Educational Objectives as a System Tool of Engineering Pedagogy and Management

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Abstract - **The goal of presented contribution is to characterize position of objectives as a sequential function in the management system with emphasis on strategy aspects and their evaluation. Objectives play a dominant role in Engineering Pedagogy, where system approach is applied, too. Among other tasks, we are aimed at problems of analysis and further determination of common and different views on objectives and "handling" with this managerial/didactic category in the enterprise and educational environment. We try to formulate characteristic features of the objectives, particular attributes and process of formulation of the objectives. The subsequent activities of evaluating of the effectivity of educational/managerial process are involved as well as an important feedback. The objective has several functions. It becomes involved in some other categories, especially decision-making, planning, organization, performance assessment, and, last but not least having impact on processing management. All these sequential functions play an important role both for manager and teacher/educator as well.**

Index Terms - Teaching methodology, revised taxonomy by Bloom, educational objectives, attributes of objectives: SMART, Management by Objectives (MBO).

INTRODUCTION

Let us consider findings of recent investigation [5] where new facts reveal. Educational objectives are an important category related to educational reform and preparation of schools to conditions of transformation frame school curriculum to their own school educational programmes. It appears that degree of importance of educational objectives was labelled by 14% of respondents (Bachelor distance students of Engineering Pedagogy). This is one percent point less than second most frequently mentioned content of education, e.g. subject matter.

In the same investigation, author was further focused on degree of difficulty of the particular areas of the process of transformation into school educational curriculum. In view of respondents, objectives of technical subjects taught at secondary schools seems to be one of the dominant category (76% answers), followed by educational schedule (71% answers) and content of education (70% answers).

On the basis of these results, it is clear that we should deal with category of educational objectives more deeply analysing that in relation to present state of knowing both on theoretical level and practical application in common teacher profession and work experience.

'SMART' OBJECTIVE AND DECISION-MAKING PROCESS

Let us query some fundamental questions having a strategic impact to effectiveness and success of educational activities in general. What is the meaning of the objectives used in educational process in fact? Why do we use them, what is the benefit, added value, or, in other words, how does the effectiveness approve as a result of well-considered activities leading to fulfilling of the target. Talking about the meaning, we should answer another question, e.g. function of the objectives in activities both teacher and students.

All human activities and efforts aimed to accomplishing certain living aspirations (private or occupational) can be interpreted as a closed chain of activities where a timed decision about our plans becomes the first as well as the last link of the decision-making process. Such is the case with profession of teacher as well as manager.
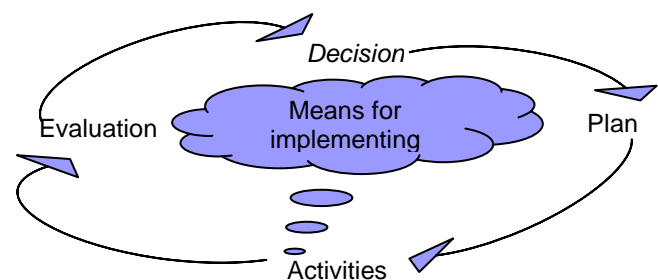

FIGURE 1
DECISION-MAKING PROCESS

Our decision is always influenced by lots of factors and limitation circumstances. In managerial system, we can apply some instruments designed for supporting decision-making (e.g. SWOT analysis, benchmarking, etc.); in the field of specification of the objectives and goals is profitably applied SMART specification which defines all necessary features common for setting-up managerial and educational objectives.

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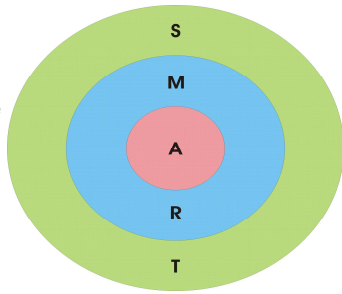
FIGURE 2
FEATURE CHARACTERISTICS OF WELL-DESIGNED OBJECTIVE (SMART OBJECTIVE)

In the teacher profession, all these attributes are used. One of the most important requirements is particularity, e.g. each objective should be expressed by means of clear and specific outcomes. This is required so that students understand well what is expected, what is evaluated and graded. Different interpretation of the acquired knowledge is checked off such a way.

A big problem rises from matching the degree of accomplishment against our objectives, e.g. measurability. In the field of education, situation is much more complicated due to character of evaluation criteria that are in most cases of qualitative nature. Moreover, there is no etalon, standard for performance assessment of pupils. In consequence, sometimes variety of contradictions between objectives and assessment can appear. Other factors that bring along some negative influence in relation to objective, open-minded, and, on matter-of-fact focused approach are, for example: subjective assessment, first impression and hallo effect, heterogeneity of the class, validity and reliability of particular "quantitative" performances, methods of evaluations, which implicate demand factor, too. Last, but not least readiness of the teacher has a great impact to professional ability to verify students' performance in relation to evaluation criteria that should be derived from the competences, i.e. behaviour that could be observed and evaluated.

There are two different approaches for specification of objectives searching for arguments to support their theory. These sides are in permanent dispute in question whether specific objectives should be used in education (yes or not); is it useful (if so, in what?). Let us ask a question what the success of the education lies in? We should be able to formulate our vision, objectives and learning/teaching activities leading to our set results (outcomes), and evaluate their accomplishing by means of feedback, i.e. answer the question of teacher's effectiveness. The next question is how the success of education is measured? This could be always reviewed in relation to students' results, not against amount of the lectured matter. In other words, the first criterion is impact of the subject matter on students' competence development. Problems of measurement have a practical repercussion to the next chain link which is evaluation. Both teacher and manager are responsible for objective assessment of the individual advance, degree of accomplishing particular pretension, standard etc. The following thesis can be formulated: Learning outcomes can be measured (i.e.

knowledge, skills, and attitudes). With reference to practical and historical connection and gradual institution of didactical categories into common practice we can convey another statement that teachers who use specific objectives are more successful than those who did not use them. This thesis is generally true regardless of level and type of education. On the other hand, as critics say, there is no cogent evidence of learning facilitation, making it easier by means of using specific objectives, especially if talking about higher objectives in the Taxonomy of Bloom (for example analysis, synthesis etc.).

Formulation of specific objectives is a creative activity involved in the teachers' preparation phase. This is a very difficult task in the light of the difference of the students' knowledge level. In view of such a class diversification teacher should be able to formulate set of goals respecting modification of difficulty. Realistic feature is so applied. By the way, objectives have some didactic functions. One of the most important is motivation. With respect to feedback and assessment, each target and objectives should be as short-term as possible (timed feature).

Objectives should be formulated preferably as much sufficiently as possible according to individual potential of student, so as to have a motivational function. Regarded to immediate feedback, it is plain enough that short-term objectives are for such a purpose more suitable (time aspect). Feedback is so applied throughout the particular phases of the class. When a problem appears, objectives can be reformulated in view of the new conditions. The last but not least feature we are dealing with both in managerial and education approach is acceptable objective. Both employee and students are involved into the process of continuous performance of the tasks so they must be motivated to achieve planed results, i.e. they should know, what is expected to be filled. It is very similar in learning activities. Teacher is the leader, who should do the best in giving a reason why to deal with subject matter, engage students making a climate of mutual co-operation. Such a way students become identified with our educational target.
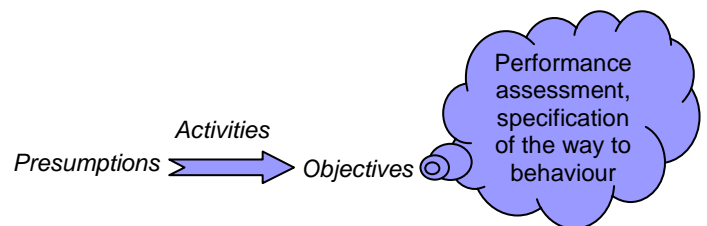

FIGURE 3
EDUCATIONAL OBJECTIVES DETERMINED BY PRESUMPTIONS

- Revisable objectives should describe students' behaviour that can be observed (instrument: active verbs + substantial) … Taxonomy of Bloom, incl. revised version [2]
- Conditions should be described under which objectives are controlled
- Should determine what target performance is considered to be satisfactory, i.e. the objective is filled in a certain level

MANAGEMENT BY OBJECTIVES

Managerial and didactic conception of objective specification is very similar, so instruments used for decision-making support can be applied in the field of education as well. Let us demonstrate another analogy between managerial and didactic category in the area of objective specification which is so called Management by Objectives (MBO). As we can see in the picture, scheme is considerably analogical to original conception of decision-making process in figure 1.
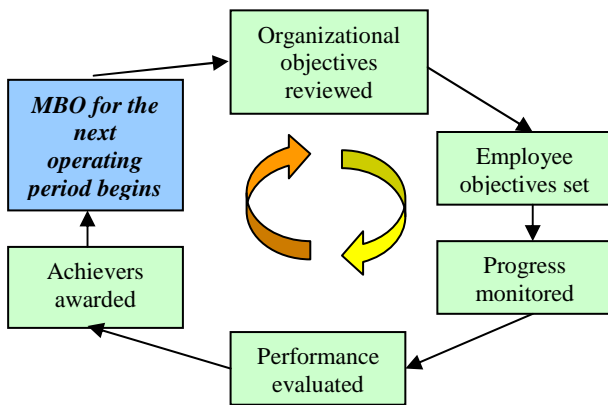

FIGURE 4
CONCEPT BY PETER DRUCKER – MANAGEMENT BY OBJECTIVES [3], [4]

Management by objectives (MBO) is a systematic and organized approach that allows management to focus on achievable goals and to attain the best possible results from available resources. It aims to increase organizational performance by aligning goals and subordinate objectives throughout the organization. Ideally, employees get strong input to identify their objectives, time lines for completion, etc. MBO includes ongoing tracking and feedback in the process to reach objectives.

MBO was first outlined by Peter Drucker in 1954 in his book 'The Practice of Management'. In the 90s, Peter Drucker himself decreased the significance of this organization management method, when he said: "It's just another tool. It is not the great cure for management inefficiency... Management by Objectives works if you know the objectives, 90% of the time you don't." [3]

Original model is extended by some items of the chain. It is necessary to underline the performance evaluation of successful employee. There is an analogy in the education process again. A teacher evaluates students during the class using for example verbal recognition, good grade, small exhibition of students' representative projects and other kinds of positive assessment reflecting individual performance in the form of award. On the other hand, extent of objective accomplishment can be negatively evaluated in case that performance does not fill expected outcomes.

According to Drucker [4] managers should "avoid the activity trap", getting so involved in their day to day activities that they forget their main purpose or objective. In the profession of educator, teacher is sometimes in the similar situation just teaching prepared set of material regardless of up-to-dateness or principle of scientism which

is very important especially for technical secondary schools. A typical example can be technical standards and their relevance.

MBO managers focus on the result, not the activity. In this context activities are instruments for accomplishing goals. Managers delegate tasks by "negotiating a contract of goals" with their subordinates without dictating a detailed roadmap for implementation. MBO is about setting own objectives and then breaking these down into more specific goals or key results.

The principle behind MBO is to make sure that everybody within the organization has a clear understanding of the aims, or objectives, of that organization, as well as awareness of their own roles and responsibilities in achieving those aims. The complete MBO system is to get managers and empowered employees acting to implement and achieve their plans, which automatically achieve those of the organization.

In order to be able to evaluate degree of accomplishment of the particular specific goals, taxonomy of cognitive objectives was designed by B. S. Bloom in 1956. The original taxonomy was created on the ground of necessity to score test items and classification of the cognitive level of the particular tasks. Revised taxonomy takes into account three different activities which are learning, teaching and evaluation [1] with regard to objective specification.

Thus taxonomy makes it easier to answer the question for the essential questions which are [2]:

- What to learn?
- How to accomplish the objective?
- How to evaluate?
- How to ensure the coherence between instructions, objectives and evaluation?

CONCLUSIONS

There is a large gap nowadays between pedagogical theory and practice. Many teachers do not know what the objective exactly means. Moreover, some of them consider using specific objective as useless. They declare that educational process can exist without this category. In general, there is a dispute between two different approaches and views on using specific objectives in education [6].

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