REENGENEERING OF THE EDUCATIONAL WORK PROCESS IN THE POSTMODERN AGE

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Summary: *Serbia's education system, has for many years, not been consistent with the real educational needs. Modern economy is characterized by the principles of sustainable business development as well as the knowledge economy. Education together with science in the postmodern era need to lead and be the headquarters of the knowledge society. Many believe that future education should be fundamentally new, which requires re-engineering of existing processes within the educational institutions. In all of this the application of modern ICT technologies should make a special contribution. The aim of this paper is to present some possibilities that the implementation of modern ICT solutions may have within business processes of an educational institution.*

Keywords: *reengineering, information and communication technologies, collaborative software*

1. INTRODUCTION

Transition in Serbia is still ongoing, and has already produced a number of negative effects: the de-industrialization of Serbia, redundancy due to poorly managed privatization, job losses and a high unemployment rate, increasing numbers of the poor and those living on the edge of poverty. Serbia is now further away from modern and technologically developed countries which base their development on intellectual capital and knowledge economy. The level of industrial production is at 50% compared to the volume achieved in 1989. (Đuričić M.M., 2013.)
Understanding the needs of a modern state as well as the modern economic system places an emphasis on knowledge as a key resource for achieving the proclaimed strategic goals and objectives. Processes in the education system are the hinges of the economic and social development of Serbia, and their radical changes should contribute to the overall economic progress. Linking educational, scientific and commercial organizations can create synergetic effects, to accelerate reform and make it more efficient. (Ristivojević, 2010.)
The state through adopted strategy and corresponding action plans should provide conditions for this synergy. The Education Development Strategy up to year 2020 clearly states that the further development of the production system in Serbia must be accelerated and based on knowledge, entrepreneurship of the educated population, its own and transferred technological innovations without adversely affecting the environment, the market economy and international business, technical and other cooperation. [10] A key factor of this development is and must be knowledge. Educational institutions are and should be an important carrier of the development goals of the state. Are the educational institutions prepared and able to carry out this task? To what extent does the State assists them in this? From the perspective of society an inquiry should be made whether the education system is entirely appropriate to adequately provide the necessary and required qualifications of the coming generation. From the perspective of students, a question arises of whether the education system is adequate to develop their full potential and to enable them to find a "good position" in society. (Rottluff, 2009.)
Precipitous technological changes dictate the improvement of business strategy of commercial enterprises as well as educational institutions, which are facing an important task of completing the reengineering of their business. Reengineering of education should bring efficiency, effectiveness and flexibility into the education system. Only an education system such as this will yield generations of experts responsible for creative and productive activities in the future.
In this article we will elaborate only on one segment of reengineering of the education process - a more intensive use of modern ICT in education.

2. REENGENEERING OF BUSINESS PROCESSES OF AN EDUCATIONAL INSTITUTION

Business Process Reengineering (BPR) is the transition to a new technological paradigm (model) where there is no division of business processes on sales, marketing, accounting, but the organizing is based on continuous business processes whose main goal is delivery of the product to the consumer. Reengineering of business processes is not just eliminating redundant details and is not just an automation of work, but a radically new technological principle, whose success is measured by parameters of the speed of problem solving and satisfaction of those for whom the work is done. (Veljović, 2001)
And in education business goal must be a satisfied customer - a successful student, as well as satisfied employees in educational institutions and the state, as the owner of capital in education.(Djuričić R.M., 2012) A well implemented business process reengineering of the educational institution will certainly lead to this goal.

Many researchers agree on the general concept of reengineering in education which consists of four basic levels shown in Table 1.

Table 1: *Baseline levels of reengineering in education*

BASELINE LEVELS OF REENGENEERING IN EDUCATION			
1. ***Educational and business reengineering***	2. ***Managerial reengineering***	3. ***Mental or educational reengineering***	4. ***Overall reengineering***
- initial and the lowest level of reengineering, - its activities should be located primarily on the level of study plans and programs towards streamlining and redesigning the educational, business and similar processes.	- indicates the introduction of new approaches in the management of educational, business and other processes.	- main function of this type of reengineering is to educate and change the attitudes of the participants of any educational, business or a similar process.	- synthesis of all previous types of reengineering, - ensure a successful operation of an educational institution as a whole.

The main causes for reengineering of business processes, according to many today are the changes in information and communication technologies. ICT represents an undeniable support to business processes in education:

- it is important segment of education redesigning,
- ICT use in the preparation and realization of the curriculum is the attitude that every teacher must have,
- the use of ICT in learning is an attitude that every student must have,
- enables modern management of the institution,
- integrates all business processes which in turn become visible to all stakeholders,
- it is used to get closer to the student (to get into the issues that the student might have even before himself and offer solutions through Internet service).

The conclusion is that ICT in a given concept for reengineering of educational institutions extend throughout all four levels. Which means that reengineering implies the application of ICT.

Whatever career path you take, understanding information systems will help you cope, adapt, and prosper in this challenging environment.(Stair,2008.)

The current state of implementation of modern ICT in the education sector in Serbia, despite existing efforts of individual institutions and the entire system can be characterized as insufficient. It requires a shift in this effort.

2.1. The necessity for application of ICT

Knowing how to use hardware and software to increase profits, cut costs, improve productivity, and increase customer satisfaction is an example of information systems literacy. Information systems literacy can involve recognizing how and why people (managers, employees, stockholders, and others) use information systems; being familiar with organizations, decision-making approaches, management levels, and information needs; and understanding how organizations can use computers and information systems to achieve their goals. Knowing how to deploy transaction processing, management information, decision support, and expert systems to help an organization achieve its goals is a key aspect of information systems literacy. (Stair,2008.)

Like all other areas of development as well as in education there are no limits to the possibilities of implementing ICT but only the willingness, for these possibilities to be defined, perceived and used.

The current use of ICT in education is insufficient. Especially it lags in intensive application of ICT in important business segments of the educational institution (in process management as an important management segment of the institution, as well as the exchange of information between schools, school districts, central level of the Ministry and local governments).

Figure 2 shows the flow of the key processes in an educational institution, as well as their interrelations. Also, this diagram shows the transparency of the process flow towards all relevant structures in an educational institution.

It would be good to all IT and communication architecture to be shaped in accordance with the process control. Today, as before, isolated solutions dominate and it is improbable to even estimate the loss on the quality of information at the interface between the subsystems. (Rottluff, 2009.)

So it is necessary to provide a comprehensive and radical solution, respectively an information and communication platform. The entire business of an educational institution must be organized as a system, also information and communication links must be the constant companion of unfolding labor processes so that an educational institution can become a successful business enterprise.

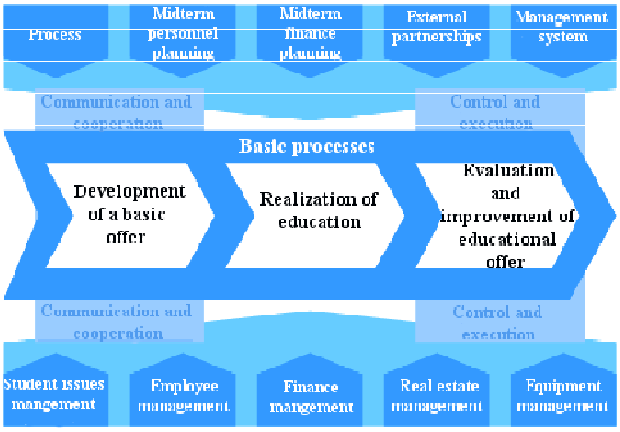

Figure 2: Course of the key processes of the educational institution [3]

Figure 3 represents a diagram of decomposition operations of educational work in primary and secondary schools. Each of the blocks in this diagram can be further introduced with a new of job decomposition diagrams. This gives a complex tree of operations with differentiated inputs, outputs, and interconnections between processes.
The diagrams in Figures 2 and 3 are the basis for the construction of an information and communication platform.

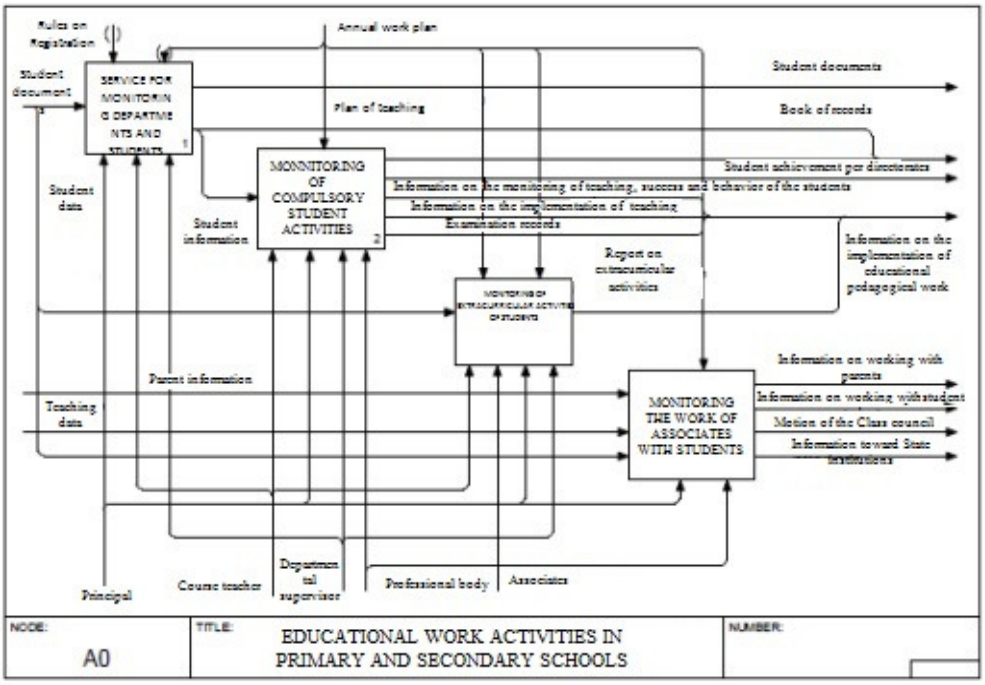

Figure 3: Diagram of job decomposition of educational work in primary and secondary schools [4]

Computer Centre of the University of Electrical Engineering has developed a preliminary project of a unified information system in education of Serbia (JISP), to support the entire system of organization, development, monitoring and funding of pre-school, primary and secondary school education of the Republic of Serbia. The preliminary design is made according to the request of the Ministry of Education, and as one of the basic steps toward better organizing and monitoring of development and control of financing of this important and complex segment of society. JISP, is intended as a basis for more effective resource planning, resource management as well as monitoring of activities in the educational system at all levels of education. Within the information system an exchange of data from schools toward municipalities is realized, from school toward school regional directorates of the Ministry of Education as well as the regional departments of the Ministry toward the central level of the Ministry. It also provides for the maximum possible automation of data transfer in the opposite direction, from the central level of the Ministry toward schools.
The implementation of the information system JISP achieved, the following specific objectives:

- *development of an integrated information system in the education and the integration of individual efforts and solutions*

- *raising the information basis for the modernization of management, that is, making decisions based on reliable and verifiable information*
- *more efficient resource planning and resource management*
- *rationalization of education funding*
- *easier to monitor activities in the educational system at all levels of educational management and the ability to easily review all relevant data*
- *easy exchange of data between schools, departments of the Ministry of Education, central level of the Ministry, local governments, and the maximum possible automation of data transfer*
- *support for the monitoring of development indicators in the field of education and the educational system, fulfillment of standards, and therefore support for the European integration of the country* [12]

It is with all certainty that The Unique Information System is the solution for educational institutions at the state level, but while waiting for the project to come out of the conceptual framework, what can educational institutions do for themselves in terms of an information and communication platform? Is perhaps collaborative software the answer?

One of the main mottoes of reengineering of business processes is communication that should allow for bridging of the from top to bottom (Top-Down) theory with the bottom-up (Bottom-Up) implementation. Bottom-up methodology provides precision and top-down methodology provides a breadth of approach. (Veljović, 2001.)

Effective collaboration combines the collective knowledge, intellectual capital of employees, a network of business partners, suppliers and customers in an organized and efficient unit. Appropriate software solution represents a tool for collaboration.

Collaborative software makes business processes run more smoothly, simplifies and makes business information reviewing easier, enables content management, search and sharing of information and documents within the intranet environment and web sites . (Paunović et al., 2011, Paunović et al., 2013)

2.1. Example of application of the Collaborative software in Uzice Technical School

In the Uzice Technical School a new organizational structure has been established, presented in Figure 4. Roads and decision-making responsibilities were established. However it turned out to be necessary to establish a new organization based on a more intensive electronic data processing. This was the assignment the team for computerization, to which one of the authors of this article belongs to: use of modern information technology in the parts of the system where there are none or are not effective.

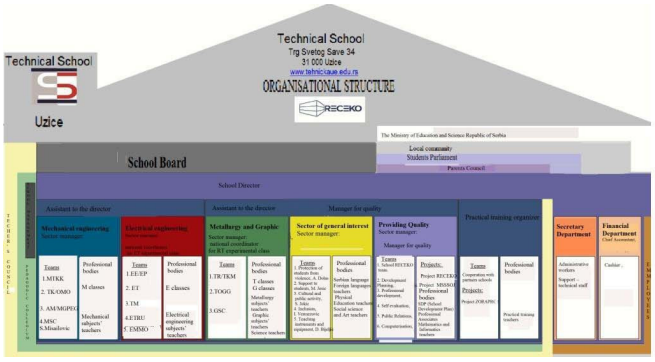

Figure 4: Organizational Chart of Uzice Technical School [13]

The offered solution of a new information and communication architectures was formed in accordance with the established strategy in the management of processes. Strategically organized management process, especially in assisting ICT in process management represents a shift in the management of Uzice Technical School, and is looking beyond the absolute novelty of the management of education in Serbia. Previous organization was based on more or less ad hoc basis. Live@edu software solution was chosen.

The school is registered with the Live@edu service and, according to team organization for work within the school, administrator and the computerization team opened accounts for employees and made distribution lists for the professional bodies and teams. Contact list is consistent with the distribution list and available to every employee. Employees are familiar with the way of using the software. Thus, an employee in a simple and easygoing manner can achieve e-mail communication with other employees, and in particular, members of professional bodies and teams to which he belongs.

Within the school's account there is a calendar which is shared with employees. This ensures that reliable information on appointments, activities and events are available to all users.

Document management is a particularly important opportunity for storing and sharing documents within Microsoft Windows Live ™SkyDrive, a Cloud folder, part of which can be synchronized with a folder on the computer that

provides assurance that all changes to the current document will be updated on the computer and SkyDrive synced folders. Within every account each employee has at his disposal a personal storage space for documents, a space which he shares with a specific, desired number of employees and the public space accessible to everyone. In this way, employees are able to access all general school documents, curricula of each teacher, pedagogical resources, various forms and other documents required in daily work. SkyDrive allows more employees to work together online on the same document. Availability of basic online functionality within Microsoft Office Web Apps 2010: Word, Excel, PowerPoint and OneNote enables online collaboration through the display, to edit and share documents stored on SkyDrive. Collaboration of more employees on the same document can be simultaneous or employees can do their part at different times, the changes to the document will be saved and marked with the name of that employee.

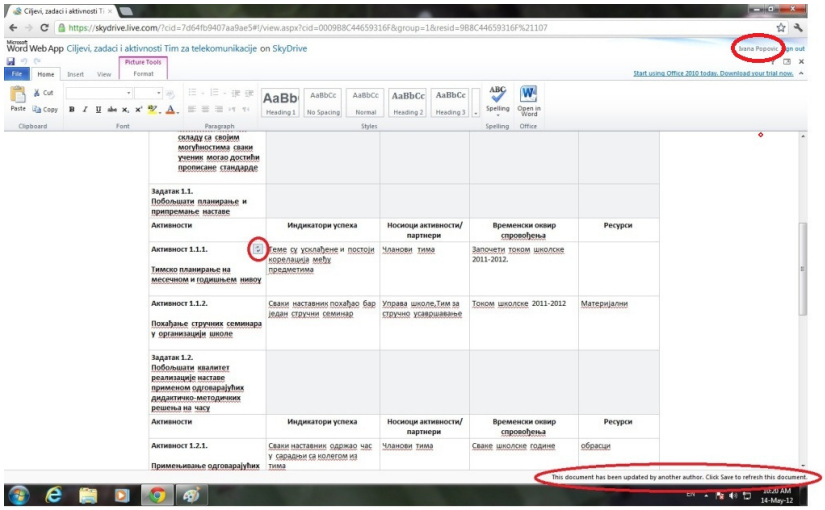

Figure 5: A team member receives a message that another member is working on the same file, the icon indicates the place and the name and also once changes have been made a proposal to save, so the changes could take effect

As the learning process of each case is only a part of the integral process of educating students for a specific educational profile, cooperation among employees in the planning and coordination of the operation within the educational profile as well as mutual correlations of the contents is imperative of modern work in schools. When you have reliable resources, the possibility of fast mutual exchange of content and work on documents, teachers can effectively implement these tasks. SkyDrive allows exactly the aforementioned requirements for effective educational work with students.

In addition to facilitating the operation and organization of work for each employee SkyDrive folders allow easy control done by management of the submission of mandatory documents, as well as control of participation and volume of executed commitments. Jurisdiction to update and use Public school documents stored in SkyDrive folder is precisely determined by the school management.

Additional functionality and ease is provided by the ability to connect your mobile phone with the Live@edu platform. Thus, increasing the number of devices that can be used, as well as the expansion of overall availability.

In addition to staff, the Live@edu accounts are open to students of the school, which opened up new opportunities, both in sharing information and documents, as well as communication and collaboration with subject teachers, class teachers, professional services, work in extra-curricular activities or projects.

Communication with students in such a unified system enables the systematic continuation of contact with students after school hours to monitor their career development, former students to facilitate communication and communication with the school as well as the teachers. For example, participation in the present work and school life in the form of technical, financial and other assistance during the reunion dinner, etc.

Table v (see table v) provides a quantitative analysis of an employees' several common everyday activities. The way this is realized and time required for implementation has been taken into account. It is clear that after the use of collaborative software activities are carried out in a much more comfortable and functional way and in a much shorter time than before.

Table 2: Quantitative analysis of several common activities in a daily routine of employees

		METHOD AND TIME REQUIRED FOR IMPLEMENTATION			
Nr.	ACTIVITY	PRIOR TO THE IMPLEMENTATION OF COLLABORATIVE SOFTWARE		AFTER IMPLEMENTATION OF COLLABORATIVE SOFTWARE	
1.	Harmonization of monthly and annual plans of teachers	Internal meetings, email communication	At best, 1h, in the worst case it can take up to several days	Teachers on the platform have access to all the plans of other teachers, the availability is at a maximum	5 min
2.	Correlation of subjects	Internal meetings, email communication	At best, 1h, in the worst case it can take up to several days	Teachers on the platform have access to all the plans of other teachers, the availability is at a maximum	5 min
3.	Amendments to the monthly and annual plans	Amendments are sent by e-mail, update is made by authorized personnel,	Uncertain time, in the worst case can take up to several days	Teacher is making changes directly on the platform, updating safe	instantly
4.	Preparation of various reports, more teachers are responsible	Internal meetings, email communication	Few hours to several days	Simultaneous on-line operation of remote actors or time-separated work (changes marked and remembered). Collaboration of individual teachers very supportive.	few hours
5.	Control handing of different, necessary documents. Control is performed by managers.	Internal meetings, email communication	Few hours	Documents are in their respective SkyDrive folders that a manager can access.	10 min.
6.	Awareness	Information boards, email communication, internal communication	from 1 minute to few hours.	Through the calendar, safe.	instantly

3. CONCLUSION

The situation in the educational system of Serbia requires reengineering of processes in order to radically improve the overall quality of each educational institution.
The development of information technologies is the basis of the development of modern society. The introduction of this type of information technologies using the Internet features aims to contribute to the improvement of quality of service provision on the one hand, and to increase the efficiency and transparency of business processes, on the other.
Along with other measures that will bring business process reengineering to an educational institution, collaborative software as the initial phase of development of the information and communication platform will bring:

- increase of service quality
- increased productivity
- less money and energy spent
- better communication within the organization
- development of new approaches to business process management
- attractive business environment

All this leads to a business goal of an educational institution that we have previously pointed out as a satisfied and successful student, satisfied teachers and other school employees, as well as the State.

REFERENCES

[1] DJURIČIĆ M.M., *Preduzetništvo*, IR-MIR Užice, 2013.
[2] DJURIČIĆ R.M., Djuričić M.M., Aćimović Pavlović, Z., *Savremeni integrisani menadžment sistem*, IR-MIR, Užice, 2012

[3] eManagement Manual, available on http://bbs-reko.mmbbs.de/index.php?id=63 (accessed 11th , September 2013)
[4] MILADINOVIĆ, M., VELJOVIĆ, A., PAPIĆ, M., GERASIMOVIĆ, M., Functional Model of the Process Education-Educational Work for Primary and Secondary Schools, 1st National Conference with international participation, Business Process Reengineering in Education, 2011., pp. 44-51.
[5] PAUNOVIĆ, L., JOVANIĆ, B., MILIĆ, A., BOGDANOVIĆ, Z. and DESPOTOVIĆ ZRAKIĆ, M. (2011), "Developing a model of portal for promotion of scientific research", Proceedings of the 3rd Slovenian Social Sciences Conference Social responsibility in 21st century, Fiesa, Slovenia, pp. 458-474.
[6] PAUNOVIĆ, L., GRUBIĆ G., STOKIĆ, A., POPOVIĆ, S. AND MILENTIJEVIĆ, D. (2013), "Developing business intelligence model for scientific research project management", Metalurgia International, in press
[7] RISTIVOJEVIĆ, M., RISTIVOJEVIĆ, M., & RADOVIĆ, D. (2010). *Reinženjering obrazovanja u funkciji prilagođavanja reformama privrede*, Ekonomski vidici, 15(2), 221-234.
[8] ROTTLUFF, J., ALLMANNSBERGER-KLAUKE, M., HARTMANN , W., JUNKER, W., Stručne škole kao regionalni centri kompetencija Vodič za rukovodstvo i razvojne timove škole
[9] STAIR, R., REYNOLDS,G. AND CHESNEY,T. (2008), Principles of Business Information Systems, Cengage Learning EMEA, London
[10] Strategija razvoja obrazovanja u Srbiji do 2020. godine, dostupno na www.srbija.gov.rs/extfile/sr/179119/strategija_obrazovanje026_cyr.zip (accessed 11th , September 2013)
[11] VELJOVIĆ, A., *Kompjuter i kvalitet, ISO 9000: 2000 procesni pristup*, Savez inženjera i tehničara Jugoslavije, Beograd, 2001.
[12] http://rc.etf.rs/projekti/idejni_jisp?lang=sr (accessed 11th , September 2013)
[13] http://www.tehnickaue.edu.rs/srp/tdoc/?conid=20 (accessed 11th , September 2013)