

Changing IS Curriculum and Methods of Instruction

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ABSTRACT

The paper presents problems of teaching information systems at school of management. Authors drew from observations in Polish and western schools of management and literature. Suggestions in respect to rules for new curriculum design are given in the paper. The results of investigations are presented in conclusions with recommendations.

Keywords

IT/IS instruction, active teaching, project-based learning.

1. INTRODUCTION

Education in computer science has developed in Poland initially at universities in the beginning of 70s. It focused mainly on technology and fundamentals of programming. Our interests concentrate rather on Information Systems (IS) understood as a domain of IT applications to management. It also means applications of the information technology (IT) to support activities in human activity systems like business or administration. IS is a specialty of business and management schools.

Employers for years have engaged programmers. Results of their job appeared unsatisfactory for users although solutions were often technologically perfect. Also graduates of economic (management) schools were more interested in technology rather than in management requirements.

Curricula in economic schools are a mixture of C.S. and economic topics. Academic milieu still do not perceive Information Systems as a domain of research and instruction.

Authors previously investigated needs for IS education and suggested changes to curriculum and new methods of teaching (for example: [1], [2], [5], [6], [7], [8], [9], [10]).

The paper is addressed to I.S. educators. Its purpose is to present and discuss obstacles in changing the practices of teaching C.S. and I.S. in a management school. Paper is divided into four sections. First section presents background of C.S. & I.S.

education at Polish universities. Second section discusses C.S. & I.S. education goals and objectives. Third section reviews problems to be solved in order to modernize IS teaching in a management school. The last section presents a sample IS curriculum. Paper concludes with suggestions in respect to reconstructing IS studies.

2. BACKGROUND

For almost 30 years universities in Poland have been instructing specialists in computer science. In 70s, when Polish industry and administration began to purchase IT equipment and software, universities, instituted departments of CS. They developed in the next two decades, but the profile of graduates was not indicated. Step by step different universities¹ specialized in distinct fields: university mathematics faculties – system software and programming, technical schools – hardware and programming toolkits and support software, economic schools – accounting inventory programs, pedagogical schools – instruction software etc.

Such specialization was enforced by the structure of state controlled education system and detailed regulations. As a result of such organization every university (school) had not only the own administration but also a team of specialists in various fields. At the same time students studied a specialty designed according to the school's field of study. C.S. / I.S. curricula varied among universities, technical schools or schools of economics although specialties were usually called Informatics (equivalent to *Computer Science*).

In the next step, as a result of disputes among specialized parties inside the profession, subgroups named their subspecialties e.g. medical informatics, agriculture, economic, technical, legal, etc. informatics. Some people think that such specialization does not help and even impedes IT development and instruction. Additionally students at various schools have to study a number of disciplines among which majority is formed by the body of disciplinary knowledge (e.g. economy and management and general issues). Classes regularly take more than 30 hours weekly. They are mainly lectures, especially in case of topics related to economy and management. C.S. and I.S. classes are often projects and laboratories. IT facilities are accessible but in scarcity and the quality of service is perceived as unsatisfactory.

Graduates get employment very easily because of organization needs for specialists. A number of students work part or full time. Many of graduates work for international firms. Their background

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¹ Universities in Poland are independent schools. Different universities (schools) teach the same specialization e.g. C.S. & I.S. in different ways.

is usually assessed as excellent as incomplete. Firms have developed training schemes for new employees.

Majority of graduates work however, for large or medium size companies, as programmers and system designers or network administrators. Requirements toward the graduates are lower in those firms. Firms just want 'computer scientists' fluent in IT to help operate IS or to build up less advanced applications.

Users' satisfaction with applications has been limited. This resulted in attempts to develop software by their own. Such experiments usually fail. Organizations then tend to engage specialized firms and / or purchase off-shelf application software. Difficulties usually persist and again firms engage C.S. graduates to serve as a connection between users and external consultants. Generally managers await a new technical solution ready to apply. Such solutions are expected to substitute employees. Managers are often engineers still believing that a computer can do anything. Usually they are afraid of any changes to the organization. It does not come as a surprise that applications do not satisfy their ill-defined needs.

Universities usually do not examine educational needs. There is hardly any contact between state owned universities and employers. Also most employers are in fact passive. They do not plan staffing and engage whoever comes and presents an appropriate diploma. They do not evaluate employees' performance and do not give any feedback to universities. With passive employers and educators quality of education can change slightly, if at all.

3. MISSION GOALS AND OBJECTIVES OF IS EDUCATION

Universities are bureaucratic organizations. They have always existed and had the same structures. Government as the owner of the educating institutions as well as employers are officially satisfied with education accomplishments. On the other hand they do not know what are the mission and goals of the whole education system and educational institutions.

Higher education bill states the objectives for institutions as delivering knowledge and training the profession. The bill regulates all the issues of universities functioning in a very detailed way. This makes fundamental changes impossible. University conservatives abstain from or often oppose to any transformation. They always can make excuse for their positions questioning legitimacy for changes.

As urgent necessity for administration and universities is to introduce a systemic change enabling institutions adapting to needs of employers. An institution has to formulate the mission, determine goals and develop strategy according to the market needs and its own capabilities.

Faculty and authorities have discussed what is more important to teach students: knowledge or skills. Today's psychology proves the transferring knowledge is not possible. Knowledge means ability to apply information to the efficient and effective action [11]. Knowledge can be built by acquiring and successive application of the information to act. Skills though should be taught foremost after developing attitudes necessary to motivate a student. Such reasoning should be a foundation for modernization of IS curriculum.

Teaching information technology (fundamentals and advanced issues) cannot be efficient as long as the dominating method is lecturing (transfer of information). Lecture is the least effective method of teaching with information retained up to 5%.

Students must not attend more classes than approximately 20 hours weekly. In other case they do not have opportunity to study literature and apply the acquired information. The most effective ways of instruction are projects and case studies. Students then adopt information but also they get a deep understanding and learn how to apply it. Real life projects help students to learn organizational context, and develop personal and interpersonal skills [5].

Definition of teaching goals has to take under consideration detailed qualities of a professional system analyst. In fact educators often do not know what personal traits employers and graduates value. In the case of a system analyst they are similar to business and management [6]. Employers and students especially value the following traits and skills: enthusiasm and motivation, oral and written communication, interpersonal skills, and self-confidence. Curriculum should take into account such topics as psychology and sociology, organizational behavior, managing of the organizational change, law and ethics, and consulting.

Another issue important to achieve better results of IT applications to support management is C.S. & I.S. education of managers and users. Managers illiterate in C.S. & I.S. cannot efficiently cooperate with IT/IS specialists. If they do not know the capacity and shortcomings of IT, they are not able to define information needs. Managers and other IS users have to actively cooperate in system development, so they need to know at least fundamentals of C.S. & I.S.

4. EXPECTED PROBLEMS

Major change to the traditional inefficient system of training in IS is a very complex and difficult undertaking. Attempts have been taken for almost a decade without significant results. Efforts are continued at a number of schools but approach chosen is not promising [12]. All faculty engaged in the endeavors try to change the curricula. Changes are superstitious and are not based on employment needs.

First we must establish the goal of education: a model graduate. Such model should specify attitudes, skills and body of knowledge necessary to perform work professionally meeting needs of employer. Curriculum may only be designed on such foundation. We can expect to encounter critical obstacles in performing this task. Potential problems should be known and analyzed before the project. If we cannot find solutions to these problems the change efforts will be lost.

The main hindrance to changes are the outdated regulations. Also traditions and conventions at universities will give rise to expected problems. Conservative approaches, procedures and practices are the most difficult to change. Also inherited ineffective methods and techniques of teaching should be replaced by active methods like case, projects and groupwork. Students will be expected to participate in developing programs and be active in the process of instruction. They are better motivated when they know goals of a subject matter, participate in program design, and are responsible for acquiring resources. Faculty are

not used to work with active students and will perceive it as not acceptable.

Shrinkage of the hours taught would probably bring about opposition among teachers because of financial reasons. Reductions are likely and this possibly has been the reason for students' weekly hours workload. Change will require considerable effort of instructors to develop or rework curriculum and syllabi.

Planning the change will be a real challenge for all project participants. The change will take five years of gradual transition following at least two years of arrangements. Difficulty of the change from results from lack of experience from previous planning and implementing the change. University's organizational culture does not encourage changes.

Changes need to be initiated and stimulated by the government. To solicit changes certain regulations should be suspended or at least loosened. One could not expect any move toward new arrangements before regulations have been released. Unfreezing the current rules is a condition for encouraging people to actively support the move.

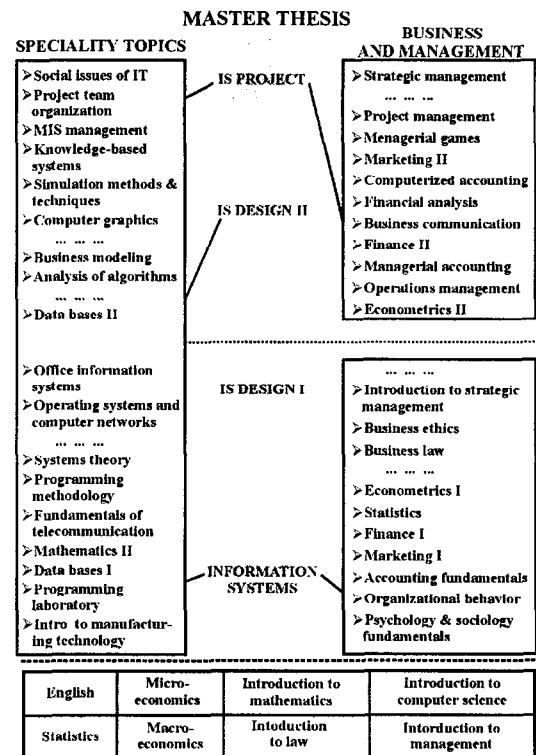
Finally the government should financially support the projects. Universities are currently suffering serious financial problems and they cannot afford the transition. Changes to curriculum and organization of instruction require investments. Building up new facilities will probably be required. Faculty participating in the change process need retraining before they begin teaching under new arrangements. Finally new and reworked teaching resources will be necessary. Their development will need require substantial investments.

5. DEVELOPING NEW CURRICULUM

New curriculum is an essential constituent and fundamental condition for radical changes to practices in IS development. Lack of knowledge primarily results from inappropriate education. Deficient curriculum embodies far to many impractical topics presented in inefficient way. New solution should be complex and include curriculum as well as new study schemes and internal regulations. Essential for success -- besides curriculum -- will be students' active attitudes and methods of instruction. Teachers should enrich their qualifications with interpersonal skills, new training methods and techniques, and which is important practical experience. These all are critical success factors for inevitable and urgent change.

New curriculum has to take after other universities' best practices. Our proposal (Figure 1) is based on the analysis of IT applications in organizations and employers opinions. Studying the model curriculum presentations [3], [4] enabled designing the proposal.

Figure 1 Outline of proposed provisional curriculum



Bottom segment of the frame specifies fundamental subjects taught to all management students during first three semesters. Above segment details the general management and business (right), core, and selected specialty topics (left) for undergraduate studies. The upper segment itemizes study subjects for graduate level. The master thesis closes the education cycle.

The presented outline does not mention yet teaching load. It is expected to be a crucial issue of negotiations among educators for reasons given in the first section. Discussion will have focus first on relations among clusters of subjects required for a model graduate [4], [6], [8]. After getting consensus about principle details can be agreed in teams representing disciplines. Core and specialty topics for IS studies must participate in 35-50% workload (1050-1500 total teaching hours).

Suggested curriculum does not fully match to these standards. At the beginning it should conform to culture, tradition and habits (as much as necessary), and to educational standards. Proposal represents groundwork for discussion with employers and educators.

Feasibility of the proposal appears to be difficult because of reasons discussed in the first section. Global developments and expected reforms of education system will speed up suggested shift.

6. CONCLUSIONS

Quality of IT applications in Polish organizations is often questioned. It is a result of inadequate education of professionals in IT applications as well as managers. It is a burning issue for employers and educators to change the curricula and schemes of instruction of I.S. specialists. Also management students need to learn information systems and C.S. in order to understand IT capabilities and constraints. Managers should be capable to delineate their information requirements and cooperate in developing applications.

Expectations of employers and comparisons against model curricula were the basis for intended change. Proposed changes, generally described in section four, present a basis to discussion and subsequent planning for modernization.

Change will require considerable effort of a university and significant support by the government. Government provision should consist in ease of rigid and detailed regulations and subsidies for task force designing the change.

7. REFERENCES

- [1] Bocheński, A., Kuraś, M., Wilusz, T. O edukacji informatycznej studentów studiów ekonomicznych. Mat. na konf. Rola przedmiotów 'ilościowych' w kształtowaniu sylwetki absolwenta studiów ekonomicznych", (1986) Sopot: PAN-UG.
- [2] Bocheński, A., Kuraś, M., Wilusz, T. Wykorzystanie metod i środków informatyki w kształceniu informatycznym w uczelniach ekonomicznych. Metody dydaktyczne w informatyce. Warszawa: PTE – UW (1986).
- [3] Buckingham, R.A., Hirschheim, R.A., Land, F.F., Tully, C.J. Information Systems Education. Recommendations and Implementation. (1987) Cambridge-London-N.York: Cambridge University Press.
- [4] Davis, G.B., Gorgone, J.T., Couger, J.D., Feinstein, D.L., Longenecker, H.E.Jr. Model Curriculum and Guidelines for Undergraduate Degree Programmes in Information Systems. <http://102.245.222.51/isdocs/isdocs.html> (1997).
- [5] Duxbury, L.E., Kuraś, M. The Practicum Approach to the Teaching of Systems Analysis and Its Applicability to Poland. (1995) Studia Informatica, nr 7.
- [6] Kuraś, M. Kształcenie analityków systemów informacyjnych. Informatyka. (1995) Vol. 30, No. 7.
- [7] Kuraś, M. Aktywne metody uczenia analityków systemów. Komputer w edukacji. (1995) No. 3-4.
- [8] Kuraś, M., Wilusz, T. Kilka uwag na temat kształcenia informatyków. Mat. Konf. INFOGRYF '96. (1996) Tom II. Szczecin-Kolobrzeg: TYNOiK Szczecin.
- [9] Kuraś, M., Zając, A. Communication Between User and IS Analyst: Is Information Communication? [in:] Sikorski, M., Rautenberg (eds.). Proc. of Int'l Workshop, Transferring Usability Engineering to Industry. Gdańsk: Eigenössische Technische Hochschule, Zürich –Swiss Federal Institute of Technology – Technical University of Gdańsk (1998).
- [10] Kuraś, M., Zaliwski, A. Kształcenie analityków systemów informacyjnych. Komputer w edukacji. (1995) No. 3-4.
- [11] Senge, P.M., Roberts, C., Ross, R.B., Smith, B.J., Kleiner, A. The Fifth Dimension Fieldbook. (1994) New York: Doubleday.
- [12] Wrycza, S. Informatyka Ekonomiczna jako dziedzina dydaktyki. (1998) Mat. III Konf. NTiE. Ustroń.