Intelligent Educational Systems, Support for an Education Cluster

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Abstract: To improve the quality and performance of higher education is essential an effective correlation between all parties of the educational system. This can be done through an educational cluster. This paper stresses the need to implement a smart system for higher education. Intelligent educational systems will be a real support for an education cluster, and this will help the development of partnerships between universities and businesses in industry, agriculture, construction, transport, communications, and computer science.

Key-Words: intelligent systems, intelligent educational system, educational cluster, cloud computing, Internet

1 Introduction
Paper aims to describe the intelligent educational systems and the support of this for an educational cluster. We want to stresses the impact of intelligent solution and educational cluster for activity in higher education.

The first part presents the theoretical elements of the implemented solutions and innovations that will revolutionize the educational system. Researchers worldwide are interested in improving education by implementing the latest innovations to the knowledge economy. Knowledge Economy emphasizes lifelong learning and the opportunity to put into practice the elements studied. All this can be done by involving all stakeholders in the educational preparation of future generations. To achieve an effective correlation between all parts of the education system we propose an education cluster that will include parts of the education system, especially universities and post-university programs and elements from the business or industry environment.

The second part will present the elements of an educational cluster and we highlighted that it generate qualified human resources, contributes to the creation or supports other economic clusters. Based on specific characteristics of economic clusters, [19] and on The Triple Helix [8] model, University - Industry - Government, these part describe the concept of education cluster, its characteristics and structure.

The third part is highlighted that the intelligent educational systems represent a real support for an educational cluster. It is essential to use existing computer infrastructure in the educational process and to identify points where it can be upgraded to improve performance in higher education.

2. Intelligent educational systems
Changes that occur each time and complexity of electronic technology society that uses a new type of electronic communication devices have resulted in continued growth in the volume, [24], diversity and service activities carried out in any field.

The existences of an intelligent educational system - focuses on the efficient use of existing infrastructure and modernize it where is necessary - considered crucial during an economic crisis when funds are needed for education. But most importantly, a comprehensive education should refocus learning on the two key components of any system of education: student and teacher.

Through an intelligent educational system, according to the latest data published by IBM in 2010, teachers can analyze student data electronically - from academic results, to information on mobility and presence.

An intelligent educational system is based on three elements (Figure no.1) interconnection (a resource sharing technology education), instrumentation (accumulation of necessary data) and intelligence (making decisions that enhance the learning process).
Efficient interconnection is achieved through a cloud computing system. Cloud computing requires an immense and complex network of servers that will provide users with both storage, computing power as well as other software, using the usual web browsing devices. In this way, costly investments in equipment and personnel will be eliminated. The implications of this trend in education are enormous, due to increased accessibility to information as experts have noted the World Bank (October 2010).

Through the technologies implemented in cloud computing, the student can access the most advanced educational content, software and computing and storage resources at any time. Wherever they find a student can use the same 3D animation and the same resources. You can build applications that can enable stakeholders to the educational process to pursue academic achievement, students' presence and comparative data. These solutions show deficiencies in learning and give those interested in the information they need to collaborate with students and teachers. Cloud computing systems provide distance learning opportunities for students in different parts of the country and beyond.

If an educational system becomes a tool - able to collect and submit accurate data, such as attendance, grades, projects, essays and involvement in activities - can provide relevant information on what makes the student or the university on the way in which the intervention and the elements that work best within their institutions during the operation.

An intelligent educational system can provide those interested in tools and understanding they need to make smarter decisions at the system level. It can develop data systems that collect, integrate, analyze and present information on key performance factors such as presence, evaluation criteria and transfer knowledge. Parties interested in the educational process can obtain a complete view of student performance and take decisions at the system to improve learning, to identify trends early and worrying and take steps to instil a sense of common motivation efforts towards objectives.

3. Educational cluster

A first analysis regarding concentrations of firms was made by Alfred Marshall in his book Principles of Economics, [15]. He highlighted the competitive advantage for firms in industrial agglomerations due to the network of suppliers and customers in that region. The cluster concept was outlined in the 90's and a first synthesis done in 1998 by Professor Porter, [19-20], highlighted the beneficial impact on productivity. Also he has defined the concept as an important factor for the development of a competitive economy.

Based on the definition of clusters given by Porter as "geographic concentrations of companies or institutions in a well-defined economic space" [21], groups of companies placed in the same region conduct activities in a competitive environment to increase productivity and efficiency of the cluster and implicitly of each member.

The Cluster Initiative Greenbook research [13], represents a first major study that examines a large collection of cluster initiatives to analyze in depth various models of clusters, their evolution and a number of factors that influence their success or failure.

Another approach of clusters, from two perspectives, clusters evolution and clusters construction and reconstruction, has been done in CLUSTERS Balancing Evolutionary and Constructive Forces, [23].

Important ongoing research projects in this area are at Harvard Business School - Institute for Strategy and Competitiveness, [11]. Based on the research have been identified profiles for more than 800 clusters in 52 countries. Each profile contains up to 120 variables, which include:

- basic descriptive data: cluster name, location and employment degree of labour;
- statistical indicators on the competitiveness of the cluster, the export growth, innovation;
- qualitative indicators regarding reasons behind the cluster and growth / decline of its competitiveness.

These profiles were collected by analyzing a vast literature devoted to the analysis and description of clusters, literature that has been created in recent years by practitioners and university researchers.
The project has a predominant orientation to the American continent and Asia, mostly Japan and China.

In the European Union, it was launched in 2006, the European Cluster Observatory, [9], project which is managed by the Centre for Strategy and Competitiveness (CSC) at the Stockholm School of Economics. This project is financed by the European Commission, Enterprise and Industry Directorate, through the Europe INNOVA initiative, [12], and the Competitiveness and Innovation Framework Programme - CIP, which aims to encourage competitiveness of European enterprises. Through this project have been identified, in 2008, around 2000 clusters. At EU level, the cluster is considered an instrument of industrial policy, research and a competition and cooperation generator.

These results and researches in the field of clusters are showing that this form of economic relationship is beneficial to all parties and despite business processes are carried out at global level, the geographical proximity of partners is a real advantage.

The education cluster is based on the same basic principles of economic and industrial cluster. Its elements are:

- universities that compete in various scientific fields by preparing students and making them competent in their activity field;
- business firms employing young graduates, who need human resources with high qualifications.

The production process of the education cluster is separated into:

- the process of educating students and training future professionals in various areas of economic and industry activities; this process is based on knowledge;
- the economic process of production goods and services through the use of qualified human resources;
- the research and generation of new knowledge.

In terms of spatiality, this cluster may develop over broad geographical areas, but the physical proximity of entities in a cluster represents a major advantage for its success and for the outcomes quality. Although human resource can migrate, there are high costs related to this action. So education clusters are formed in geographic areas with strong academic centers. Another argument for the physical proximity of cluster partners is the fact that the presence in the same environment and the direct contact between persons, allows the exchange of information in such more subtle forms [2].

From this point of view, an education cluster can be described starting from the description of "socioeconomic entity characterized by a social community of people and a population of economic agents localized in close proximity in a specific geographic region", [16].

Because education clusters generate qualified human resources, it contributes to the creation or it supports other economic clusters. A particular case that supports this fact is the most powerful IT cluster of India, Bangalore, [1], [14], that has reach over $ 15 billion in annual exports for IT products, in less than 20 years. In addition to government tax incentives, other important factors which are the basis for this cluster development:

- high level of skilled human resources;
- high percentage of English speakers;
- low cost of resources, especially labor force.

The first factor is very important because it is a very expensive resource that is generated over long periods of time, 3 to 5 years. From an economic perspective, any company is able to acquire new technology and to reduce the gap with top competitors, but in terms of human resources that may be not possible or would involve much higher costs.

At European level, strong education clusters are developed around prestigious universities. Silicon Fen, in the UK, is one of the strongest R&D oriented cluster. It has developed around the Cambridge University. In this case, the cluster concentration around a generator of qualified human resources and the financial support from the industry that invests in innovation has enabled the development of a University-Industry relation which brings significant benefits to both parties.

The clusters economic model and in particular the education clusters one is based on knowledge. The economic process end product of the education cluster is the professional competence, a set of knowledge acquired by a person who uses them to take part in other economic processes. The input in this economic process is represented by people who accumulate knowledge, skills going through the education system. These people are then absorbed by businesses that will use their experience to produce goods or other knowledge.
Currently, in many school systems, including the Romanian, there is a missing link between graduate university students' skills and those needed by businesses and industry. This was and is an intensely debated fact. Solutions based on defining skills or competences sets or standards are defined to reduce this breakage. This type of system provides an information database that can be used by companies to identify parts of the educational system that can provide necessary skilled human resources. This is a static approach because it is not based on the principle of supply and demand. It shows only what the educational system is generating but the business environment has no influence on it.

Implementing and sustaining an education cluster as a bridge between theory and practice, between components of the education system and the qualified labour market should be done in all three entities, universities, industry, and government, by:

- implementing an information infrastructure that will enable rapid exchange of information between academia and business;
- defining new graduate programs, master's or doctorate, or adjust existing ones to generate human capital needed for research and development complex activities;
- promoting university-industry joint projects as a government policy;
- promoting the relations between business and education through tax benefits in the short or long term;
- promoting entrepreneurship to future graduates to enable the integration of academic knowledge in a real economic environment.

4. Support of investment in intelligent educational systems

Technologies have become more widespread, [18], in all educational levels, from elementary school to universities. The study of intelligent educational systems concept is significant because it's a quickly growing trend and in a lot of traditional university it is consider the successful type of education. Compared to just a few years ago, when we didn't discuss about this concept this becomes a solution of easy student-university interaction.

There are six main reasons that could be invoked in support of investment in intelligent educational system, [3]:

- Flexible - Firstly, learning can take place anytime, anywhere. Learning can happen across locations. These opportunities are offered by intelligent systems. Students are overtime in go, so they are interested by more flexible kind of learning.
- Collaborative - Secondly, through intelligent educational system everyone uses the same content, which will in turn also lead to receiving instant feedback and tips. This learning will reduce cultural and communication barriers between faculty and students by using communication channels that students like.
- Motivate - Thirdly, multimedia resources which can be develop in intelligent educational system can make learning fun. With this kind of intelligent educational system, it is much easier to combine gaming and learning for a more effective and entertaining experience. This is a great point of view because most of students are learn more when they are do something just in play.
- Accessible - Fourthly, intelligent educational system is accessible virtually from anywhere which provides access to all the different learning materials available.
- tools -intelligent education system is able to collect and submit accurate data, like the notes, projects, essays and involvement in activities - can provide relevant information on what makes the student or the university on the way in which the intervention and elements giving good results in the institutions during their operation.
- Reduce of time - Technology expands time and compresses space. There is no need for students to be in the same place at the same time in order to have a sense of live exchange. So, in this mode university can build relationship on different continents.

Students need to engage in activities that allow them to approach problems from different vantage points, testing out assumptions, and redefining meanings. Students need to engage in the social, collaborative exchange of ideas to pose hypothetical problems, general hypotheses, conduct experiments and reflect on outcomes.

Moreover, because these implementations intelligent educational system in universities to be successful, teachers and technology developers
should consider the following significant challenges:

- **Mobility:** the ability to participate in academic activities anywhere, gives students an opportunity to "get rid" of hours and to engage in activities that do not correspond with the requirements of the teacher nor the curriculum. The concepts of "anytime, anywhere" experiences encourages support of intelligent learning environment outside the classroom teacher. Both scenarios present significant challenges for conventional teaching practices.

- **Information:** the benefits of intelligent educational systems may be lost if their benefits are highlighted so that students are passionate and interested in their use. We need to bring information to students not students at the info.

- **Accessibility:** students want to have control, should be considered as only they can access just the resources they need from existing information system package.

The intelligent educational systems represent a real support for an educational cluster. In the last time the intelligent educational system profoundly changed, research, learning and innovation, by connecting systems so as to record, analyze and integrate data. In short, we can revitalize the educational system through an educational cluster, so that this system can become smarter and more efficiently. In this process, universities can increase and sustain the quality of the results of their students.

5. Conclusions

In conclusion, the intelligent educational system represents a real support for an education cluster which will generate a sustainable development of quality of our students because they will have access to projects developed by the business environment. Results gained from using an intelligent system for a education cluster, allows:

- governments to provide legal/economic support to firms to promote the development of the education cluster;
- Business operators to define or modify their competition policies in order to join existing clusters or to identify areas where further clusters can be formed;
- analysis of cluster effects on the labor market, human capital and development and competitiveness policies;
- continuous development of the educational system which must generate qualified human resources and specialized based on industry requirements;
- creating a real link, based on knowledge, that will allow businesses to integrate students into real activities through periods of practice or joint projects.

To improve the quality and performance of higher education is recommended to involve all interested parties to implement efficiently intelligent educational systems.

The development of intelligent educational systems as support for education cluster depends on the evolution and the efficiently uses of the informational communicational technologies. In many countries the telecommunications systems infrastructure currently exists, but isn’t use to the real value.

Acknowledgments

This work was supported from the European Social Fund through Sectored Operational Programmer Human Resources Development 2007-2013, project number POSDRU/89/1.5/S/59184, “Performance and excellence in postdoctoral research in Romanian economics science domain”.

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