

## Referring to the issue of the improvement of students' educational process efficiency on the basis of informational and projective activity

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### ABSTRACT

The article regards an issue of informational and projective activity appliance from the perspective of educational theory, videlicet the necessity of finding such a knowledge structure which would allow the students to master the educational material by the most rational means and would contribute to improvement of subject knowledge. Pursuit and building up the educational knowledge structure is connected with allocation of its substance and with rejection of secondary, complementary and duplicating information. The developed and tested algorithm of studying educational and scientific texts, which is considered to be the most efficient and advisable for applying in the cases requiring increasing of the volume of the information mastered per time unit, is represented as the mechanism of this issue solution.

### KEYWORDS

Informational and project activity, folding and development of information, roll out-roll in of information, educational and scientific texts studying algorithm.

### ARTICLE HISTORY

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## Introduction

Quantitative and qualitative changes of information lead to the expansion of the types of educational activity diapason as well as to the improvement of widely-recognized organizational forms, methods and approaches of the educational process. Personal and activity educational paradigm requires the substantial alteration of pedagogic environment as well as a student's capability to project his or her own activity and to develop the skills of independently acquiring and processing knowledge (Altukhova, 2010; Guzenko, 2009;

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Kolesnikova & Gorchakova-Sibirskaya 2007; Lavrentyev G.V., Lavrentyeva N.B. & Neudakhina, 2004; Leontyev, 2004).

The modern pedagogical science has accumulated the rich experience referring to the efficiency increase of training the students (S.I. Archangelsky, Y.K. Babansky, V.A. Slastenin and others). Nowadays, this issue is being actively studied in the context of the informational and projective activity. The general aspects of informational and projective activity are being reviewed in the works of V.A.Koutyrev (informational and projective model of the world), S.P. GavriloVA (informational and projective thinking), N.P. Petrova (informational and projective culture) which define the initial informational and projective activity concept, reveal its substance and explicit its general principles.

It is necessary to point out, that, focusing on the value of fundamental researches, the above-mentioned works have not fully defined the substantial, procedural and objective characteristics depicting the sense of the "informational and projective activity" concept; the means of its implementation into the educational process have also not been completely worked out. It is caused by the fact that under the current conditions of pedagogics there have not been completely solved the issues of systematic using of advantage of informational and projective activity aimed at the educational efficiency improvement (Kryulova 2012).

### ***The Research Hypothesis***

According to the above-mentioned items, there has been proposed a hypothesis lies in the following assumption: informational and projective activity shall increase the efficiency of educational process in case if the algorithm of educational and scientific texts researching, aimed at the rational mastering of scientific texts, is applied as a mechanism of informational and projective activity implementation.

### **Methodological Framework**

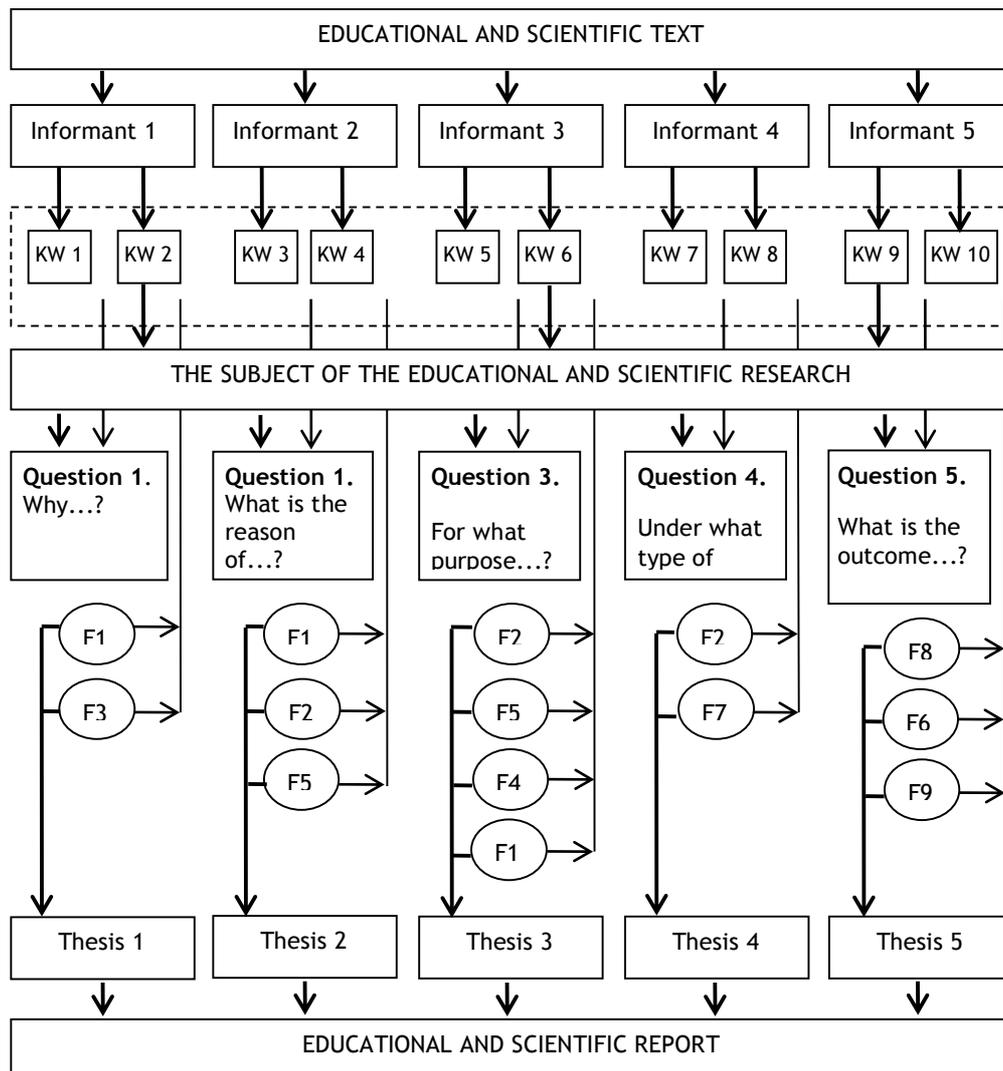
In the present research the system the following set of self-checking and supplementing methods was used:

- theoretical methods: studying the philosophical and psycholog-pedagogical literature related to the object of the research; systematization and summarizing of the pedagogical experience, prognostication, modeling;
- empirical methods: direct and indirect observation, questionnaire surveys, pedagogical experiment;
- statistical methods referring to the data processing.

### **Results**

There has been worked out the mechanism of informational and projective activity implementation within the frameworks of up-to-date pedagogical views about increasing the efficiency of students' training and rational means of scientific and educational information structuring (Altukhova 2016/2016; Guzenko, 2009; Sokhor, 1974).

The algorithm of educational and scientific texts researching, presented herein, consists of the following blocks: educational and scientific text, informants, key concepts, educational and scientific research subject, diagnostic items, frames, theses, educational and scientific report (Figure 1).



**Figure 1.** Algorithm of the educational and scientific texts research

Block 1. Educational and scientific text represented the material on the educational subject (text of a lecture or a study guide).

Block 2. Informants are the parts of the text with similar logical meaning. The process of exposure of informants has been defined as "the text tracing" which defines the principal idea of the text, is effected by a student on his own, and promotes developing of "informational and projecting interaction" between the researcher and the text. The sufficient quantity of the informants the text is between 6 and 8 pieces.

Block 3. Key concepts of a scientific and educational text (keywords) are to be identified through the informants text tracing process and reflect the semantic meaning of the analyzed text.

Block 4. The subject of an educational and scientific research is to be identified upon the basis of personality-centered position of a student.



Block 5. Diagnostic questions with typical openings, such as: "Why...", "What is the reason of...", "For what purpose...", "Under what conditions...", "What is the outcome..." (Question 1 - Question 5) are to be asked to the educational and scientific text in order to build up the frame plan. The typical opening of the 1st question ("Why") reflects the methodological meaning of the educational and scientific information's transformation. The typical opening of the 2nd question ("What is the reason of") reflects the psychological and pedagogical direction and sense of the applied educational and scientific actions. The 3rd question ("For what purpose") reveals the purpose of the applied educational and scientific actions. The 4th question ("Under what conditions") reflects the focus on efficient study of the educational and scientific subject through identification of the research ways and methods of the subject investigation. The 5th question ("What is the outcome") reflects the ultimate outcome.

Block 6. The frames (F1 - F10) are a verbal image (general notions, definitions) which contains the answer to the question posed.

The frame concept has been created by M. Minsky, an American scientist specialized in sphere of artificial intelligence, who assumed that the processes of thinking are rooted in multiply structured data stored in human's memory (Minsky, 1974).

Block 7. The theses are the developed answers according to the frame plan, which reflect the peculiarities of the educational and scientific text being analyzed. Theses are the developed statement of the informational and projecting activity frame plan content ("brain-storming") aimed at the search of confirmations, assumptions for solution of the issues being discussed.

Block 8. Educational and scientific statement is the developed answer referring to the issues of diagnostics on the basis of already formulated theses, which allow to state the educational and scientific materials grounded upon the personal-oriented point of view related to the studied issue.

Thus, the informational and projective activity, grounded upon the researching algorithm of educational and scientific texts investigating, is based on the performance of sequence of the following steps (Altukhova 2010/ 2016; Altukhova & Smirnova 2016):

Step 1 - Exposure of the principal elements of an educational and scientific text through its division into the parts (informants), each of which can be comprehended by a student, and through omitting the auxiliary information.

Step 2 - The content of each informant is to be developed briefly with pointing out the key words and numbering them.

Step 3 - The subject of the educational and scientific research is to be composed of the typical opening and typical final which are to be formulated by a tutor, as well as of simultaneous synthesizing of the pointed out keywords.

Step 4 - Elaboration of the problem plan: there should be formulated the diagnostic questions, such as "Why...?", "What is the reason of...?", etc., on the basis of the educational and scientific text and pointed out keywords.

Step 5 - Diagnostic question is to be posed to the educational and scientific text along with the pointed out keywords; the keywords, which more completely reflect the answer to the diagnostic question (the frames), should be picked out from these pointed out keywords. The selected keywords are to be transmitted to

the palm of the answer.

Step 6 - The formulation of the theses for the diagnostic questions (the developed answers) reflecting the peculiarities of the analyzed educational and scientific text.

Step 7 - elaboration of the educational and scientific statement through the integration of the answers (the theses) to the diagnostic questions.

Let's look at the example of the Steps 3, 4 and 6 implementation of the algorithm in the course of studying the specific subject "Information science" (Table 1).

The empiric research of the informational and projecting activity in the educational process has been implemented within 20145-2016 on the facilities of the Lipetsk State Pedagogical University named after P.P. Semyonov-Tyan-Shansky.

The empiric work aimed at improving the efficiency of educational process on the basis of the informational and projecting activity has been carried out on certifying and forming stages.

There has been identified the level of the subject knowledge and skills as per the subject studied through testing. Test includes questions of different types of difficulty:

- the higher level of difficulty has included the tasks required the cause-and-consequence links between several subjects studied;
- the average level of difficulty has included the tasks which required the appliance of the knowledge and skills obtained while a new subject being studied and different phenomena and processes studied within the subject;
- the lower level of difficulty has included the tasks required the appliance of the knowledge and skills referring to the subjects studied.

After the outcomes have been analyzed, there has been identified that 51,79% of the students achieved the average level of knowledge and skills referring to the subject.

The students have been divided into the 2 groups (the controlling and the experimental one) which by their knowledge and skills level.

**Table 1.** The pattern of the activities aimed at structuring educational and scientific text in "Informational science"

Sequence of Steps	The outcome
<b>Step 3. Building up the subject of the educational and scientific research</b>	
Typical beginning of studying of theoretical grounds of programming; Cyclical algorithms	Primary study of the theoretical foundations of programming algorithms cyclic
<b>Step 4. Elaboration of the problem plan</b>	
1. Why...	1. Why the cycles operators are to be applied?
2. What is the reason of...	2. What is the reason of applying the cycles in the organizing of repetitions?
3. For what purpose...?	3. For what purpose the cycle interruption operation should be applied?
4. Under what	4. Under what type of conditions should be applied the cycles



conditions...	with parameter, or with pre-condition, or with post-condition?
5. What is the outcome...	5. What is the achieved outcome if the programming cycles are applied?
Step 6. Formulating the theses for the diagnostic questions	
1. Because, firstly... secondly... thirdly...	The cycle operators are to be applied because, firstly, they make possible to organize the cyclical repetition of the particular operator or the group of the operators, secondly, they simplify the elaboration of the programs, thirdly, they significantly shorten the source code of the program.
2. The reason is, firstly... secondly... thirdly...	It is recommended to apply the cycles in order to organize the cyclical repetition of the operator or the group of the operators, because of the following reasons: firstly, the cycles are the essential part of "Information sciences" studying, secondly, the cycles are the grounds of studying the subsequent subjects (e.g., lines, arrays etc.), thirdly, the appliance of the cycles is a more rational process for creating the more complicated programs.
3. With the purpose of firstly... secondly... thirdly...	Cycles interruption operators are applied, firstly, to interrupt any cycle implementation and to transmit the administration to any operator, committed after the cycle, secondly, to transmit the administration to any operator, thirdly, to interrupt the implementation of any currently working cycle and to transmit the administration process to the subsequent.
4. Provided under the conditions, that firstly... secondly... thirdly...	Firstly, the cycle with the parameter implements the repetition of the operator, or the group of the operators, for the set number of times, secondly, the cycle with the pre-condition is applied when the number of repetitions is not known in advance and the cycle body might have no one repetition, thirdly, the cycle with the post-condition is applied when the cycle body is to be executed at least one time and the total number of the repetitions is not known.
5. The outcome firstly... secondly... thirdly...	The appliance of the cycles will have the following outcomes: firstly, there will be studied the mechanism which allows to repeatedly perform the same type of action vunder the certain conditions, secondly, having studied all the types of cycles, the students will be able to elaborate more complicated programs, thirdly, the students will be able to elaborate the efficient ptoqramm code.

In the course of the experiment, the controlling group was working with scientific texts on the basis of the accepted methodology: the students studied the educational material to subsequently stating the material in written or orally form. The experimental group was working with the algorithm of educational and scientific texts. The students of the both groups have analyzed the significant volume of educational and scientific information (lectures, educational and additional literature).

Building up the informational and projective activity of the students in the course of work with educational and scientific texts is implemented on the following stages.

— Organizational stage consists of the following subsequent and interrelated components:

- formation of adaptability - adaptation of the informational and projective activity to the individual features of the students;
- formation of the knowledge and skills for working with the information

within the frameworks of subject/object relations in the informational process;

-formation of inner purpose aimed at transformation of the reality as well as the positive motivation.

— The practical stage consists of the following components:

-understanding of the problem situation which is the basis of educational activity transformation, aimed at increasing the efficiency of the educational process;

-diagnostic of the problem situation: formation of the actual substantial tasks, controlling of the students' factual knowledge and skills.

— The resulting stage means the transition to the own informational and projective activity.

The series transition from the one stage to another is impossible without taking into account motivation, content and orienting components, aimed at exposure of dominant motives of the students' educational activity, preliminary knowledge and skills, at exposure of students' readiness for independent informational and projective activity.

Each of the components (motivation, content and orienting) is to be diagnosed on the following levels: higher, medium, lower.

The higher level is characterized by sustainable interest to the subject studied, and the consciousness of the fact that the higher "motivation strength", the higher the level of educational activity which implements the informational and projective activity as the aspect of increasing the improvement of students' education; transition of obtained knowledge and skills of working with educational and scientific texts to the independent accomplishment of tasks with the higher difficulty level; the students are capable to apply the individual and creative approach to the solution of the tasks, aimed at development of informational and projective activities.

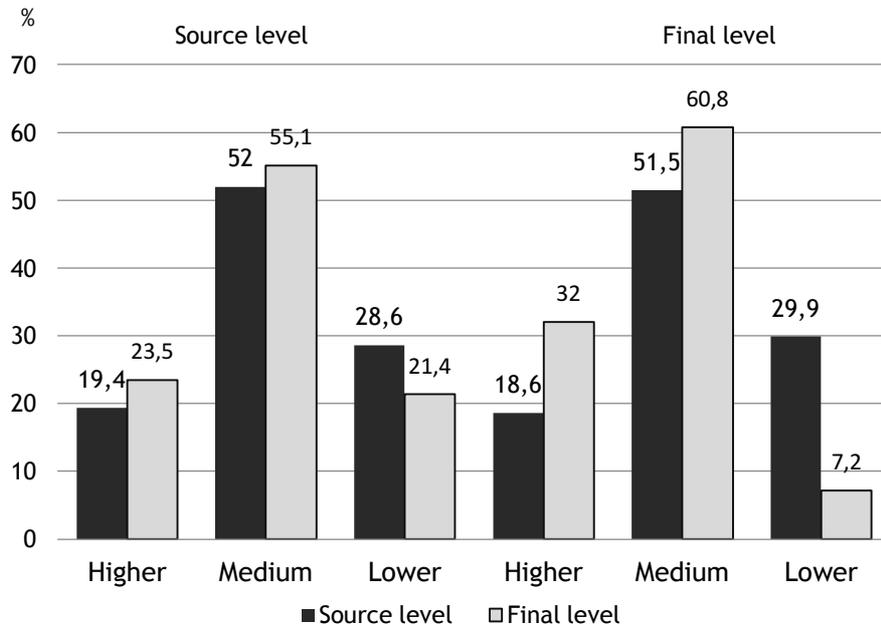
The medium level: when there is the sustainable interest of the students to study the subject with the elaborated tool and consciousness of the fact that the "motivation strength" in studying process depends upon the keenness, persistence; the essential knowledge has been fully obtained, the skills of comparison, juxtaposing and analyzing of the scientific texts key notions, while accomplishing the tasks and exercises, have been built up; prevailing of the collective activities, non-stable need to obtain the new knowledge on his own beyond the educational activity.

The lower level: an ad hoc interest of the students to the informational and projective activity with the external motives prevailing (to catch up the colleagues, to avoid the denunciation, to obtain the certificate/diploma, to receive approval, etc.); the comprehension of the structured educational and scientific information has not been built up, the sustainable skills are absent, formal activities while structuring the texts are prevailing; contextual interest to the informational and projective activity, absence of the sustainable needs in new knowledge.

When the formation stage of the current study has been finished, in the both groups a re-diagnosis of the subject knowledge level, skills and abilities to the studied subject was carried out.

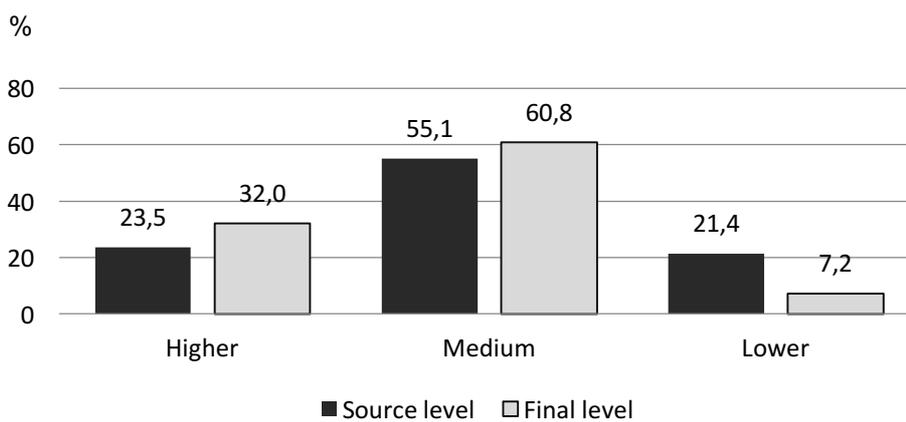


The results of the psychological experiment have demonstrated the changes in the levels of knowledge and skills both in the control group, and in the experimental group. But the experimental group has demonstrated more significant changes (Figure 2).



**Figure 2.** Changes of knowledge and skills levels of students from the control and experimental groups

There are more students with the high level of knowledge in the experimental group than in the control one. The percentage of higher level more by 8,5%; the average level: by 5,7%; the lower one: less by 14,2% (Figure 3).



**Figure 3.** Changes of knowledge and skills levels of students from the control and experimental groups

## Conclusion

Thus, the experimental research has confirmed the fact that the informational and projective activity might be the basis of the efficiency improvement of students' educational activity in the higher educational institutions. The proposed concept allows to implement the integration of the knowledge and its synthesis, being the basis of the professional activity of a pedagogue under the current informational society conditions. Grounding upon the above, the approved system of teacher's professional training lays the foundation for formation and development of the skill to see the problems of pedagogical reality, skills to apply informational and projective activity in pedagogical work, to create the conditions for developing of a personality within the educational process.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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