

MACIEJ SZAFRAŃSKI
MAREK GOLIŃSKI

**INTERACTIVE LABORATORY
OF TECHNICAL
KNOWLEDGE ACCELERATION
IN PROGRAM OF ACCELERATION
OF KNOWLEDGE
OF TECHNOLOGY, MATHEMATICS
AND NATURAL SCIENCE IN POLAND**



Wydawnictwo
Politechniki Poznańskiej

**Maciej Szafranski
Marek Goliński**

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1. Introduction (Maciej Szafrński)

1.1. Program of acceleration of knowledge of technology, mathematics and natural science in Poland¹

Many factors have influence on competitiveness of an economy; one of them, often perceived as a key factor, is **innovativeness**, which has recently been a subject of intensive discussions.

Innovative economy may develop in societies characterized by high level of **human capital**. Development of human capital positively influences the competitiveness of economies.

Development of innovative economies is mainly based on **technical competencies** (fig. 1.1). When acquired and used, they help creating tangible goods, facilitates functioning of the society and creates conditions for its survival and improvement. Development of technical knowledge and its using for constant improvement of **quality of life** is possible thanks to, among others, development of mathematics, statistics and natural science.

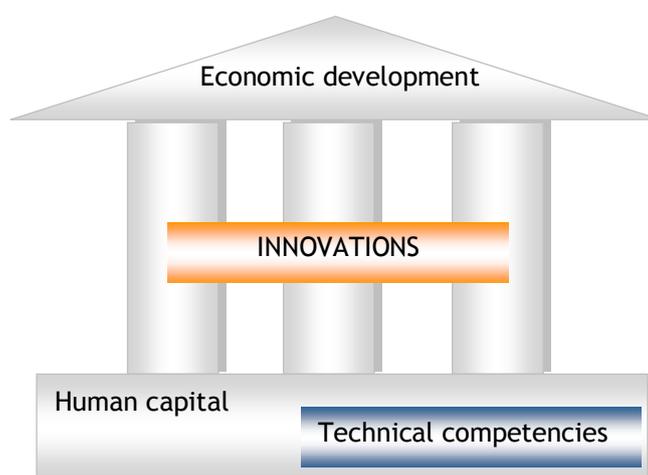


Fig. 1.1. Technical competencies – key factor of increase of economy's innovativeness and competitiveness own work

A process of creation of innovations and adaptation to labor market which is structurally based on advanced technologies requires from a society acquiring proper knowledge and qualifications, which will allow for **efficient adaptation to changing environment**. Moreover, acquiring and deepening knowledge from the field of modern technologies is a way to **prevent social exclusion**. Dynamic development of technical knowledge should trigger off in everyone a necessity of **constant improvement** and monitoring of areas of ignorance, in order to instantly **eliminate gaps in professional competencies and skills useful in life**. Deepening technical knowledge should be a domain of not only graduates of technical studies, but all the people, since **in knowledge society, every member commonly uses the achievements of technology**.

Development of knowledge and technical skills leads to changes in culture. These are multidimensional changes.

¹ This chapter uses the fragments of the introduction to the book called Program akceleracji wiedzy technicznej i matematyczno-przyrodniczej w Polsce (Szafrński M., Grupka K., Goliński M., 2008).

First of all, development of technology resulting from increasing level of knowledge and technical competencies leads to an **increase of quality of life**, which results in an increase of society wellbeing, which in turn translates into a possibility of satisfying higher needs, which include self-accomplishment and spiritual needs. The will to satisfy those needs inclines to participate in cultural life.

Second of all, development of technology leads to an increase of a **work culture**. Higher level of work culture, which can be a result of increasing level of work stand ergonomics, leads to positive economic consequences for both entrepreneurs and entire economy.

Technology development is inevitable. In 19th and 20th century it was the reason of progressive environment degradation. By deepening knowledge and technical skills we can lower its negative impact on environment, which is important not only from the perspective of this generation, but also future generations and complies with a **concept of balanced development**

If the indicators defining the level of innovativeness of Poland are to be improved, first of all we have to take care of **human capital development**, and particularly **technical knowledge** which is one of its major components. But to make it possible, it is first necessary to **trigger in the society a need of** increasing the level of technical knowledge, because this need is not sufficiently high. In order to know how to trigger and maintain this need, it is necessary to conduct adequate **research**. It should contain the issues of **education effectiveness**, so that the results could be used in a process of education quality improvement in the area of technical knowledge and skills and adjustment of created technical knowledge to dynamically changing needs of labor market.

If Poland is to be innovative in a few years or decades, an **organic work** must be performed today, which must result in **systemic solution** regarding constant planning of needs regarding technical knowledge, its creation, usage and development

It should be underlined that actions regarding development of technical knowledge should have open character and include all social groups interested in acquiring this knowledge. Such factors as social status, age, gender, education, health etc. may not be impediments.

Fulfillment of these goals should be possible thanks to a program of **acceleration of technical knowledge** (Szafranski M., Grupka K., Goliński M., 2008), more thoroughly characterized in a book of M. Szafranski, K. Grupka and M. Goliński. It is suggested that the first stage of this program were actions within a pilot group of projects under the name of **Technical Knowledge Accelerator (AWT[®])** [trans. Akcelerator Wiedzy Technicznej].

There is no doubt that as long as man strives at development and improvement of the world in which he lives, development of knowledge, including technical, will take place. A problem worth solving is how to **accelerate** the development of technical, mathematical and natural science knowledge, so that it can be used in economy to most efficiently shorten the period of equalizing the level of innovativeness and competitiveness of Poland and its regions to this of other European countries and other biggest world economies.

Until now, within the Program, two projects financed from EU grants were commenced:

- Wielkopolska system of monitoring and forecasting (vocational education).
- Partnership of science and progress (in regard to promotion of science).

One development project is in the launching stage – An integrated system of access to information in urban area.

One of the planned initiatives in the Program is creating a laboratory of technical knowledge for training of Wielkopolska teachers and students, and further, if possible, creating a network of such laboratories throughout entire Poland.

Interactive laboratory of acceleration of technical knowledge in the Program

Development of innovations is a process occurring in a social and individual dimension. Authors of this book observed that most often innovativeness is perceived in a static approach. The most frequently defined problem is how to move innovativeness from one level to another, when levels are defined with a use of various indicators. With such, exclusively indicator based approach to measure the development of innovativeness, there is a high risk of focusing only on monitoring the results, without paying adequate notice to changes, which yield these results.

Creating innovative solution requires innovative approach, which cannot be learned during a single course or training. Basically, you can't make the subject of activity innovative. Shaping an innovative attitude is a process strictly influencing processes of constructing, creating, devising, pursuing the truth, etc.

A process of shaping innovative attitude in regard to a subject of an action can be perceived as a sub-process in an education process of this subject. It means that in order to make this process effective, it is important to properly prepare all resources at the process entry: teaching subject (teacher, lecturer, etc.), learning subject (student, pupil, etc.), methods and tools. Treating the shaping of innovative attitudes as a process means that it is not a short-term phenomenon, but it stretches in time. This process should be carried out and improved throughout entire life. The sooner the adequate resources are provided in this process, the lower the costs of reaching results in form of competencies regarding creation of innovative solutions will be. Connection between processes of education, shaping innovative attitudes and creating innovative solutions are presented in figure 1.2.

The faster (at the earlier stage) the quality approach is used in the process, the lower the costs of achieving expected quality of a process of shaping innovative attitudes will be. We can analogically refer here to a quality model, commonly used in management, according to which the sooner a possibility of discrepancies is predicted in a process or the sooner the discrepancy is discovered in a process, the lower the costs of achieving satisfactory quality level are² (see: Hamrol A., 2005). If, in a society, high level of solutions' innovativeness is a value, then low level of this innovativeness should be recognized as a discrepancy in a creation process of such solutions. In order to avoid such discrepancies, it is necessary to undertake preventive actions, and if such discrepancy has already occurred, it is necessary to undertake corrective actions. The sooner these actions are undertaken the better.

Presented approach was the backbone of a concept of **interactive laboratory of acceleration of technical knowledge**.

² Cost should be in this case comprehended as the sum of expenses intentionally spent on achieving the goal, expressed in monetary values and a sum of losses connected with quality (because in quality management, losses resulting from bad quality are recorded in an accounting system in such way, that they are presented as one of the cost categories.

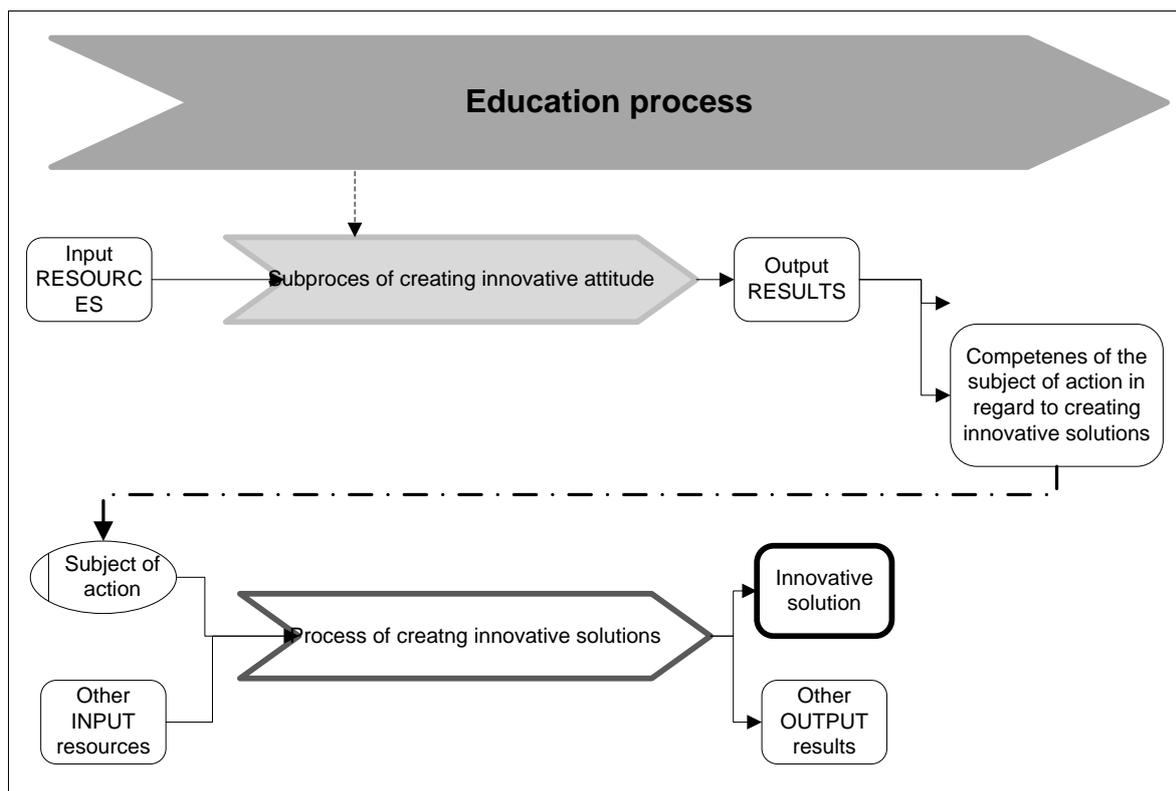


Fig. 1.2. Connection between processes of education, shaping innovative attitudes and creating innovative solutions own work

Based on the experiences of many European countries, its authors believe that it is possible to achieve very good results in shaping innovative attitudes, if this process is initiated at early stages of education process. That is why authors' intent was to create the laboratory for the youngest students. Because of the specification of the call for proposals, for which the application was submitted for the project under the name of “Interactive laboratory of acceleration of technical knowledge” and because of the type of equipment predicted for the laboratory (advanced, specialized, modern devices) it became necessary to design the laboratory to suit the needs of post-secondary schools students.

Interactive laboratory has deeper origins. Primarily it was planned as a **mobile laboratory**, that is a laboratory room installed in a bus, traveling to schools, particularly those poorly equipped.

This primary concept was developed as a result of discussions with representatives of a signatories of a letter of intent, signed in 2007, regarding cooperation in the area of development of knowledge and technical skills in Wielkopolska society³. At that time the main issue was whether to construct in Poznan a large technology center (campus, park) or reach the schools directly. Representatives of some institutions - signatories of the letter of intent claimed that for logistical, organizational, psychological reasons it would have been better to reach schools directly.

Because of the discussed concept of acceleration of development of technical, mathematical and natural—science knowledge in a society, the decision was made to design this mobile laboratory with around ten modern laboratory stands for students to perform experiments. The authors of this idea wanted to reach the maximum number of schools and

³ Full content of the letter of intent along with mentioned signatories was published as an appendix to the book called Program akceleracji wiedzy technicznej i matematyczno-przyrodniczej w Polsce (Szafranski M., Grupka K., Goliński M., 2008).

classes with their mobile laboratory. The objective of this action was to popularize technical solutions, stimulate interest in making experiments, showing relationships between knowledge presented during classes and practical solutions, encouraging students to choose their education path according to the needs of the economy. Every student, who would have used the laboratory, was supposed to have made at least a few experiments.

It should be emphasized that from a European perspective this solution would have not been new. For example in Holland, dedicated vehicles are produced based on truck tractors, which are designed as a mobile classrooms. Using a bus was dictated by lower costs of such solution.

The project application was rejected after an evaluation made by Ministry of National Education. Poor evaluation was a result of such factors as:

- high complexity of the project, which was hard to describe in 20 thousand characters (no possibility to present figures, investment plan, detailed specification, precise description of laboratory stands),
- extending the laboratory with additional functionality (see figure 1.3), which has not gained understanding of the project's evaluators.
- a change in the contest documentation, made by the Ministry of National Education in the middle of the contest - a month after the beginning of the contest and less than a month before its ending, when the application for the described project was nearly finished, MNE at one of its websites added one sentence, which according to the MNE interpretation was merely a specification to the contest documentation, while from the perspective of the team preparing the project, it meant total change of approach toward the concept of the laboratory; from the beneficiary's perspective, the actions of Ministry were unacceptable, but the employees of the Ministry department responsible for the change have not anything unsuitable in their conduct; the specification made to the contest documentation during the contest was in a sentence:

"participation of a student in the project must yield permanent results, therefore every student should be involved in actions (classes) for 3 academic years"⁴.

Entire project of the mobile laboratory was prepared to maximize the number of students participating in classes, so that as many students as possible got in touch with solutions gathered in the bus. Enforcing an obligation of 3 years participation in laboratories for every student, first of all lowered the number of students attending offered laboratories by 60%, and second of all increased by 3 times the cost per unit of students' participation in the project, which drastically lowered its economic efficiency. The authors could chose to either attempt to rewrite the project virtually from scratch or to abandon the idea of mobile laboratory. They have chosen the former.

Despite the failure, they made second attempt to acquire funds for creation of the laboratory. This decision was influenced by the following factors:

- advanced stage of works on the laboratory,
- Large number of people engaged in preparation of the project in:
- Poznan University of Technology, Teachers Training Center in Poznan, Marshal's Office of Wielkopolska Voivodship,
- Introducing a new form of projects in Operational Program Human Capital, that is innovative projects, which could have been done in cooperation with foreign partners (specification of these projects is described in chapter 3 of this book).
- gathered knowledge about the innovative projects,
- interest of a foreign partner in content-related help in creation of the laboratory,

⁴ This specification appeared on March 10, 2009 at <http://efs.men.gov.pl/content/view/73/309/>) and referred to the explanations to contest no 1/POKL/3.3.4/09.

- creating an even stronger team preparing the application

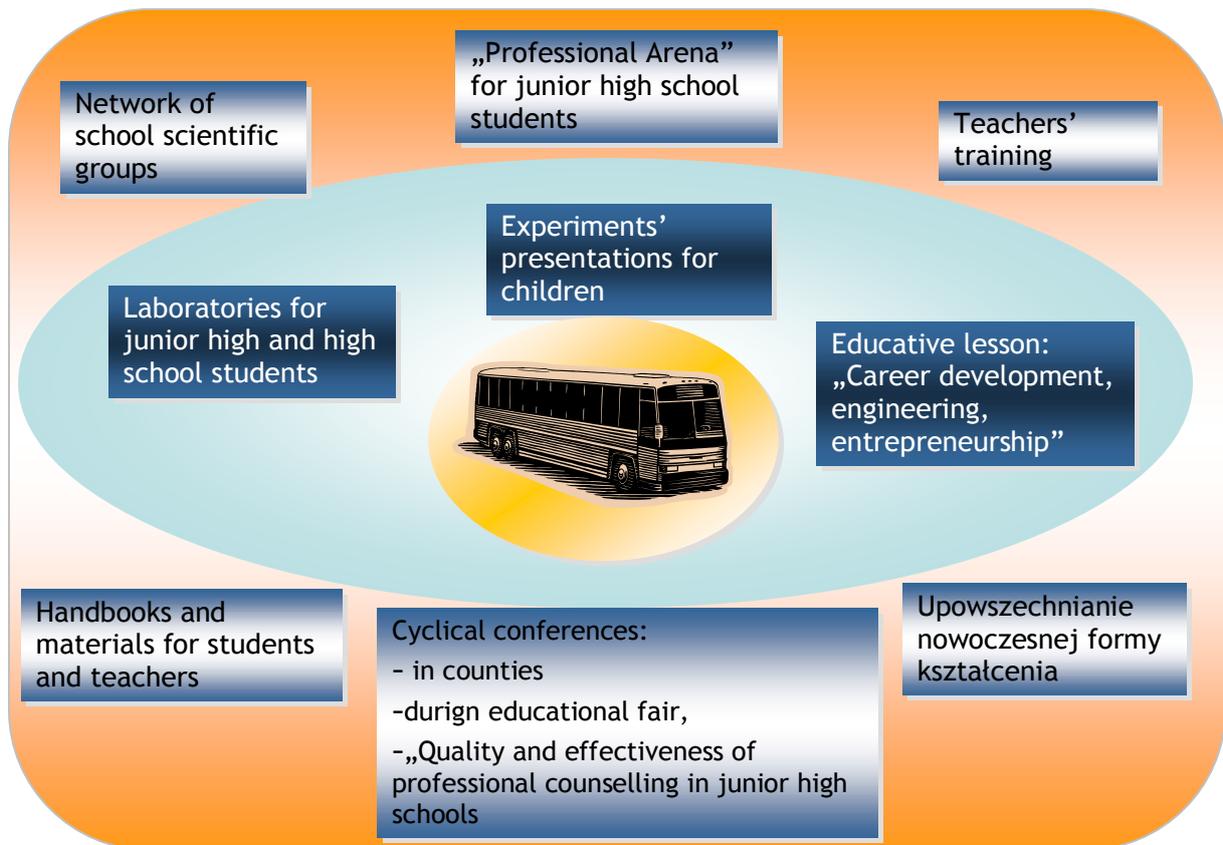


Fig. 1.3. Planned functionality of the mobile laboratory of technical knowledge own work

Experience gained during preparation of the application for the project of mobile laboratory, caused the change in the concept of the laboratory. This change was also a result of a different formula of innovative projects. Prior to commencing works on a project's application, the following assumptions were made:

- laboratory will be stationary,
- its functionality will be changes (see: figure 1.4.),
- scale and scope of the project will e adjusted to the formula of EU projects,
- the project will make use of the experience of a foreign partner, in order to improve the effectiveness and efficiency of a designed solution.

Although the project team consisted of employees of Poznan University of Technology, it was decided in agreement with the Department of Education and Science of Marshal's Office of Wielkopolska Voivodship, that the project will be realized in partnership, under the leadership of Wielkopolska Voivodship. Such solution was chosen first off all to guarantee the continuation of laboratory's functioning after the end of the project. Second of all, education elements of the project were supposed become a responsibility of the Teachers Training Center in Poznan, connected with Marshal's Office, therefore it seemed natural, that the project was managed by the institution responsible for educational, and not organizational, aspects; The role of Poznan University of Technology was to organize the didactic process and guarantee international cooperation, as well and to consult with scientific workers.

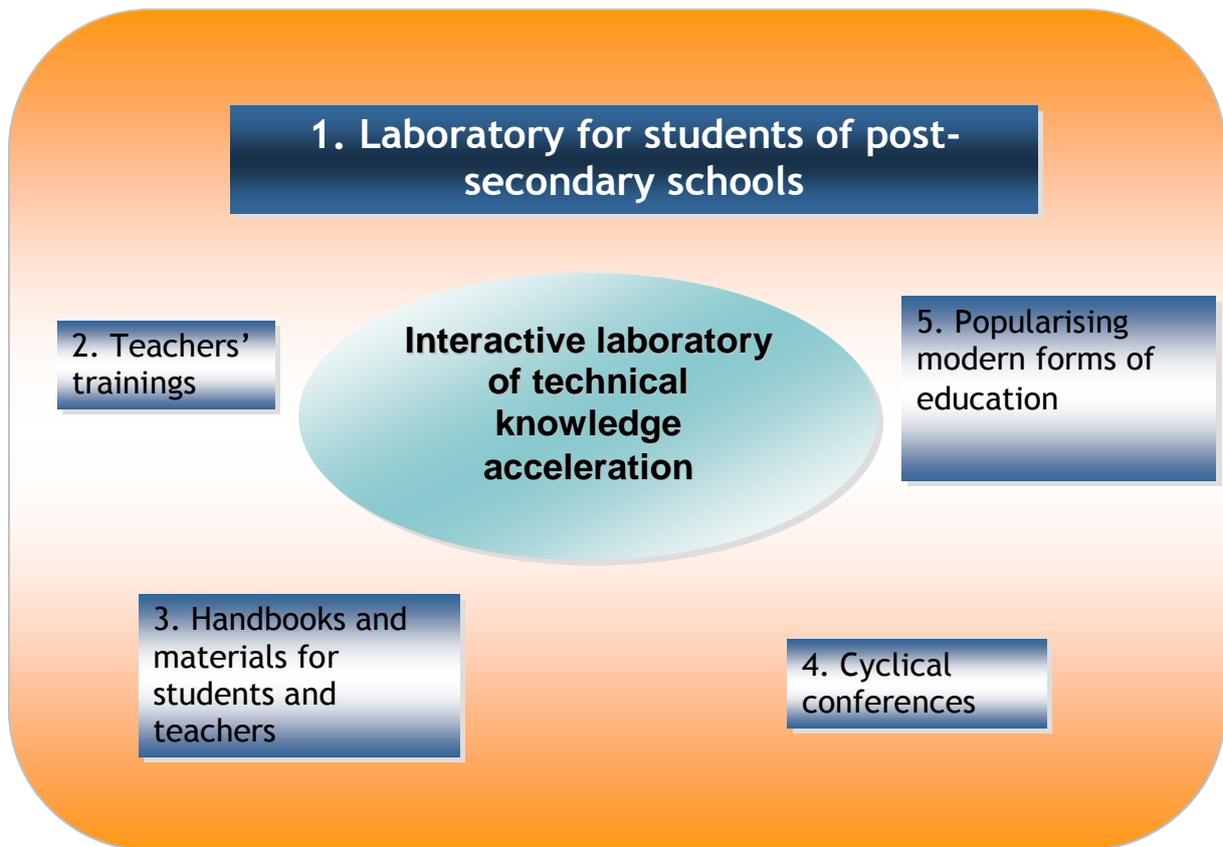


Fig. 1.4 Planned functionality of an interactive laboratory of technical knowledge acceleration own work

1.3. Scope of the document

Next chapters, first of all present basic issues related to innovativeness with particular emphasis on innovativeness in education (chapter 2).

Then, the specificity of the innovation projects and the international cooperation component in these projects was discussed, presenting them in a context of entire Operational Program Human Capital and projects financed from EU funds in general (chapter 3).

Further on, in chapter 4, authors presented in detail the project of Interactive Laboratory of technical knowledge acceleration. A manner of presentation is not typical, and it will be characterized in the introduction to chapter 3. A used manner of presentation results from the will to present the marks given by project's evaluators and felt urge to take an attitude toward them. The marks are related to the content of the application, in which the project was described. Since in the application, the project had to be described synthetically, this book contains additional descriptions of prepared concept of the laboratory, so that the characteristic of the designed product was comprehensible for the reader.

The book is concluded with a summary, which contains, among others, the directions of possible further actions in favor of launching the designed laboratory.

2. INNOVATIONS AND INNOVATIVENESS IN EDUCATION (Marek Goliński)

2.1. Place and importance of innovativeness in economy

Described project of an Interactive Laboratory of technical knowledge acceleration is an example of a fully innovative solution.

System of education constitutes a foundation for functioning of economic system. Investing in education yields observable benefits for entire economy and analogously, mistakes made at an education stage result in consequences in further stages of human life, and consequently for entire society. Education, its development and proper use, which is invariably connected with creative approach to problems' solving is a backbone of a market success. Ability to solve problems is connected with creativity, which lies at the foundation of innovativeness development.

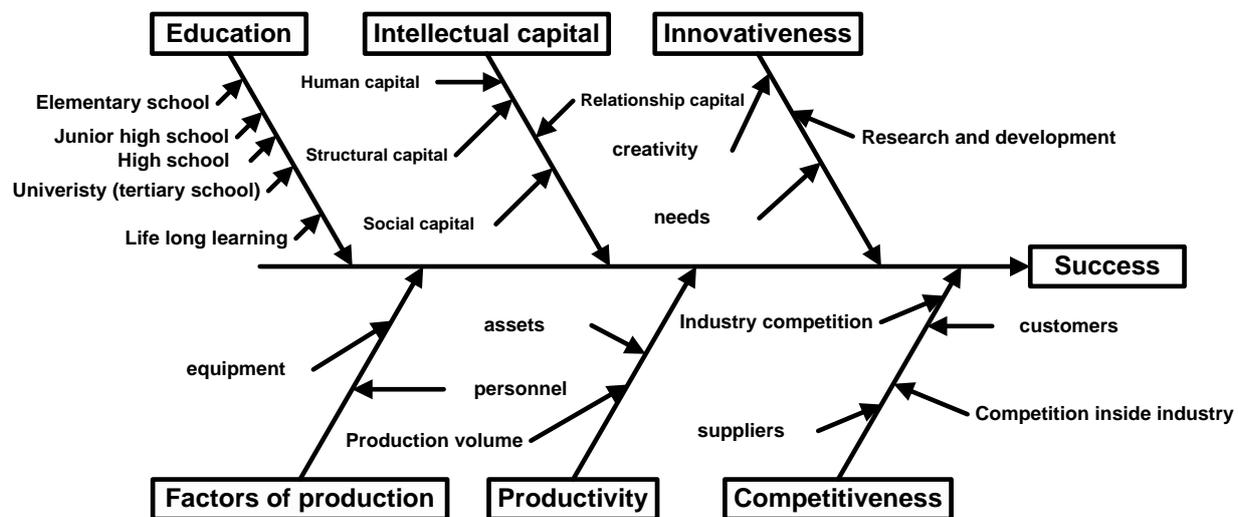


Fig. 2.1 Education and innovativeness as stages of a road to success own work

Every institution must fulfill many requirements to function and develop in a competitive market. A basic development factor of many institutions functioning in a market is achieving assumed economic goals by, among other things, adjusting its actions to market's needs and expectations, which helps achieve competitive advantage.

In conditions of a market economy, innovation became one of the most important factors of achieving competitive advantage, and thus an economic growth. Innovation is described and defined in regard to many forms of human activity, but most frequently it is related to economy practice. In economics, the notion of innovation was introduced by Joseph Schumpeter, who indicated five cases of using innovation:

- introducing new product or new type of products,
- introducing new method of production,
- opening new market,
- gaining new source of materials,
- introducing new organization of an industry (Janasz W. Koziół K, 2007)

"Innovation means introducing new or significantly improved product (good or service) or process, new marketing method or new organizational method in economic practice, organization of a work place or in relationship with environment"; Innovation activity means "all scientific, technical, organizational, financial, commercial activities, which genuinely lead or are intended to lead toward implementation of innovations. Some of these

activities are innovative by their character, some other are not new, but are necessary to implement innovations. Innovative activities also include Research and Development activity, which is not directly related to creation of a specific innovation." (Olso manual, 2008).

Innovative practice is often associated with a notion of management and manifestation of a resourceful activity. Peter Drucker describes innovations as a special managerial tool, which transforms a change into an opportunity to undertake new business activity (Drucker P., 1992). Drucker also indicates situations and conditions which favor the development of innovations. The reasons of these changes are often inside an organization initiating innovation or in organization's environment. Among reasons initiating innovative activities Drucker lists seven most important:

- unexpected success, failure or external event,
- discrepancy between what is and what should be
- a need of a process requiring change,
- constancy of structure of industry and market,
- changes in demography (changes in size, structure, employment, education),
- change in perception (values, social moods),
- new knowledge (Drucker P., 1992)

Interpretation of innovations may be very wide and general, referring the notion of innovations to national economy, changes in industry or changes in social attitudes regarding changes in valuing the surrounding world. Innovation in narrower perspective relate to changes of innovative character realized in industry and services both in regard to products (creating new products, modifying already existing products) and to production processes (improvement).

Kinds of innovations are often distinguished based on their importance for an institution. One of classification divides innovations into:

- **technological, product related** – introducing products with new functionalities, providing the buyers with new or augmented benefits, **process related innovations** – connected with implementation of new or significantly improved methods of production, forms of distribution, changing of production machines and tools or methods of work.
- **organizational innovations** – related to organization of processes or ways of organization of sales, distribution, storage, cooperation with other institutions. Organizational innovations may include innovations not connected with technical innovation, which goal is to improve the performance efficiency and make use of the existing resources or organizational innovations triggered off by technical innovations, which by blending of technical and organizational improvements will lead to an increase of economic effectiveness of an institution.
- **marketing innovations** – changes in the looks of the product, its package, positioning and modifications regarding price and promotion strategy. Marketing innovations aim at better fulfillment of buyers' needs.

Ability to create innovations is based on R&D activity and often boils down to improvement, development and creation of new products, processes or ideas. Subjects capable innovative activities will achieve better competitiveness in the nearest future, which will be reflected in a strong market position.

Regardless to the scope of innovative actions, there are certain areas with which innovations are most frequently associated.

- introducing new products,
- introducing new production methods,
- opening new markets,
- gaining new sources of materials,

- using new organizational techniques (Brzeziński M., 2001).

In all the above mentioned areas, development of innovations requires strong support through research and development activity. The greatest benefits come however from implementing innovations in areas of high technology, including airline industry, manufacturing of computers and office equipment, pharmaceutical and electronic industry (Ways of increasing innovativeness... 2006). High technology industry, along with development of education, science and R&D, business services and sector of services for information society, are the cornerstones of knowledge based economy. Making equal use of innovations and knowledge creates opportunities not only for development of particular enterprises, but also supports technical development and effectively contributes to the development of national economy.

Development of innovativeness in Poland against the background of entire Europe does not look very promising. In EU innovativeness is considered a necessary condition for dynamic growth of economy. At the beginning of a year 2000, an objective was set, according to which European Union was to transform into the most competitive and dynamic knowledge based economy, capable of constant development, with the higher number of better workplaces and social integrity (Poland in Lisbon Strategy... 2003). Main foundation on which the most competitive economy was to be built, should be innovation and development of science and research, which generate the economy and employment growth. One of the conditions of fulfillment of this strategy should be increased financing of research and development to 3% of GDP of European Union – fig.2.2.

Effectiveness connected with using innovations is also connected with a scale of using innovative solutions and areas of economy in which these solutions were implemented. Diversification of using innovations in particular countries is presented in fig. 2.3.

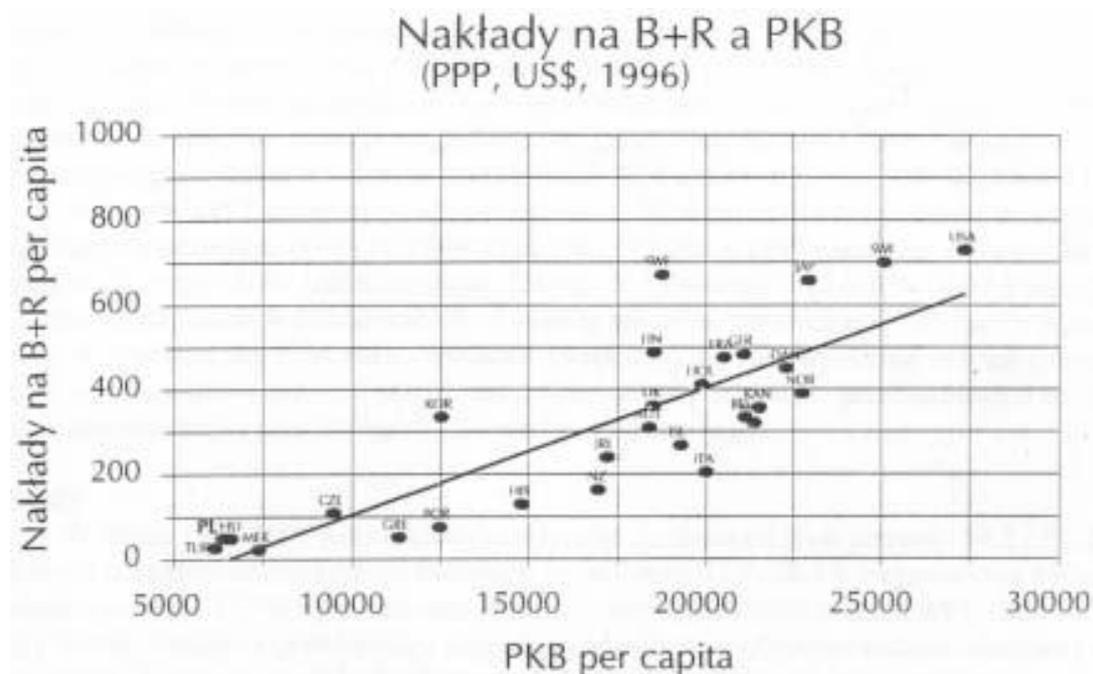


Fig. 2.2. Relationship between R&D and GDP (per capita)

Source: Kierunki zwiększania innowacyjności gospodarki na lata 2007 – 2013, s. 9 [directions of increasing innovativeness of economy for years 2007-2013 p.9

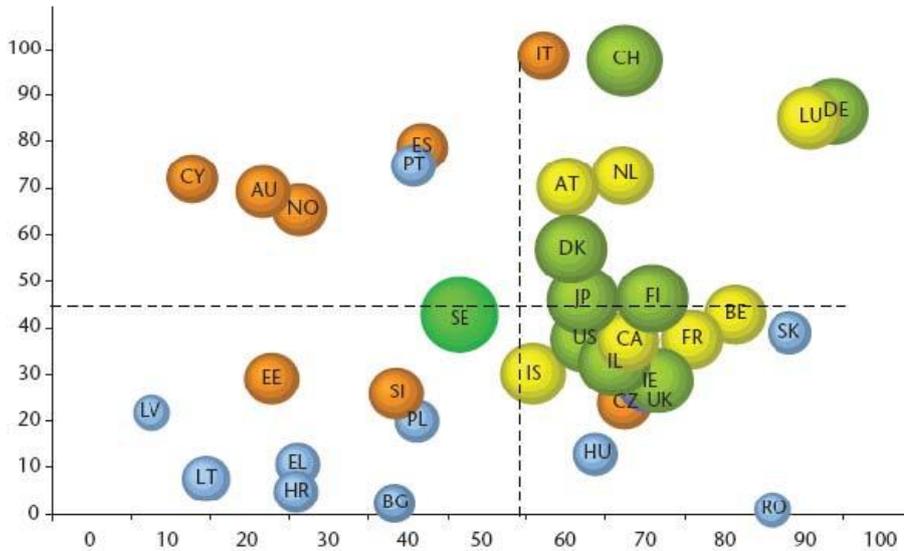


Fig. 2.3 Effectiveness in using innovations

Source: European Innovation Scoreboard 2005, February 2008, p. 24

Taking into account the criteria assessing company's innovativeness may become a manifestation of marketing oriented company management. Novelty – new way of using products, new technologies and new organizational solutions - these are the features expected by the buyers. New methodology of calculating the Summary Innovation Index, which will be used in years 2008-2010 includes 27 compact indexes in the following subject groups:

- motors of innovation understood as human resources, possibilities of projects' financing and governmental support for innovative activities;
- enterprises' activity considering their innovative activities, that is investments, external affiliations and entrepreneurship and indirect results;
- effects of innovative activity, including innovators implementing innovations to the market or within a company, and economic effects of innovations comprehended as employment structure, volume of export and sales.

Selected indexes for evaluation of SII are related to national economy, include connections between science and technology but in the area of company's evaluation, and may define the directions of further development of an organization. Presented below are the indexes connected with enterprises' activity and results of economic activity.

1. Enterprises' activity

Investments

R&D expenses (% of GDP)

1.1.2. IT expenses (% of GDP)

1.1.3. expenses on innovations other than R&D (% of GDP)

External connections and entrepreneurship

1.2.1. % of SME implementing own innovation in total number of SME

1.2.2. % of SME cooperating in the area of innovations in total number of SME

1.2.3. % of companies starting and terminating operation in total number of SME

1.2.4. Number of public-private scientific publication per million citizens.

1.3. Indirect results

1.3.1. Number of patents issued by EPO per million citizens

1.3.2. Number of new community trade marks per million citizens

1.3.3. Number of new community industrial patterns per million citizens

1.3.4. National technology balance of payments (TBP)

2. Results of innovative activity

2.1. Innovators

2.1.1. Technological innovators (innovations within product, service, process) - % of SME

2.1.2. Non-technological innovators (marketing, organizational innovations) - % of SME

2.1.3. Innovators regarding the efficiency of company resources

2.2. Economic results of innovations

2.2.1. % of people employed in medium and high technology sectors of industry in total number of people employed in industry and services

2.2.2. % of people employed in services requiring expert knowledge

2.2.3. % of export of medium and high technology products in total export

2.2.4. % of export of services requiring expert knowledge in total export of services

2.2.5. % of sales of new or modernized products for the market in total sales

2.2.6. % of sales of new or modernized products for companies in total sales

Skillful management of innovations is currently one of the major factors of competitiveness increase of all institutions. Innovative activity has been conducted for decades; it is reflected, for instance, in applying for patents, utility designs, etc. Recently, innovativeness began determining directions of institutions development and include many area of organization's activity. Making decisions, regarding implementation of innovations, may currently be of primary importance for fulfillment of basic goals of an institution.

2.2. Place of innovations in education of high school students

Learning processes are initiated by education processes and include creating awareness of objects and phenomena and are connected with descriptive knowledge.

Present goals of MNE include, among other things: guaranteeing better access to education for the youngest (significant popularization of preschool education), improvement of vocation education quality, opening polish education system to the world, solidifying changes connected with new core curriculum and building a system of flexible adjustment of workers' and employers' needs, connected with program changes and lifelong learning principle (Co warty wiedzieć o kierunkach... 2010) [What you should know about directions2010]

Innovativeness in education refers to a general resources of knowledge, skills and potential contained in humans and society as a whole, describing ability to work, adapt to changes in environment and ability to create new solutions, as the human capital is described (Operational Program Human Capital 2007). Description of human capital is a result of research of scientists in Europe and United States at the beginning of the 90's. Knowledge, in reference to business entities, will be treated as a soft resource, frequently balancing material and energetic resources (Kozłowski A., 2004); however in most cases it is still connected with intellectual potential of workers.

Analyzing issues related to learning processes and development of education system, we should also refer to demographic forecasts, which influence future shape of educational market, and labor market effectively (fig.2.4). For a country and a region, the most important for the development of knowledge, including innovative methods of transferring knowledge, are the education processes connected with available school and after school services, according to Polish system of education.

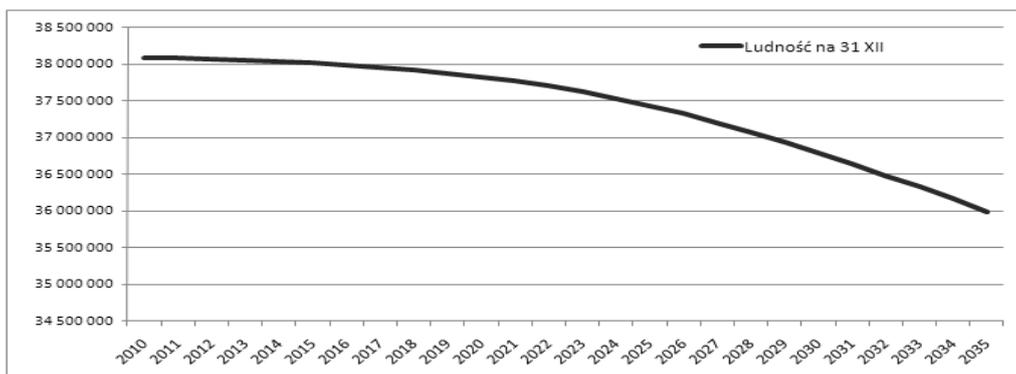


Fig. 2.4. Population forecast for years 2010-2035

Source: Population forecast for years 2008-2035, Natural and migration movement of population in years 2008-2035, information note of GUS, Warszawa 2008]

Number of students at particular levels of education will have very strong influence on a selection of teaching methods and tools. Structure of students, considering their place of residence will also be important for educational systems planning. Demographical forecasts connected with a period of educational activeness referring to year 2002 is presented in fig.2.5. Continuation of educational process after postsecondary schools, is done in colleges and universities. In the academic year 2008/2009, there were 456 higher education facilities of all types in Poland, of which a part was non-public schools.

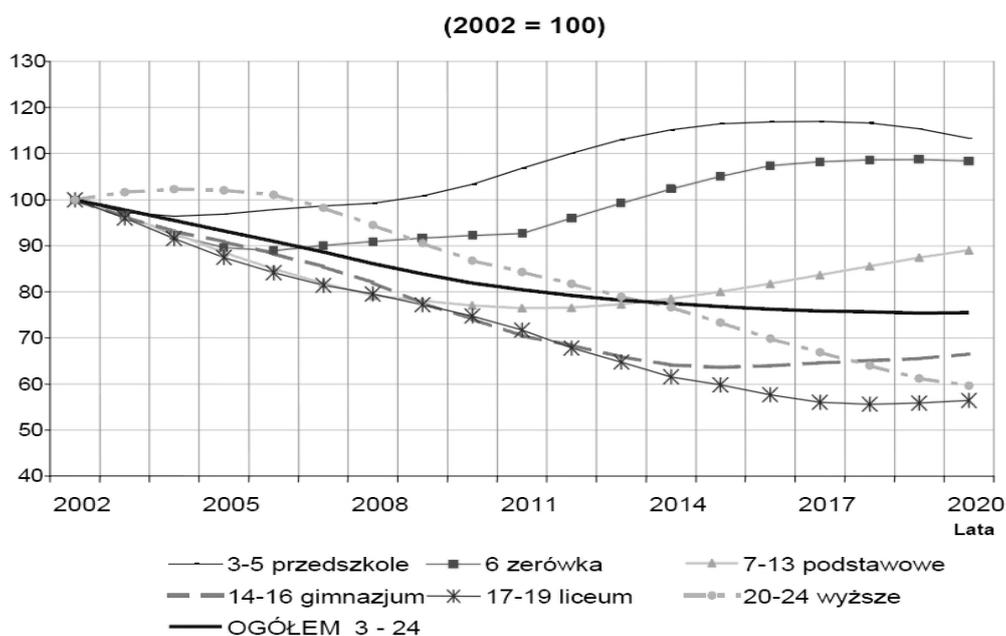


Fig. 2.5. Predicted demographical trends divided into particular age groups, Poland 2002-2020.

Source: National Operational Program development plan 2007-2013, Education and competencies – project version from September 12th, 2005, Warszawa 2005]

Education and innovation should be discussed in close relation to technological progress, which is better implemented in cooperation with younger and well educated people, who have better access to trainings and further increase of qualifications. In Poland, despite development progress, educational system cannot keep pace with technological challenges (National Operational Program ..., 2005).

High pace of information-communication technologies development leads to the rise of information society, for which access to computers, Internet and information is of primary

importance. Information and services connected with information management become the most sought product. Making use of information technology generate cost savings and competitiveness increase for entire economy. Not all social groups can make equal use of information transmitted with modern methods. It is different for economy and different for education. In 2008, 95% of Polish companies used computers, and 93% had access to Internet, while educational workers declared as their major sources of knowledge: conversations with coworkers (78%), reading legal acts, regulations (78,1%) and materials received at trainings (77,8%) (Fazlagić J, 2009).

Human, acquiring knowledge and necessary skills throughout entire life, is the center of interest in education process. Subjects participating in education process may also be listed according to the time in which the accompany socio-economic development of a human. Educational process includes first of all a formal and informal cycle of education, preparing for functioning in labor market, which is supplemented along with the needs with qualification and skills required in professional and private life.

3. INNOVATIVENESS IN PROJECTS REALIZED WITHIN OPERATIONAL PROGRAM HUMAN CAPITAL (*Maciej Szafranski*)

3.1. Financing in EU programs

Chapter 3 presents synthetically the issue of financing the projects from European Union funds. The goal of this presentation is to merely introduce to the issues presented in chapter 4, devoted to description of a project of interactive laboratory of acceleration of technical, mathematical and natural science knowledge. This book will not discuss the entire complexity of issues regarding the EU financing. The readers interested in the subject of EU resources are kindly requested to redirect to a the website: <http://www.funduszeuropejskie.gov.pl> and to the website of Ministry of Regional Development, where they can find real time updated materials describing the principles of financing from EU resources. More demanding readers are encouraged to get familiar with the web page of European Commission: <http://ec.europa.eu/>.

Taking into consideration that most of current information regarding issues related to financing from European Union can be found on thematic websites, they are being referred to in this chapter instead of book publications.

A number of initiatives/activities in European Union is financed from EU resources. As we can read at one of the websites concerning financing within EU: “European Union financial resources are gathered by member countries and transferred to union budget. According to the law, these funds constitute private resources of European Union. Resources is the EU budget come from three major sources:

- custom duties collected from goods imported from non EU countries (so called traditional own resources of EU)
- from VAT (value added tax) - it is a defined percent, which a given country has to pay to the Union from VAT incomes).
- from resources dependent on national income of every member country (each country pays 0,73 percent of its Gross National Product (GNP) to Union budget; it is currently the biggest source of European Union financial resources [...]).

Annual budgets of EU function within long-term budgets. Annual budget very much resembles national budget [...]. Long-term budget (so called financial perspective) on the other hand, is a financial plan, in which only limits of expenses in particular budget positions are defined.⁵

Current perspective comprises years 2007-2013. Financing from EU resources is mainly conducted within three major structural funds. These are:

- European Regional Development Fund (ERDF)
- European Social Fund (ESF)
- Cohesion Fund (CF)

We may not forget however about other important funds and initiatives, such as for example: European Agricultural Fund for Rural Development (EAFRD), European Fisheries Fund (EFF), Community Initiatives (Jaspers, Jessica, Jeremie).

The undertaking described in this book can be financed from the resources of European Social Fund, hence only this fund will be discussed more thoroughly.

⁵ <http://www.funduszeuropejskie.gov.pl/WstepDoFunduszyEuropejskich/Strony/Czysafundusze.aspx>, 2010-11-23.

3.2. European Social Fund (ESF)

European Social Fund (ESF) has been existing since 1957. It is commonly described on websites devoted to financing from union resources⁶, but it is also characterized in many scientific publications. ESF is devoted to financing of so called soft projects (not investments), which goal is the development of human capital. Financing within ESF is done in five areas:

1. development and support for active policies toward labor market, in order to: counteract and prevent unemployment, contribute to returning to the market of the long-term unemployed and support young people and people returning to the labor market;
2. support and contribute to guaranteeing equal opportunities in accessing labor market;
3. support and improvement of training, education and vocational counseling systems;
4. support of educated, qualified, trained people, capable of adjustment, support of innovativeness and possibility to adjust to work organization, development of entrepreneurship, creating new work places and conditions favoring increase of qualifications and workers' potential in the area of research, knowledge and technology;
5. improvement of access to labor market for women: (Uryga J, Magielski W., Bienias I., 2007)

3.3. Operational Program Human Capital

A process of spending union funds had to be organized. Priorities and areas of use as well as a system of implementation of union funds were described in a document called "national strategic reference framework 2007-2013 in support of growth and jobs. National coherence strategy." (MRD, may 2007). The document also describes goals to be achieved in years 2007-2013. In order to guarantee efficient organizational realization of these goals, it was located within several operational programs. These are:

- Infrastructure and Environment - financed from ERDF and CF,
- Innovative Economy– ERDF,
- Human Capital – ESF,
- 16 regional programs – ERDF,
- Development of Eastern Poland – ERDF,
- Technical Assistance - ERDF
- European Territorial Cooperation - ERDF

One of the programs, Operational Program Human Capital, is entirely financed from the above mentioned European Social Fund (ESF). Basic principles of this program functioning were described in a document called "Operational Program Human Capital. National Strategic Reference Framework 2007-2013" issued by the Ministry of Regional Development (MRD, September 2007).

The objective of "Operational Program HUMAN CAPITAL" is to enable making full use of human resources potential by increasing the employment and adaptation potential of companies and their employees, increasing the level of society education, reducing the areas of social exclusion and supporting the development of administrative structures of a country (MRD, September 2007). The program comprises ten priorities divided into two groups: realized on a central and regional level. These are:

⁶ <http://www.funduszeuropejskie.gov.pl/WstepDoFunduszyEuropejskich/Strony/CelePolitykiSpojnosci.aspx>, 2010-11-23.

Priority I. Employment and social integration.

Priority II. Development of human resources and adaptation potential of enterprises and improvement of health conditions of working persons.

Priority III. High quality of the educational system.

Priority IV. Tertiary education and science.

Priority V. Good governance

Priority VI. The labor market open for all.

Priority VII. Promotion of social integration.

Priority VIII. Regional human resources for the economy.

Priority IX. Development of education and competencies in the regions

Priority X. Technical Assistance

The goals formulated in Operational Program Human Capital (OP HC) include:

- main goal – increase of employment level and social integration,
- specific goals:
 - adjusting human resources to changing situation in a labor market,
 - reducing the areas of social exclusion,
 - increasing the level and quality of society education and connecting them with labor market,
 - support for creation of efficient and partnership oriented country,
 - increase of territorial integration.

Detailed information about the functioning of OP HC, as well as the collection of most important documents, based on which the program is realized, can be found at <http://www.efs.gov.pl>.

From the perspective of the project, which is the subject of this publication, particularly important is priority III – High quality of educational system.

As stated in “Detailed description of priorities of Operational Program Human Capital 2007-2013” (MRD, June 2010), a document which more thoroughly describes all priorities in the Program, the objective of measures within Priority III is: “increasing the quality of functioning of education system and provides for introduction of systemic solutions as regards monitoring and evaluation, development of educational research and linking them with education policy” (MRD, June 2010), as well as “aiming at greater effectiveness of pedagogical supervision exercised by Education Superintendents”. (MRD, June 2010).

Within each priority there are measures and sub-measures to which financial resources are assigned, reserved for a given priority. These resources may be acquired for realization of projects by authorized subjects in a contest mode, or the projects realized as systemic by an institution, which distributed resources within a given priority.

The institution responsible for reaching goals in Priority III, a so called Intermediate Body, is Ministry of National Education.

Measures and sub-measures in Priority III are presented in table 3.1.

Table 3.1. Measures and sub-measures in Priority III of Operational Program Human Capital.

Priority III "High quality of educational system"	
Measure 3.1	Modernization of the management and supervision system in education
Sub-measure 3.1.1	Creating conditions and tools for education system monitoring, evaluation and research – systemic projects
Sub-measure 3.1.2	Modernization of pedagogical supervision system – systemic projects
Measure 3.2	Development of the external exams system – systemic projects
Measure 3.3	Increasing quality of education
Sub-measure 3.3.1	Effective systems of teachers education and in-service training- systemic projects
Sub-measure 3.3.2	Effective systems of teachers education and in-service training- call for proposals projects
Sub-measure 3.3.3	Modernization of education’s content and methods – systemic projects
Sub-measure 3.3.4	Modernization of education’s content and methods – call for proposals projects
Measure 3.4	Education system openness in the context of lifelong learning
Sub-measure 3.4.1	Development and implementation of the national qualification system – systemic projects
Sub-measure 3.4.2	Popularization of lifelong learning – systemic projects
Sub-measure 3.4.3	Popularization of lifelong learning – call for proposal projects

Source: based on Detailed description of the priorities of Human Capital Operational Program 2007 – 2013”, Ministry of Regional Development, Warszawa, June 1st, 2010.

http://www.efs.gov.pl/Dokumenty/Lists/Dokumenty%20programowe/Attachments/89/SzOP_1405_ost.pdf, 2010-11-23

3.4. Innovativeness in OP HC and innovative projects.

A key requirement set for the projects, which are financed from union resources is high level of innovativeness. The issue of innovativeness was described in chapter two, therefore here we will only specify how it is comprehended in Operational Program Human Capital.

Notion of “innovation” refers in OP HC to “creating something new, therefore innovation is most often defined as a process in which current possibilities are transformed into new ideas and implemented in practical use” (Innovative projects, 2009). A definition from Oslo Handbook is also cited, which “indicates practical character of innovations, defining it as an implementation of a new or significant improvement of an existing product (goods or services), new marketing methods or organizational methods in business activity, work organization or regarding external relationships. A minimal condition to concede something as innovation, according to this definition, is newness (or novelty) for someone implementing this innovation (organization, company)” (Innovative projects, 2009).

Although innovativeness is assumed in all OP HC projects, a special group of projects called “innovative projects” is also distinguished in the Program. In these projects it is important not only to include aspects of innovativeness but developing innovative solution becomes a primary objective. In these projects, final results are perceived differently. Additionally, a way to reach an innovative solution is much more formalized than in case of achieving goals of standard projects within the Program. The essence of innovative projects in OP HC can be described by the following issues:

1. “The goal of an innovative project is to find new, better, more effective ways of solving problems included in the ESF area of support.

2. Innovative project should be focused on research and development and/or popularization and implementation in practice of specific products, used to solve problems of target groups, and not directly solving these problems.
3. Innovative project is not meant to solve the problems of target groups, but to solve problems resulting from lack of proper instruments, which could be used to support the target groups.” (Od pomysłu...., 2009) [From idea...]

In OP HC there are two types of innovative projects:

- testing innovative projects,
- popularizing innovative projects.

Table 3.2 presents the difference between these two types of projects.

Table 3.2. Difference between testing innovative project and popularizing innovative project in OP HC.

testing innovative projects,	popularizing innovative projects.
their goal is to create, popularize and include new solutions in the main stream of politics ⁷ (testing innovative projects must be focused on research and development of a specific product).	their goal is not to develop a new product, but to popularize and include in the main stream of politics good practices/solutions developed within other program or projects in OP HC.

Source: based on: Od pomysłu do projektu innowacyjnego. Fundacja „Fundusz współpracy”, Warszawa 2009. [From idea to innovative project]

Testing innovative projects are realized in two stages:

- first stage: preparation,
- second stage: implementation.

Basic steps in realization of stage one are:

- diagnosis and analysis of a problem
- creating partnership (international)
- developing initial version of a product
- developing the strategy of implementation of a testing innovative project
- opinion of a subject network
- evaluation of a strategy by a verifying institution.

Basic steps in realization of stage two are:

- testing of a product,
- analysis of actual results of product's testing,
- development of a product based on the results of analysis,
- product's validation.

Both stage also include a task of popularization of a product and introducing it to the main stream of politics⁸.

Innovative projects may be enriched with a component of international cooperation, which detailed principles have been described in a handbook called Projects of international cooperation (Projekty współpracy...., Warszawa 2009). The essence of international cooperation in innovative projects is to enrich the developed product with a solution or good practices used in a country of a foreign partner.

⁷ Inclusion to the mainstream of policy means performing actions, which enable connection of developed solutions within testing innovative projects with existing legal regulations or policies at the regional or national level, or can be used as a result of changes introduced in these documents.

⁸ Compare.: Appendix 1 i 2 [w]: Od pomysłu do projektu innowacyjnego. Fundacja „Fundusz współpracy”, Warszawa 2009.

4. PROJECT OF AN INTERACTIVE LABORATORY OF TECHNICAL KNOWLEDGE ACCELERATION (*Maciej Szafranski*)

4.1. Specification of a project description

Applications submitted in response to call for proposals regarding testing innovative projects of Operational Program Human Capital have to be prepared according to strict rules of creating project's description. Presented below are the examples of the selected rules:

- 1) Description is created in the following points:
 - justification of a need of realization and the goal of the project,
 - innovativeness,
 - measures,
 - results,
 - potential of the project's initiator and project's management.
 - 2) Description must not exceed thirty thousand characters, including spaces.
 - 3) Description must not contain figures, charts, tables, patterns, formulas created in formula editors.
 - 4) Description principles are identical regardless to the value and organizational complexity of a project.
 - 5) Description is supplemented with a schedule and budget of the project, which constitute an integrated part of the application.
 - 6) Application is created in the application generator available on websites.
- Using the above listed principles leads to certain consequences.

- 1) Large, complex organizational projects are much harder to plausibly describe than small projects or large projects but with simple organizational structure (such as publishing 100 thousands of handbooks, organizing a 100 repeatable training for a selected target group etc.)
- 2) Large, complex organizational projects are perceived as more risky, because it is not possible to include any additional documents to an application, such as for instance, project's specification, detailed plan of actions including detailed financial and organizational plan.
- 3) More complex elements of the project cannot be visualized with figures, photographs, charts, which undeniably facilitate comprehension of the specificity of the solution presented in projects, particularly innovative projects, which are realized in order to develop a new product.
- 4) The result of a 30 thousand characters limit is that quite commonly the rules of Polish written language are violated: words are abbreviated, spaces avoided, etc. Moreover, part of the content which does not fit into the description, is included in the schedule and budget as a justification to the budget positions. Such approach divides the consistent, logical description into fragments presented in different parts of an application. Project's evaluators may naturally get lost in such description, overlook some information or not take it into consideration, treating (wrongly) the application description as the only element used for evaluation of the presented solution.
- 5) Division of a description into points is mainly an effect of an objective based management methodology used in OP HC. Regarding general principles this methodology is correct. It is assumed that an applicant should clearly state a problem, define goals which fulfillment would lead to solving the problem, describe what actions would be undertaken to achieve the goals and indicate what resources will be used over the period of time. Somewhat problematic is the notion

of result in OP HC. The author of this part of monograph devoted a lot of time to studies on efficiency, particularly in the context of quality management (Szafranski M, 2006, Szafranski M., 2007) and believes that OP HC introduces too many terms, which leads to difficulties in preparation of a project description. First of all, goals and results are formulated so that it was possible to evaluate the planned efficiency of actions. Principles of goals and results description used in OP HC force the applicants to formulate an excessive number of indicators, which inevitably become inconsistent or at best the consistency has to be artificially proven. In the description, the applicant is obliged to follow the following rules:

Defining a goal → improvement of skills of trainees
 Defining goals indicators → improvement in 30% of trainees
 Description of measures → training of this number of people in this or that way
 Formulating results ?????
 Defining results indicators → ????

In practical application writing, results are formulated differently than goals and their indicators must be formulated differently than those referring to the goals.

It should follow such pattern:

Defining a goal → improvement of skills of trainees
 Defining goals indicators → improvement in 30% of trainees
 Description of measures → training of this number of people in this or that way
 Formulating results improvement of skills of trainees
 Defining results indicators → improvement in 30% of trainees

As shown, the content of goal and result should be identical, because the only difference between them is that the goal is a measured results and the result used in OP HC is in fact an actually achieved result. An applicant's intent is obviously to achieve 100% of the goal, which content is defined by the formulated indicator (unless the applicant accepts certain deviations already at a design stage). In that case, it truly makes no sense to formulate a result and its indicator in an application. The procedure should thus be the following:

Defining a goal → improvement of skills in 30% of trainees
 Description of measures → training of this number of people in this or that way
 (maximum assumed deviation from the formulated goal → 5% less trainees than intended, whose skills improved)

Every other approach should be considered harmful from the content related perspective, unjustified from the perspective of enterprise management, leaving space for abuse (not necessarily deliberate) in the process of applications' evaluation.

Presented specificity of innovative projects' evaluation in OP HC was taken into consideration in the description of the project "Interactive laboratory of acceleration of technical, mathematical and natural science knowledge", which was presented in chapter 1.

The project will be described in more details in further chapters. The description will include citations from the application. Because one of the subchapters will include a criticism of evaluation of the presented projects, the content taken directly from the application will be

presented in italics. The texts were slightly edited to make them linguistically correct. Since part of the explanations was presented in application beside the main description content (in budget and schedule), the descriptions will be supplemented with this content. These and all other supplementations will be presented in regular font or in form of footnotes.

Some data, such as those regarding unemployment may already be out of date, as the application was created in 2009.

4.2. Genesis of the project (justification of a need of realization)

This chapter generally refers to the content of point 3.1. of the application: “Justification of a need of realization...”. The need of realization was justified in the following way.

Lack of connections between education programs of physics and mathematics in technical schools and high schools and the education programs in post-secondary technical schools. Technical universities attempt to adjust the knowledge and skills of students to the standards of education at higher education facilities, but at this stage of education, these are mainly corrective actions, which are more expensive and less effective than preventive actions (a known and unsolved problem).

The analysis made at Poznan University of Technology indicates that students, more women than men, are afraid of studying at technical majors, which confirms the existence of a stereotype of perceiving technical professions as “masculine”. Very commonly natural science classes, particularly physics, lack reference to scientific solutions used in business. It is enough to follow the content of matriculation tests from physics or math to become convinced that these test in majority have no reference to life problems and real business solutions (Osiągnięcia..., 2009, Wyniki egzaminu maturalnego, Raport OKE w Poznaniu, 2009). [Achievements..., 2009, Results of matriculation exam, Report of OKE in Poznan]

First problem is mainly a result of insufficient relationship between teachers and scientists (overlooked problem). Lack of cooperation in creating education programs for schools, particularly technical schools and high schools, translates into lack of adjustment of high school graduates to requirements set at technical universities. It seems that process approach is necessary in a creation process, which will transform into systemic solutions other than incidental (shows, exhibitions, presentations, excursions).

Second indicated problem is a result of low attractiveness of physics and other classes, insufficient investments in these subjects, which results in using obsolete equipment and insufficient amount of physics, mathematics and technique classes, limited offer of extracurricular technical and natural science classes (observed but unsolved problem).

A problem is also a small amount of women at technical universities. Analysis of candidates for technical studies in Wielkopolska shows that women are more mobile (candidates come from all around Poland), which confirms their greater involvement in a knowledge gaining process, yet the percent of female students at the technical universities is only 20%. Consequently, less women perform jobs connected with technology. The origins of this problem lie both in the mentioned fear of studying in technical majors and in stereotype perception of professions and social roles.

There are no regional solutions regarding attractiveness improvement of education in the area of technical and natural sciences. The benefit of creating regional solutions is taking into account the potential of academic and school teachers, making use of experience, but also considering the limitations. There is no general model of creating regional solutions, which could be implemented in various regions (new problem).

Discussions led by project team members in a school and academic environment prove that the experience of foreign institutions regarding the improvement of education methods

are not being used. It might be particularly interesting to learn the methods of acquiring skills, and not just knowledge, used by students (a hitherto avoided problem).

Unattractiveness of classes in the field of mathematics, technology and natural science leads to a situation, where according to OKE data, these subjects are least frequently chosen during matriculation exam⁹, which is reflected in a small number of students in technical majors and creates a danger of insufficient number of specialists in the key domains for economy, not only in Wielkopolska. Reluctance towards these majors translates into choosing majors, which graduates have difficulties in finding employment, as their competencies are divergent with labor market requirements. According to the information from District Employment Agency in Poznan, this problem touches more the unemployed women – 55,65% of all unemployed¹⁰.

The presented problems indicate that in Wielkopolska, there is a need for innovative programmatic, organizational and methodical solutions regarding education of mathematics, technology and natural sciences, which development enhance the economic development.

The project fits into the development strategy of Wielkopolska Voivodship and other regional strategies, referred to in the development strategy of Wielkopolska Voivodship, is complementary with an Employment Strategy of Wielkopolska Voivodship and Strategy of Education Development in a voivodship in the area of supporting education of professions for economy.

4.3. Project goals¹¹

General goal of the project is to link education programs of secondary technical schools and high schools with education programs of technical universities as well as practical business solutions by developing innovative tools used to improve the attractiveness of conveying knowledge of mathematics, technology and natural science in perspective of the labor market needs.

For the general goal there are two general goal indicators:

- 80% of students participating in tests will have necessary knowledge and skills to relate the material learned during the class to the practical economic solutions.
- 90% of teachers will positively evaluate the received tools.

Particular goals are the following:

- Increasing the interest of students, particularly girls, of secondary technical schools and high schools in Wielkopolska, in choosing technical majors, in case of a declared will of continuing education after high school (indicator: interest increase of 20%, including 60% women)
- Improvement of preparation of Wielkopolska secondary technical schools and high schools students participating in the project, to study in technical majors (indicator: increasing the number of students achieving positive results in pre-matriculation test by 40%, in the group participating in the project).
- getting familiar with innovative forms of gaining knowledge, based on experience of the foreign partner, scientific bodies, Wielkopolska school workers (indicator: at least 500 people included in the popularization activities)

⁹ Since 2010 the matriculation exam from math is no longer compulsory, but it used to be when the application was written.

¹⁰ Data from November 2011.

¹¹ Goals were described in point 3.1. of the application "Justification of the need of realization and the goal of the project".

- *improvement of cooperation between scientific bodies, schools, authorities and methodologists in Wielkopolska (indicator: engaging in cooperation at least 5 institutions).*

All project goals are consistent with the goals of OP HC in regard to supporting development of education areas important for modern economy. The goals also fit into the goals of Priority III, as they assume modernization of an education process in regard to the economic needs and development of innovative education programs along with teaching materials, used to train key competencies in the area of mathematics, technology and natural science.

A developed program will become a permanent stimulus, positively influencing students' decisions to choose key majors, which is consistent with the subject of the contest.

4.4. Target groups in the project¹²

In testing innovative projects there are basically two target groups: users and receivers.

Users are: "those who gain new methods of acting, new technologies, new tools" (From idea..., 2009), and receivers are: "those, whose problems will be possible to be successfully solved" (From idea..., 2009).

Project users are teachers.

Testing phase of the project foresees the participation of 35 high school and technical secondary schools teachers, who will become a sample of testers. Choice of secondary technical schools and high schools is dictated by the necessity to tie teaching programs with tertiary studies, and the graduates of these schools are the candidates for technical majors. In the popularization phase, a participation of 500 teachers from Wielkopolska was planned. This number includes only users who will participate in workshops. Additional representatives will participate in other activities, such as debates. Selection of teachers will be made based on result of research conducted within task 3¹³, which will enable choosing representative sample in regard to region, type of schools, kinds of subjects, and also gender (people will be selected to the testers' group according to the existing proportion of genders).

Declarations of participation was submitted by teachers during preliminary discussion over the project.

Project's receivers are students of secondary technical schools and high schools from Wielkopolska.

In a testing stage a participation of 960 students of secondary technical schools and high schools from Wielkopolska was predicted (according to the existing gender proportion) All students will participate in testing classes in schools and in the laboratory (also during summer classes) with a use of developed teaching programs and materials. Selection of a representative sample of students will be made based on research conducted in task 3, in regard to such criteria as: level of knowledge, family incomes, gender.

To facilitate participation of teachers and student, who will be asked by teachers to participate in the project, the tasks will be realized during classes. ODN and Department of Education and Science of Wielkopolska Voivodship will be responsible for proper cooperation with schools. Representatives of target groups will be engaged in development of a system, from preparation stage of an initial version of a product until the popularization stage. Such combination of target groups is innovative. Previous attempts were usually focused on solving problems of particular subgroups; separate treatment of these groups is a mistake and one of the reasons of failures in creating systemic solutions. Measures undertaken so far, in regard to the group of both users and receivers, are insufficient.

¹² Description of target groups was made in point 3.1. Justification of realization and the goal of the project.

¹³ Task's name: Deepened diagnosis and analysis of problems.

The project does not mention people who will be encompassed by a wide range of popularization activities, as the informative actions are supposed to reach the biggest number of receivers in schools, authorities, media etc.

4.5. Innovativeness in the project¹⁴

The notion of innovativeness was broadly discussed in chapter 2. Additionally, chapter 3 describes the specificity of innovative projects. Having accepted the described understanding of a notion of innovation and having considered the principles of innovative projects evaluation included in appendix 8 of the Handbook for innovative project initiators in OP HC (From idea..., 2009), the authors presented in an application the innovative character of the solution planned in the project, in form of an interactive laboratory of technical knowledge acceleration.

Considering the forms of support available for innovative projects the authors decided that: *“Innovativeness of the project is reflected in dimensions of forms of support and problems”*

Dimension of form of support is crucial from the perspective of identified problems. Developed products will be the innovative education programs of students, prepared in cooperation between teachers and scientific workers with adaptation of foreign solutions¹⁵, helping in gaining not only knowledge, but also the skills in the area of physics and technical sciences while offering attractive form of classes both in schools and in specially created interactive laboratory. Such combination of features of form of support currently does not exist. If actions are undertaken to increase the attractiveness of classes, they do not have a systemic character.

Foreign partner will share his experience regarding the functioning of a laboratory, manner of preparing teaching materials, will create a report on education and provide experts. Teknokas-Technology Education Center, which is an archetype of the interactive laboratory functioning in Finland, addressed to students and teachers, have been functioning for many years. Its experiences show that laboratory classes best help in understanding the problems of physics and technique, and additionally stimulate innovative thinking.

Innovativeness of form of support in the project is reflected in connecting school classes with away laboratories in one consistent program.

Preparation of teaching materials is innovative:

- for laboratory classes (for teachers and students): description of laboratory stands, guidelines for exercises, extended information about practical use of equipment used in work stands and similar to them,*
- for school classes (for teachers and students); phenomena will be referred to laboratory work stands, to make them easier to understand and remember. To fulfill these goals, preparation of the following teaching materials was foreseen: film materials – a supplement to teaching materials, handbooks for teachers to be used during trainings.*

An important element of implemented innovation will be developing procedures of laboratory functioning, which will facilitate transfer of the solution to other regions. Open form of the laboratory is innovative, which means:

- a possibility to expand teaching program for students,*

¹⁴ In the application the issue of innovativeness was described in point 3.2. Innovativeness.

¹⁵ Project foresees international cooperation which is described in detail in chapters 4.6. and 4.7.

- *a possibility to prepare teaching programs for junior high school and elementary school students (Finnish partner has experience in innovative teaching of lower classes students).*
- *expanding and improving teaching program in regard to physics and technical sciences,*
- *development of teaching programs in the area of natural science,*
- *development of teachers training function,*
- *development of alternative forms of teaching with a use of broadband connections and mobile laboratory.*

Innovation of a form will be reflected in adaptation of solutions verified in Finland. Adaptation will include elements of procedures, teaching materials, laboratory stands, realization of sex parity principle.

The dimension of a problem is equally important.

Innovative solutions will make it possible to:

- *develop ways of increasing coherence between teaching programs in secondary schools and teaching program in higher technical schools,*
- *define and verify ways of lowering students fear of studying in technical majors,*
- *create social capital on the edge between teachers and technical universities staff,*
- *lower the costs of providing teachers and students with modern forms of education,*
- *take into account in the developed products not only their strengths but also weaknesses, which will leave a path to constant improvement of products.*

Every solution connected with implementation of a developed product should be characterized by effectiveness, which should be at an expected level. In case of a laboratory which is not focused on profit, the effectiveness may not be defined as a relation between revenues and costs. Other indicators must be found for its measurement. We could for instance consider what part of laboratory maintenance costs should be covered by laboratory operation. Such perception of effectiveness of the proposed solution might be preferred, if we assume that the created unit was self-financing. The effectiveness of the planned solution may however be also perceived from the perspective of benefits it brings to a local society. As much as the maintenance costs of the laboratory can be precisely calculated, the benefits are more undefined, arbitrary, especially that the results of laboratory functioning in context of increasing the level of students' knowledge and skills may be evaluated with great delay. Making the decision about financing the creation and maintenance of the laboratory of technical knowledge acceleration will thus be mainly based on perceived vision of education development in Wielkopolska or entire country. Project of the laboratory was elaborated as a detailed version of the Program of acceleration of technical, mathematical and natural science knowledge in Poland, which strictly corresponds with strategies and programs, both regional and national, which allows believing that the proposed product answers the social needs identified in all these documents.

It is hard to compare the costs of this solution with costs of traditional solutions, in relationship between results and investments, because traditional solutions are ineffective. The financial evaluation should take into account the opportunity costs. We should answer a question, how much we are going to lose if we don't launch the process of development of technical competencies at medium level. Losses resulting from not creating new solutions will be greater than costs of implementing higher quality of teaching physics and technical sciences for high school students, which becomes an investment in knowledge and skills. The cost of testing one such laboratory will significantly decrease the costs of creating similar ones in future. Such reasoning is shared by the Finnish partner in the proposed project, *whose country is known for one of the best education systems.*

Value added of the project is using the Finnish solution, which saves on the costs of building a tool from scratch and additionally introduces a new model of teaching. Current practice has little concern to the element of experience in education process. Pilot implementation of education programs and building laboratories would not have been possible within financial resources of schools. ESF support will allow for gaining synergy effect by engaging all target groups as well as educational institutions, authorities, universities, foreign partner.

Main barriers which obstructed the implementation of this solution until now were:

- lack of support from experienced foreign partner,*
- not noticing or marginalizing problems,*
- lack of sufficient cooperation between schools and universities allowing for permanent systemic approach.*
- lack of financial resources sufficient for realization of large scale innovative undertaking*

Main product of the project is a systemic solution in education, that is an Interactive laboratory of technical knowledge acceleration (ILTKA) It is an innovative way of stimulating interest of the youth in mathematics, technology and natural sciences. Young people from high schools and secondary technical schools will participate in a cycle of classes according to the education program. The program of classes will contain issues, interdisciplinary linking mathematics, technology and natural sciences. A practical verification of acquired knowledge will be done during laboratory classes in ILTKA, localized at Poznan University of Technology. At the laboratory stands the students will observe possible ways of developing skills in practice.

The project's product consists of a system of mutually connected final partial products:

- program of teachers training,*
- handbooks for learning in the laboratory: for students and teachers,*
- handbooks for learning in school: for students and teachers,*
- training materials for teachers education,*
- 15 scenarios and 15 educational films, integrated with developed training programs,*
- set of procedures describing functioning of the laboratory,*
- osh instruction for laboratories,*
- laboratory with 15 stands and equipment,*
- report about education system in Finland,*
- 2 conferences,*
- 8 internships,*
- 1 visit specifying the international cooperation rules,*
- 1 study tour,*
- 1 visit of foreign partners in Poland,*
- 1 strategy of product's implementation,*
- 1 report from analysis preceded by systematization of data,*
- set of research tools,*
- 1 cycle of teachers trainings,*
- 8 testing 5-days summer workshops,*
- 80 hours of testing classes in laboratory.*
- 60 hours of testing classes in schools,*
- results of research planned in tasks (tasks 3-7),*

- reports from monitoring, external analysis of testing results, evaluation, external audit¹⁶,
- website,
- design of laboratory interiors,
- information campaign,
- 2 national conferences,
- 2 organized visits of media representatives in the laboratory,
- 2 debates,
- 1 publication popularizing the project,
- 33 popularizing workshops for teachers,

Main product is an innovative laboratory in regional and national scale. Development of laboratory after the end of the project and including it in the main stream of educational policy will eventually lead to creation of a network of laboratories. Popularization will encompass teaching programs, teaching materials, laboratory operating procedures, results of research conducted in the project. Including in the mainstream of policy will be realized by introducing new teaching program to a compulsory teaching program in schools.

4.6. Characteristics of measures, including international cooperation¹⁷

The project uses process approach in management, which means emphasizing several main processes, which will yield results in form of final products.

In the project there are 9 tasks:

1. International cooperation
2. Project management
3. Deepened diagnosis and analysis of problems
4. Development of an initial version of a final product
5. Product's testing
6. Analysis of real effects of product's testing
7. Development of a final product
8. Validation
9. Popularization and inclusion in a mainstream policy of the interactive laboratory (ILTKA)

Accepted structure of tasks is a result of requirements set for realization of innovative projects (realization charts of innovative projects).

1. International cooperation

The essence of international cooperation in the project is *learning the experience of foreign partner and education systems in Finland and adapting selected organizational, methodical and thematic solutions, which will lower the risk connected with realization of an innovative solution¹⁸. The task uses the model of international cooperation limited only to import and adaptation of solutions of a foreign partner to project situation.*

The authors intent was to start a cooperation with a Finnish Central Ostrobothnia University for Applied Sciences, with which Poznan University of Technology, and the

¹⁶ If the costs of external audit will be qualified in the project.

¹⁷ Measures foreseen in the project were described in the application in point 3.3. Measures. This point also includes the description of the scope of international cooperation, although it should be noted that the issues related to the cooperation with a foreign partner were also discussed in other points of the application.

¹⁸ Innovative solutions are always connected with higher risk of failure compared to development of typical, common, standard solutions.

Faculty of Management Engineering¹⁹ in particular, maintains close contacts for many years. The role of a partner would be organization and support of cooperation with the Teknokas functioning in Finland, a unit functioning as a laboratory, which hosts classes for students and courses and trainings for teachers, and develops modern education methods aiming at the development of innovative attitudes. The scope of activities of Teknokas is broadly described at <http://www.oulu.fi/teknokas/index.html>

The objective of cooperation in the project is above all transferring the organizational and methodical experiences to the Polish solution. Three of the laboratory stands are planned to be designed based on the ideas taken from Finnish laboratory. Since the target group of the project receivers are the high schools students, in Teknokas emphasizes teaching of lower classes, direct transferring of classes would be unreasonable. It is possible that in future the offer of the laboratory will be extended, but for now the authors' intent was to stimulate passion of learning and creating among students, who after graduation will decide about the direction of their studies. As one of the goals of national development strategy (Strategy..., 2006) is an increase of a percent of graduates of key specialties, including mathematics, technology and natural science, the used approach seemed justified.

Polish delegation, prior to issuing an application, spent some time on a study tour at the future foreign partner. The rules of cooperation in this and other projects were discussed. The delegation learned the principles of Teknokas functioning, and the delegation members reassured themselves about the reasonability of the undertaken actions. The idea of the laboratory gained acceptance of the foreign partner²⁰. The result of a study tour was signing a letter of intent concerning the cooperation in the project.

We should notice the validity of an international cooperation in the project, as both in Wielkopolska and in entire country there is no such laboratory, and learning and using the experience of a Finnish partner would greatly shorten the time and lower the realization costs, at the same time lowering the risk connected with development and implementation of an innovative product, which is an interactive laboratory of technical knowledge acceleration (using the best practices principle).

2. Project management

It will be described in detail in subchapter 4.7.

3. Deepened diagnosis and analysis of problems

The knowledge regarding selected education centers will be systematized, the project of a research process and monitoring of project results process will be made, including the analysis of a base situation for the needs of recruitment according to the sex parity rules. The analysis of secondary information sources will be made, regarding methods and tools increasing the effectiveness and efficiency of education.

The task will include pilot research, consisting in defining barrier of students interest in mathematical, technical and natural sciences, separately for female and male students.

¹⁹ Until 2010 the Faculty of Management Engineering has functioned as and Institute of Management Engineering

²⁰ The result of a study tour is a cooperation in another innovative project since co-financed by EU since 2010. The project is related to the adjustment of vocational education in Wielkopolska to the needs of labor market.

4. Development of an initial version of a final product

The research will result in making a recruitment, which will guarantee representative selection of 960 students (in real proportion of men and women), which will participate in testing laboratory classes.

Within the task, the initial versions will be developed of:

- procedures,*
- instructions,*
- education programs,*
- handbooks.*

5. Product's testing

Developed products, including main product – ILTKA, will be tested. Teachers – tests participants will be trained in the area of realization of new programs in schools.

600 students will participate in away test laboratory classes during school year.

Each group (30 people) will come to the laboratory classes 2 times. During each visit, a group will be divided into two laboratory subgroups of 15 persons each. Therefore, at any given moment, each laboratory stand will be occupied by one student. During every class the students will be rotating, changing the stands. When one group will be participating in the laboratory classes the other will be visiting the University and eating lunch.

360 students will participate in summer workshops. There are 8 visits planned, each lasting 5 days, hosting 45 students each.

all students will attend physics classes at school, during which the education program developed in task 4 will be used and tested. Teachers and students participating in laboratory classes will use teaching materials, which will be used in at least 60 classes. The test classes will be accompanied by: a study of factors which increase the attractiveness of programs for students and teachers, teachers' opinion survey about the products, monitoring of changes in students attitude toward mathematics, technology and natural science, questionnaires within monitoring.

6. Analysis of actual results of product's testing,

Once the report of test results analysis is done, the evaluation will be ordered. The evaluation will make use of all the research results collected so far. Independently, to verify these results in evaluation, focus and questionnaire research will be conducted on a selected group of representatives of target groups who participated in tests. In the task there is time foreseen for the correction of products.

7. Developing final product

Final versions of main products will be shaped within the task. Their descriptions will become appendices to the description of product's use created in this task. The description will include characteristics of ILTKA functioning.

8. Validation

Validation in OP HC innovative projects is comprehended as an evaluation of final product's compatibility with assumptions and its aptness and usefulness (Projects...., 2009)

Within this task, a representative of the project will participate in works of a thematic network.

9. Popularizing and including in a mainstream policy of interactive laboratory (ILTKA)

There will be 2 debates about including ILTKA in a mainstream policy, with a participation of teachers, scientists and authorities from around the country. A conference, opening and closing the projects, is also planned for the representatives of schools, authorities, universities, etc.

There will be workshops for teachers, during which the functionalities of ILTKA, programs and teaching materials will be presented. Teachers will be informed about workshops through posters and leaflets in schools and through emails. Posters and leaflets will also be used to inform students from Wielkopolska about ILTKA. Popularization is also planned through publications about the project's results, which will be sent to educational institutions in entire country. A website will be created, containing information about progress in ILTKA, and after final development of the product, also teaching materials. During the project, PR activities will be performed.

According to the principles of OP HC innovative projects, students and teachers will participate in development of the project's product throughout its entire duration. They will be engaged in product's testing and in research conducted in tasks 3,5,6,7. In task 9, the popularization process will encompass a larger group. Focusing this task on a group of users defined in point 4.3. of this publication is a result of the fact that teachers will have the greatest influence on using the developed products in an education process.

4.7. Partnership in the project, including potential of the project's initiator and the rules of project's management.²¹

The project's leader is Wielkopolska Voivodship. It successfully realized, among others: scholarship programs within Integrated Operational Program for Regional Development (IOPRD), Innovative Economy program. Since 2004, the Voivodship is engaged in implementation of EU funds, which resulted in acquiring human resources and technical potential. Part of project's tasks will be realized by the Voivodship subordinate unit - Teachers Training Center in Poznan, which is also experienced in projects' realization and participates in a network of institutions educating teachers.

Partners:

1. Poznan University of Technology – between 2004 - 2009 realized over 30 projects co-financed from EU funds, including ESF²². Poznan University of Technology cooperates with partners from a business sectors, public administration, non-governmental organization and other universities and scientific units. It organizes classes in selected schools in Wielkopolska Voivodship, within polytechnic classes. Poznan University of Technology has proper backup, experience and staff to realize the project. University has been cooperating for several years with a foreign partner who also participates in the project.

2. Keski-Pohjanmaan Ammattikorkeakoulu/CENTRIA T&K, Ylivieskan Yksikkö – public higher education facility (public finances sector) functioning within a network of schools, currently realizing 20 projects in an area of education and innovations. It has been acting in favor of improvement of education programs of technical knowledge. Finnish

²¹ Issues described in this chapter are placed in the application in point 3.5: Potential of the project initiator and project management.

²² The project application was prepared in the second half of 2009, therefore in the content of application there is no reference to further experience already gathered and still being gather in 2010 (another project contest won)

partner will be responsible for organizing meetings for the representatives of Polish side: providing Finnish experts, preparing necessary information for assessment of possible scope of adaptation and implementing this adaptation.

Management structure.

Recruitment of the personnel will be performed according to a principle of equal opportunities, which means that only qualifications and experience of candidates will be taken into consideration.

The following positions connected with project management are planned, along with their scope of responsibilities:

- project manager: management of current realization of tasks, supervision of team work, securing realization of the project, monitoring and evaluation, supervision of project's settlement,*
- recruitment specialist for the tests (periodically employed): recruitment of target groups representatives (based on the designed process of research sample selection); reports to project manager,*
- education process specialist: designing and supervision of tasks connected with shaping education programs, teachers' trainings, content of teaching materials, taking care of consistence and proper quality of these products; reports to project manager*
- Poznan University of Technology tasks coordinator: supervision over the works within the measures realized by PUT, supervision over PUT tasks settlements, coordination of preparation, maintenance and efficient organizational functioning. ILTKA: reports to project manager,*
- two financial settlement specialists (one in Wielkopolska Voivodship - reports to project manager, the other in Poznan University of Technology - reports to PUT tasks coordinator): supervision over financial realization of a project, preparation of applications for payments, documents description, archiving,*
- coordination of technical and scientific actions specialist: supervision and creation of technical solutions in ILTKA, confronting educational programs with scientific aspects, advancing proposals of classes; reports to the PUT tasks coordinator,*
- popularization and inclusion in mainstream policy assistant: responsibility for task 9, creating content of website; reports to PUT tasks coordinator.*

The project assumes appointing a *Panel of national experts (5 people), which members will report to the project manager.*

Additional people will be employed in task 1, who will be responsible for its successful realization.

All people will have higher education and experience in preparation or realization of projects co-financed from ESF.

Tasks of project leader will include mainly project management, settlements and reporting, supervision over partners activities. Technical works on a leaders side will be in the responsibilities of Teachers Training Center in Poznan - a unit reporting to Wielkopolska Voivodship. Voivodship will also be responsible for management and students' education. Poznan University of Technology will be responsible for scientific aspects, organization of ILTKA functioning, international cooperation and popularization. Foreign partner will be responsible for information transfer, providing know-how and supporting adaptation of Finnish solutions in the project.

No cash flows are foreseen between the leader and the foreign partner. Coordination of partnership will be assured by a Steering Group.

Steering Group in OP HC consists of representatives of a leader and partners in a partnership project. The scope of tasks and framework principles of its functioning have been defined in a document prepared by Ministry of Regional Development (The Scope...., 2009)

“Scope of realization of partnership projects defined by a Management Institution of Operational Program Human Capital”. Detailed rules of Steering Group work are defined for project in a partnership agreement, which is an appendix to financing agreement.

4.8 Planned results in a project²³

In the opinion of an author of chapter 4, a notion of a result used in OP HC is incorrectly defined and stays in an improper relationship to the notion of an objective (see: subchapter 4.1), nevertheless while preparing an application, it was necessary to comply with the rules of the contest, therefore in the application an attempt was made to formulate the results based on the guidelines included in a “Podręcznik przygotowania wniosków o dofinansowanie projektów w ramach Programu Operacyjnego Kapitał Ludzki” (Podręcznik..., 2009) [Guidebook for preparation of applications for co-financing of projects in Operational Program Human Capital].

The following results are defined for the project with the following indicators:

- 1) *adapting organizational and product solutions from a foreign partner by using benchmarking techniques; indicator: at least 3 out of 15 created laboratory stands will be organized analogically to the laboratory functioning in the foreign partner's site.*
- 2) *specifying the needs of teachers and students, particularly the needs of women regarding the themes and form of ILTKA and the education process; indicator: 90 respondents of a questionnaire;*
- 3) *Initial preparation of innovative programmatic and organizational solutions regarding mathematical, natural science and technical education, indicator: 3 procedures, instruction, 3 education programs;*
- 4) *development of a methodological assumptions for conducting of innovative classes in the field of mathematical, natural science and technical classes, indicator: 5 handbooks;*
- 5) *conducted analysis of efficiency and effectiveness of teaching programs implementation in ILTKA, indicator: 995 tested representatives of target groups;*
- 6) *defining final version of innovative teaching program in area of mathematics, natural science and technology; indicator: 1 publication and 1 description of product's usage;*
- 7) *facilitating the access of high school students to innovative, attractive forms of gaining knowledge and skills in technical sciences and physics, indicator: 960 students visiting the laboratory;*
- 8) *popularized innovative teaching program in area of natural science and technology; indicator: an information reaching at least 500 people (excluding those participating in tests);*
- 9) *developing a model of cooperation between methodologists from teachers training center and employees of technical universities in regard to preparation of programs and procedures of education of high school students in the area of physics and technical sciences; indicator: 1 model.*

All results will help connect the teaching programs at medium and higher level, thanks to cooperation between target groups and developing innovative solutions in teaching programs. Students using the laboratory will get familiar with new ways of acquiring knowledge and an innovative program will contribute to an improvement of preparation of students to further stages of education in the area of technical, mathematical and natural sciences.

²³ Results foreseen in the project were described in the application in point 3.4: Results

Popularization will be done with a use PR actions as well as connections of Wielkopolska Voivodship with educational institutions in the region and country. The goal of the planned tools is to present practical dimension of ILTKA and to engage target groups.

In case of innovative ideas, indicating risks of their realization is desirable. In the prepared project two key risks have been defined, and their preventing countermeasures have been indicated:

- 1) risk 1: after the end of the project there might be difficulties with further financing of the laboratory, however placing the ILTKA at Poznan University of Technology will guarantee its continuation,*
- 2) risk 2: in the testing phase there might be some difficulties with recruitment of participants, therefore the Teachers Training Center in Poznan and Department of Education and Science of Wielkopolska Voivodship Marshal Office will advance a request to schools to include the testing element to the program of classes, which, thanks to the possibility of getting familiar with practical solutions, will not be disadvantageous for students.*

Results will be monitored at the beginning, in the middle and at the end of the project, with reference to the base values. Monitoring will be conducted within planned research (after the end of every task) and by current gathering of information by the project manager, responsible for monitoring process. Monitoring process of entire project, because of its innovativeness will be a subject of a separate research, which will allow for detailed control of results during entire project realization. Moreover, task 6 includes an external evaluation, which will results in an unbiased analysis of achieved results and products, which will constitute a base for corrections of the final project.

4.9. Schedule and budget of activities

Schedule and budget of the project are an integral part of the application. Beside the information characteristic for them, they include content supplementing the description. This book presents entire schedule of the project, which was included in the application, as well as selected information from the project's budget, important in light of project's evaluation and analysis of its validity presented in chapter 4.10.

Schedule of actions

Figure 4.1. presents the schedule of actions in a the described project of Interactive Laboratory of Technical Knowledge Acceleration (ILTKA), which was included in the application.

The schedule presents a detailed description of the first twelve months of project's realization. The remaining period of the project was presented in quarters. Such procedure was forced by the rules of completing an application generator.

Selected information from project's budget

Detailed budget of the project was prepared according to the sample presented in figure 4.2.

L.p.	Kategoria	Cross-financing (T/N)	State aid (T/N)	unit	2010			2011			2012			2013			GRAND TOTAL
					amount	price per unit	total										
4.1	TOTAL COSTS (4.1.1+4.1.2)																
4.1.1	DIRECT COSTS																
	Task 1. International cooperation																
	Task 2. Project management																
	Task 3. Deepened diagnosis and analysis of problems																
	Task 4. Development of an initial version of a final product																
	Task 5. Product testing																
	Task 6. Analysis of real effects of product's testing																
	Task 7. Development of a final product																
	Task 8. Validation of a final product																
	Task 9. Popularization and inclusion in a mainstream policy of the interactive laboratory (ILTKA)																
4.1.2	INDIRECT COST																
	indirect costs a % of direct costs																
	including cross financing																
	Lump sum indirect costs																
4.1.3	Cross-financing in total costs (4.1.3)																
4.1.4	International cooperation in total costs																
	Expenses included in additional aid																
	Expeses included in state aid																
	private contribution																
L.p.	Justification of costs: (compulsory only for cross-financing)																
0	Justification of cross-financing in the project:																
1	Justification:																
	...																
	Justification:																
Methodology of calculating co-financing and private contribution for expenses included in state aid.																	

Fig. 4.2. sample of a detailed Schedule according to which the budget of ILTKA project was prepared based on the project application

The book will not contain the detailed amounts presented in a budget. Table 4.1. presents however all budget entries included in the project's tasks. As presented in figure 4.2, in OP HC projects applications it is possible to justify the costs presented in a budget. Although in an application this justifications are placed under the budget, in this book they will be presented next to a respectable budget position, providing better transparency and readability of the records.

Because of the limited amount of characters which can be used in an application generator in fields reserved for costs descriptions, abbreviations were commonly used in the application. Table 4.1. does not include these abbreviations.

This book intentionally skips the justification of a cross-financing (that is expenses on tangible assets) and indirect costs, which were included in the application.

Table 4.1. Cost entries included in a budget of the project – Interactive Laboratory of Technical Knowledge Acceleration (ILTKA).

No	Category	Cross-financing (Y/N)	Public assistance (Y/N)	measure
Task 1: International cooperation				
1	international cooperation coordinator's salary with national insurance contributions; 1 person (contract for a specific task)	N	N	Month
<i>Justification:</i> contract foreseen for the duration of an international cooperation in the project, exclusively in months in which the cooperation tasks are carried out; a contractor is a scientific worker of PUT (PhD) cooperating with a Finnish partner in many fields for several years; presented amount includes contributions on both sides: employer and employee, which means that the net wage will be 42,42% lower than this presented in the budget.				
2	international cooperation assistant's salary with national insurance contributions; 1 person (contract for a specific task)	N	N	Month
<i>Justification:</i> Employment as in position 1; PUT scientific worker with good command of English				
3	Salary with national insurance contributions of an innovative solutions adaptation specialist; 1 person (contract for a specific task)	N	N	day
<i>Justification:</i> The hired person will be working in Finland; planning, organizing, supervising and monitoring of thematic works in Finland with particular consideration to adaptation of Finnish solutions in Poland.				
4	Salary with national insurance contributions of an innovative solutions adaptation assistant; 1 person (contract for a specific task)	N	N	day
<i>Justification:</i> Employment as in point 3; organizational works for fulfillment of tasks in Finland				
5	Traveling costs of foreign business trips (airline, railway, bus tickets, compensation for using a car, taxi)	N	N	person
<i>Justification:</i> trip aiming at preparation of a study tour and details of a further cooperation; Flights and road trips both within a working visit for preparation of cooperation program and the course of a study tour (including detailed goals) at foreign partner's, and flight and road trip of study tour participants, which main objective would be getting familiar with education programs for teachers and students, functioning in Finland, with particular regard to technical and natural sciences and physics.				
6	Costs of accommodation during business trips (in order to prepare the study tour and the details of further cooperation and during the study tour)	N	N	accommodation
<i>Justification:</i> scale analogical to point 5; during the working visit 4 nights per person, during a study tour 5 nights per person				
7	Costs of allowances during business trips (in order to prepare the study tour and the details of further cooperation and during the study tour)	N	N	day

<u>Justification:</u> scale analogical to point 5; during the working visit 4 allowances per person, during a study tour 5 allowances per person				
8	Writing a report about a systems of education functioning at foreign partner's. (contract work)	N	N	day
<u>Justification:</u> indispensable employment of scientific workers (experts) in Finland; settlement calculated per day results from the rules of settlements used by the foreign partner in other projects; rates are typical for Finnish conditions per working day in the project of a Finnish university worker; an average work efficiency of 5 pages a day was assumed, which gives an elaboration of about 100 pages.				
9	Translating the report into Polish – contract for a specific task	N	N	page
<u>Justification:</u> Report discussed in pos.8 will be prepared in Finnish language because a majority of valuable information about Finnish education system is gathered in this language; there is a need of translating the report from Finnish to Polish.				
10	purchase of a translation service, including simultaneous translation (trips, conference); at least 2 translators for every event – contract for a specific task	N	N	unit
<u>Justification:</u> Hiring simultaneous translators during the study tour (they assume participation of methodologists who are not fluent in English), during the conference in Poland (foreseen participation of around 100 people, most of whom will not be fluent in English); translation of conference materials by hired translators; simultaneous translators have to alternate (necessary breaks in translation)				
11	2 weeks internships for direct consultations and deepening the knowledge of a system in the foreign partner's country	N	N	internship
<u>Justification:</u> Includes: accommodation 4900zł/person, allowances 3500zł/person, flights and road trips 2500zł/person, salaries 1200zł/person, internships will be done in 4 people groups, accommodation in double rooms, allowances 250zł/day; accommodation 350zł/night; Gross salary at a minimal level for internship work;				
12	Organizational preparation of a three day international conference - contract for a specific task	N	N	unit
<u>Justification:</u> People mentioned in pos.1-4 will be responsible for technical preparation; organizational preparation includes all issues related to placing orders, paying for room, catering, conference materials, invitations, organization of conference days along with providing the technical conditions, covering the contacts with media, etc.				
13	Salaries of 2 foreign experts (contract for a specific task)	N	N	day
<u>Justification:</u> Settlement calculated per days is a result of settlement rules used by a foreign partner in other projects; rates typical for experts in Finnish conditions encompass the entire duration of expert business trips				
14	Traveling costs of experts, consultants, coordinator and assistant of a foreign partner during business trip (airline, railway, bus tickets, taxi)	N	N	person
<u>Justification:</u> As a part of conference, an innovative solutions adaptation specialist and assistant will also come from Finland; in 2011 also a visit of consultants from laboratory in Finland is also foreseen, who will observe the education process in a laboratory and in the classrooms, to offer comments and suggest changes in procedure, programs, teaching materials, and on stands adapted from Finnish partner.				
15	Costs of accommodation of experts, coordinator and assistant of a foreign partner during a foreign business travel (international conference trip)	N	N	accommodation
<u>Justification:</u> As in position 14				
16	Costs of allowances of experts, coordinator and assistant of a foreign partner during a foreign business travel (international conference trip)	N	N	day

<u>Justification:</u> As in position 14				
17	Translation of Polish materials for Finnish consultants and materials from Finnish consultants into Polish - contract for a specific task	N	N	pages
<u>Justification:</u> Translation of procedures, education programs and parts of teaching materials; translated materials will be sent for consultations; documented opinions of Finnish consultants will be translated into Polish; Finnish consultants will come to Poland only once, and their engagement in a creation process of the laboratory will be necessary for a longer period; sending the materials by email or traditional mail will lower the costs of consultations				
18	Costs of foreign deliveries	N	N	unit
19	Salaries of foreign consultants for consultations regarding prepared products of the projects - contract for a specific task	N	N	day
<u>Justification:</u> Consultants will be people working in Finland, in a center similar, in terms of activity, to the interactive laboratory, and dealing on a daily basis with process of education of students and teachers.				
Task 2. Project management				
20	Salary of a project manager, 1 person x 1 FTE (employment contract) - WV	N	N	Month
<u>Justification:</u> Wielkopolska was chosen as a location of this project, because first of all, the leader and partners are from Wielkopolska, so the pilot version will be tested here, as a part of pursuit to lower the costs of the project, second of all, data from OKE with a headquarters in Poznan indicated that in terms of education of mathematics, technology and natural science, including physics, Wielkopolska looks very weak compared to other regions.				
21	Salary of a project financial settlements specialist, 1 person x 1 FTE (employment contract) - WV	N	N	Month
22	Salary of a recruitment specialists for the tests (contract for a specific task) - WV	N	N	Month
<u>Justification:</u> In the testing project the participants form a sample group participating in tests; research process will be the responsibility of an external company, which will choose a sample for testing; based on this sample selection, the recruitment will be made with a particular care, with a support of Department of Education and Science of Wielkopolska Voivodship Marshal Office and Teachers Training Center.				
23	Salary of popularization and inclusion to mainstream policy assistant; 1 person ((contract for a specific task) - PUT	N	N	hour
24	Salaries of members of national experts panel (around 5 people); (contract for a specific task) - WV	N	N	hours
25	Salary of a project education process specialist, 1 person x 1 FTE (employment contract) - WV	N	N	Month
26	External audit - contract for a specific task	N	N	unit
27	Salary of PUT tasks coordinator; 1 person x 0,5 FTE (employment contract) PUT	N	N	Month
<u>Justification:</u> given monthly amount includes contributions on both sides: employer and employee, which means that the net wage will be 42,42% lower than this presented in the budget; the salaries of all people hired on employment contracts, contracts for a specific task and contract works have been calculated similarly; it refers to employees of a leader and PUT, who besides the employment in the project are also employed in their institutions based on employment contracts.				
28	Salary of a technical and scientific actions coordination specialist, 1 person (employment contract – additional salary) - PUT	N	N	hour
29	Salary of financial settlements in PUT tasks specialist; 1 person x 0,5 FTE (employment contract) - PUT	N	N	Month
30	salary for legal services and public procurements (contract for a specific task) - PUT	N	N	hours
31	purchase of 2 laptops - WV	Y	N	unit
32	Purchase of 2 MS Office packages - WV	N	N	unit

33	Purchase of 1 multifunctional device for over standard amount of prints -WV	Y	N	unit
34	Purchase of furniture (2 desks, 2 under desk cabinets, 2 rotating chairs, 2 file cabinets) - WV	Y	N	unit
35	Reimbursement of national business trips costs - WV	N	N	Month
36	Costs of bank accounts - WV	N	N	Month
37	Purchase of 2 laptops - PUT	Y	N	unit
38	Purchase of 2 MS Office packages - PUT	N	N	unit
39	Purchase of 1 multifunctional device for over standard amount of prints - PUT	Y	N	unit
40	Purchase of furniture (2 desks, 2 under desk cabinets, 2 rotating chairs, 2 file cabinets) - PUT	Y	N	unit
41	Reimbursement of national business trips costs - PUT	N	N	Month
42	Costs of bank accounts - PUT	N	N	Month
Task 3. Deepened diagnosis and analysis of problems				
43	Salary for analysis and systemization of secondary sources data regarding educational center (contract work) – PUT	N	N	unit
44	Formulating a research problem, preparing assumptions for research and designing consistent, detailed process of research in entire project (contract work) - PUT	N	N	unit
45	Research in order to specify the needs regarding the theme and form of ILTKA (6 focuses: 3 with teachers, 3 with students) - contract for a specific task - WV	N	N	unit
Task 4. Development of initial version of a final product				
46	Salary of a maintenance specialist (contract for a specific task) - PUT	N	N	hours
47	Development of a laboratory maintenance procedure (contract work) - PUT	N	N	unit
48	Development of a procedure of preservation and maintaining working order of laboratory appliances (contract work) - PUT	N	N	unit
49	Development of a OSH instruction in a laboratory and on work stands (contract work) - PUT	N	N	unit
50	Development of a design and organizational procedure for the laboratory (contract work) - PUT	N	N	unit
51	Development of research tools in order to acquire data in a monitoring process of a testing phase - contract for a specific task - WV	N	N	unit
52	Selection of a research sample for the tests - contract for a specific task - WV	N	N	unit
53	Purchase of a stand no.1 to measure magnetic field shields (including: Magic Plasma Ball, fluorescent lamp, set of shields) - PUT	Y	N	unit
54	Purchase of a stand no.2 for observations of a fiber composites (including: luminous laser, set of micro-sections) - PUT	Y	N	unit
55	Purchase of a stand no.3 to cast wax models (including: wax injector, set of silicon forms, wax) - PUT	Y	N	unit
56	Purchase of a stand no.4 for plasma cutting (including: plasma burner, curtain gas tank, specialized table (bath) and materials) - PUT	Y	N	unit
57	Purchase of a stand no.5 for three-dimensional scanning (including: Personal Computer, 3D scanner EScan, specialized software Leios Mesh) - PUT	Y	N	unit
58	Purchase of a stand no.6 to discover hidden defects (including: a device for a ultrasound detection of defects in materials, samples) - PUT	Y	N	unit
59	Purchase of a stand no.7 to study PLC drivers – PUT (according to a specification)	Y	N	unit
Justification: <i>including: Personal Computer, FANUC RX3 driver, PACMotion servo-drive steering module, servo-drive Beta-is, metal construction with additional materials, PLC FANUC driver software, package of visualization software Wonderware</i>				
60	Purchase of a stand no.8 for laser engraving (including: Personal Computer, laser graver) - PUT	Y	N	unit

61	Purchase of a stand no.9 for studying of radioactivity (including: radioactivity measuring device, radioactive supplements) - PUT	Y	N	unit
62	Purchase of a stand no.10 to study selected usages of laser beams (including: laser, light intensity receiver, distance measuring device) - PUT	Y	N	unit
63	Purchase of a stand no.11 to study basic parameters of work ergonomics (including: VDT Sit-To-Stand-TaskMate & Stance Angel Chair Combo + software and equipment) - PUT	Y	N	unit
64	Purchase of a stand no.12 to study alternative sources of energy (including: fuel cell, solar batteries, indicators and other auxiliary equipment) - PUT	Y	N	unit
65	Purchase of 3 stands created as a result of adaptation of a foreign partner's solutions - PUT	Y	N	unit
66	Purchase of auxiliary equipment for the laboratory (15 stands: tables, chairs, cabinet and other small equipment) - PUT	Y	N	unit
67	Making a design of laboratory interiors - contract for a specific task	N	N	unit
68	Making a laboratory interiors based on the arrangement design - contract for a specific task	Y	N	unit
69	Development of an initial version of a teachers training program (contract work) - WV	N	N	unit
70	Development of an initial version of students training program in the laboratory (contract work) - WV	N	N	unit
71	Development of an initial version of students training program in the classrooms (contract work) - WV	N	N	unit
72	Salaries of the authors of initial version of a handbook for students for the laboratory stands (contract work) - WV	N	N	half of publisher's sheet
73	Salaries of the authors of initial version of a handbook for teachers for the laboratory stands (contract work) - WV	N	N	half of publisher's sheet
74	Salaries of the authors of initial version of a handbook for students for the classrooms (contract work) - WV	N	N	half of publisher's sheet
75	Salaries of the authors of initial version of a handbook for teachers for the classrooms (contract work) - WV	N	N	half of publisher's sheet
76	Salaries of the authors of initial version of a handbook for the teachers' trainings (contract work) - WV	N	N	half of publisher's sheet
77	Salaries for the technical consultations regarding the content of the handbooks (contract for a specific task) - WV	N	N	hour
78	Salary for the editorial correction of the initial versions of handbooks for he need of testing (contract for a specific task) - PUT	N	N	handbook
79	Salary for typesetting and page makeup of the initial versions of handbooks for he need of testing (contract for a specific task) - PUT	N	N	handbook
80	Printing of the initial version of handbooks for testing purposes (3 handbooks for 35 teachers + 20 additional handbooks and 2 handbooks for 960 students + 50 additional) - contract for a specific task - PUT	N	N	handbook
81	Salary for scenarios of educational films (contract work) - WV	N	N	scenario
82	Production of didactic films - contract for a specific task - WV	N	N	unit
Task 5: Testing of a product				
83	Salary for training teachers participating in tests (35 teachers: 1 lecture for 35 people and 6 workshops in laboratory for groups of 7 teachers) (contract for a specific task) -WV	N	N	hour
84	Reimbursement of travels costs for teachers traveling to the trainings (35 teachers) - WV	N	N	day
85	Catering during training (2 coffee breaks and lunch) (35 teachers x 35zł x 2 days including 1 day of lecture and 1 day of workshops) contract for a specific task - WV	N	N	day

86	Purchase of laboratory vests with the logo of OP HC and the project - PUT	N	N	unit
<p><u>Justification:</u> All laboratory workers will be dressed in identical vests with logos of the project, EU and OP HC; their major function will be protection; they will additionally make laboratory classes more attractive</p>				
87	Salary for laboratory maintenance; 3 people (contract for a specific task) - PUT	N	N	Month
88	Salary for testing procedures of laboratory maintenance along with writing a tests report (contract work) - PUT	N	N	unit
89	Salary for testing preservation and maintenance procedures of laboratory devices along with writing a report (contract work) - PUT	N	N	unit
90	Payment for testing OSH instruction in laboratory and on work stands along with writing a report (contract work) - PUT	N	N	unit
91	Payment for testing laboratory organizational procedure along with writing a report (contract work) - PUT	N	N	unit
92	Costs of students accommodation and chaperones during summer workshops - contract for a specific task - PUT	N	N	day
93	Costs of food and chaperones for students during summer workshops - contract for a specific task - PUT	N	N	day
94	Wages of chaperones during summer workshops; 3 chaperones for every edition of testing workshops x 8 workshops (contract for a specific task) - WV	N	N	day
95	Payment for the transportation service of students to and from the summer workshops and during the semester - contract for a specific task - PUT	N	N	unit
96	Costs of entry tickets and traveling to events connected with science and technology - PUT	N	N	person
<p><u>Justification:</u> During summer workshops laboratories will be held in certain hours, and at the same time the laboratory will host only a group of 15 students; specificity of workshops requires minimizing the time in which students are unoccupied, therefore some other forms of making the workshops more attractive are planned, such as visiting PUT, sightseeing Poznan, visiting HCP museum; these forms will be supplemented with visiting technical museums (such as agricultural museum in Szreniawa, near Poznan, museum of steam locomotives in Wolsztyn) and scientific exhibitions – these forms of attractions require co-financing; preparation of a detailed program is one of the elements in task 4 (in the project and organizational procedure for the laboratory – pos.50)</p>				
97	Lecturers' wages for teaching at summer workshops (contract for a specific task) -WV	N	N	hour
98	Purchase of lunch for students and chaperones participating in tests during semester 0 2 chaperones for each tour x 2 tours x 20 groups - contract for a specific task - PUT	N	N	unit
99	Wages of stationary lecturers for teaching test classes during semester - WV	N	N	hour
<p><u>Justification:</u> During testing there will be a constant set of teachers – lecturers (3 people), who will teach laboratory classes for groups of students coming to the laboratory; these teachers (which are members of the project teams) are called stationary lecturers as opposed to 35 teachers testing programs and teaching materials during classes in schools; 480 hours = 20 groups x 2 laboratory groups x 2 tours x 2 hours as the duration of one class x 3 stationary lecturers for each class unit)</p>				
100	Payment for the tour guide for groups coming during semester (contract for a specific task) - PUT	N	N	hour
<p><u>Justification:</u>A group of 30 people will be coming at a time, which will be divided into two laboratory subgroups; one of them will be attending laboratory classes while the other will be following the sightseeing program of PUT and Poligród, therefore the presence of a tour guide is indispensable, as the chaperones coming with the groups are not qualified to do this; 280 hours = 20 groups x 2 tours x 7 hours for each tour.</p>				
101	Purchase of supplementary teaching materials for laboratory classes (pen, notebook, bag – with a logo) - contract for a specific task - PUT	N	N	unit

<i>Justification:</i> A unit means a set: pen, notebook, bag; every student participating in laboratory classes during testing phase will be given materials necessary to do exercises (pen and notebook, bag; bag will be useful also during the sightseeing tour of PUT, where students will receive additional information materials and booklets describing PUT and WV); materials will be handed also to the chaperones, who will observe the teaching process and make notes with their remarks regarding education process.				
102	Pretest: Opinion poll between test group members related to the prepared initial versions of products (programs and handbooks) - contract for a specific task - WV	N	N	unit
<i>Justification:</i> Describing barriers of students interests in technical subjects, studying factors increasing communicativeness and attractiveness of programs for students.				
103	Test: Opinion poll of teachers participating in testing phase about testing versions of products (programs, handbooks, laboratory) -contract for a specific task - WV	N	N	unit
104	Survey, monitoring the change of attitude of teachers and students – random survey and individual questionnaire along with the report - contract for a specific task - WV	N	N	unit
105	Questionnaires as a part of monitoring, preparation, analysis of data and preparation of report from monitoring - contract for a specific task - WV	N	N	unit
<i>Justification:</i> An individual questionnaire and random survey completed during two classes, two laboratories in a semester and two laboratories during summer workshops.				
Task 6: Analysis of real effects of product's testing				
106	Writing a report from internal analysis of test results (contract work) - PUT	N	N	unit
107	External evaluation along with writing a report - contract for a specific task - WV	N	N	unit
108	Development of a method and research tool in order to gather opinions with a use of a website (contract work) - PUT	N	N	unit
109	Correction of a laboratory maintenance procedure based on the reports (contract work) - PUT	N	N	unit
110	Correction of a procedure of preservation and maintaining working order of laboratory appliances based on the reports (contract work) - PUT	N	N	unit
111	Correction of a OSH instruction in a laboratory and on work stands based on the reports (contract work) - PUT	N	N	unit
112	Correction of a laboratory organizational procedure based on the reports (contract work) - PUT	N	N	unit
113	Correction of a teachers' training program based on the reports (contract work) - WV	N	N	unit
114	Correction of a students' teaching program in the laboratory based on the reports (contract work) - WV	N	N	unit
115	Correction of a students' teaching program in the classrooms based on the reports (contract work) - WV	N	N	unit
116	Payment for the correction of a students' handbook for the laboratory stands based on the reports (contract work) - WV	N	N	half of publisher's sheet
117	Payment for the correction of a teachers' handbook for the laboratory stands based on the reports (contract work) - WV	N	N	half of publisher's sheet
118	Payment for the correction of a students' handbook for the school classes based on the reports (contract work) - WV	N	N	half of publisher's sheet
119	Payment for the correction of a teachers' handbook for the school classes based on the reports (contract work) - WV	N	N	half of publisher's sheet

120	Payment for the correction of a handbook for teachers' training based on the reports (contract work) - WV	N	N	half of publisher's sheet
121	Payment for technical consultations regarding the content of the handbooks - WV	N	N	hour
Task 7: Development of a final product				
122	Organization of a cycle of focus meetings between representatives of target groups and the evaluator (6 meetings, 3 with teachers, 3 with students) - contract for a specific task - WV	N	N	unit
123	Payment for the development of a final version of the laboratory maintenance procedure (contract work) - PUT	N	N	unit
124	Payment for the development of a final version of a procedure of preservation and maintaining working order of laboratory appliances (contract work) - PUT	N	N	unit
125	Payment for the development of a final version of an OSH instruction in a laboratory and on work stands (contract work) - PUT	N	N	unit
126	Payment for the development of a final version of the laboratory organizational procedure (contract work) - PUT	N	N	unit
127	Development of a final version of a teachers training program (contract work) - WV	N	N	unit
128	Development of a final version of a students' training program in the laboratory (contract work) - WV	N	N	unit
129	Development of an final version of students training program in the classrooms (contract work) - WV	N	N	unit
130	Payment for the development of a final version of a students' handbook for laboratory stands - WV	N	N	unit
131	Payment for the development of a final version of a teachers' handbook for laboratory stands (contract work) - WV	N	N	unit
132	Payment for the development of a final version of a handbook for students for the classrooms (contract work) - WV	N	N	unit
133	Payment for the development of a final version of a handbook for teachers for the classrooms (contract work) - WV	N	N	unit
134	Payment for the development of a final version of a handbook for teachers' training (contract work) - WV	N	N	unit
135	Salaries for the technical consultations regarding the content of the handbooks (contract for a specific task) - WV	N	N	hour
136	Payment for the editorial correction of a final version of handbooks (contract for a specific task) - PUT	N	N	handbook
137	Payment for typesetting and page makeup of a final version of handbooks (contract for a specific task) - PUT	N	N	handbook
138	Payment for the cover design (contract work) - PUT	N	N	handbook
139	Payment for the handbooks review (contract work) - PUT	N	N	handbook
<i>Justification:</i> Each of the prepared final versions of handbooks requires reviewing its content (requirement in the publishing process), 5 handbooks are planned - each of them will be reviewed by one reviewer				
140	Printing of the final version of handbooks for the needs of popularization (5 handbooks x 1000 units) - external contract - PUT	N	N	unit
141	Payment for writing the description of the product's use (contract work) - PUT	N	N	unit
Task 8: Validation of a final product				
142	-	-	-	-
<i>Justification:</i> Task mentioned to keep order; it does not generate costs for the project; some costs will be generated in task 2 – project management.				
Task 9: Popularization and including in a mainstream policy of the interactive laboratory (ILTKA)				

143	Development and technical maintenance of the project's website - contract for a specific task	N	N	unit
144	Project's design layout (contract for a specific task)	N	N	unit
145	Information campaign in schools about preparation of ILTKA (posters in high schools and information send-out to school principals) – contract for a specific task	N	N	unit
146	Organization of an opening conference - contract for a specific task	N	N	unit
147	Organization of a closing conference - contract for a specific task	N	N	unit
148	Organization of two debates about including the project in a mainstream policy - contract for a specific task	N	N	unit
149	Development of a publication popularizing the project (contract work)	N	N	publisher's sheet
150	Payment for the editorial correction of the popularizing publication (contract for a specific task)	N	N	handbook
151	Payment for the typesetting and page makeup of popularizing publication (contract for a specific task)	N	N	handbook
152	Payment of the cover design of the popularizing publication (contract work)	N	N	handbook
153	Payment for the review of a popularizing publication (contract work)	N	N	handbook
154	Printing of the project's popularizing publication - contract for a specific task	N	N	unit
155	Mailing costs of the popularizing publication	N	N	unit
156	Payment for laboratory maintenance as a part of workshops for teachers; 3 people (contract for a specific task)	N	N	day
157	Payment for presenting the laboratory to visitors as a part of workshops for teachers (contract for a specific task)	N	N	hour
158	Payment for lecture about teaching programs developed within the project - workshops for teachers (contract for a specific task)	N	N	class hour
159	Printing posters - contract for a specific task	N	N	unit
160	Printing leaflets - contract for a specific task	N	N	unit

When analyzing budget entries in the application, we can easily notice, that they form a valuable source of information about the project, supplementing information in its descriptive part.

To complete the content of table 4.1. we should explain that the project foresees two major groups of stands:

- stands using modern apparatus for exercises,
- stands to perform exercises with a use of simple materials and tools, based on the solutions of the foreign partner.

As to the first group of stands, their equipment was consulted with scientific workers of Poznan University of Technology and methodologists from Teachers Training Center in Poznan.

Poznan University of Technology employees were asked via email to forward proposals of laboratory stands equipment. The sample form is presented in figure 4.3.

**LABORATORY STAND DESCRIPTION FORM OF A TECHNICAL KNOWLEDGE ACCELERATION
LABORATORY WITHIN AWT®**

Institute			
Contact person (name and surname/phone/email)			
Name of experiment			
Maximal dimensions required for the equipment (l/w/h)			
power demand (required special junctions):			
Special requirements: (ex. compressed air, technical gases, ventilation, technical supervision, etc.)			
Price of purchase/construction (at least estimated)		Monthly operating costs	
Name of a company or other contractor, who can make the equipment			
Time needed for making the equipment and it trial operation.			
Description of a stand and the essence of the experiment			

Contact:

Fig. 4.3. Sample form used to gather proposals of technical knowledge acceleration laboratory equipment. own work

As to the adaptation of stands from the foreign partner, initial evaluation of reasonability and possibility of such conduct was made during a study tour in Finland in December 2009.

All participants agreed that the Finnish ideas of stimulating innovative thinking among children and youths and supporting teachers in this regard is very valuable, thus the implementation of these solutions in interactive laboratory of technical knowledge acceleration will be very beneficial from the perspective of creating new quality in the process of stimulating students' interest in technical subjects as well as in the process of supporting teachers in regard to developing new forms of teaching students.

4.10. Analysis of validity of project's evaluation

4.10.1. The essence of evaluation

A natural consequence of issuing a contest application is its evaluation. Subchapter 4.1. synthetically discusses the specificity of evaluation in contest projects realized in Operating Program Human Capital. It is worth reminding here what the evaluation is and how this notion is defined in literature.

First of all, we can locate the issues of evaluation in axiology, that is a philosophical study of value. In this context it will be a judgment, expressed to define first of all, whether the subject of evaluation is valuable or not, and secondly to what degree it is valuable. Accepting evaluation criteria and conducting the evaluation process according to these criteria for more than one object allows for arranging these objects in order, from most to least valuable. Such evaluations are called preferential (see: Ziemiński Z., 1987).

In logic, deriving from philosophy, the evaluation is often connected with evaluator's experiences. Z. Ziemiński writes that it is "experiencing approval or disapproval of a given state of matters or an event, genuinely happening or just imagined by this person" (Ziemiński Z., 1987).

Evaluations are subjective by nature, because most often they are based on a evaluator's reference to state of matters of events. Such evaluations may be for example esthetic, hedonistic, moral (see: Ziemiński Z., 1987).

Entire axiology is based on an ethical concept of good. Therefore evaluation as a stage of valuation, which is the subject of axiology, is truly connected with answering whether something is good or bad. In order to make the evaluation process it is necessary to assume that good and evil exist. Additionally, good is gradable. Gradation of good facilitates comparison of an evaluated object with other evaluated objects.

It is an unsolved problem of philosophy whether objective good exists, or can it only be referred to the evaluating subject. Kołakowski, for instance, believes that: "distinguishing good and evil is the act of moral intuition" and that "it is a distinction referring to what indeed happens in human world" (Kołakowski L. 2008).

Particularly important is the approach to evaluation in practical dimension, occurring in economy and management processes. The achievements of praxeology had influence on development of organization and management studies. One of its main representatives in Poland, T. Kotarbinski, while presenting the notion of evaluation, discusses it in the following contexts:

- economical evaluation,
- effectiveness evaluation,
- efficiency evaluation,
- emotional evaluation,
- praxeological evaluation,
- technical evaluation,
- practical evaluation (Kotarbinski T., 1982).

In the evaluation process, very important part is valuation, very sophisticatedly and neatly described by W. Mantura (Hamrol A., Mantura W., 1998) in qualitative approach.

By valuation, he understands: "operation of functional assignment of a given feature (features) of a value of defined subject quality. As a result of this assignment, the states of values features are described, reflecting the features and states, levels and intensity of features, as well as states, levels and relative quality levels" (Hamrol A., Mantura W., 1998)

²⁴. As a universal characteristic of value used in valuation processes of objects' quality²⁵ he indicates the efficiency of fulfilling the needs. Such perception of value characteristic corresponds with a efficiency evaluation process, which is described by T. Kotarbinski (Kotarbinski T., 1982).

Although, as mentioned, evaluation is subjective by its nature, accepting a common assumption that good objectively exists, results in creation of sets of norms in social systems, which add objectivity to evaluations by reference to these norms, which are created with belief that when obeyed, will lead to good solutions. If these norms are related to activities in social systems²⁶, they are created in belief that, if obeyed, they will lead to achieving goals, which are considered critical, to improve the quality of social systems functioning. Abiding the accepted systems of norms will, according to their creators, influence the efficiency of achieving goals, because the efficiency is: "accordance of characteristic of real effect of action with characteristic of the goal of this action" (Szafranski M, 2006), where action is: "intentional and aware behavior of the subject of action" (Szafranski M., 2006).

4.10.2. Presentation of the application evaluations and their analysis.

Specificity of evaluation process in Operational Program Human Capital was discussed in chapter 3.

The authors of the project presented in this monograph believe that achieving results described in the project application would result in development of a product, which would create an opportunity for improvement of education system, particularly in case of development of the project solutions.

Unfortunately, the concept representing the opinions of many groups of interest, which representatives participated in many meetings and discussions with project's authors, prior to preparing the project application, has not been positively verified by two people designated to evaluate the application, which resulted in its rejection.

Because the authors of the concept had not had a chance to express their opinion toward the application evaluation results, as it had been prepared on request and in cooperation with Wielkopolska Voivodship, which was supposed to become a project's leader, taking a stand that pursuing beneficial solutions requires dialogue and cooperation, below we present the attitude toward the assessments of project's evaluators. This form of dialogue is the only possible way the authors of ILTKA concept can use, as they have not been informed who was evaluating the application (the data has not been published by Intermediate Body, announcing the contest), They hope that this publication will reach these people. Moreover, the authors of this publication wish to leave to Readers judgment the views of two sides, about the previously presented concept of the laboratory, and in particular:

- obeying the application evaluation procedures,
- integrity of evaluations,
- arguments of both sides.

Presented below are the statements of evaluators and the opinions expressed by the authors of the laboratory concept and the application. The full content of the assessments is not presented, but only the fragments that the authors wish to refer to. Quotation of these

²⁴ This book will not discuss in detail the system of terms used by W. Mantura, including such notions as quality, features, state of quality and other. We encourage the reader to read the publication cited in this text, as well as the book titled „Teoretyczne podstawy projektowania produkcyjnych systemów sterowania jakością” (Mantura W., 1994).

²⁵ Subject might be comprehended very widely here as the subject of cognition.

²⁶ Examples of social systems include: Country, local society, education system, enterprise, family, etc.

fragments will eliminate the risk of miscommunication, which could have occurred if the book only contained the generalizations of the evaluation content.

Presentation of assessment is sometimes made by emphasizing the arguments of the concept's authors. This is the case for example in the first part of presentation called "complaints to part A" and in the third part called "General complaints to the concept of evaluation". The authors allowed themselves such construction, because the content of the mentioned parts implies the content of evaluators' assessment, which became the subject of discussion of this publication. Presentation of evaluation and the authors attitude toward it was done in three parts.

- attitude toward in part A,
- attitude toward accusations in part B,
- general complaints to the evaluation.

The division of the justification into parts A and B is directly a result of the structure of the technical evaluation sheet (card) used by evaluators. Part A contains the evaluation of fulfilling the access criteria (including the minimum standard) and horizontal criteria. In part B the evaluators make assessment based on the rules of technical evaluation. These rules are cited in part B, keeping their numeration, used in the technical evaluation sheet.

Part I Taking a stance toward accusations in part A

One of the two evaluators stated that the application does not meet a minimum standard, therefore it does not meet the horizontal criteria connected with a sex parity principle.

The project's authors believe that it answer the issues connected with sex parity principle in several areas.

"Project's initiator indicated problem connected with access to technical knowledge in point 3.1. of the application. Identified problem is reflected in project's goals, which by accepted goals indicators precisely indicate the parity character of the project (indicator: Increasing the interest of students, particularly girls, of secondary technical schools and high schools in Wielkopolska, in choosing technical majors, in case of a declared will of continuing education after high school (indicator: interest increase of 20%, including 60% women).

Also the target group was characterized with consideration to gender. It was indicated that both in the group of users and receivers the parity proportion of selection will be guaranteed, considering the necessity of such selection of a research sample which will assure the validity of achieved results. The percentage values of women and men participation were given.

Because the project contains an element of detailed research preceding the preparation of innovative product, in task 3 the pro parity actions were indicated, based on the acquired research results, which would generate a precise answer to identified needs of both genders. Also the management structure was planned with consideration of the sex parity principle, which was indicated in the description: "Recruitment of the personnel will be performed according to a principle of equal opportunities, which means that only qualifications and experience of candidates will be taken into consideration."

According to the project's initiator, the information given in the projects are totally sufficient to concede the minimum standard as fulfilled, because at the level of description of a problem, goal and activities and in the construction of management structure, precise reference to situation of men and women were indicated, as well as numeric data indicating real consideration of the needs of both genders"²⁷.

²⁷ Content of the justification was prepared by Anna Jarmuszkiewicz.

Part I Taking a stand toward accusations in part B,

3.1. Justification of a realization need and project's goal

3.1.a. Indicating problems, to which solving the realization of the project will contribute and justification of the need of change of the current approach.

Remarks/comments of evaluators

EVALUATOR 1

- 1) Applicant indicates the lack of abilities of connecting theory and practice in exact sciences among students. Little participation of women in technical education It is a relative matter, dependent on the teacher
- 2) Lack of innovative programmatic solutions.

EVALUATOR 2

- 3) The applicant does not back up the theses included in the description with solid results of research or statistical data, which would allow an opinion that the existing state of matters should be changed.

Taking a stance toward the remarks/comments of evaluators

Re 1) The evaluator presumes in advance that uninteresting classes depend on the teacher. Undoubtedly, human is an important input resource of this activity, but as commonly known, the other input resource of this activity described in systemic approach are methods, materials and tools, and they are described in the project.

Re 2) This point serves indicating the problems. Point 3.2. contains the description of innovation, including programmatic innovations. These innovations were also described in point 3.3.; these descriptions are supplemented with content in project's schedule and budget. They include information, which because of the limited amount of characters allowed in the description could not have been placed there.

Re 3) Applicant refers to reports and data. These are the data from OKE (report 2009) as well as data coming from research conducted by Poznan University of Technology. Because of a limited amount of characters allowed, it is not possible to cite entire titles of research. Nevertheless, the applicant precisely indicates smaller amount of women interested in technical majors and data regarding the level of technical skills acquired by students.

3.1.b. Characteristic of project target groups (that is people and/or institutions/sectors, who will receive the product for testing and people who will be more efficiently supported thanks to the new product) and justification of their selection.

Remarks/comments of evaluators

EVALUATOR 1

- 4) Target group was defined very generally.
- 5) No justification of a target group

EVALUATOR 2

- 6) No rules of recruitment were indicated however.

Taking a stance toward the remarks/comments of evaluators

Re 4) Target group was defined very precisely. The definition (presentation) included the characteristics of the group as well as its size, percentage of each gender, division into users and receivers, manner of selecting research sample and way of recruitment, in this case referring mainly to the selection of the sample. Moreover, the risk of deficiency of research

participants was diagnosed and described in part 3.4 of the application. The application distinguished two major target groups, which were characterized. These are:

- a) users group – teachers of high schools and secondary technical schools; the descriptions starts with words: “Testing phase of the project foresees the participation of 35 high school and technical secondary schools teachers...”, and ends with: according to the existing gender proportion).”
- b) receivers group – students of high school and secondary technical schools in Wielkopolska; the description starts with words: “Testing phase of the project foresees the participation of 960 high school and technical secondary schools students...”, and ends with: ... family incomes, gender.”

Re 5) and 6) Justification of a receivers group selection is presented in point 3.1.a, and justification of users selection is a derivative of organizational prerequisites of entire project, because if we create the innovative programs for students, it is obvious that they must be implemented by teachers. Innovative projects by definition do not assume the improvement of situation but development of tools which will be used for this improvement (specificity of innovative projects in OP HC), therefore both teachers and students will constitute only a testing sample of a solution developed in the project. Selection of this sample will be made with a use of standard methods of research sample selection, which are described in all textbooks discussing social, sociological, marketing and pedagogical research. Project’s authors assumed, perhaps wrongly, that these methods are well known to the experts evaluating innovative projects regarding education.

3.1.c. Defining general goal and particular goals of the project

Remarks/comments of evaluators

EVALUATOR 1

- 7) ...it is hard to tell what the applicant had in mind while saying "innovative tools used for making knowledge more attractive"
- 8) Applicant notoriously uses a sentence "innovative forms of acquiring knowledge" without defining how he understands it.
- 9) I’m under impression that [Applicant] doesn’t precisely know what he means by this innovation.

EVALUATOR 2

- 10) General goal defined too generally
- 11) No description of innovation
- 12) Particular goals not operationalized

Taking a stance toward the remarks/comments of evaluators

Re 7) These tools are the project’s products and these were described in point 3.2. The description is constructed in such manner that the applicants specifies the described concept in successive points, making final specification in schedule and budget, additionally explaining some issue in specification under the detailed budget.

Re 8) The meaning of this notion stems from the context of the content of description.

Re 9) The impressions may not be the base of a content related evaluation of the project worth approximately 4 million zł. It is not a content related remark.

Re 10) The goal was precisely defined by accurate indicators, which makes it consistent with a SMART principle - measurable, specific and relevant. The duration of the project is additionally precisely defined in a correct field of the application, and therefore it is evident that achieving the goal is assumed during the project realization. In authors’ opinion there is no need to repeat the same information in several places in an application form, especially that evaluators are obliged to refer to the entire content of the application.

Re 11) It is hard to guess whether the evaluator means that the definition of innovation was not cited in the application or was it more about the description of a solution's innovativeness. The terms “innovation” and “innovativeness” are two separate terms. Still, the evaluator asks about innovation, therefore it should be clarified that the authors of the application assumed, that when writing an application in OP HC, one should use the definition of innovation agreed upon in OP HC. Innovativeness, on the other hand, was described in point 3.2.

Re 12) Particular goals were supplemented with specific measurable indicators, which is consistent with the PCM methodology used in this regard; It is also in line with, and even exceeds the requirements set in the indicators handbook for OP HC.

3.2. Innovativeness

In this point the authors resigned from citing the evaluators assessments, because they clearly negated the innovative character of solutions presented in the project, which is reflected in their assessments (3/20 and 5/20). Because the evaluators showed a great consistence in comments to their individual evaluations, presented below are the counterarguments, which emphatically prove the innovativeness of the project, and therefore prove the idleness of the low assessments of the project in point 3.2.

3.2.a. Description and justification of innovativeness of proposed solution/approach against the background of existing practice – indicating how it is different from currently used solutions (also in the context of cost/effect relationship); definition and evaluation of product’s innovativeness; value added of innovation compared to current practice.

Attitude toward the remarks of EVALUATOR 1

The evaluator cleverly notices that teachers “have an opportunity to implement their personal teaching programs”, but, first of all, not many make use of this opportunity, and second of all, in the area of technical sciences they do not have financial resources to implement their programs.

The evaluator mentions that teachers make use of multimedia equipment. There is an immense difference between an overhead projector, which enables a student to watch something, and the device for plasma cutting, or three-dimensional scanner, which enable a student to work, experiencing simultaneously a number of mutually connected phenomena, about which he would normally only read, often without comprehension.

The Evaluator writes about constant training of teachers, probably with reference to trainings foreseen in the project. These training however, are connected with programs, which are supposed to be developed in the project. This training is dedicated to use an innovative form of teaching, which is teaching the student both in the laboratory and in the classroom.

The Evaluator mentions that teachers prepare their own teaching materials. He fails to mention however what type of materials. A teacher can independently prepare small materials, such as photocopies, prints, models from plasticine, cardboard or wire, but the project of Interactive laboratory of technical knowledge acceleration foresees textbooks, laboratory stands equipped with the state of the art equipment and devices (detailed information included in the budget, in the description of stands).

The Evaluator “does not see anything innovative in the solution”. Such attitude stays in opposition with solid and verified arguments presented in the project’s description. Interactive laboratory for interdisciplinary teaching of subjects requiring technical, mathematical and natural science knowledge does not exist in Poland, and is successfully used in the best organized systems of education in the world, such as Finnish, yielding outstanding results.

Implementation of such solutions in Polish education has an innovative character and this type of actions has not yet been undertaken.

The Evaluator has not referred one single time to the content, in which the description of project's innovativeness was included, such as: systemic solution, specificity of Wielkopolska Voivodship, organizational solutions, which are the essence of innovativeness. He only manipulates standard examples, reflecting common solutions in education, while the innovativeness by definition must require new, unprecedented and non-typical elements.

Attitude toward the remarks of EVALUATOR 2

The Evaluator does not see the innovativeness of teaching materials. He breaks the entire concept into elementary parts...

The first bonfire lit by a primitive man had nothing innovative in the fire itself. It was the same fire as the one coming from a lightning hitting the tree. When we break down any object into protons, neutrons and electrons it turns out that the human is no different than a pond.

3.2.b. Indicating barriers not allowing the use of the currently proposed solution

Attitude toward the remarks of EVALUATOR 1

The Evaluator stated that the application does not indicate the barriers of currently used solutions, which is the result of the fact that the application does not refer to the currently used solutions.

First of all, this point is not about indicating barriers of using "currently used solutions" but about indicating barriers of using currently (that is in the application) "proposed solution". It would have been illogical to prove that the already used solutions are not being used.

Second of all, the barriers were very precisely defined. According to the descriptions included in appendix 8 to the Guidebook for Projects Initiators of innovative projects in OP HC, called "From idea to innovative project" issued by KIW in 2009, this description is a continuation of a description of the proposed solution against the background of existing practice and continuation of a problem's description. The description of existing practice occurs in point 3.1. and so it has not been repeated here. The required reasons, explaining why the approach proposed in the project has not yet been used, were unambiguously indicated.

Barriers were described in the content: "Main barriers which obstructed the implementation of the proposed solution until now were: lack of support from an experienced foreign partner, lack of support from experienced foreign partner, not noticing or marginalizing problems, lack of sufficient cooperation between schools and universities allowing for permanent systemic approach, lack of financial resources sufficient for realization of large scale innovative undertaking

Attitude toward the remarks of EVALUATOR 2

1) Evaluator states that "not all barriers were indicated properly"; he does not state however, which were not indicated properly, and what are the mistakes. The Evaluator's remark thus becomes unsubstantiated.

2) Evaluator writes: "problems, which the applicant wishes to reach...". The applicant does not wish to reach problems but to solve them. This point was supposed to indicate barriers, which make it impossible to solve problems, and not the problems themselves. The latter were described earlier in the application. There is a fundamental difference between the term "barrier" and "problem". In further remarks, the Evaluator refers to problems and not to barriers. The problems are not the subject of evaluation in point 3.2.b. In this regard the assessment is unsubstantiated.

While referring to the barriers, the Evaluator writes that “similar solution has been used for years”. It is not clear in this context what the Evaluator had in mind. If he indicates in this point, although it is not a place for such assessment, that activities described in the project have been used for years, this assessment is too general, because it does not state what activities are taken into account: All of them in such arrangement as in proposed project? All of them but considered separately, one after another? Only selected? Interactive laboratory in a form described in the project does not exist in Poland and until now such solutions have not been used in Poland, so in reference to the project’s content the evaluation has no confirmation.

3.2.c. Description of project’s final product, including the definition of what will be the subject of popularization and inclusion in policy; assessment of product’s potential to popularization and inclusion in policy.

Attitude toward the remarks of EVALUATOR 1

The Evaluator claims that “the Product is non-uniform”. Applicant clearly states that the product is uniform, has a character of a system of activities, in which the methods, tools, people and relationships between them strictly correspond. Obviously, point 3.2 merely lists the partial products of the project, pointing at the main product - "Interactive laboratory of technical knowledge acceleration". We have to distinguish in the project the entire system as an “Interactive laboratory of technical knowledge acceleration” from the physical laboratory room, which is a tool in the system. Some of the classes are also held in schools. This is also innovative, that we systemically create education in two forms (also in two places) within the same program. Place and form of test classes are dictated by the organizational, effectiveness and logistical reasons.

The continuation of development of Interactive laboratory, which development potential is very big thanks to its open formula, was unambiguously described. Because of space limitations, the popularization was not described in detail in this point, however this description was completed in point 3.3. as well as in the schedule and budget. These three parts constitute the entire description of popularization and they should be treated as a whole. Engagement of the Voivodship, as a leader, is a guarantee of including the solution in the policy.

Attitude toward the remarks of EVALUATOR 2

The project Evaluator believes that the “Description of target groups’ participation in preparation and realization of the project is very laconic”.

This is not true. It is true that point 3.2 contains a synthetic presentation of principles of Interactive laboratory functioning, but that is why so much effort was made to present detailed information under the specific budget. Had the evaluator read this part of the application, he would have noticed that there are transparent descriptions of Laboratory operation with specification of such budget entries as: 96, 99, 100, 101.

Attitude toward the evaluation regarding integrity and popularization are analogical to the above “Attitude toward the remarks of Evaluator 1”.

3.3. Measures

3.3.a. Indication and description of measures used to achieve project’s goals (including the popularization and inclusion measures at all required stages and the strategy of popularization and inclusion of the final product to the policy); their adequacy against the identified problems and target groups, reasonability of the schedule.

Because of the fact that many remarks of both evaluators are concurrent, we listed them in table 4.2. and we took our stance toward the remarks below the table.

EVALUATORS' remarks

Table 4.2. Remarks of evaluators to the content of the application in regard to point 3.3.a.

Noticed mistakes in the description	Evaluator 1	Evaluator 2
1) The description of actions does not clearly explain whether the results of these actions will cause the increase of women's interest of mathematical and natural science education	YES	NO
2) Project initiator does not adjust the measures and forms of support individually to men and women. It is therefore hard to say whether the measures undertaken within the project will contribute to diminishing the imparity in access to technical schools.	YES	NO
3) Measures have not been described according to required stages of innovative project realization.	YES	YES
4) Lack of division into preparatory stage and implementation.	YES	NO
5) Questionably big tour groups of students – 30 people for 15 stands. No information what the group, for which temporarily there is no work stands, will do in the meantime.	YES	YES
6) No description of popularization activities.	NO	YES
7) No strategy of popularization and inclusion of the final product to policy. (not emphasized)	YES	YES

own work

Attitude toward the EVALUATOR's remarks

Re 1) Since the applicant is guided by the equal opportunities policy and opposes any type of sex discrimination, he prepared a project which aims at encouraging both girls (women) and boys (men) to study in technical majors. Re 1) is connected with Re 2).

Re 2) Differentiating the education program for women and men would be an apparent violation of the equal opportunities principle, which is important for the applicant. It is exactly the preparation of laboratory classes and other forms of education (including this in classrooms) common for male and female students that should show that classes regarding technical sciences can easily be addressed at both men and women. The invitation to the laboratory localized at Poznan University of Technology (technical university) of entire classes, both male and female students), their common efforts to complete the laboratory experiments, is a message that gender does not matter when it comes to fathoming technical sciences, and mathematics, chemistry, physics entangled within. Dividing male and female students, or what is even worth, proving that some stands are meant for males and other for females would only lead to the imprinting of the differences in students' conscience and would strengthen the stereotypes deriving from the culture.

Re 3) Measures have been precisely described according to required stages of innovative project realization, which was proven in table 4.3.

Table 4.3. Presentation of consistence of measures emphasized in the project with the stages characteristic for innovative projects in OP HC.

No.	Stages defined in the chart included in the appendices 1 and 2 of a "Guidebook for innovative projects initiators in OP HC, issue by KIW (National Supporting Institution) in 2009	Sentences emphasized by the applicant in the project "Interactive laboratory of technical knowledge acceleration"
STAGE i		

1	-	International cooperation – a task normally shown as the first in the generator, if the international cooperation is foreseen in the project, and it was foreseen in the project issued by the applicant. This task includes the description (in description, schedule, budget and in justification of budget entries in particular) of tasks in regard to cooperation with a foreign partner
2	-	Project management , usually located as the first in the project; in the applicant's project, because the first tasks is reserved for "international cooperation", this task is placed second.
3	Diagnosis and analysis of the problem	Deepened diagnosis and analysis of problems – because before preparation of the project's concept and ultimately the project's application, the diagnosis and analysis of problems was made, including this made with applicant's international partner during study tour in Finland, it is reasonable to make deepened diagnosis and analysis in the project; such approach is consistent with the "guidebook for the innovative projects initiators in OP HC" issued by KIW in 2009.
4	Creating partnership	Rules of partnership has been defined before issuing the application. This included signing an appropriate letter of intent with the foreign partner. Contracts between partners are presented to the Intermediate Body (MEN) before signing the co-financing contract. For this reasons, the project does not include the task called Creating partnership. It is obvious that the international cooperation between partners will be developing and improving during entire duration of the project.
5	Development of an initial version of the product and strategy of implementation of innovative project.	Development of initial analysis²⁸ of a final product – main product in the project is ILTKA, which should be comprehended not only as the laboratory room, but as a system of actions, subjects and methods and connections between them. The structure and the scope of strategy were not described. In innovative projects the strategy takes a form of a specific document, which is delivered to the Intermediate Body at the end of stage I and is a base for the evaluation of the initial version of a product. At the preparation stage of the application, even the Ministry of Regional Development (a superior institution to MEN in EU projects) did not know the structure nor the scope of implementation strategy for innovative projects, and so it could not have been described in the project (applicant has not received information about the structure of this document from any of IB, including MEN, KIW and MRR) Nevertheless the applicant took into account the necessity of development of such document (stage 19 in task 4).
6	Popularization and inclusion in a mainstream policy	Innovative projects require the popularization of products and including them in a mainstream policy in entire cycle of their realization, starting from

²⁸ In the application in the name of task 4 there is a word "analysis". This word was incorrectly used; it should be replaced with a word "version". The entire description of task 4 however indicates that it refers to an initial version of the product

		stage I, beginning with the task of developing initial version of the product and the strategy of innovative project implementation. That is how it was done, also considering that the popularization actions should be intensified in stage II, particularly after project's validation. In order to prove the continuation of popularization actions, and at the same time lower their costs, the popularization actions from stage I and II were presented together in Task 9 of the project, called: Popularization and inclusion in a mainstream policy of interactive laboratory (ILTKA) ; Applicant's potential (Wielkopolska Voivodship) and abilities to influence the inclusion to the mainstream policy of the project's products are so great that the popularization actions were limited to necessary minimum, to lower the project's costs, while increasing its effectiveness.
7	Submitting a strategy by a beneficiary	It is a one-time activity which is a consecution of preparing the strategy, and thus it has not been emphasized in the schedule, but it was included as an action in the stage 19, task 4.
	Opinion of the thematic network	Evaluation is beyond the applicant's scope of tasks, however the applicant reserved the time in the schedule for this evaluation. The OP HC documents state that the safe period which should be reserved for the evaluation is 2 months; it is also suggested that other tasks in the project should be limited to the bare minimum during this time. So it was done. The evaluation was planned in February and March. Meanwhile: - task 4 includes participation of a project's representative in the thematic network works, because the KIW informed that such participation might be necessary, - a break in realization of a task "international cooperation" is planned already since December 2010. - no further content related tasks are planned, - expenses within task "Popularization..." are limited.
8	Acceptance/rejection of the strategy by IOK/institution verifying the systemic project	It is a certain act resulting from evaluation, which lies beyond the scope of applicant's actions, thus it was not included in the application.
STAGE II		
9	Testing of the product	Testing of the product – the project foresees the testing of the product, which (what was clearly emphasized in the description) should be comprehended not as a laboratory room but as a system of action, subjects and methods and connections between them.
10	Analysis of real effects of product's testing	Analysis of real effects of product's testing
11	Development of the product based on the analyses results	Development of a final product
12	Popularization and inclusion in a mainstream policy	Justification analogical to the point 6 of this table.
13	Development of a final product	Development of a final product – in the projects' schedule the stages presented in the chart of innovative projects realization presented in points 10 and 13 of this table are combined.

14	Presenting the product for validation	It is a consequence of development of the final product, which is an action in the task: Development of a final product
15	-	Validation – in the flowchart, appendix 2, in "Guidebook for innovative projects initiators of OP HC", issued by KIW in 2009, this task was not clearly presented, but the validation is precisely defined in the guidebook; the description indicates that it is safe to reserve the period of 3 months for the project's validation, which was done. We should notice, that in this period the activity in the project is limited to minimum, which can be confirmed by the schedule analysis.
16	Validated/non-validated product	This decision lies beyond the activities of the project, therefore it was not reflected in the schedule and not included in the description.
17	Diminishing the value of the product/termination of the contract of co-financing the project.	Consequence of the previous decision, which the applicant simply acknowledges.
18	Popularization and inclusion in a mainstream policy	Justification analogical to the point 6 of this table.

own work

Re 4) Application generator does not offer an opportunity of additional division of tasks in Stage I (preparatory) and Stage 2 (implementation). Complete mapping of innovative project realization chart in the structure of tasks in the project (which was proven in annotation 3 above) leaves no doubt as to which tasks belong to the preparatory Stage and which to the implementation stage.

Re 5) This information is given in description of task 5. It states: *"When one group will be participating in the laboratory classes the other will be visiting PUT²⁹ and eating lunch"* Further description is continued as a justification to the budget entry no 100. It says:

"A group of 30 people will be coming at a time, which will be divided into two laboratory subgroups; one of them will be attending laboratory classes while the other will be following the sightseeing program of PUT and Poligród, therefore the presence of a tour guide is indispensable, as the chaperones coming with the groups are not qualified to do this; 280 hours = 20 groups x 2 tours x 7 hours for each tour".

Re 6) The popularization actions are described. In the project description the description of popularization actions is presented under the number "9"³⁰. A supplement to the description is the list of stages in task 9 and the list of budget entries for task 9.

Re 7) Strategy of popularization and inclusion in a mainstream policy of the final product is presented (emphasized), which is reflected in the title of stage 6 in task 9 in project's schedule.

3.3.b. Description of the manner in which the representatives of the project's target groups were/will be included in its preparation and realization.

EVALUATORS' remarks

²⁹ Poznan University of Technology

³⁰ In this book the description of popularization contained in the application is presented in chapter 4.6 (Task 9).

Both evaluators state that the description is very general/imprecise/laconic. Second evaluator, by setting such thesis, argues the difficulty with evaluation of the project resulting from this point. One of the evaluators refers to entire project's documentation.

Attitude toward the EVALUATORS' remarks

The project's documentation unambiguously indicates in what ways the target groups' representative will be included in its presentation and realization. The applicant is fully aware of the significance of the opinions of future receivers and users, during the design process of new products. Therefore the engagement of target groups' representatives was emphasized at every stage of project's realization, which by the way is concurrent with the requirements set for innovative products.

This engagement was first described in point 3.3., starting with words: "The project foresees the engagement...", and ends with words "...element of the research process".

The description proves that this engagement exists in all content related tasks of the project, that is 3,5,6,7, and these tasks are presented earlier in the project's description, therefore they were not repeated in this paragraph. In the application, the project's description is connected also with schedule, budget and justification of the selected budget entries.

These elements of project's documentation clearly present the engagement of target groups' representatives:

- in task 3 it is reflected in:
 - content of stage 5 of the schedule,
 - pos. 45 in the budget,
- in task 5 it is reflected in:
 - content of stages 2, 3, 4, 5, 18, 19, 20, 21 in the schedule,
 - pos. 83, 84, 85, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, and particularly **102, 103, 104, 105**
 - justifications of pos. 96, 99, 100, 101, 102 i 105 of the budget
- in task 6 it is reflected in:
 - content of stage 3 of the schedule (if the reader is familiar with the desired way of evaluation in innovative projects),
 - pos. 107 in the schedule (comment as above),
- in task 7 it is reflected in:
 - content of stage 1 of the schedule,
 - pos. 122 in the budget,
- additionally in task 9 it is reflected in:
 - content of stage 9 of the schedule,
 - pos. 145, 146, 147, 148, 155, 156, 157, 158 in the budget.

3.4. Project's results

3.4.a. Description of project's results in regard to planned actions and chances of their achievement

3.4.b. Description of a way in which the results will contribute to achieving project's goals.

3.4.c. Description of what will account for the success of popularization and inclusion in policy activities.

Evaluators state among other things that³¹:

- “project results are not connected with justification of the need of project’s realization, do not show in what ways the project will have influence on greater participation of men and women in the structure of graduates of technical schools”;
- “description of results is chaotic”;
- “project’s innovativeness is poorly visible”;
- “No transparent indications of success and popularization actions”.

Results were formulated with regard to the PCM methodology and supplemented with clearly defined indicators. It is therefore hard to agree with the evaluator that the description of results is chaotic and too general. Moreover, all results refer to the actions foreseen in the project. What is more, it is possible to build a transparent connection between results and goals of the project: for example facilitating the access of high school students to innovative, attractive forms of gaining knowledge and skills in technical sciences and physics, indicator: 960 students visiting the laboratory translates into the goal: Identified problem is reflected in project’s goals, which by accepted goals indicators precisely indicate the parity character of the project (indicator: Increasing the interest of students, particularly girls, of secondary technical schools and high schools in Wielkopolska, in choosing technical majors, in case of a declared will of continuing education after high school (indicator: interest increase of 20%, including 60% women). Although the project initiator has not presented in the result the division into men and women, but in light of the declaration regarding the division of the target group, it is not fair to say that this information was omitted in the application.

Assessment of one of the evaluators in point 3.4b. was written outside the assessment table (in the bottom margin) and it is incomplete, and therefore the Applicant was not given an opportunity to express his opinion toward evaluator’s remarks.

3.4.d. Description of a potential risk and countermeasures

Remark of EVALUATOR 1

“It is not indicated that the project’s testing will be done as a part of existing class schedule. It is connected with trips, and so a part of obligatory classes will not be realized. Lack of plan of countermeasures.”

Remark of EVALUATOR 2

“It is not indicated that the project’s testing will be done as a part of existing class schedule. It is connected with trips, and so a part of obligatory classes will not be realized.”³²

Attitude toward the EVALUATORS’ remarks

The applicant doesn’t understand why the evaluators claim that the applicant has not indicated that project testing will be done during classes. It was unambiguously indicated in point 3.3, in the characteristic of task 5. It says:

³¹ Basically, the evaluators’ remarks in these points are so general that they do not refer to the results at all. The content of results has not been subjected to any analysis by neither of them. In such case it is hard to argue with the evaluators at all. The comments are dominated by content, which occurs in many other points of assessment, regardless to their scope. If the evaluator writes that: “results are not...”, he should justify his opinion. When he doesn’t, the only answer that can be given is:

³² Reading the evaluators’ comments we should notice how consistent the content of these comments is, with regard to the fact that it was evaluators duty to make independent analyses, which is the essence of the evaluation process in OP HC projects.

all students will attend physics classes at school, during which the education program developed in task 4 will be used and tested. Teachers and students participating in laboratory classes will use teaching materials, which will be used in at least 60 classes. “.

It should be emphasized that testing will be done not only during classes. The scale of testing during classes will not be too large not to interfere with the realization of class schedule. First of all because testing, limited in scale, will be distributed on a large number of classes. Second of all because the developed innovative program is supposed to supplement the standard education program; developed teaching materials will be designed in such way that the teachers were able to use them to discuss the content normally discussed during classes. Two trips for every class will not tear down the education system of tested classes, just as much as it is not torn down by occasional trips to visit universities at other occasions, and the fact of realizing such trips is noticed by evaluators in other points of the evaluation (it should be once again underlined, that the trip itself is not an innovation, but the activities and effects of the trip are innovative)

3.4.e. Description of the way of monitoring the project results and its evaluation

Remarks of EVALUATORS

No description of methods of project's monitoring

Attitude toward the EVALUATORS' remarks

The project's documentation contains exhaustive description of monitoring, which will be explained below.

It should be noticed, that innovative projects form a specific group of projects within OP HC. They do not yield an immediate improvement of human capital level, but create products, which are supposed to deliver positive changes in regard to human capital when popularized. The innovative projects in OP HC have a lot in common with development projects and sometime even research projects, although the specificity of their products is different.

Nevertheless, such projects require constant supervision of the product, which is strictly related to the project's monitoring process. Particularly significant indicator of success and correctness of project's realization is correctness of the product. The project includes the process of activities, in which the verification of the product and monitoring of the project is done simultaneously.

Monitoring process is realized in a continuous mode (hence the term “process”), for entire duration of the project. All research on the product foreseen in the project provide data for analysis of correctness of monitoring process realization.

Using the same articulated research methods for simultaneous realization of a monitoring process, beyond obvious organizational benefits, also brings economic benefits. We face here the phenomenon of accumulation of goals, described by Tadeusz Kotarbinski in "Treatise on Good Work".

In a descriptive part of the project the description of monitoring is the following:

“Results will be monitored at the beginning, in the middle and at the end of the project, with reference to the base values. Monitoring will be conducted within planned research (after the end of every task) and by current gathering of information by the project manager, responsible for monitoring process. Monitoring process of entire project, because of its innovativeness will be a subject of a separate research, which will allow for detailed control of results during entire project realization. Moreover, task 6 includes an external evaluation,

which will results in an unbiased analysis of achieved results and products, which will constitute a base for corrections of the final project”.

Particular methods used simultaneously in the research process and monitoring process are described in the project’s budget, in particular:

- pos. 45 – focuses,
- pos. 88, 89, 90, 91 – testing, analysis of correctness with a use of observation method (although the word "observation" is not used, it stems out directly from the annotations in budget entries)
- pos. 102 – participants opinion poll as a part of pre-test,
- pos. 103 – teachers opinion poll as a part of pre-test,
- pos. 104 - random survey,
- pos. 104 – individual questionnaire as a part of monitoring research,
- pos. 105 – questionnaires as a part of monitoring,
- pos. 107 – external evaluation,
- pos. 108 – Internet survey,
- pos. 122 – focuses,

Listed methods for obvious reasons have not been described in details in the project’s documentation, as these are commonly used research methods, and their names implicate their specification.

3.5. Applicant’s potential

3.5.a. Credibility – experience in realization of similar projects, institutional potential, particularly in regard to popularization and inclusion in policy (of the leader and partners – if applies).

Remarks of EVALUATORS

Both evaluators believe that: “Applicant has little experience³³ in realization of such type of projects. He did not present a research potential and the potential for popularization and inclusion in policy activities”

Attitude toward the EVALUATORS’ remarks

These statements are untrue.

1) Innovative projects have not been launched before, so no one has real experience in their realization.

2) Evaluators have not referred at all to the partnership in the project, which essence is combining potential and gaining synergy effect. It is obvious that Wielkopolska Voivodship does not have a required research potential, but such potential is a domain of Poznan University of Technology and the Faculty of Management Engineering (former Institute of Management Engineering). This research potential will be back up by the research potential of Teachers Training Center in Poznan. The application contains a proposal of innovative solution, that is such solution that does not yet exist, so neither the applicant nor the partner has ever realized such a project. Both the applicant and a partner have however extensive experience in realization of projects, including projects connected with education and teaching.

3) It is hard to present in few sentences the impressive experience of such institutions as Wielkopolska Voivodship, Poznan University of Technology, Teachers Training Center.

³³ The orthographical mistake made in the original evaluation sheet was intentionally kept, as it will be an important subject of further analysis.

These institutions are well known and experienced in realization of every type of projects (Wielkopolska Voivodship additionally in organization and processing of projects, either directly or through a Voivodship Labor Office in Poznan) so it is hard to choose a few out of hundreds. Names of these institutions constitute a trademark, which symbolizes a high quality of solutions, activeness in the projects field, ability to deal with complex solutions in cooperation. In case of any doubts regarding the research, organizational, administrative potential, it is enough to visit the websites available to general public, to make sure that these institution really exist and have necessary experience to realize medium size projects, such as Interactive laboratory of technical knowledge acceleration. We will emphasize once again that the potential of our partner institutions should be considered with regard to the synergy effect resulting from the cooperation. Moreover, the leader of this partnership has good orientation regarding the issues of education in a region, including its problems and needs.

3.5.b. A manner of project's management (transparence of realization rules, approach to management in all its aspects, distribution of duties: adequacy of a key personnel).

Remark of EVALUATOR 1

Rules of **project management not transparent. Key personnel and its tasks described roughly.** No task description for steering group and expert panel.

Remark of EVALUATOR 2

Description of **project management is not very transparent. Key personnel and its tasks are described roughly.** No distribution of duties and indication of tasks for personnel.

Attitude toward the EVALUATORS' remarks

Rules of project management are defined very clearly. It is worth noticing that:

- 1) The project description contains separate description of every key person in the project and their duties, naming specific positions. These tasks have been assigned to particular people, which were indented in the text. What more could have been done to make the description of tasks even more transparent?
- 2) In the description of OP HC application form there is no room for detailed job description sheets of people employed in the project; that is why it is important that the applicant and its partners proved their potential, which guarantees that they will be capable of managing the project, including: specification of general functions mentioned in the application, distribution of work between work positions, recruitment procedure, etc. Detailed descriptions of selected key positions in the project were located in the specifications of selected budget entries, regarding wages, in such positions as: 1, 2, 3, 4, 27.
- 3) The scope of duties of a Steering Group has not been specified, because it is described in detail in the document "Scope of realization of partnership projects, defined by Management Institution of Operational Program Human Capital". Detailed scope of duties of a Steering Group is added as the appendix to partnership agreement.

3.5.c. Role of partners or other institutions (including subcontractors) engaged in the project (if applies)

Remark of EVALUATOR 1

No partnership schedule of actions.

Remark of EVALUATOR 2

Applicant does not provide the tasks of partners and schedule of actions.

Attitude toward the EVALUATORS' remarks

It is hard to guess what the evaluator 1 had in mind while saying “partnership schedule of actions”” Authors of the application, for example, understand that the application should indicate that it was created with a participation of all partners. In this context the Evaluator may not argue that project partners have not consulted the preparation of the schedule. Obviously, without such consultations the application would have not been created and signed by the representatives of partner institutions.

The remark of the evaluator 2 is much more comprehensible and thus it may be referred to, assuming that the intent of evaluator 1 was expressing similar opinion.

- 1) First of all it is not true that the applicant does not provide the tasks of partners. On the contrary the tasks of partners are unambiguously defined, when written:
“Tasks of project leader will include mainly project management, settlements and reporting, supervision over partners activities. Technical works on a leaders side will be in the responsibilities of Teachers Training Center in Poznan - a unit reporting to Wielkopolska Voivodship. Voivodship will also be responsible for management and students’ education. Poznan University of Technology will be responsible for scientific aspects, organization of ILTKA functioning, international cooperation and popularization. Foreign partner will be responsible for information transfer, providing know-how and supporting adaptation of Finnish solutions in the project.”³⁴
This description was supplemented with the specification in the budget by dividing the costs entries between partners. Effectively also the schedule, reflecting the distribution of tasks to partners, contains a precise division of tasks.
- 2) It should be underlined that the subject of evaluator's interest, which influences the assessment, is not the specification of tasks description but the fact that this description does not exist.
- 3) Yet, even a possible accusation that the description is not detailed enough would have been unsubstantiated. Detailed descriptions of partners' tasks have been included in the project's budget. Every position is marked with a symbol of partner’s institution. Exceptions are tasks 1 and 9 which are entirely realized by Poznan University of Technology, which stems from the project description, and the task called Validation, which, as written before, is the task included only to maintain order, because it is not realized by partners in the project but by an external institution.

IV. Project expenses

Contested categories related to the international cooperation, regarding expenses connected with international cooperation (costs of translations, trips to Finland) were estimated based on market rates. It should be underlined that Finland is one of the most expensive countries in Europe, and Finnish language is not particularly popular in translation services, which increases the price. The texts translated in the project will be specialized, which has significant influence on costs.

Part III. General complaints to the evaluation.

- 1) According to one of the two evaluators, the project does not meet only horizontal criterion, while the statement approved by Under-secretary of State in Ministry of National Education, which is an Appendix no 12 to the Protocol from KOP session, indicates that the project does not meet not only the horizontal criterion but also the access criterion, which is not true. Doubts arise as to the reliability of Appendix no 12.

³⁴ The original spelling from the application was kept.

- 2) Most of evaluators assessments are based on beliefs, views, premonitions, or are not supported with any substance, which would make the evaluation more objective. It is evident that the evaluation is by nature a partially subjective judgment, but it is unacceptable that the application for the project worth almost 4 million zł was evaluated so roughly and with flagrant and regular negation of the existence of content which was directly included in the project documentation.
- 3) At places the content of assessment is identical, which arises doubts, whether the evaluators were working independently, or were they contacting one another or even working together. The comments to the points, which are presented in table 4.4. are worth looking at.

Table 4.4. Examples of concurrent content of assessments in evaluation of application regarding the project Interactive laboratory of technical knowledge acceleration (identical fragments are written in bold)

No.	Number in an evaluation sheet	Content of assessment of evaluator 1	Content of assessment of evaluator 2
1	3.3.a.	Questionably big four groups of students – 30 people for 15 stands.	Questionably big four groups of students – 30 people for 15 stands.
2	3.4.a.	Description of results is chaotic, and high level of generalization makes the assessment difficult. Project's innovativeness poorly visible	Description of results chaotic. Project's innovativeness poorly visible Very high level of generalization makes the assessment difficult.
3	3.4.c.	No transparent indications of success and popularization actions	No transparent indications of success and popularization actions
4	3.4.d.	It is not indicated that the project's testing will be done as a part of existing class schedule. It is connected with trips, and so a part of obligatory classes will not be realized.	It is not indicated that the project's testing will be done as a part of existing class schedule. It is connected with trips, and so a part of obligatory classes will not be realized.
5	3.4.e.	No description of methods of project's monitoring	No description of methods of project's monitoring
6	3.5.a.	Applicant has little experience in realization of such type of projects.	Applicant has little experience in realization of such type of projects.
		It should be noticed that in both evaluations there is the same spelling error "experience" (polish: do świadczenie) – letters "do" are written separately from the letters "świadczania".	
7	3.5.a.	Did not present a research potential and the potential for popularization and inclusion in policy activities	Did not present a research potential and the potential for popularization and inclusion in policy activities
8	3.5.b.	Rules of project management not transparent. Key personnel and its tasks described roughly. No task description for management groups and expert panel.	Description of project management is not very transparent. Key personnel and its tasks are described roughly. No distribution of duties and indication of tasks for personnel.

own work

Taking into consideration these evident prerequisites as well as the fact that in many points the content of Comments/Remarks of both evaluators is surprisingly similar in regard to: reasoning, sentence structure, where at times only other equivalents of words (synonyms) are

being used, it would be reasonable to ask (whom, the authors will not decide) for verification done by proper experts, whether the evaluation process was free of procedural irregularities.

5. Conclusions

A great deal of this monograph is devoted to presentation of the project Interactive laboratory of technical knowledge acceleration. Although at the application preparation stage, development of the concept was the main goal, in this book the authors, in the context of development of education processes, wanted to:

- convincingly present the importance of such solution, in at least regional scale, beside the extended description of the project,
- draw attention to connecting modern forms of education with innovative approach to creation of solutions both at the education level and later in mature life,
- present their own attitude toward innovativeness of education processes, referring to already developed solutions.

Needless to say, such undertakings as the one presented in this book, require co-financing from external sources, if the access to the described forms of education is to be common and free of charge.

At the preparation stage of an application for co-financing, the authors decided that the most reasonable would be applying for financial resources in the Operating Program Human Capital. Because of the chosen path of applying for financial aid, the authors presented in this book the essence of this program, including the Priority three, and the formula of innovative projects. They wanted to present the specific conditions in which the application for funds to complete the project was issued.

As presented in the content of this book, application for funds was rejected, however in the authors' opinion, failure in applying for funds does not mean that the presented idea is not interesting. According to the authors, the evaluation system of applications within OP HC is imperfect, which was proven in chapter 4.10 by presenting that during the evaluation process of the project application, there were major omissions, which significantly contributed to the rejection of the application.

Because the concept of Interactive laboratory of technical knowledge acceleration is sound, both in opinion of its authors and potential partners and many other institutions responsible for education in the region, and at the same time its soundness is confirmed by the conducted literature analysis, we should answer the following questions:

- is there currently a possibility to finance such undertaking,
- is it, and to what extent, necessary to modify the presented concept of interactive laboratory,
- how to organize back-up, perhaps based on a larger number of institutions, to make the concept realization possible³⁵?

Figure 5.1. presents several potential sources of financing. First of all, authors believe in a possibility of realization of such undertaking in Poland (I). Measures undertaken to launch the proposed undertaking could be financed from European Union sources (I.A) or national budget (I.B).

As far as the EU sources, it would seem most reasonable to finance the creation and launching of the laboratory from resources in Priority III of Operational Program Human Capital (High quality of education system) (I.A.1). However the experience of the authors,

³⁵ The more institutions get involved in building the laboratory (or maybe a network of laboratories?), the more probable will be the effect of stimulating interest of technical and natural sciences among children and youths. On the other hand we should remember that greater number of institutions engaged in building of the laboratory and its operating program, means greater complication of the management of the project.

backed up by the initial analysis of the titles of projects, which received financing in the contest for innovative projects, resolved in 2010 show, that we should rather be skeptical when it comes to the willingness of the Minister of National Education to finance this type of initiatives. First of all, as proven in chapter 4.10.2, the evaluation process at MNE is characterized by low quality; among other things, it does not guarantee the procedures of honest evaluation. Additionally the assessments tend to be ill-considered, superficial, based on beliefs and views, and not on a reliable analysis of the application content.

At the same time the analysis of results of the above mentioned, resolved contest, indicate that evaluators in MNE prefer innovative programs regarding the development of education programs for particular subjects, and not the interdisciplinary solutions. Such attitude is inconsistent with the ideas of the authors of Interactive laboratory, but they see no point in further commitment of their time and resources to convince MNE that the described laboratory is a beneficial solution from the perspective of development of educational processes in schools.

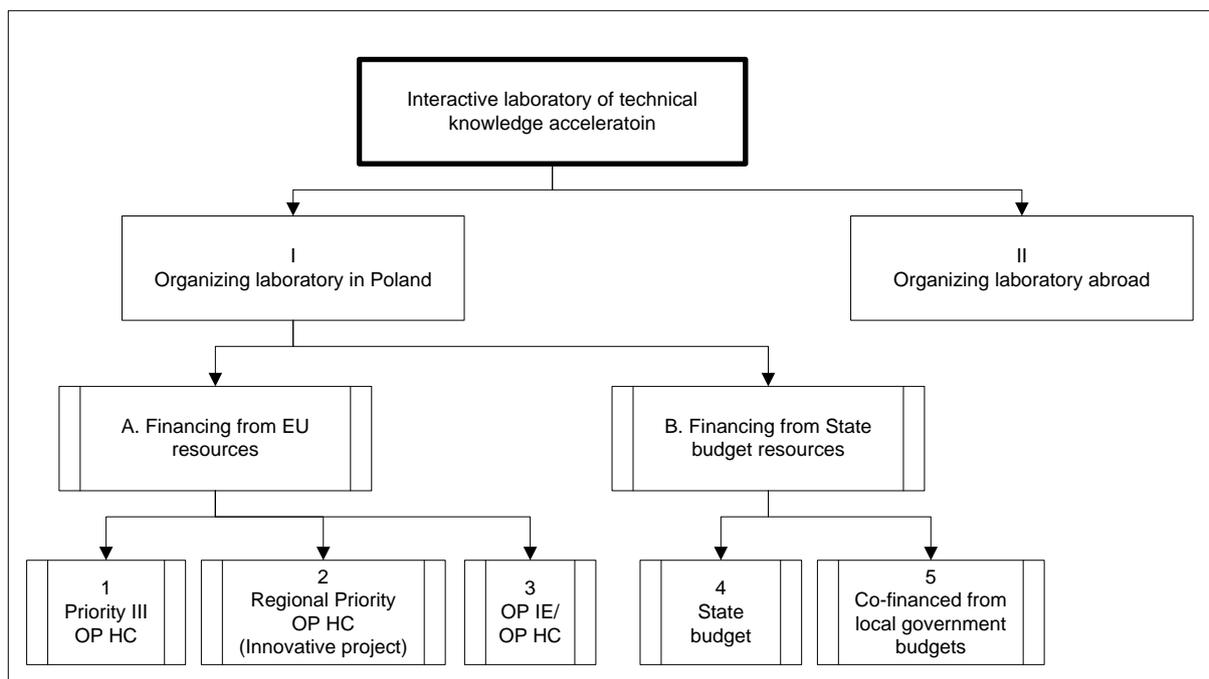


Fig. 5.1. Potential directions of seeking funds for Interactive laboratory of technical knowledge acceleration. own work

Another possible source of financing of Interactive laboratory is an innovative project within one of the regional priorities (I.A.2). The advantages of creation of such laboratory were noticed in Wielkopolska. Perhaps in other voivodships in Poland the need of creation of interdisciplinary, modern programs of education of students with their active participation in learning modern solutions in science and technology is not as strong. Perhaps then it is worth realizing this idea first in the region, where the needs of such solutions are noticed. It will only be reasonable to prepare an adequate application, when the readiness of realization of such concept is clearly communicated. An option for innovative projects would also be a systemic project realization, however at the level of Wielkopolska Voivodship it would be necessary to create formal conditions to prepare such project. It would be natural to engage in the development of technical science in Wielkopolska the Poznan University of Technology, but it would also be beneficial to engage other universities which offer technical majors.

If similar projects were created in other regions, it would be possible in future to exchange experiences as well as students and teachers between laboratories. The specialization of such laboratories would be possible.

Third variant of financing is by combining two projects (I.A.3). Within the Operational Program Innovative Economy we could finance the construction of the laboratory room along with its equipment, and within Operational Program Human Capital we would find financing for the laboratory functioning. Such solutions has great advantage resulting from the principles of projecting costs in cross-financing. In hard projects in OP IE, the possibility of planning financial resources for wages is limited; it is also difficult to finance the laboratory functioning from these resources; on the other hand the OP HC are not dedicated to financing tangible investments (up to 10% of project's value). Such combination of two projects however has also one major disadvantage. The preparation of two separate projects in each of the programs, particularly innovative projects, is difficult. When attempting to coordinate in the same time the preparation of two projects, from two different operational programs, the undertaking becomes much more challenging, particularly when we take into consideration the fact, that when applying for funds in two different contests, we have no guarantee that both of them will get accepted.

Union resources are currently a very attractive source of financing, however we must remember that they were planned for a definite period of time, which ends in 2015. We don't know what resources Poland will receive in the next period, and if they will be suitable for further financing of the laboratory. Therefore we must consider a possibility of financing of such undertaking from the budget resources.

First potential source of financing of such type of undertaking would be the State budget (I.B.4). Procedure of acquiring such sources seems however very complex, long and uncertain. It is possible to seek funds for financing of the laboratory in the development projects, but the adjustment of the discussed solution to a specific scientific discipline in which the application could be issued, seems difficult.

There is also a possibility to finance the laboratory from the budget resources of a given local-government or budgets of many local-governments, which could sign an agreement about financing the laboratory (I.B.5). Such financing would be very safe from the formal point of view, however if this was the only source of financing, the local-governments might at times want to withdraw from financing the laboratory when seeking budget savings.

Considering all the above financing variants of the presented project, it appears that the best would be financing the creation of the laboratory from EU funds and its maintenance from the budgets of local-governments, which would sign a suitable agreement.

Obviously, in case of lack of interest in this solution in Poland, we might consider creation of interactive laboratories abroad (II). It appears that such initiatives might find interest particularly in countries, which are smaller in terms of the number of inhabitants. In such countries the procedures of decision making are usually less complicated. Smaller complexity of administration system of such countries usually results in smaller complexity of financing principles. It might turn out that the decision making process with complexity similar to this at the regional level in Poland, in other countries, with several millions of inhabitants, occur at the ministerial level. Additionally in such countries, the creation of one such laboratory may result in encompassing much larger percent of the country students than it would have place in Poland, therefore the scale of influence of such laboratory on the education systems of such countries would be much greater on national level than in Poland.

There is also a possibility of financing the laboratory by the group of business entities. Obviously such variant may not be omitted.

According to the authors, such or similar solutions, as this described in the monograph, will soon start to emerge on a large scale. There is no other alternative to currently offered,

boring and unproductive lessons, after which student understand little of the surrounding world, which is more and more visible at later stages of education, particularly at universities.

The idea behind interactive laboratory is creation of opportunities for students to get familiar with the most up-to-date achievements of science and technology to connect the theoretical knowledge they acquire with practice.

An alternative to the Interactive laboratory in future will be well equipped schools, technical centers in regions or other analogical solutions. Nevertheless, regardless to the form, there will always be a need for financial resources to create and maintain the infrastructure.

A condition to make decision about such undertakings is a prospective insight into the competences of current students and noticing social benefits resulting from realization of a principle "toward knowledge, through action", the principle of active and emotional engagement of students into the learning process.

Bibliography

- [1] Brzeziński M., Zarządzanie innowacjami technicznymi i organizacyjnymi, praca zbiorowa, Wyd. Difin, Warszawa, 2001.
- [2] Co warto wiedzieć o kierunkach zmian w edukacji, aby skutecznie realizować projekty z Europejskiego Funduszu Społecznego? Przewodnik, Edukacja skuteczna, przyjazna i nowoczesna, Ministerstwo Edukacji Narodowej, Warszawa 2010.
- [3] Drucker P., Innowacja i przedsiębiorczość: praktyka i zasady PWE, Warszawa 1992.
- [4] European Commission, European Innovation Scoreboard 2005, Comparative Analysis of Innovation Performance, luty 2008
- [5] Hamrol A.: Zarządzanie jakością z przykładami. WN PWN, Warszawa 2005.
http://www.funduszeuropejskie.gov.pl/WstepDoFunduszyEuropejskich/Documents/NSRO_maj2007.pdf, 2010-11-23.
- [6] Janasz W., Kozioł K., Determinanty działalności innowacyjnej przedsiębiorstw, PWE, Warszawa 2007.
- [7] Kierunki zwiększania innowacyjności gospodarki na lata 2007 – 2013. Ministerstwo Gospodarki, Departament Rozwoju Gospodarki, Warszawa 27 kwietnia 2006.
- [8] Kołakowski L., Mini wykłady o maksi sprawach. Wydawnictwo Znak, Kraków 2008.
- [9] Kotarbiński T., Traktat o dobrej robocie. Zakład Narodowy Imienia Ossolińskich Wydawnictwo, Wrocław-Warszawa-Kraków-Gdańsk-Łódź 1982.
- [10] Kowalczyk A., Nogalski B.: Zarządzanie wiedzą: koncepcja i narzędzia, Wydawnictwo Difin, Warszawa 2007
- [11] Koźmiński A., Zarządzanie w warunkach niepewności, PWN, Warszawa 2004
- [12] Mantura W., Teoretyczne podstawy projektowania produkcyjnych systemów sterowania jakością. Wydawnictwo Politechniki Poznańskiej, Poznań 1990.
- [13] Narodowe strategiczne ramy odniesienia 2007-2013 wspierające wzrost gospodarczy i zatrudnienie. Narodowa strategia spójności. Ministerstwo Rozwoju Regionalnego, Warszawa, maj 2007 r.
- [14] Narodowy Program Operacyjny plan rozwoju 2007-2013, Wykształcenie i kompetencje - projekt wersja z 12 września 2005, Warszawa, 2005
- [15] Od pomysłu do projektu innowacyjnego. Fundacja „Fundusz współpracy”, Warszawa 2009.
- [16] Osiągnięcia maturzystów w 2009 roku. Sprawozdanie z egzaminu maturalnego w 2009 roku. Centralna Komisja Egzaminacyjna, 2009.
http://www.cke.edu.pl/images/stories/Wyniki_09/raport_matura_2009.pdf (2010-09-04)

- [17] Podręcznik Oslo, zasady gromadzenia i interpretacji danych dotyczących innowacji, Komisja Europejska, OECD, wydanie trzecie, Warszawa 2008.
- [18] Podręcznik przygotowywania wniosków o dofinansowanie projektów w ramach Programu Operacyjnego Kapitał Ludzki. Ministerstwo Rozwoju Regionalnego, 1 kwietnia 2009.
- [19] Polska wobec strategii Lizbońskiej. Biała Księga 2003r. Polskie Forum Strategii Lizbońskiej, Urząd Komitetu Integracji Europejskiej, Gdańsk – Warszawa 2003.
- [20] Program Operacyjny Kapitał Ludzki. Narodowe Strategiczne Ramy Odniesienia 2007–2013” wydanym przez Ministerstwo Rozwoju Regionalnego. Ministerstwo Rozwoju Regionalnego, Warszawa, 7 wrzesień 2007. http://www.efs.gov.pl/Dokumenty/Lists/Dokumenty%20programowe/Attachments/87/POKL_zatwierdzony_7092007.pdf, 2010-11-23.
- [21] Projekty innowacyjne. Poradnik dla projektodawców Programu Operacyjnego Kapitał Ludzki. Fundacja „Fundusz współpracy”, Warszawa 2009.
- [22] Projekty współpracy ponadnarodowej. Pod redakcją Ewy Wosik. Fundacja „Fundusz współpracy”, Warszawa 2009.
- [23] Raport. Wyniki egzaminu maturalnego, pod redakcją: Zofii Horyhorowicz, Lidii Skibińskiej. Okręgowa Komisja Egzaminacyjna w Poznaniu, 2009.
- [24] Ratajczak Z., Człowiek w sytuacji innowacyjnej, PWN, Warszawa 1980
- [25] Strategia rozwoju kraju 2007-2010. Ministerstwo Rozwoju Regionalnego, Warszawa, 29 listopada 2006.
- [26] Szafranski M., Grupka K., Goliński M.: Program akceleracji wiedzy technicznej i matematyczno-przyrodniczej w Polsce. Wyd. Politechniki Poznańskiej, Poznan 2008.
- [27] Szafranski M., Elementy ekonomiki jakości w przedsiębiorstwach. Wyd. Politechniki Poznańskiej, Poznan 2007.
- [28] Szafranski M., Skuteczność działań w systemach zarządzania jakością. Wyd. Politechniki Poznańskiej, Poznan 2006.
- [29] Szczegółowy opis priorytetów Programu Operacyjnego Kapitał Ludzki 2007 – 2013”, Ministerstwo Rozwoju Regionalnego, Warszawa, 1 czerwca 2010. http://www.efs.gov.pl/Dokumenty/Lists/Dokumenty%20programowe/Attachments/89/SzOP_1405_ost.pdf, 2010-11-23.
- [30] Uryga J., Magielski W., Bienias I., Środki unijne – klasyfikacja, funkcjonowanie, ewidencja i rozliczanie, ODDK, Gdańsk 2007.
- [31] Zakres realizacji projektów partnerskich określony przez Instytucję Zarządzającą Programu Operacyjnego Kapitał Ludzki. Ministerstwo Rozwoju Regionalnego, 23 kwietnia 2009.
- [32] Ziemiński Z., Logika praktyczna. PWN, Warszawa 1987.