

## MODELLING OF INFORMATION SUPPORT FOR THE DEVELOPMENT OF CREATIVE ABILITIES OF STUDENTS IN THE CONTEXT OF PHILOSOPHY OF EDUCATION

### Abstract

Creativity is defined as a general ability that combines general intelligence, personality traits, and the ability to think productively. The creativity of psychology students is a mandatory characteristic of a holistic personality because of the appropriate psychological and pedagogical conditions and the high level of formation of his professional and personal qualities. The purpose of the article is to systematise the process of increasing the creativity of psychology students with the help of mechanisms and elements of the functional model of IDEF0 in the context of the philosophy of education. It allows us to improve the process of developing students' creativity by using the modern management model IDEF0, which is unique and interesting. For the specification of the methodology for increasing creativity among psychology students, it has been chosen the methodology of functional modelling and a graphical description of processes (IDEF0). The article considers the specifics of students of higher educational institutions and psychologists in particular. In the future, the IDEF0 model should be applied to other students in the context of the philosophy of education.

*Keywords:* psychology student, creativity, creative potential, model IDEF0, philosophy of education.

### Introduction

Creativity is based on the ability that reflects the individual's capabilities to create new concepts and form new skills, i.e. ability to be creative. This concept is studied inextricably from the intellect and is associated with the creative achievements of the individual.

Creativity is considered a unique phenomenon, the intellectual-heuristic quality of the personality and the process and complex of intellectual and personal characteristics of the individual, manifested in productive activities. Creativity in the context of development management is provided by a prime motivation, a conscious and

shown interest, an active and independent position, healthy rivalry, hard work, and perseverance. It considers mobilization, informational, developing, orientational skills, the ability to generate ideas, technical ingenuity.

Building creative potential is associated with forming a search apparatus and creating an object to satisfy the general human need. As a component, creativity is part of its self-regulation system. In this regard, human creativity is understood as such an integral property of a personality that arises as an internal premise of its creative activity. Creativity can be interpreted as a synonym for innovation; that is, it can be described by a concept that determines a person's ability to

create new, spiritual and material, elements of economic development, an important factor in creating a knowledge society, and therefore an essential attribute of professional competence. The development of professional creativity of students involves a maximum orientation towards creativity in educational activities, the development of their own creative experience. Students need to develop the ability to clearly realize the goals and objectives of their profession, understand the essence of professional functions, identify important personal qualities and the ways of their formation, diagnose their ability to study and professional activities, and choose self-improvement strategies.

From this, it is clear that creativity in the profession is an integral component of professional activity, which characterizes as the ability of a professional to transform the experience of educational and professional activity, during which he masters the ability to reproduce and creatively change the products of labour, becoming an active subject, responsible person, and creative personality.

At the present stage of human development, highly professional creative specialists are needed because of rapid changes in the socio-economic sphere of the country's public life. The question arises of a fundamental change in the system of training future professionals, which should focus on the challenges of everyday life and provide for their productive solution in the future. The problem of organizing educational activities of students is very urgent since the leading goal of the modern system of higher education is the formation of a highly qualified, competitive specialist who can maximize the benefits of society to realize his creative potential, effectively and humanely solve diverse life problems that are becoming increasingly complex and unpredictable in the context of the philosophy of education.

This concerns the social and humanitarian specialists who are responsible for the favourable psychological climate in society. At the same

time, psychologists will certainly be involved in solving precisely these complex problems to provide appropriate assistance to various segments of the population and timely prevent the predicted deviations in the psychosocial development of people of different sex and age. Psychological specialists have significantly increased requirements for their preparedness for professional practice in the new conditions and the ability for professional creative performance.

The progressiveness of social development in many respects depends on the ability of the educational sphere to reproduce the intellectual potential, high-quality labour force. The modern higher education system covers a significant segment of society; large human, financial and material and technical resources are involved in its sphere.

This system today is an economic complex. The activities and development of these require the widespread use of scientific knowledge, the introduction of scientifically grounded management methods, the attraction of significant financial and material resources, and the activation of human capital. The relevance of the problem of creative development of a student's personality at the stage of education in higher education institutions is now recognized so much that it is prevailing in all state documents on education, speeches of persons who are directly related to the development of the national education system. But there are many difficulties in solving this problem.

First of all, this concerns the lack of a clear understanding at the level of an individual educational institution about the methodology of the developed creative potential of the psychology student. This is because the basic concepts of creativity are presented as vague theoretical dogmas, which in their essence comprise populist statements, a set of banal and ineffective psychological advice (source needed). Those individuals whose task is to increase the professional and personal potential of the psychology student, particularly creative, do not have the precise steps to

improve it in their arsenal.

Students' creative activity is one of the main factors in the effectiveness of the educational process, which is aimed at training specialists, the formation and development of a professional personality in the context of development management. The traditional higher education system is focused on the development of convergent thinking, that is, on the formation of only one position in the assessment of phenomena or facts, while modern society requires a radical revision of the educational model of the existing higher education system. That is why training specialists' primary task is to develop the professional creative abilities of psychology students on new conceptual foundations.

For the development of creativity of students, an unregulated environment with democratic relations and imitation of a creative personality are needed. Such development takes place under the influence of the microenvironment by forming a system of motives and personal properties (independence, motivation for self-actualization).

In this regard, a fundamental transformation is required by the training system of professional psychologists. It provides the widespread use of innovative, productive forms, methods, and means of developing their professional creative abilities for realizing creative potential both in the study and further working life.

Increasing the creativity of psychology students has been considered for many years as part of a general scientific search for ways to increase the creativity of students of higher educational institutions in the context of the philosophy of education.

#### Analysis of Recent Studies and Publications

The problems of creativity and ways to increase its level among students began to be considered for a long time. In particular, Weisberg (1988), in his work, revealed the basic principles and paradigms of creativity in people, including

those who study at higher educational institutions. Thus, his work paved the way for other scientists to consider methods to increase the level of this indicator. As a successful method for improving creativity among children in schools and students at universities, Renzulli (1992) proposed a methodology for stimulating creativity, according to which a student can successfully and periodically increase their level of creativity if certain incentives and pre-requisites for success act on it (Barab & Roth, 2006).

Dickhut (2003) and Goodman (2014) facilitated the ways and methods of enhancing students' creative abilities by introducing the game and cognitive-semantic techniques in the learning process.

In their work, Zhang and Sternberg (2009) examined the major ways and styles of enhancing students' creativity through the use of constant paradigms, the process of increasing creativity, the key participants of which were teachers and students. The teacher was assigned the central role of the catalyst for the creativity of the student.

Nevertheless, over time, this direction became so vast that scientists concluded that ways to increase creativity should be explored in the context of taking into account the characteristics of the future profession.

For example, Shandruk (2020) examined ways to increase creativity, specifically among students in the psychological sphere. In particular, his work presents improved techniques for enhancing creativity for students of general profile.

A supporter of the competency-based approach to enhancing creativity among students of a psychological profile should be considered Bermus (2018) and Maley, Peachey (2016). Today, their works are used as a methodological basis on the territory of higher educational institutions in Eastern Europe.

In their research, Panok (2019) and Shevchenko (2019) created a methodology for enhancing the creativity of psychology students, basing

on principles and paradigms on the upcoming features of their profession, particularly in the field of psychological analysis and counselling. Such a specification brought their work to a new level because using methods, which students could train their own creativity and prepare themselves for future work.

Chepeleva (2019) and Barnett (2011), and Kondakov (2020) investigated the role of faculty in enhancing the creativity of psychology students. According to their works, this element is crucial in achieving success in this process.

Given all the previously presented work, today, the issue of enhancing the creativity of psychology students is considered in many scientific circles. However, despite such a large number of scientific achievements, in each of them, in our opinion, there are still gaps in the field of specification of a methodology for enhancing creativity among psychology students. Thus, it would be expedient to refine and make the methodology of increasing creativity among psychology students.

The purpose of the article is to systematise the process of increasing the creativity of psychology students with the help of mechanisms and elements of the functional model of IDEFO in the context of the philosophy of education, gives us the opportunity to improve the process of developing students' creativity.

### Methodology

The formation of professional creativity among future specialists is an extremely important component of the process of becoming a holistic personality, ready for professional creative activity. Creativity characterizes the unity of perception, experiences and actions that are accomplished in an original way, arise as an integral ability to find new connections and become aware of new relationships, a tendency to work and learn about innovations, leads to new insights, to the transformation of experience into new forms and to the expression of unprec-

edented meanings. Considering what has been said, the common denominator or determining principle of true professional skill of a specialist in the psychological profile is a full-fledged, creatively started, social activity that makes professional development differently and is based on the complementarity of the four components:

- fundamental knowledge of university graduates in the field of theoretical and applied sociology, general, social and age psychology, theory, methodology and technologies of social work, the foundations of building a civil society and a democratic state;
- well-developed personality standards, formed skills of professional activity, methodically characterize it as a competent specialist in a specific direction of social professionalism, which cannot effectively solve everyday tasks of the business environment, but also to find optimal solutions to practical problem situations and personal problems;
- acquired values and psycho-spiritual forms or existential embodiment of a spiritualized human life (holiness, freedom, faith, hope, love, creativity, responsibility, conscience, virtue, truthfulness, tolerance, empathy, etc.).

A prerequisite for creating psycho-didactic conditions for the development of professional creative abilities of future practical psychologists is the development of such a model that would reflect the system-forming set of causes and circumstances in creative knowledge and thus form the personality of a psychologist.

Moreover, modelling (in our case, the process of increasing creativity) is necessary in order to:

- understand how a specific object is built - what is its structure, basic properties, laws of development and interaction with the environment;
- learn how to manage the development of a process and identify the best ways to manage it under given conditions and conditions (optimization);
- to predict the direct and indirect consequences of implementing the given methods and

- forms of interaction on the object or process;
- make changes and track the results.

To specify the methodology for increasing creativity among psychology students, we have chosen the methodology of functional modelling and a graphical description of processes (IDEF0). The reason for choosing this model was that during its construction, an emphasis was placed on the step-by-step model elements. In our opinion, just such a model can become the best visual reflection of the methodology of increasing the creativity of psychology students.

The basic structure of the IDEF0 model is a dataset, which comprises the following elements (Kryshtanovych, Kryshtanovych, Stechkevych, Ivanytska, & Huzii, 2020):

1. The major goal of modeling - to form a functional model IDEF0 for visual modeling and algorithmization of the process of increasing the creativity of psychology students.
2. The target audience of the model - psychology students, teachers, and staff of a higher educational institution that is involved in the educational process.

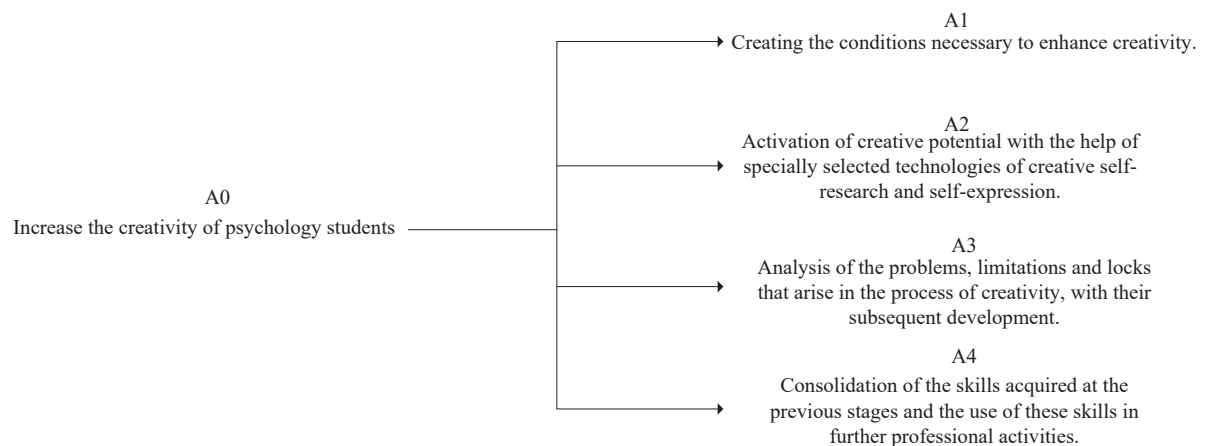
3. Context of the functional model - a list of functions and diagram objects of the functional model IDEF0.

4. Modeling technology - methodology of functional modelling IDEF0.

5. Technological support of simulation-program for the formation of vector diagrams.

Implementing the methodology of enhancing the creativity of psychology students will comprise a certain set of stages. These steps will be further subdivided into subprocesses that will be guided by specific directives that are formed according to the stated purpose - to increase the creativity of psychology students.

To begin with, for the sake of initial detailing of this goal, we need to form a functional diagram of the highest level A-0, which will be primary in the process of building the functional model IDEF0. Thus in *Figure 1*, we have systematized the main and uppermost components of the system for increasing the creativity of psychology students in the context of the philosophy of education.



*Figure 1.* Main and uppermost components of the system for increasing the creativity of psychology students in the context of the philosophy of education (*development by authors*).

The scheme that we have developed makes it possible to see a list of the primary stages in increasing the creativity of psychology students. Such a simplified model, using IDEF0

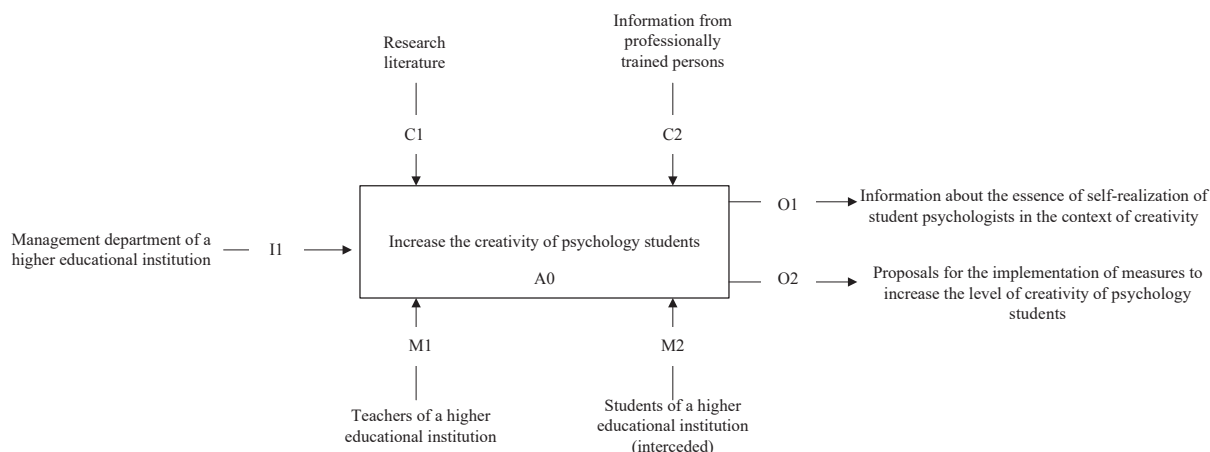
functional mechanisms, will be further expanded and detailed to understand the process of increasing psychology students' creativity fully.

## Results and Analysis

It is worth noting that a feature of the structural blocks of the IDEF0 model is that each block implements the process of converting inputs to outputs using certain mechanisms and resources. Thus, having depicted the main goal of our research in the form of A0, it would be advisable to depict the main initial elements that are necessary to achieve the goal in the context of development management (*Figure 2*).

Unlike a goal tree or other functional model-

ling methodologies, our chosen methodology IDEF0 better demonstrates how to achieve the goal set and what result it will lead. This is achieved by reflecting the underlying inputs, mechanisms and models that drive the outcome. Such visualization is not the only advantage, and another advantage is that it allows visualizing each stage of achieving the task (A0) and detail these stages. Therefore, we decided to use the IDEF0 model; even though it is used less often than other scientific research models, it has a significant list of advantages.



*Figure 2.* Hierarchical structure of functional model IDEF0 of increasing the creativity of psychology students in the context of the philosophy of education (*developed by authors*)

For a better understanding of the model, it would be desirable to clarify all the above elements of the IDEF0 model we built in more detail.

“Input” elements are marked with the symbol “I” and, in our case, are summarized as inventory and logistics management, which is used in the implementation of the process of increasing the creativity of psychology students. This group includes both those resources that exist in a higher educational institution permanently and the new inventory and logistics management necessary for the implementation of innovative activities.

“Control” objects were designated by us with the symbol “C”:

➤ C1 - research literature. This control element

forms the totality of information that can be used in the implementation of the process of increasing the creativity of psychology students.

➤ C2 - information from professionally trained persons can include information that is provided from persons who have undergone certified training. The information submitted from them differs from the research literature in that it is presented in the most straightforward and understandable form for recipients.

“Mechanism” objects were designated by us with the symbol “M”:

➤ M1 - teachers of a higher educational institution. These persons are one of the main participants in the educational process, and they are entrusted with the role of both theoretical

and personal development of students.

- M2 – students of a higher educational institution. Since creativity is a reflection of the comprehensive development of the individual, the ability to form the powerful and mutually beneficial interconnection between direct participants and colleagues is an essential element. Given this, the indirect influence of students on their colleagues is a powerful mechanism for increasing creativity.

The final elements are the set of outputs that are achieved with the correct implementation of all the above elements of the functional model IDEF0 and are indicated by the symbol “O”:

- O1 – information about the essence of self-realization of student psychologists in the context of creativity. This information is gen-

erated after all the proposed measures have been implemented and the opportunity is formed to evaluate the results.

- O2 – proposals for the implementation of measures to increase the level of creativity of student psychologists. In the end, we get the most optimal solution according to the methodology of implementing the process of increasing the creativity of psychology students.

Having presented all the elements of the IDEF0 model we have constructed, it would be desirable to go over the specifications and details of the chosen stages. To do this, we built decompositions of the first level of the process of increasing the creativity of psychology students in the context of the philosophy of education (Figure 3).

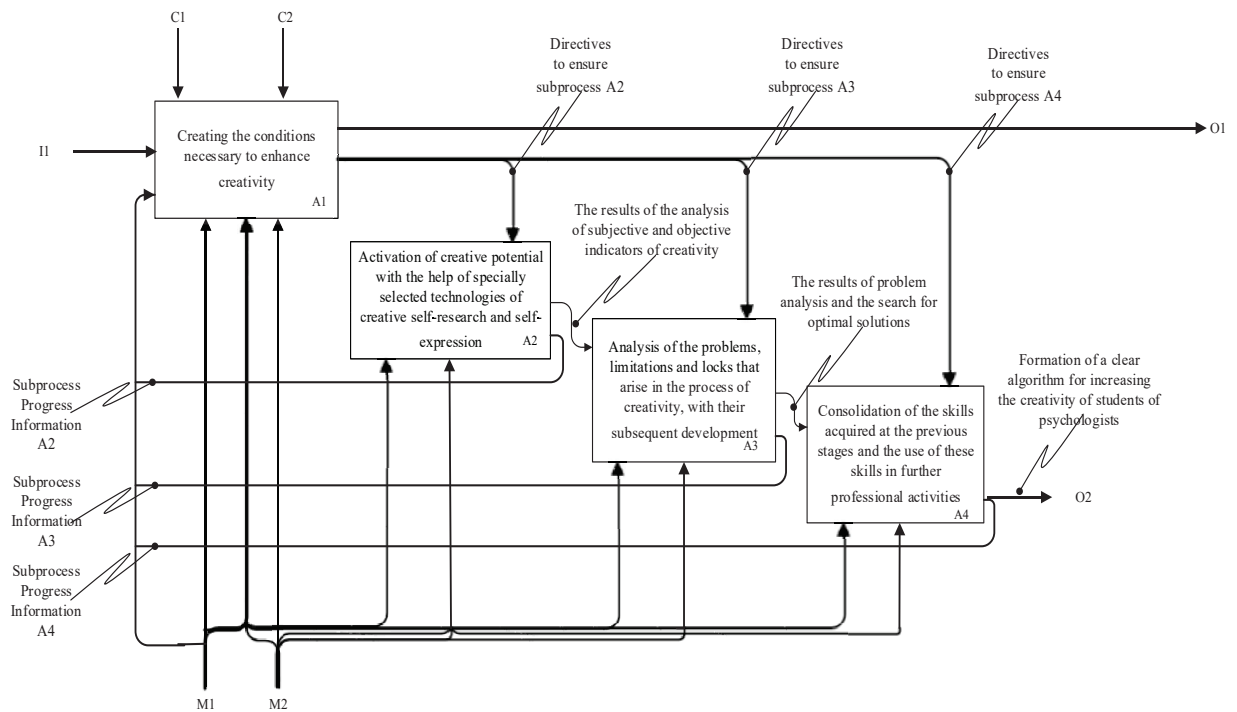


Figure 3. Decompositions of the first level of functional model IDEF0 of increasing the creativity of psychology students in the context of philosophy of education (developed by authors)

Considering the decomposition presented above, it would be advisable to explain in more detail the contents of each of the stages:

- A1 - Creating the conditions necessary to enhance creativity. The creation of these conditions implies the presence of an atmosphere

of acceptance and trust in the training group. In the absence of such an atmosphere, it is necessary to create conditions conducive to its occurrence. At this stage, the use of technologies aimed at group interaction is recommended. It should be noted that it is not the end

result or the product of creative expression that is of particular value but the spectrum of emotions that accompanied the creation of this product in the process of completing a task or exercise.

- A2 – Activation of creative potential with the help of specially selected technologies of creative self-research and self-expression. Work at this stage requires a certain level of basic mutual trust among the group members and between the group and the leader. If the previous stage of the work was successful, the level of trust is generated automatically. The component of creative expression in the learning process is associated with the uniqueness and originality of each student at any given time. Viewed in this aspect, the creative component becomes a development path without fear of making a mistake in any new action. The process of creativity also becomes a way of self-knowledge and expanding contact with others and oneself, which results in an increase in the student's personality resource and a gradual expansion of the degree of freedom of application of practical skills acquired in the classroom.
- A3 – Analysis of the problems, limitations and locks that arise in the process of creativity, with their subsequent development. This stage is carried out using technologies and techniques of role modelling. These technologies allow working with students softly and unobtrusively. Most of the locks are usually associated with topics that are relevant at a given time. In most cases, the occurrence of locks can be avoided in situations where the group has an atmosphere of reliability and security. It is worth noting to the students that they determine the content of the workshops and, therefore, depends on the completeness of the expression of their requests.
- A4 - Consolidation of the skills gained at the previous stages and the use of these skills in further professional activities. It is advisable

to carry out this work using visualization and modelling techniques. These techniques allow you to design the skills gained in the learning process, with the aim of their fruitful use in the future. This stage forms a rational idea for the teacher about the dynamics of increasing creativity in the group and allows making the necessary changes.

Separately, it is necessary to explain the intermediate inputs, outputs, control mechanisms, which are depicted in the form of arrows on the constructed functional model IDEF0. Intermediate inputs (control) and outputs comprise the following elements:

- directives for process management A2, A3, A4 - these result from decision-making by the entities responsible for monitoring and control of this process;
- the output “Information on the progress of the process A2, A3, A4” - this is the information that the subjects responsible for monitoring and control receive from each subprocesses an increase in the creativity of psychology students. Based on this information, decisions are made on completing the subprocesses and the transition to the next.

For the following specification and a more visual explanation of the process of increasing creativity among student psychologists, we built a second-level decomposition of the functional model IDEF0 (*Figure 4*). This decomposition explains the process of implementing one of the stages of the general process of increasing the creativity of psychology students. For brevity, we have described stage A2 (Activation of creative potential with the help of specially selected technologies of creative self-research and self-expression), but it is worth noting that this decomposition of the second level of the functional model IDEF0 can apply to any of the stages. The specificity of the functional model IDEF0 is that it is always possible to form decompositions of the following levels, which will make it possible to explain in more detail the imple-



mentation of the process of increasing the creativity of psychology students in the context of

the philosophy of education.

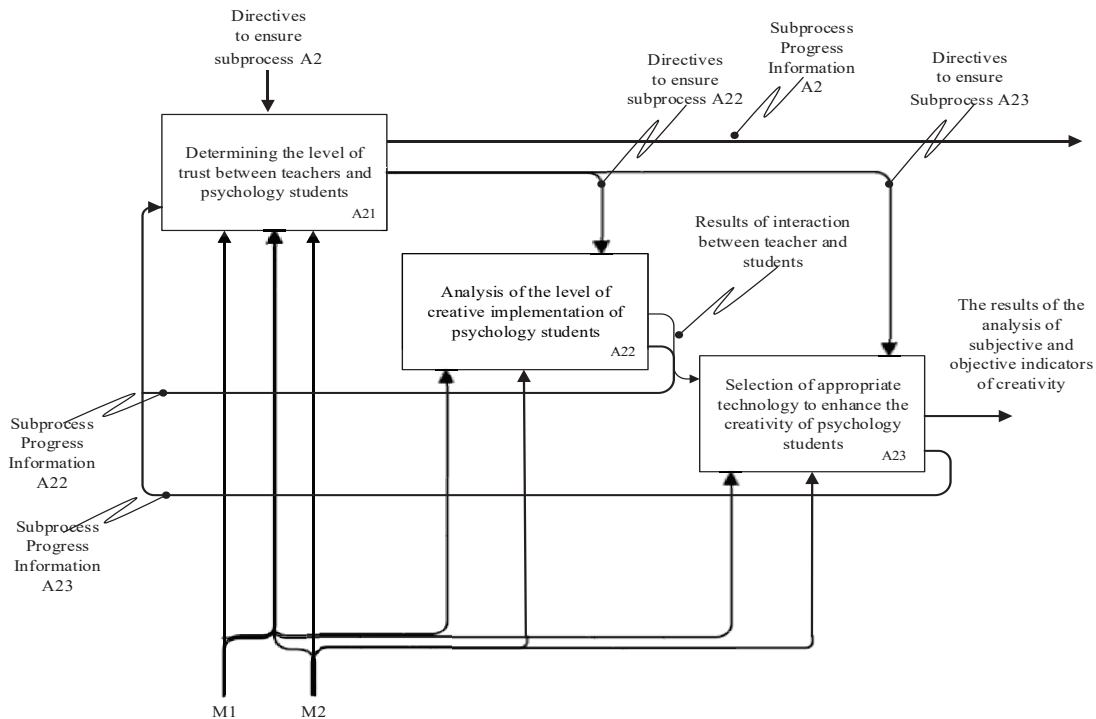


Figure 4. Decompositions of the second level of functional model IDEF0 of increasing the creativity of psychology students in the context of the philosophy of education (developed by authors)

Here, the elements of the decomposition will be interpreted as follows:

- A21 - Determining the level of trust between teachers and psychology students. Trust is an important and determining element in the formation of a favourable learning environment among psychology students. Only if there is a certain level of trust between the student and the teacher, it becomes possible to increase the creativity of student psychologists.
- A22 - Analysis of the level of creative implementation of psychology students. The analysis of the initial and intermediate level of creativity is carried out using specific techniques of communication, modelling and other technologies. This will allow correctly and clearly planning the following strategy and tactics.

- A23 - Selection of appropriate technology to enhance the creativity of psychology students. Taking into account the stages and having passed the appropriate directives for control and monitoring, teachers have the opportunity to choose the most optimal methodology for increasing the creativity of psychology students.

### Discussions

The originality of our research lies in the fact that we used the modelling methodology using IDEF0 to develop the creativity of university students. Thus, using the IDEF0 functional model, we have clearly demonstrated all the functional levels and structural elements of the process of enhancing the creativity of psychology

students in the context of the philosophy of education.

In modern scientific research, one can find a large number of works devoted to the problems of creativity for students (Langebaek, Tangaard, Tolf, & Berendt, 2020). For example, Entrialgo and Iglesias (2020) examined how vital the role of creativity is for entrepreneurship among students. Ling and Loh (2020) examined how creativity and critical thinking work for students in private schools in a particular country.

Weisberg (1988) devoted a significant amount of his work to solve the problems of developing students' creativity; however, on a different basis from his research, we propose to visualize our approach.

Mayer (2006) strove to develop students' creativity and solve this problem through the use of subject knowledge. However, we believe that for the development of creativity, only subject knowledge should be used, and each stage can distinguish and include initial knowledge that is individual in nature.

Since, for an illustrative practical example, we have selected psychology students of higher educational institutions for stagnating our modeling methodology, we note that the development of creativity in psychologists is one of the priority tasks. So, Panok (2019) applied a conceptual approach to this problem, but we believe we should try to apply a visual-functional approach and emphasise originality in our study.

Function Modeling is a functional modelling methodology. With the help of the visual graphic language IDEF0, the system under study appears to developers and analysts in the form of a set of interrelated functions (functional blocks - in terms of IDEF0). Typically, IDEF0 modelling is the first step in learning about any system. For our system of development of creativity of students of higher educational institutions, it is well suited. This is why we are compared to other similar studies.

We believe that the very process of developing creativity among students of higher educa-

tional institutions should include such a set of stages that will directly transform all input material and information flows into flows that will have completely different properties at the output. So the process of developing students' creativity will occur according to the directives for managing its subprocesses. Such directives are formed on the basis of the main goal of educational institutions. To implement such a task, we, different from other studies in our research, use the methodology of functional modelling and graphical description of processes (IDEF0). Its feature, among other models, is the emphasis on objects, which makes it possibly better to understand the objectivity of the field of study. It should be noted that the objects of functional modelling and structural analysis according to the IDEF0 methodology are just organizational and pedagogical systems.

Thanks to the decomposition of the first and second levels of the functional model IDEF0 of increasing the creativity of psychology students in the context of development management, we achieved our goal and were able to reflect how the process of developing the creativity of students of higher educational institutions can be developed using the example of future psychology students. This will only make it possible to strengthen the already existing research base in the field of solving the problem of unlocking the student's potential, his innovative abilities and creativity, in particular in the context of the philosophy of education.

## Conclusion

Creativity as a value-personal category is an essential reserve of self-actualization of the personality, and today, to a large extent, it acts as a kind of mechanism for adapting the student's personality to social changes. In order to internally correspond to modern reality, a specialist psychologist must not only adapt to a new situation but also be able to change it, changing and developing at the same time.

The creativity of psychology students is a mandatory characteristic of a holistic personality due to the appropriate psychological and pedagogical conditions and the high level of formation of his professional and personal qualities. We have determined that today there are a vast number of scientific works relating to both the process of increasing creativity in general students and exclusively among psychology students. Nevertheless, despite the tremendous scientific achievements, there is no clear methodology for introducing measures to increase creativity among psychology students today. Given this, we proposed using a functional model as a permanent methodology, clearly demonstrating all the elements of this process, the interaction between them and the most optimal way to achieve the final result. The advantages of this model are the fact that at the planning stage, the executive structure can clearly form and evaluate the resources and mechanisms necessary to fulfil the goal. In our case, it will be defined as measures to increase the creativity of psychology students.

For better detailing and visualization and the process of increasing the creativity of students of psychologists, we used the IDEF0 functional model, with which it became possible to depict all the structural and functional elements of this process. Also, the peculiarity of using this model is the ability to build decompositions of various levels, which detail a separate period of the process of increasing the creativity of psychology students.

Our article allows us to improve the process of developing students' creativity due to the use of the modern management model IDEF0, which is unique and exciting.

The article is not without limitations, and it should be noted that the article considers the specifics of students of higher educational institutions and psychologists in particular. In the future, the IDEF0 model should apply to other students within the philosophy of education.

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