*Teaching Efficiency*
*Ефективност на обучението*

# FACTORS DETERMINING THE IMPROVEMENT OF EDUCATION QUALITY OF FOREIGN STUDENTS IN THE MEDICAL UNIVERSITY

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**Abstract.** Foreign students' academic motivation and personal motives play important role for the successful comprehension of relevant Bulgarian and Latin medical terminology, contextually structured with scientific and general Bulgarian lexis. Therefore, the main purpose of our research is to study and identify the motivational incentives of the students, which determine the learning outcomes and success. We conducted a survey with 57 students in compliance with Saaty's Analytical Hierarchy Process requirements. Major advantage of the latter is that it could compare and prioritize seemingly incomparable alternatives. Another important benefit is that the process allows for inconsistency in the responses, which could be measured, and identify random assessments. Furthermore, the research confirms the ability of the students to analyze the important prerequisites for active learning. The high quality of logically comprehended information relies on an active process related to in-depth processing, semantic and cognitive analysis, increased satisfaction with results, and support for students' academic objectives achievement. Additionally, the employment of motivational approach in educational activities facilitates students' adaptation and integration in new academic environments. To summarize, the analysis of the results of the Analytical Hierarchy for Educational Process Optimization study reveals that the respondents indicate preference for the quality of comprehended information and latter's contextual integrity. Derived priorities could be a valuable contribution for the practitioners' efforts to increase the educational process effectiveness, tailored according to academic needs and students' preferences.

*Keywords:* education, optimization, quality, determining factors, motivation

## Introduction

The problems, related to activation and development of students' motivation for learning, as well as the needs to find practical solutions, set the framework of our concept and the directions of our research efforts.

Our research attempts to study and identify the motivational incentives of the students, which determine learning outcomes and success.

We study learning motivation, and foreign students learning incentives, in particular, in attempt to provide guidelines for approaching numerous issues related to learning quality and efficiency. Foreign students' academic motivation and personal motives play important role for the successful comprehension of relevant Bulgarian and Latin medical terminology, contextually structured with scientific and general Bulgarian lexis.

Quality of education is an important aspect of the general educational process where students' interests and social needs intersect with the ones of university and the society.

**Motivation, motives and educational quality**

*Motivation*

Motivation is one of the major factors for activation of learning, key component and indicator for education quality as well (Maslow, 1954; Petre & Govern, 2003; Pintrich & Schunk, 2001). Oxford & Nyikos (1989) define motivation as the "primary determining and most important factor in the process of learning and comprehension of certain information". Moreover, according to aforementioned (Oxford, 1992) motivation "consists of four inter-related internal factors (interest, applicability, expectation and results) and three external ones (behavioral characteristics). The behavioral characteristics are persistence, level of activity and decision (Oxford, 1992). Furthermore, Harmer (1983) in turn defines pursuits of learners as "the most important element of motivation". Important contributions towards theoretical research on motivation have also Gardner & Lambert (1972) who distinguish two main types of motivation when learning foreign language: instrumental and integrative. They argue that "attitudes and motivation are important because they determine the degree to which individuals are motivated for involvement intensive mental activities, directed at language". Additionally, Ely (1986) defines third motivation type, which he calls necessity motivation.

*Motives*

Motivation and motives may seem semantically close, but they are not identical notions. Motives are those aspects of individuals, related to goals and actions, guided by objectives. Psychologists view **"***motives***"** (motive – move, lat.) as "*inciting reason* or *incentive* for human actions". Human beliefs, feelings, inclinations, interests, needs and ideas could also be motives (Пирьов, 1975). Пирьов (1975) argues that human behavior is affected not only by a single motive, but by a "system of motives, usually considered as motivation or motivation field". According to Десев (1999) "individuals' motivation field is a system of actual and potential motives". Furthermore, motives are considered to "energize, designate, guide behavior" of individuals (Emmons, 1997). Шапарь (2004) in his "Practical Dictionary for Psychologists" defines motive as: (i) an incentive for actions related to certain need and inclination (motivation); (ii) an object,

material or ideal, which drives activities; (iii) conscious reason, determining the choice for actions of individual. According to Шапарь (2004), *motives could be primary and secondary (motives-incentives), conscious and subconscious*.

Ников (1996) categorizes the factors which shape students attitudes toward educational activity to objective (didactical, methodical and organizational-pedagogical) and subjective (personal) ones.

Motives for learning reflect the attitudes towards educational process and aspirations for self-improvement. Clarification of needs and motives for learning in foreign language is of primary importance because these define the content (construction and adaptation), means, learning materials, approaches and methods for education.

*Education quality*

For the purposes of our research, within the context of active learning, we define learning information (logical) quality as a factor which provides incentives for development of students' cognitive complexity. Our research confirms the ability of the students to analyze the important prerequisites for active learning. The high quality of logically comprehended information relies on an active process related to in-depth processing, semantic and cognitive analysis, increased satisfaction with results, and support for students' academic objectives achievement.

Should lecturers possess profound knowledge of about students' interests, needs, motives and goals, they could guide and provide impetus for active learning using motivational approach. Therefore, motivation is of primary importance for engaging students in intensive academic activities while latter pursue their own personal goals, as well as for the educational purposes of the university.

Learning motivation refers to the individual willingness-regulation potential which provides motivational energy directed towards particular attitudes, behavior, direction and demonstrations for achievement of particular goals. Therefore, in that manner could be provided incentives for high-quality and intensity of mental activity for effective comprehension of new information and selection of suitable behavioral strategies.

Important aspect for learning motivation is to gain (mechanically and logically) and process educational information. Intermediate and final results from students' learning are important criteria for measuring the overall quality of the educational process. Intermediate results facilitate and provide insights for lecturers for filling the information gaps foreign students might have. The logically processed information by students has its advantages compared to mechanically processed information, including with regards to lasting memorization criterion.

Important role for comprehension of specialized volume of Bulgarian and equivalent Latin medical terminology, contextually structured with scientific and general Bulgarian

lexis, have the degree of academic motivation, personal motives and individual characteristics of the foreign students. Moreover, social adaptation and integration are directly dependent on individual's activities and motivation. The employment of motivational approach in educational activities facilitates students' adaptation and integration in new academic environments. Therefore, motivation for active learning and studies has positive influence over learning process dynamics and specifies its quality and intensity parameters.

**Motivational model for educational process optimization**

Currently, the theoretical and practical framework, which has already been developed, could be used to support targeted elaboration of our concept for motivational approach in terms of methodology and motivation strategy, in compliance with the foreign students' learning specifics. Experimentation with motivating model for logical comprehension of information, in general, we define as a factor which shapes the development of mental skills, attitude, learning motivation and foreign students' behavior. We focus our research on the educational process, provided to foreign students with basic level of competency in medical-biological disciplines of various nationalities in the Bulgarian Medical University Plovdiv.

The issues, related to learning specialized information on foreign language (in this case Bulgarian) by foreign students in the Medical University of Plovdiv, prompted us to study the motivational incentives of cognitive activity. We conducted a survey with 57 students in compliance with Saaty's Analytical Hierarchy Process (1996) requirements. Major advantage of the latter is that it could compare and prioritize seemingly incomparable alternatives. Another important benefit is that the process allows for inconsistency in the responses, which could be measured, and identify random assessments. The calculations have been carried out with Expert Choice v.11 (software developed according to the premises of the Analytical Hierarchy Software).

*Analytic hierarchy process*

The Analytic Hierarchy Process (AHP) is developed by Thomas Saaty (1996) at the Pennsylvania University Warton School of Business and allows decision-makers to model a complex problem in a hierarchical structure, showing the relationships of the goal, objectives, sub-objectives and alternatives. It is based on several basic concepts: hierarchical structuring of complexity, pairwise comparisons, redundant judgments and consistency considerations. The process uses eigenvector method to derive ratio scale measures. Pairwise comparison process could be performed by using words, numbers or graphical bars and at the end it reveals how the goal, the objectives (sub-objectives) and alternatives relate. The process allows for using various types of

information, personal experience, uncertainties in a logical way to derive priorities and weights from a set of judgments, taking into consideration the humans abilities of making better relative rather than absolute judgments. Therefore, it is possible to take into account objective and subjective factors, which could influence a decision. Furthermore, the weights or priorities are ratio level measures, not counts. Priorities, derived from judgments automatically incorporate non-linearities in measuring utility. Another advantage of the AHP is that it not only allows inconsistency, but also provides measure for the inconsistency in each judgment so that random answers could be distinguished. The process is widely employed and has proved as a useful managerial method for taking justified decisions.

Based on our practical experience we assume that the educational process optimization depends mainly on the following three factors: quality, quantity and lasting memorization of information. For learning quality we assume it is the information, which could be identified, understood and meaningfully assimilated, memorized and correctly interpreted. The factor quantity refers to the volume of learned specialized scientific vocabulary and terminology. Information, memorized lastingly is a data which has been transferred to long-term memory and could be easily extracted. Aforementioned are inextricable part of motivation for learning management process and are emphasized as objectives, influencing the achievement of the goal.

For the implementation in the educational practice of the aforementioned factors in the Medical University-Plovdiv preparatory course, major impact have: adapted textbooks (with minimized number of scientific lexis synonyms); specialized dictionaries (for medical terminology and scientific lexis); and lecturers with students' mother tongue knowledge. Based on the aforementioned parameters we devised the following hierarchy (Fig. 1).

The application of the process allows figuring out which objective the respondents regard as most preferable and the alternative which according to them has most significant contribution to educational process optimization.

*Educational process optimization study*

The research involved 57 students in 2009/2010 and 2010/2011 academic years. They filled questionnaire, which required them to make judgments on pairwise comparisons in compliance with the AHP requirements. They prioritized the relations between alternatives with regards to the objectives and the latter with respect to the goal. The inconsistency in their answers was also computed. Questionnaires with levels of inconsistency significantly over 25% were returned for reconsideration.

We could explain the process of the study with the following example. It provides information about aggregated judgments on pairwise comparisons of alternatives with

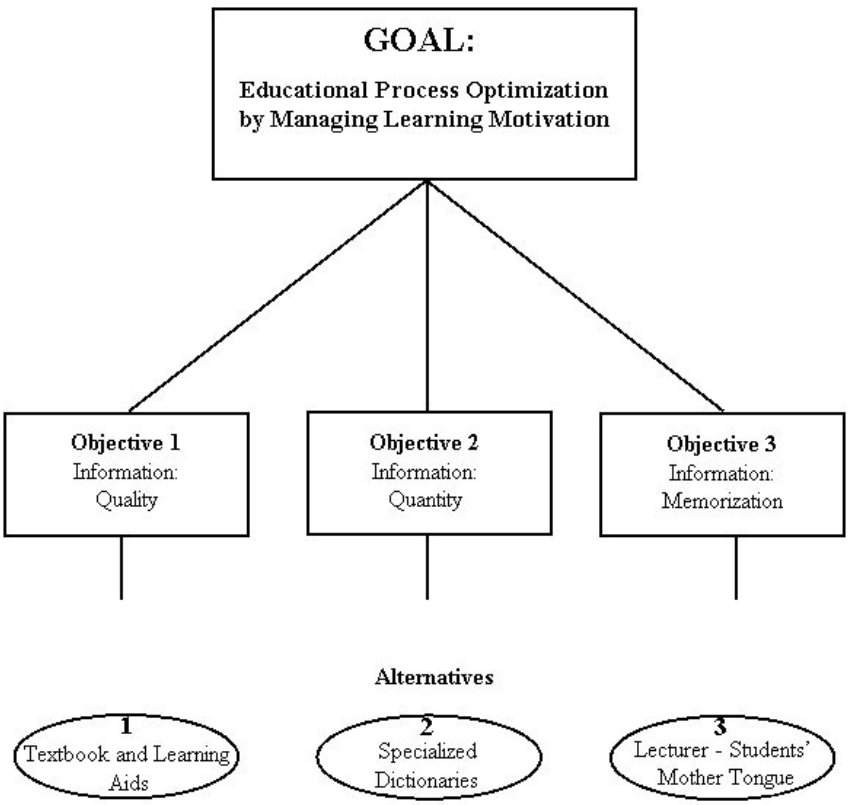


**Fig.1** Decision Hierarchy for management of the motivation for learning

respect to information quality (Fig. 2). According to the results the preferences are: for 37,2% for dictionary; 33,2% for textbook; and 29,6% for lecturer. Inconsistency in the answers in 0,01%.

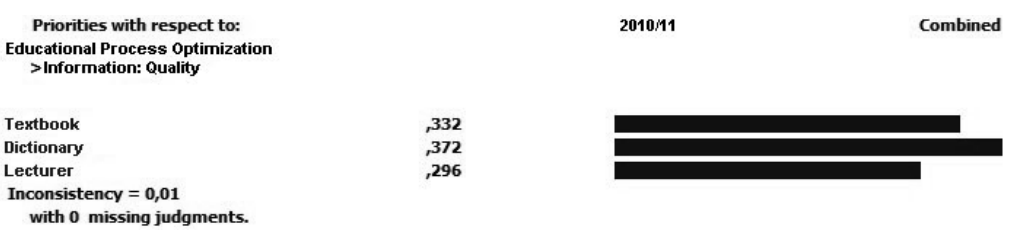


**Fig. 2.** Prioritization of alternatives with regard to Information Quality objective

The next example shows the aggregated data from alternatives' pairwise comparisons with respect to Information Quantity objective (Fig.3). According to the results, the preferences are: 45,7% for textbook; 38,8% for dictionary; and 15,5% of lecturer. The inconsistency in the judgments is 0,03%.

The figure, provided below illustrates the aggregated judgments of alternatives with respect to lasting memorization objective (Fig.4). According to the results, the preferences are as follows: 39,7% for lecturer; 30,9% for dictionary 29,4% for textbook. Judgments' inconsistency is 0,00219%.

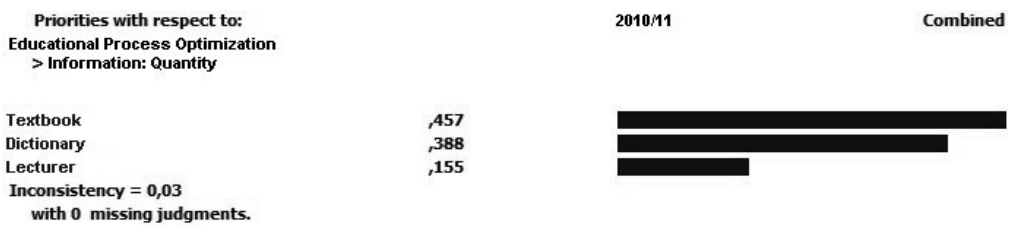


**Fig. 3.** Prioritization of alternatives with respect to Information Quantity objective

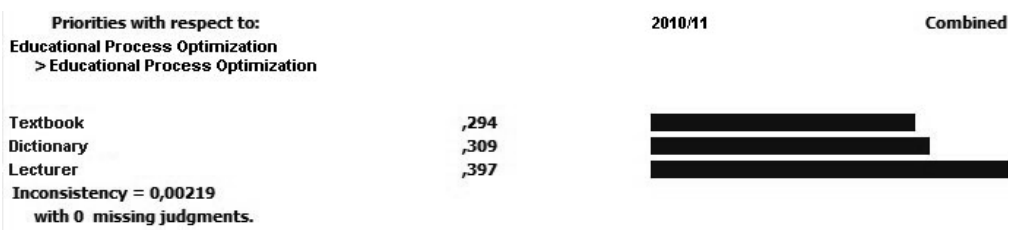


**Fig. 4.** Alternatives' prioritization with regard to Lasting Memorization objective

Furthermore, the participants provided judgments for the pairwise comparisons the objectives with respect to the Educational Process Optimization goal (fig.5). Aggregated judgments reveal the following prioritization of objectives: 46,0% for Information Quality; 31,9% for Lasting Memorization; and 22,1% for Information Quantity. The inconsistency of the judgments is 0,03%.

Upon completion, the participants' judgments are combined to derive priorities. Should judgments in the questionnaire indicate inconsistency levels significantly over 25% they are returned to respondents for re-consideration.

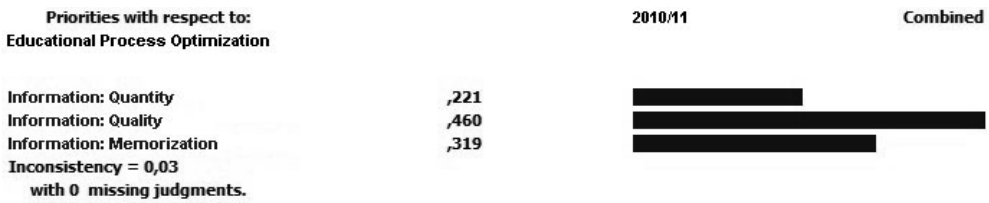


**Fig. 5.** Prioritization of objectives with respect to Educational Process Optimization goal

*Analysis of the results from the Educational Process Optimization Study*

Educational Process Optimization Study combined results (Fig.6) for 2009/10 academic year indicate the preferences of alternatives by the participants as follows: 35,9% for dictionary; 35,3% for textbook; and 28,7% of lecturer. The following prioritization of objectives has been derived: 44,7% for Information Quality; 28,7% for Information Quantity; and 26,6% for Lasting Memorization of information.

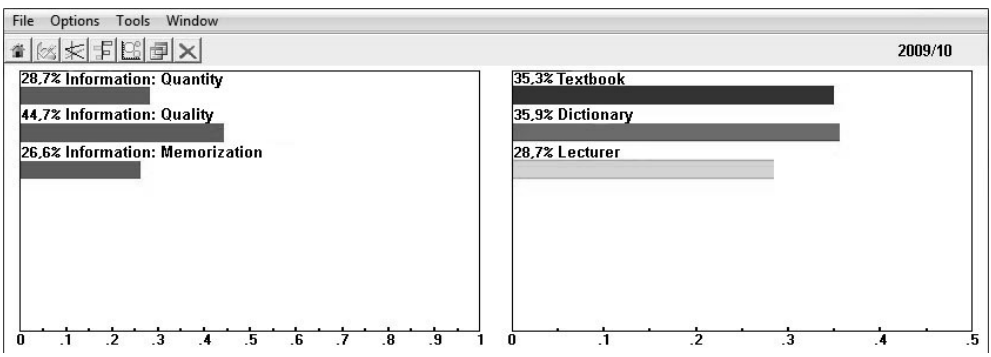


**Fig. 6.** Combined results of decision hierarchy for educational process optimization for 2009/2010 academic year

The sensitivity analysis illustrates the aforementioned combined results from the study, particularly the relations between objectives and alternatives (Fig.7).

Educational Process Optimization Study combined results (Figs.8 and 9) for 2010/11 academic year indicate the preferences of alternatives by the participants as follows: 35,5% for dictionary; 34,4% for textbook containing adapted information for foreign students; and 30,1% of lecturer. The following prioritization of objectives has been derived: 46% for Information Quality; 31,9% for Lasting Memorization of Information; and 22,1% for Information Quantity. In 2010/2011 the participants again indicate as most preferable the factor Information Quality. According to data analysis, the preference of specialized dictionaries contributed most significantly to these results.

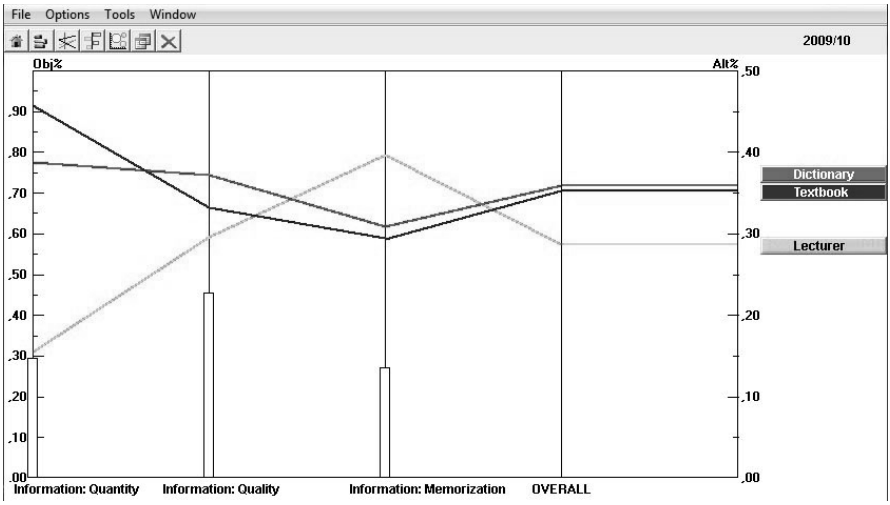


**Fig.7.** Sensitivity analysis of objectives and alternatives for 2009/2010 academic year

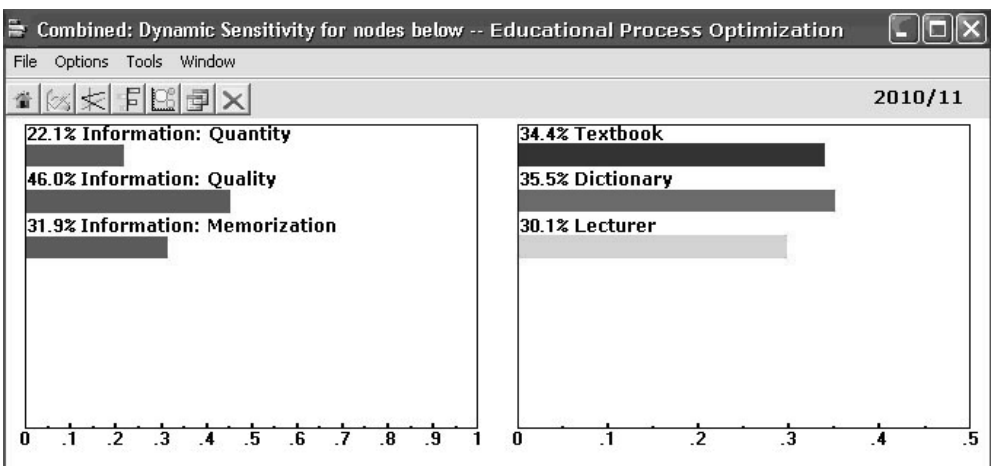


**Fig. 8.** Combined results of decision hierarchy for educational process optimization for 2010/2011 academic year

The sensitivity analysis illustrates the aforementioned combined results with regard to the relations between objectives and alternatives (Fig. 9).

The indicated preferences of the students for the quality of information factor, with use of specialized terminological dictionaries and coordinated methodical support from lecturers, over the alternatives is due mainly to the specifics of the studied information. Furthermore, the research results confirm the ability of the students to analyze important prerequisites for active learning. The high quality of logically comprehended information relies on an active process related to in-depth processing, semantic and cognitive analysis, increased satisfaction with results, and support for students' academic objectives achievement as well.

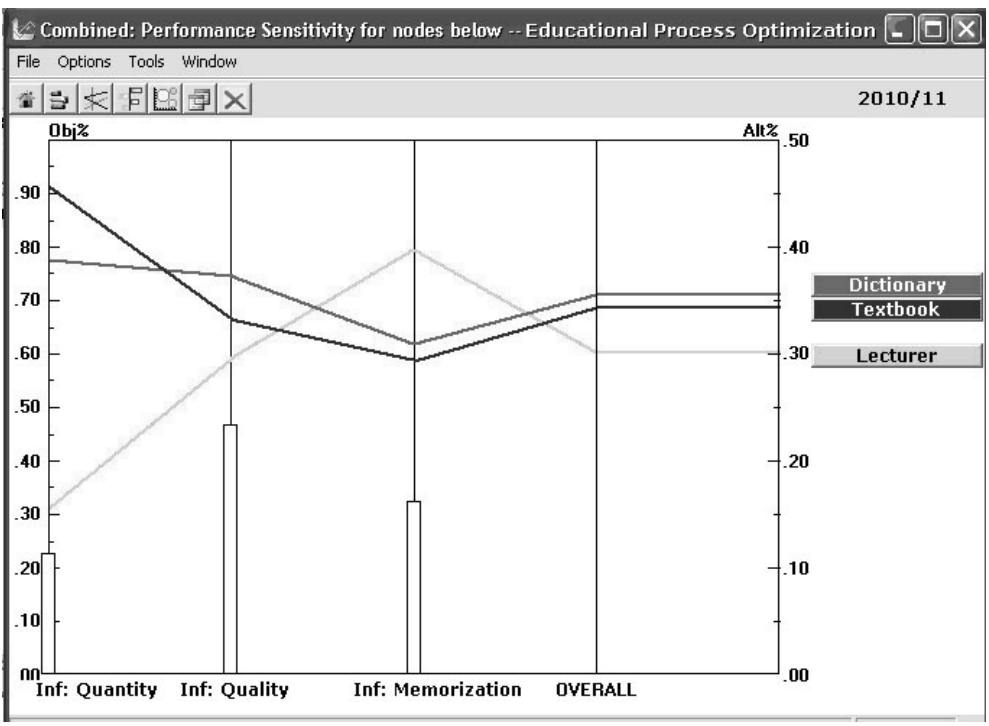


**Fig. 9.** Sensitivity analysis of objectives and alternatives for 2010/2011 academic year

Mastering novel and specialized information in foreign language is of particular importance to build up high-quality pool of terminology, adequately comprehended and processed in initial stages of education, which is necessary precondition for follow-up improvement of information. Moreover, important prerequisite for efficient educational process is the correct memorization of information lectured to students, precise identification of semantic codes (terminology and scientific lexis), logical understanding of basic

components and the context in general. Memorization is the next stage of the process, which mainly involves transformation of short-term to long-term memory.

Furthermore, the use of specialized dictionaries in specialized education has high added value which materializes in the form of improved final cognitive results from education, demonstrated by the students, and language and communicative skills as well. Within the learning process, the use of such dictionaries is a type of active learning which facilitates visual decoding of semantic information codes. Essentially, inter-language transformation is an active reproduction activity related to rational information processing (transformation of short-term memory to long-term). Therefore, the students' preferences for high-quality (logical) comprehension of information could be argued to be a motivational incentive for cognitive activity and a determining active learning factor.

The analysis of the results of the Analytical Hierarchy for Educational Process Optimization study reveals that respondents indicate preference for the quality of comprehended information and latter's contextual integrity. Furthermore, the derived priorities could be a valuable contribution for the practitioners' efforts to increase the educational process effectiveness, tailored according to relevant specifics of lectured information and students' personal characteristics.

**Conclusion**

In conclusion, it should be noted that important aspect of learning motivation is related to receiving adequate feedback from the participants in the educational process to set tangible objectives, to initiate targeted actions and to achieve clear results. Therefore, motivation is necessary not only in the initial stages of education, but throughout the entire educational process as well, which implies that it should be stimulated and also constantly maintained. Results from our research suggest that when lecturers use maximum means for visual presentation of key information in academic environment to increase students' personal creative energy, comprehension and lasting memorization. The positive students' motivation and the degree of achievement of quality learning of medical terminology and scientific lexis have beneficial influences on the next stages of education in theoretical departments in various disciplines.

Finally, the results of our research could be used for budgeting purposes in various activities and projects aimed at increasing efficiency in spending allocations of available funds for optimization of the educational process.

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