

## Systemic approach to problems of the quality in education

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### Education and research trends

#### ABSTRACT

**Purpose:** The purpose of the study was to present a view of problems of quality assurance/management system in university education in the field of education and research.

**Design/methodology/approach:** In the paper there was presented an approach to quality management system in the education and associated requirements and purposes.

**Findings:** The paper presents problems of implementation and functioning of quality assurance/management system based on legal requirements obligatory in Poland, either on standard ISO 9001:2000 and guide IWA 2:2007.

**Research limitations/implications:** The article presents problems of implementations and functioning of quality assurance/management systems in the education.

**Practical implications:** Presented in the paper opinion should acquaint with advantages of introduction in the universities the quality assurance/management system based on legal requirements obligatory in Poland, either standard ISO 9001:2000 and guide IWA 2:2007 in the field of education and research.

**Originality/value:** The paper is based on personal experience of the authors in introduction of the quality assurance/management system in educational units with usage of standard ISO 9001:2000 and on legal requirements obligatory in Poland.

**Keywords:** Quality Assurance System; Quality Management System; Education; Research; University; Audit; Improvement

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### 1. Introduction

The quality of education including particularly academic education is becoming more and more popular subject in all European countries. It could be seen in activities undertaken by all the nations which purpose is to create European Field of Academic School System described in Bologna Declaration [1].

There are a lot of studies describing the quality of education at the academic level. A. I. Vroeijenstijn defined the quality of

education as the result of negotiations between all the participants of the educational process regarding that these negotiations concern the realization of the expectations by the academic school system. The academic school system should realize these expectations as good as it can, for example through clear determination of the purposes of education at the academic level" [2].

The other authors try to describe the quality of education using mathematical forms, for instance [3]:

$$Q_k = \sum_{i=1}^k (\alpha_i q_i)^n \quad (1)$$

where;

$Q_k$  - the quality of education,

$\alpha_i$  - coefficient of importance of features  $x_{i,}$ ,

$q_i$  - value of feature  $x_{i,}$ ,

$k$  – the number of features described characteristics of education.

Education is one of two basic activities of the university (beside scientific researches). The quality of education understood by E. Deming as “totality of features and characteristics (...) of the service which concern their ability to satisfy requirements and needs” should play an essential role in forming competitiveness in the field of the academic education. The defining, creating and introduction of the systemic approach to the problems of the quality should comprise these two fields of activities in the university (education and researches).

Most of research workers of the university is active in both fields; care of the quality of realized activity in one field should influence the quality in the other field. In the present requirements of (PKA) it is stated about rules of preparing and evaluation of diplomas: “the subject matter of the conducted degree work should be consistent with the scientific interests of person making it” (suppl. to the Resolution No. 219/2008 of the Presidium of the State Accreditation Committee from 10.04.2008 concerning criteria of evaluation for the system of result verification in education).

This requirement confirms validity of the problem of creating and the quality management in both fields of the university activity. The high level of the research work quality of the tutor influences essentially the quality of the degree work.

Designing and introduction of the effective internal system of quality assurance in education is one of strategic elements in the development of the university.

## 2. Systemic approach

Realization of services is always associated with fulfillment of different requirements. In the aspect of the process of education, the requirements could be found in some fields, defined by a lot of subjects. To these subjects belong:

- Government
- Community
- Employers
- Students
- Parents
- Workers of schools
- Shareholders
- Suppliers.

The requirements of the government and national control institutions are fulfilled by the universities. This process is obvious and normalized by the juridical acts regulating this field. The requirements of the other subjects - depending of their activity in process of management of the university - are more or

less concrete and introduced in the aspect of creating real solutions conditioning increase of the quality in realized processes.

Methodology of introduction of the management systems in different organizations is particularly based on engagement of all the subjects taking part in realization of these processes, because only conscious and full engagement in the realization of the quality politics gives best achievements and results.

Fulfillment of the requirements is associated with consciousness of their existence and with their importance. Legal requirements constitute *a priori* fields of proper regulations. The other activities influencing the creation of the quality level comprise the field of voluntary requirements. These activities have a special added value because they create new levels of the quality, becoming gradually obligatory, as commonly known voluntary certification associated with the fulfillment of requirements of popular standards ISO series 9000 and 14000.

The requirement concerning introduction and maintenance of the quality assurance system was described in the Decree of the Polish Ministry of the Science and Academic Education from 12.07.2007. It describes standards of education for all the courses and levels of education, and also means of creation and conditions which should be fulfilled by the university to conduct the interdisciplinary studies and macro courses. The 3 paragraph of the 1 law of this decree states that: “The University is obliged to maintain high level of education. In this purpose the internal quality assurance system should be created”.

This decree did not define the requirements for the internal quality assurance system; awareness of number of solutions allows for critical view what field and what requirements should create limits for this system. Also decree from 27.07.2005 (Regulations of academic school system) did not define the requirements and even did not mention about necessity to introduce such a system. No interpretation (no requirements concerning the internal quality assurance systems) did not allow making an evaluation of elaborated and introduced systems in the universities [5].

The accreditation constitutes an instrument for the supervision of the quality in education and it is the domain of activity of the State Accreditation Committee. There are also known different kinds of accreditation in the academic school system, as for instance environmental accreditation of the University Accreditation Commission.

Published rankings constitute the particular kind of evaluation of the university. They are using different methodologies in which different factors are taken into account: scientific activity, quantity and usage of means excluding budget subvention, innovation of education, number of students for one research worker etc. Results of these rankings create opinion of the society, becoming marketing element of the game on the educative market. From point of view of influence of published rankings it is obvious to ask a question: How could information enclosed influence choice of high school graduates for the further educative way?

Elaborated in ISO 9001 standard model of process approach in the quality allows for reference to the quality understood as fulfillment of requirements of the customer. The revision of the ISO standard from 2008 paid a particular attention to fulfillment of legal requirements for the organization – obliging every organization beginning process of system certification to make an analysis of existing legal acts in this field [6, 7]. Internal legal

Table 1.

Resolutions of the State Accreditation Committee regulating the works of the committee and describing standards of requirements [8]

1. Decision concerning establishment of specification of courses of the studies remaining in competence of individual teams of courses of the studies.
2. Resolution No. 76/2009 from 19.02.2009 concerning establishment of general criteria of the quality of education evaluation.
3. Resolution concerning criteria of evaluation of the study plans and teaching programs.
4. Resolution concerning criteria of evaluation of fulfillment of the requirements in the sphere of research activity in the discipline or domains associated with the given study course.
5. Resolution concerning criteria of evaluation of the didactic base.
6. Resolution concerning giving an opinion to applications concerning validation certification for education at the level of the second degree study.
7. Resolution No. 828/2008 of the Presidium of the State Accreditation Committee concerning criteria of evaluation of fulfillment of the requirements in the sphere of personnel minimum, with attachments: 1 and 2. The resolution was introduced on 1.01.2009.
8. Resolution of the Presidium of the State Accreditation Committee concerning guidelines for report preparing of self-evaluation taking into consideration changes introduced by the Resolution No. 805/2008 from 13.11.2008.
9. Resolution of the Presidium of the State Accreditation Committee concerning rules of inspection - uniform text regarding changes after Resolution No. 974 from 13.12.2007.
10. Resolution of the Presidium of the State Accreditation Committee concerning criteria of formal and legal evaluation of aspects of education.
11. Resolution of the Presidium of the State Accreditation Committee concerning criteria of evaluation of fulfillment of requirements in sphere of students' affairs.
12. Resolution of the Presidium of the State Accreditation Committee concerning criteria of evaluation of the system of verification of effects of education.

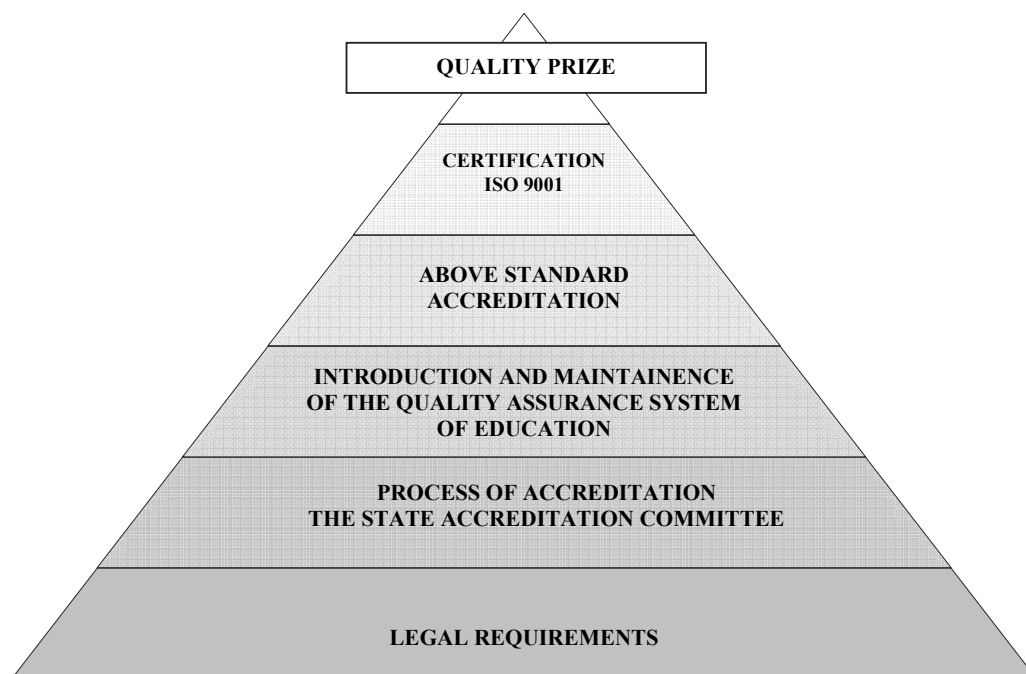


Fig. 1. The quality pyramid in the universities

acts of the State Accreditation Committee are particularly important in this field [8].

Creation and evaluation of the quality of education are based on two established activities:

- Accreditation
- Certification.

In the sphere of activity of the State Accreditation Committee, process of accreditation is an obligatory field, but process of certification is a voluntary activity.

Both accreditation and certification are directed to verification of fulfillment of requirements by the university with reference to different criteria. The certification based on ISO 9001 standard

comprises a wide profile of the activity of the university as an organization – if the university did not exclude the requirements enclosed in the 7 Chapter of the norm PN-EN ISO 9001:2008, what is methodologically rather difficult to motivate, then all the processes realized in the university, not only process of education, will be comprised by process of certification [7].

ISO 9000 has been traditionally prepared for production companies, although in its revision from the year of 2000, it also incorporates the line of improvement and its application to any sector.

The ISO 9000 model implementation in higher education supposes a very significant advance in the normalization of the fundamental teaching-learning process activities. This model constitutes a reference to build a strategy of progress toward medium and long-term excellence in agreement with EFQM – European Federation Quality Management pattern.

Process of accreditation is based on obligatory criteria of requirements elaborated by the State Accreditation Committee. The accreditation concerns courses of the studies, but not the universities or faculties – and it is the main difference from process of certification [8].

There are 12 resolutions regulating the works of the commission and describing standards of requirements which could be found on the web side of the State Accreditation Committee on 1.06.2009. They are presented in table 1 [8].

Activity of the State Accreditation Committee leads to check formally determined minimal requirements in the sphere of education maintained and realized by the university.

Certification of the systems of the quality management and supervision audits constitute important element in the improving of the system also in reference to the process of education. Certification naturally forces to undertake activities which purpose is not only to fulfill the legal requirements – minimal criteria described in resolutions of the State Accreditation Committee.

One should emphasize that a great correlation exists between particular requirements of the State Accreditation Committee stated in Table 1 and requirements of ISO 9001:2008 standard [7, 8].

It is found very often that particular requirements determined by the State Accreditation Committee and ISO 9001 standard are regarded complimentary in solutions of internal quality of education assurance systems introduced by the universities.

Internal quality of education assurance systems which are introduced in the universities constitute hybrid solution using methodology of the quality management systems introduction based on ISO 9001, and also chosen aspects of requirements described in it. Simultaneously a lot of academic centers already introduced and undertook process of certification of introduced quality management systems according to ISO 9001. However, it mostly concerns field of education, without special attention to the field of scientific researches [9-13].

The field of realization of the problems of quality in universities is based on fulfillment of requirements determined by different institutions or standards. The quality pyramid is presented in Fig. 1.

Statutory requirements concern formation of the university or acknowledgment of titles. The process of accreditation comprises particular requirements in the sphere of process of education; all the courses at the university are liable to it [14].

The quality assurance system constitutes the field of activities which is differently understood and defined by the universities; essentially its purpose is to create a proper quality of process of education. There are no regulations in this field.

Super standard accreditation concerns voluntary field based on:

- Accreditation Commission of Technical Universities,
- University Accreditation Commission.

Increasing competition among universities makes an effect that introduced and certificated quality system according to ISO 9001:2008 becomes important and more and more frequently undertaken task by universities. An example of such approach is certification of the quality management system introduced in the Institute of Engineering Materials and Biomaterials, Silesian University of Technology according to ISO 9001:2000 standard in the field of realization of process of didactics and researches in the sphere of material engineering [9, 10].

The highest approval in the sphere of undertaken activities by the universities in the field of the quality in education is the process of application for the quality prizes. The most prestigious is Malcolm Baldrige's National Quality Award – an American educational quality prize. In the sphere of Polish Quality Prize there are elaborated criteria of Polish Quality Prize for Education [15, 16].

The level of the quality in education constitutes an essential factor influencing the tempo of development of economy. The quality of process of education should refer to all the levels of educative system, providing their high level of realization. Achievement of such position is possible thanks to specially elaborated standard Quality Management Systems – ISO IWA 2:2007 (E) complementary to standard ISO 9001:2000 with reference to widely understood education. The elaborated document constitutes a guide facilitating proper introduction of requirements of the norm ISO 9001:2000 in sector of education [17].

The guide IWA 2:2007 adds a great value to ISO 9001 system. This guide was elaborated by the experts in the field of education. It emphasizes so important elements of education as: educative value, concentration on social values etc. This guide contains practical instruments of introduction and improving the quality system in the field of education.

This guide defines four additional rules of maintenance of the success completing eight rules of the quality management [17]:

- *Creating value of teaching*; in purpose to encourage the students to feel satisfaction from the value they get. Measurement of satisfaction describes how needs and expectations of students are fulfilled. Results of measurements help to increase development of processes in purpose to create value of the student in the educative organizations.
- *Concentration on social values*; it means taking care of this how students interpret ethics, safety, environmental protection. The educative organization should assured continuous increase only then when most of society appreciates initial value added of the student.
- *Efficiency*; it has fundamental significance for permanent economic increase in drastically changing educative environment giving the chance for continuation of successes in education.
- *Independence*; it is based on analysis of situations and individual analysis. Educative organizations should undertake individual decisions free of stereotypes.

The introduction of the certificated quality system using elaborated standard IWA 2:2007 allows pick up right activities in introduction and maintenance of an effective quality management system (based on attachment A: Self evaluation of the educative organizations).

The introduction and maintenance of the quality management systems became an obligatory standard for factories. The big amendment of the standard from the year 2000 gave a great interest of application it in the public organizations – administration, hospitals, universities and schools. Great experiences based on many introduced and functioning systems allow making a thesis that the introduction of internal quality assurance systems of education should be based on fulfillment of requirements of ISO 9001 standard. The simultaneous implementation of QMS in whole organization could be risky. The experiences from implementation of QMS in industry are not fully transmitted into university environment.

The implementation of quality management system in education should be done in the phases:

- *the preparation phase (5 steps process):*

1. The decision of top management about implementation of QMS as inherent part of management
2. The declaration of mission, vision and strategy (quality policy)
3. The definition of project team for implementation of QMS
4. The definition of terms
5. The reservation of sources (financial, HR)

- *the implementation phase (7 steps process):*

1. The training the staff about QMS
2. The implementation of process approach. It consist of :
  - a. Identification of processes and definition of the process map
  - b. Definition and documentation of processes
  - c. Definition of criteria for process performance assessment
3. The comparison of existing processes with ISO 9001 requirements
4. The implementation so far missing procedures (control of document, control of records, internal audits, control of nonconforming product, corrective actions, and preventives actions)
5. The trial period
6. The improvement of existing processes based on evaluation of trial period
7. The certification of QMS.

The quality of education comprises following elements: local and equipment base, teaching programs and program contents, teaching methods, administrative process service, lecturers and students. The quality assurance of education is a continuous and dynamic process, which is liable to constant evolution. The changes inside the process are the result of continuous interaction between these five mentioned elements.

The quality of didactics means the quality of didactic methods used in the process of education. In this approach it means suitability that is degree in which didactic methods are answering expectations and needs of the main customers (individual students and the whole society). This is the subject of technology of education.

The quality standards in didactics need to be continuously analyzed and modernized. It is the reason of changes occurring in the surrounding reality and – what is associated with it – with changes of expectations and needs of clients of higher education. It also requires dynamic nature of the quality in didactics. This

kind of changes could be observed particularly during last decade. Unprecedented development in all the spheres of life and coming global processes caused essential changes in the way of functioning of society. Also they influenced young people who constituted group of receivers of educative services.

According to the Finnish experiences, the evaluation of the activity of the university should be done with usage of acknowledged and checked criteria:

**The quality of education:** substantial knowledge, level of abilities, communicativeness, empathy, care of client

**The quality of conditions:** local and equipment conditions, additional materials, possibility of individual process of education

**Knowledge of needs:** selections of contents, range of contents

**Methods of education which are favourable to effectivity of assimilation of knowledge and abilities:** educative platforms, e-learning

**Achievements in education:** new forms of education, development of methods, new types of services, activity for development, openness to changes

**Results in organizational activities:** method of usage of return information, style of management, state of internal engagement of the staff

**The effectiveness and efficiency of management of resources:** economic effectives, profitability, costs in generic system, results of education in comparison do inputs on realization of the process, coefficient of costs and advantages, solutions of rationalization.

Understanding and determination of criteria of improvement in the didactic process allows to plan and realize the real activities which have to affect the type of process.

### 3. The quality of education in the European Field of Academic Education

The proper level of the quality of education constitutes the main attribute of the European Field of Academic Education. The undertaken activities by the member countries of the Bologna process have the task to create the common politics and harmony required in the field of procedures and partnership exchange of experiences [1].

The meeting of the ministers of education in Berlin in 2003 obliged the countries – signatories to elaborate national systems of the quality assurance until the year of 2005, in which there were described:

- the role and responsibility of all the engaged organs and institutions;
- kind and range of done evaluation of programs and institutions including internal and external evaluation, with participation of students and published results;
- kind of functioning of system of accreditation, certification and similar procedures;
- assurance of participation of international experts and realization of other forms of collaboration

Because of heterogeneity of perception of problems of the quality of education, the European Association for Quality Assurance in Higher Education (ENQA), European Association of Institutions In Higher Education (EURASHE) and National Unions of Students in Europe (ESIB) elaborated the document

constituting adjusted set of norms, procedures and guidelines concerning quality assurance.

Elaborated document *Standards and Guidelines for Quality Assurance in the European Higher Education Area* foresees preparing European standards referring to internal (in the university) and external (accreditation) quality assurance and accreditation agencies entering so called European register [18].

This document suggests to create system of meta-accreditation; it means accreditation (at the European level) of centers responsible for assurance and improving the quality of education in particular countries. Accreditation would allow to honor decisions in the whole Europe - in the same way as it concerns accreditation of the certificated units. This document also postulate to create European register of the agency *European Register for Quality Assurance Agencies* together with the Committee concerning Register which would select agencies. Each European university could undertake accreditation using any agency inserted in the register, not paying attention if it is national agency or foreign [18].

At the last Conference in London in the year of 2007, all the ministers of education made a decision about creating a registering unit suggested in the report of ENQA. On the 4 of march 2008 this decision was performed through acceptance of the status of the European Quality Assurance Register for Higher Education (EQAR). According to London postulates the activity of EQAR is based on principles of independancy and voluntarity. Cooperation of national agencies with this agency is possible and recommended, but not obligatory [18].

The main coordinator of the process of the quality assurance of the European higher school system is *European Network for Quality Assurance In Higher Education*, which is responsible for exchange of information, exchange of experience and good practice between national agencies responsible for the quality assurance. Although the leading role of ENQA remains unmenaced, there are also new initiatives in the sphere of the quality assurance of education in Europe. The intension of new tasks is not competition with the European network, but supporting and fulfilling the activities of this organization. The example is *European Consortium for Accreditation* (ECA), which started in the year of 2003 and which purpose is to coordinate the accreditation procedures in countries where system of accreditation was already admitted [18].

#### 4. Assessment, Audit and Accreditation

External quality assurance is defined as the action of an independent organization to assess the quality of the university, or a program of the university or its internal quality assurance. I would like to distinguish:

- institutional quality assessment: evaluation of the internal conditions enabling delivery of good quality programs;
- program assessment: evaluation of the content of the study-program (s);
- quality audit: evaluation of the internal quality assurance. The subject in this evaluation is the university procedures to determine whether the provisions are adequate.

In the universities, there are three main fields for quality assurance: education, research and administration.

##### a) Educational Field

The higher education client is society in general, and in particular, the organizations or companies that incorporate those titled. In this sense, the titled university student is the final product of the University, as a result of the teaching-learning process. This product is achieved, on one hand, by means of the legal reference of the Studies Plan, and on the other, as a consequence of the success of the teaching-learning process, in which the students (its entrance level), the faculty, the methods, the means, the global organization, and, in definitive, the quality process assurance system play a very important part.

##### b) Research Field

The fundamental line of universities is R+D (research and development). These activities should also be subject of a control, so that the given service, in connection with the research plans or the companies that demand this service have the necessary quality. It would also be necessary to consider, in a wide sense, inside this section and their assurance, other activities, such as rehearsals realization, prototypes design and manufacturing, training courses for companies. It is necessary to remember that all these processes have specified commitments for contract, due to this a system of quality is necessary that assures customer's satisfaction with the established requirements.

##### c) Administration Field

The administrative management associated to a university degree constitutes a responsibility attributed to the Centers, although the Departments with teaching staff in these Centers condition it. In this sense, it is necessary to work out the appropriate co-ordination as refers to functional aspects as well as to human resources, the administrative management and the specific quality management. The system should consider, in this case, the opportune interactions, so that the intervention of different areas on the processes neither impedes the achievement of the objectives nor alters the global management significantly.

The process of quality improvement in assurance/management in education is shown in exhibit 2.

According to the norm PN - EN ISO 9001:2009, the systemic approach is the basis of the quality management systems.

The effective management system should be based on management of suitable processes. Independently from the number of processes existing in the given organization, the essence of management depends on effective management of processes and associations between them, according to one of eight rules of management – process approach

The norm PN-EN ISO 9001:2009 introducing the rule of process approach determines the necessity of evaluation of processes from point of view of their effectiveness. The audit is the basic instrument in the management system for evaluation of processes and dependences between them.

The norm PN-EN ISO 19011:2003 which constitutes guidelines for the audits of the quality management systems pays attention to proper conduction of the audits of processes. An idea of process should be introduced for proper understanding of the essence of the audit; the norm PN-EN ISO 9000:2005 defines the process as the collection of interacting activities which help to convert the input state to output state, where the outputs of the processes are simultaneously inputs of the other processes.

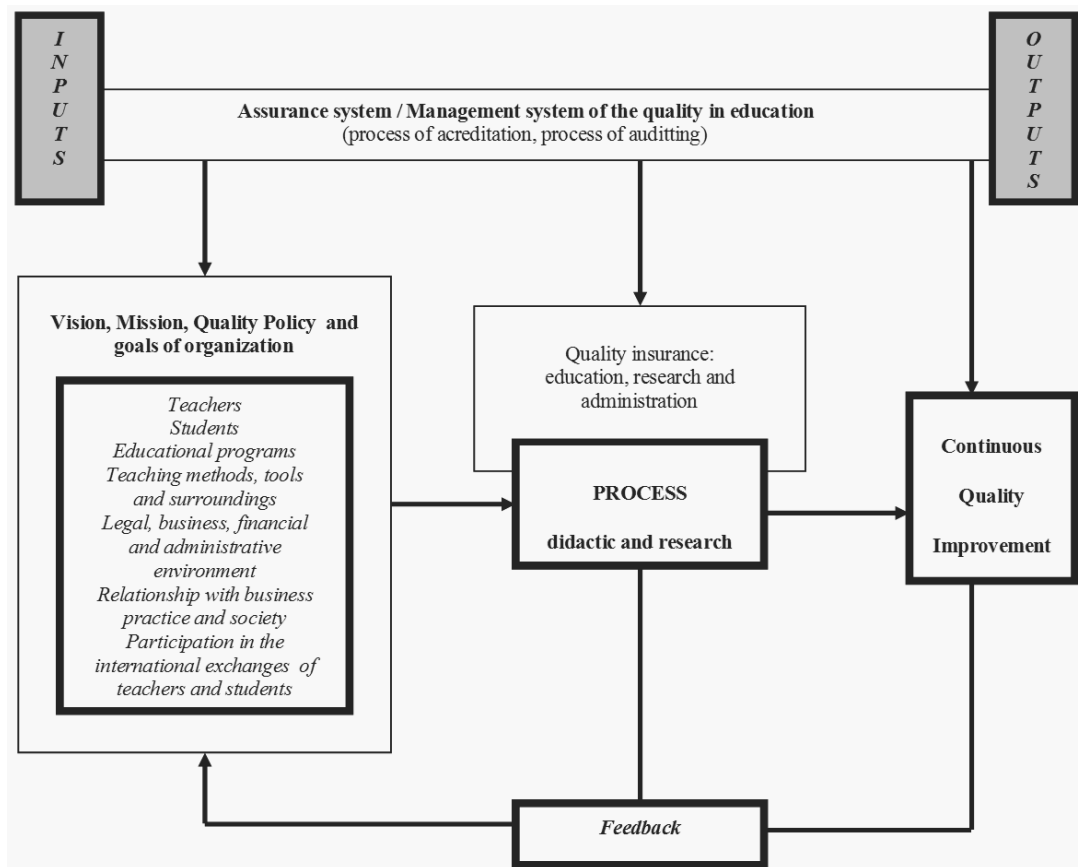


Fig. 2. Quality improvement process in education

The audit of the quality management system is a systematic, independent and documented evaluation made for comparison of the achieved results with the planned results. It is also used as an instrument for evaluation of effectiveness of the management and for evaluation of level of consistency with declared or required standards. The audit is always describing if the quality management system is consistent with planned establishments, if it fulfils the requirements of the norm PN-EN ISO 9001:2009, if the requirements of the quality management system are described by the organization and if the system is effectively introduced and maintained.

The process of education which is the main process of the quality management system in the university consists of lots of compounds: projecting – the plan of the studies, the programs of the subjects, didactic equipment, grades, recruitment, preparation and validation of didactic equipment, the planning of the lectures, the didactic process, professional practices, the process of evaluation (plan and program of the studies, students, employees – by the students, superiors, graduates and employers). Each of above mentioned didactic processes consists of the following elements: purposes, contents and rules of education, forms, methods and remedies of lecturers and students, which also experience the whole course of projecting, validation, evaluation and modernization.

When an audit of the management system processes in the services of education is done one should make an evaluation of the structure of processes and interactions between them. Fixed among research workers feeling of “academic autonomy” is the most important trouble of the modern quality management systems of education. Aversion is associated with testification of the process of education, including its planning, course and results. The introduction of the quality management system do not limit the creative work of the university workers but it forces significant engagement in process of realization of education and not only doing ordered didactic classes. The quality management system forces to determinate purposes, requirements, indicators and criteria of evaluation of all the processes of education. It is important to determine: Who? What? How? When? Where? What results? for all the processes.

## 5. Summary

The quality assurance is not a state but a process which purpose is to tend to perfection in field of its application. The introduction of quality assurance systems of education became a reality, universities fulfilling the legal requirement started this

task and obligation to introduce mechanisms which determine it. The efficiency and effectiveness of these introductions and also their tasks and purposes is becoming an important and particularly present question at the beginning of the way associated with forming the quality standards of education.

Solutions from the sphere of the quality of education utilize rich experience associated with introduction and maintenance of systems based on ISO 9001 standard. It is necessary to begin a discussion which purpose is to create an approach in the field of the quality management systems in the field of education.

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