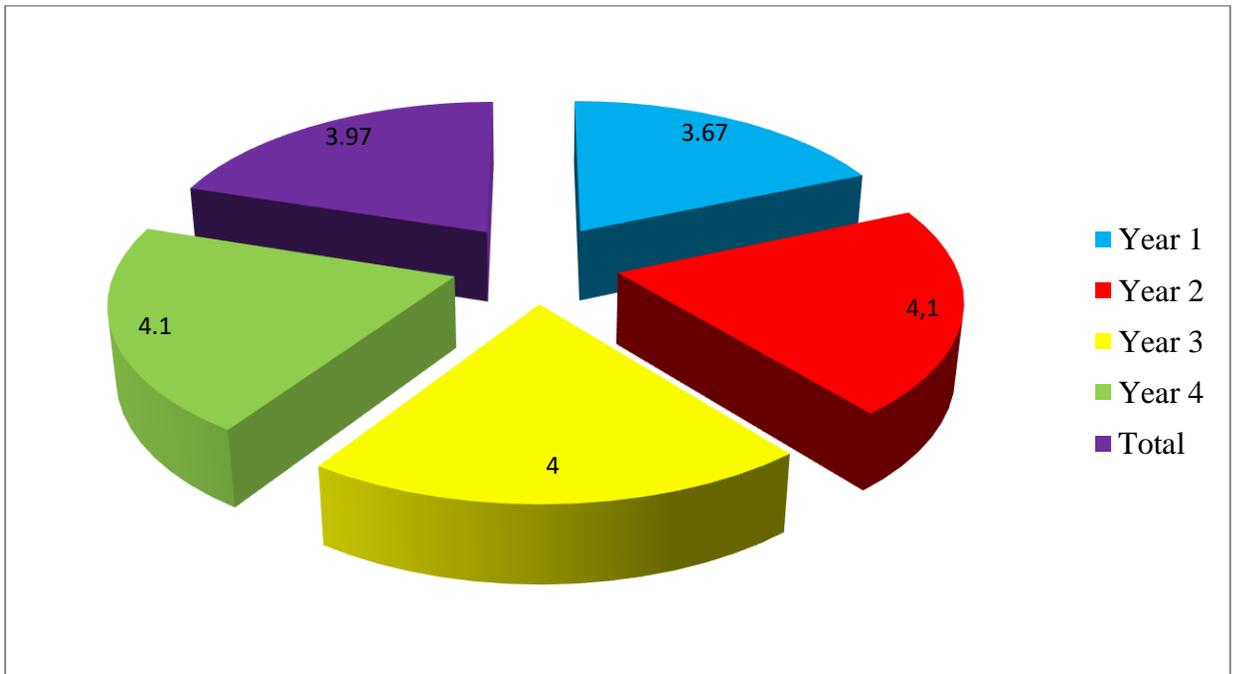Chart 1. Survey results

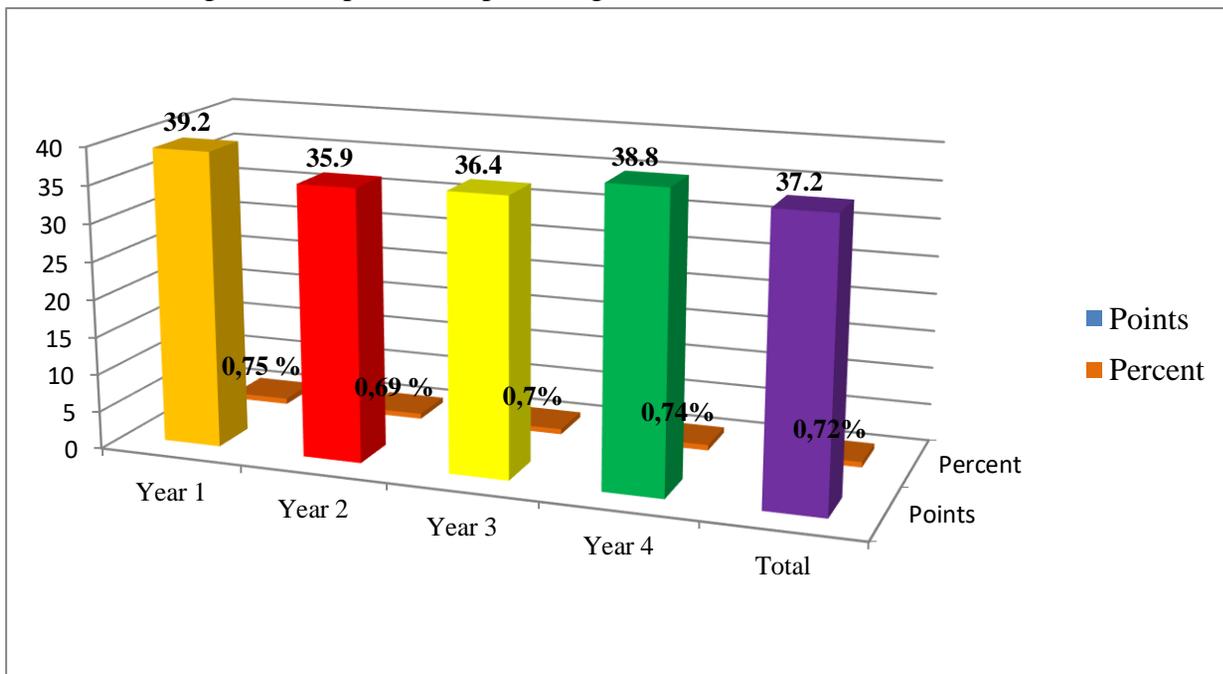Chart 2. GPA of end-of-semester exams

Chart 3. Average MAI in points and percentages

The indicator of metacognitive involvement in activities slightly increases from Year 1 to Year 4. The highest value of the indicator is observed in Year 1. In our opinion, this is due to the somewhat high self-esteem of students, which confirms the low average grade point. The division of students into four groups with different levels of metacognitive involvement in activities - "very low", "low", "medium" "high" (figure 4) showed that only 1% of students have a very low and low level of metacognitive involvement in activities.

Chart 4. Groups of students with different levels of metacognitive inclusion in activities
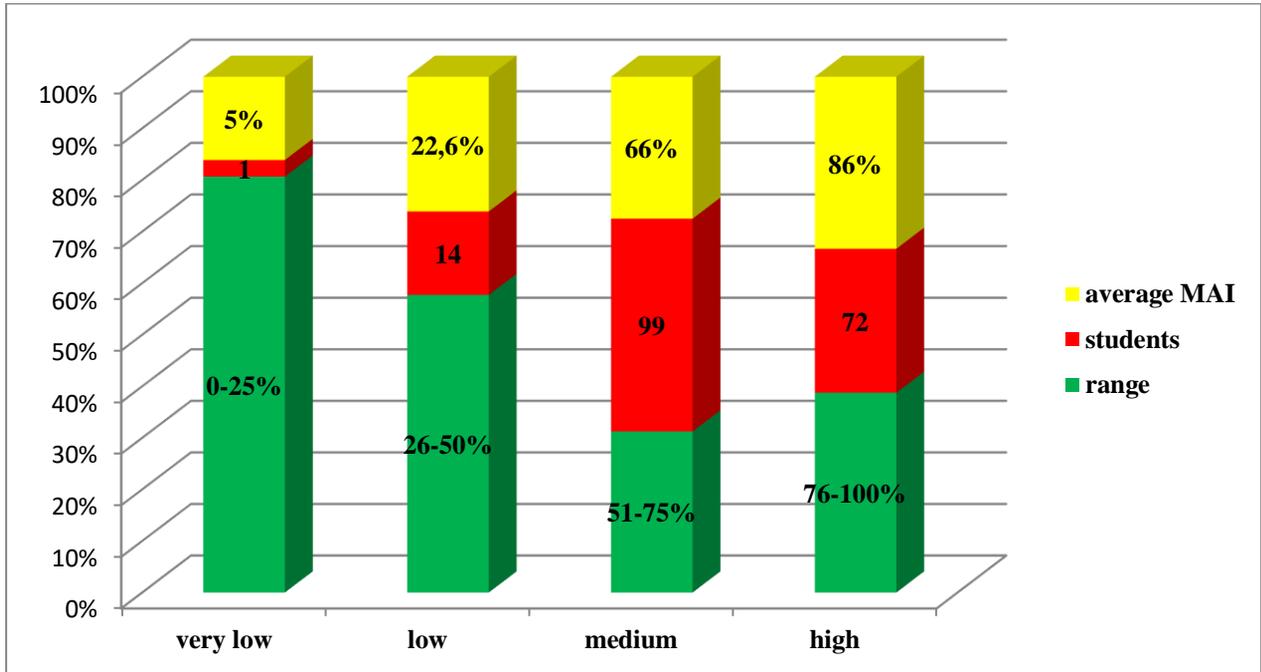
In all four Years, the average proportion of positive responses of students ("truth", "rather agree") in the category of metacognitive knowledge is slightly higher than the proportion of positive answers in the category of metacognitive processes. For each Year separately and for all courses as a whole, the average proportion of positive responses for each approval of the questionnaire was calculated.

In our case, a similar picture is observed on all Years: the average shares of positive answers to almost all questions take on fairly close values.

These are four statements that less than 50 percent of students generally agreed with:

1) "I raise questions on the topic before proceeding with the study of new material, or finding solution for the problem" - number 22;

2) "In order to better understand the material being studied, I make drawings, build charts, diagrams" - number 37;

3) "After the problem is solved, I ask myself if I have considered all possible cases" - number 38;

4) "When I finish my studies, I ask myself if I learned as much as I could" - number 50.

Among the questions with an average share of positive answers, slightly exceeding 50 percent, we can single out the statement number 17 - "I can remember the information well".

Interestingly, the proportion of positive answers to this question consistently decreases from 65 percent in Year 1 to 40 percent in Year 4.

The question of why students have problems remembering information requires further study.

According to the results of the survey, the average level of metacognitive involvement in activities was 72 percent.

Discussion Questions

There is absolutely no definite answer to the question: what level of metacognitive involvement in activities can be considered necessary and sufficient for successful learning? Most often, researchers talk about the need to increase the level of metacognitive involvement in activities, but always, the higher the better.

Thus, two main ways of organization of educational activities on the formation of metacognitive knowledge and skills can be recommended:

1. Individual work with students who have a low level of metacognitive involvement in activities. The MAI questionnaire allows not only to identify students with low rates, but also to determine which metacognitive knowledge and processes are not used by them. Perhaps some of them are critical to mastering a particular discipline.

2. Explicit formation in the framework of lectures and practical exercises based on the subject content of the metacognitive knowledge and skills that, according to the results of the generalization of indicators of metacognitive involvement in the activities, are used by students most rarely.

Conclusion

Our study of metacognitive involvement in the activities of students showed a fairly good picture, less than 1% of students have a low level of metacognitive involvement in activities.

Measuring and analyzing metacognitive involvement in activities can be a tool for teachers that will take into account the individual characteristics of students, the

generalized characteristics of study groups and appropriately construct their activities to improve the metacognitive knowledge and skills of students. This is especially important in conditions of reduced classroom hours in favor of independent work of students, in large study groups or distance learning, when the teacher's direct contact with the student is limited.

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