E-tutor - the student support system for raising the quality of the learning process and learning outcomes in the undergraduate civil and geodetic engineering education

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Abstract: - In the paper we present the student support system e-tutor which was designed and implemented in order to raise the quality of study process and outcomes. The system is part of a more comprehensive faculty development programme. First year students need special support in the process of acculturation and adjustment to the academic environment, with special emphasis on developing study skills and organisation and management skills. Third and fourth year students have more needs in career development and planning. The role of the study support system is to provide information and the data for teachers, students and at the organisational level in the process of quality assessment and organisational development. The qualitative research methodology was used for identification of key factors for effective and efficient tutoring system when developing student support services.

Key-Words: - e-learning, higher education, engineering education, on-line academic counselling, study support system, e-tutor, student retention, individualised study plan, quality, Slovenia

1 Introduction

Precondition for quality learning and achievement is that students accept the responsibility for their learning and learning outcomes. Students must be able to play a proactive role and regulate their learning process soon after entering university. Predominant organisation of study at the traditional university, which supports teaching in large lecture theatres and tutorials for semi-large groups of students, usually doesn’t foster students to develop a capacity to self-regulate learning. At the Faculty of Civil and Geodetic Engineering we are facing many problems of traditional universities, such as large classes with inadequate student-teacher ratios, diversified classes in terms of student prior knowledge, ability and motivation, students dropping-out in different years, student and teacher conceptions of teaching and learning aligned to a transmissive model of teaching. The study process is mainly designed for an average student and as such insufficient for better students and for those with poorer prior knowledge. Within the Bologna reform process, which we are facing, we intend to renew the curriculum towards an organisation of study which will support more flexible organisation and enhance individualisation, i.e. student-centred teaching. In the period 2004-2006 we developed the study support system for fostering quality learning and learning outcomes. We estimate that a range of improvements in teaching approaches by shifting towards student-centred teaching could improve the quality of learning process and raise students’ achievements. Awareness of importance of the teacher’s mentoring and tutoring role is one of the crucial preconditions in the renovation process of university teaching and learning. More intensive teacher-student and student-student interaction during the learning process will be supported by the information and communication technologies (ICT). Oliver argues that “Technology has the capacity to promote and encourage the transformation of education from a very teacher directed enterprise to the one which supports more student-centred models [14]”. Results of a research conducted among higher education teachers in Slovenia in 2002 illustrate that the majority of teachers have conceptions of ICT supported teaching
aligned with a transmissive model of teaching which is a major obstacle for a productive use of ICT in teaching. Teachers will be supported in rethinking their conceptions of teaching and learning and in finding best possible ways for improving their approach to teaching with an underlined role as facilitators, and by integrating ICT in their teaching [5].

2 The student support system

2.1 Needs analysis and key factors

The Faculty of Civil and Geodetic Engineering within the University of Ljubljana is one of two faculties in Slovenia offering higher education programmes in civil engineering and the only faculty in Slovenia providing geodetic engineering education. Study programmes at undergraduate and postgraduate levels include Civil Engineering, Geodetic Engineering and Water Management, and Communal Engineering. There enrolled 1660 undergraduates, 350 graduates and 580 novices in the study year of 2005/2006. Teaching staff includes 130 faculties, and thereof 53 professors. The average studying period of students having graduated from the Faculty of Civil and Geodetic Engineering in 2005 was 7.6 years. In the period 2001-2005, the average studying period amounted to 6 years. Figure 1 shows student retention rates. Retention rates are lowest at transition from the first to second year. Most students drop out during or by the end of the first year. Accordingly, the novices need strong support in their study. Within the framework of faculty development programme, first year student populations have been studied so as to identify approaches for increasing retention rates.

Student support activities had not been a major priority at the faculty in the past 10 years. In 1984, the appellation of “the mentor of the year” was instituted. The understanding and implementation of the mentor of the year’s role had been up to each individual teacher. In large classes, mentors have difficulties in mentoring because of an inadequate student ratio. The mentoring system needs improvement so as to provide effective, responsive and developmental support. “Higher education needs to be more supportive and the students should have greater access to advice and guidance, but still many support services tend to be (reactively) responsive rather than (proactively) developmental [18].”

In 2004, we launched a faculty development programme. The aim of the programme was to analyse the needs of student support and to join the existing “mentor of the year” appellation and the newly developed support into a comprehensive support system that would support students in their study process and career development.

Focus groups were used to identify needs and key factors of effective and efficient tutoring system. A qualitative research approach was selected for a very complex field of investigation of conceptions and approaches to teaching and learning with special emphasis on the mentoring/tutoring role of the teacher [1]. The aim of focus groups was to identify key factors, their context ant the interpretation [13]. The type and planning of focus groups was designed according to Crueger and Casey [9].

Focus groups were formed of students and teachers in order to analyse:
- Conceptions and approaches to teaching and learning “Teaching approaches differ qualitatively within different conceptions of teaching and learning [16], [2], [8]”.
- Facilitative and mentor/tutor role of teacher.
- Planning and organisation of learning.
- Identification of obstacles for quality learning process and outcomes.
- Relations between teachers and students.
- Counselling and/or tutoring needs, conditions and resources.

According to themes or perspectives noted in student groups, first year student needs included: developing study skills, management of study, and organising collaboration groups for daily assignments and preparation for exams. Effective studying and time management is one of the main problems of novices. Implementation of student support groups improves students’ achievements [19]. First year students need support in the process of acculturation and adjustment to the academic environment. Novices who hold conceptions of learning, which are aligned with a

Figure 1: Student retention rates in the study year of 2005/2006

![Student retention rates in the study year of 2005/2006](image_url)

CIE – Civil Engineering; WMCE – Water Management and Communal Engineering; GEE – Geodetic Engineering;
transmissive approach to teaching, found it more difficult to adjust [8]. First year students value very highly tutor support. According to themes or perspectives noted in student groups, third and fourth year students needs include career development, planning, time management. They value very highly the tutor’s role in developing their career orientation.

Themes or perspectives noted in teacher groups include organisational culture with emphasis on teaching and learning approaches. Main obstacles for quality learning originate from predominant teaching approaches which are content oriented and support knowledge transmission and reproduction and as such are not facilitative/transformative [2], [8]. They feel that tutoring system at the faculty will bring changes into teacher-student relations and foster facilitative/transformative teaching approaches. Teachers underlined the need for organisational resources and conditions for new facilitative/transformative teaching approaches.

2.2 Tutoring for student-centred teaching and new demands for university teachers

The concepts of tutoring and counselling differ between each other. The concept of tutor in higher education refers to the support and improvement of individual learning. It can be understood as the individualised instruction of domain knowledge [11] or personal assistance in improvement of study skills and organisation of study. Counselling refers to the academic counselling in order to support students in different academic decisions and career planning. The role of tutor or counsellor can be provided also by more experienced students.

A university teacher is challenged with large transformations in tertiary sector which brings significant dilemmas in teaching and research. “The teaching is changing; it is being forced to change by dominant globalizing forces of social change. Teachers are faced with playing new roles requiring many more and sometimes different skills [6]”.

Teaching in large classes with inadequate student-teacher ratios resulted in transmissive model of teaching with teachers holding dominant position in frontal lecturing. More individualised or personalised teaching was reserved for small groups usually in the postgraduate study programmes. By the project we try to foster changes in the general approaches at the faculty at undergraduate level. Teachers facing the tutors' role will gradually bring more individualisation in their relations to students and consequently in their teaching approaches.

The potentials of new information-communication technology (ICT) are becoming widely used in promotion of individualisation of study also in the field of study support systems for development of study skills and management of study [18], [11], [10].

3 The aim and structure of the student support system

The system combines the tutoring system, mentors of the year and counsellor for students and teachers. The rationale of tutoring purpose and aims is set, but the methods of tutoring are not prescribed. Tutors perform their role according to their own conceptions of tutoring/counselling, teaching approaches, communication styles, and according to the characteristics of groups of tutees or individual tutees. We understand tutoring similar to Robert’s description of mentoring, as a complex social and psychological activity and recognition that the definition of mentoring depends on the experience, and phenomenon itself [17].

To implement ICT assisted support system is a necessity because of flexibility in time and place, multidirectional communication patterns, potentials for forming community and specifics of computer mediated communication. Computer mediated communication has an extraordinary potential in integrating written and oral dimensions and procedures. It has been able to replace the traditional oral dimension without destroying what has until recently seemed to be an irreplaceable privilege of classical face-to-face communication [4]. Computer mediated communication can foster productive interaction in counselling and tutoring.

Counsellor had worked with tutors individually in identifying and designing their individual approach to tutoring. The training of tutors will be organised on a yearly basis. The purpose of training is to evaluate the tutoring process, to exchange experience and to develop shared conceptions and visions of tutoring and to improve individual tutoring skills. The concept and model of tutoring has to be developed in a process of shared construction of meaning.

Individualised study plan was implemented with the tutoring system. The idea comes from Finland where an individualised study plan is a requirement for all students [20]. The aims of study plan for students include:

- stimulating students in developing responsibility and self-regulation of their learning;
- self-evaluation of study outcomes and study skills, styles and approaches;
- developing skills for planning, organisation and time management;
- identifying one’s own strengths and weaknesses;
- career planning.
Students are constantly in a position of decision making and evaluating their own ambitions, potentials, choice of courses in their study programme and progress. An important feature of students' individualised study plan is assisting the students in developing their skills. Vainio and Salmenjoki report on development of an agent-based system for design and development of study plan with the advanced features for development skills of students for planning and design of their study plans [20].

Tutor supports students in designing, executing and evaluating their study plans. Most important is awareness improvement that study plans are a responsibility of the students and not of the tutors. At the organisational level, study plans assist the teaching staff and management in quality assessment of the study process and outcomes. From student study plans, an organisation may gather important data for planning improvements of the organisation and organisational culture.

Learning management system (LMS) was introduced. Universities and other educational organisations use LMS to support teaching and learning with the electronic learning materials, individual and group learning activities, evaluation of students learning and achievement and generation of databases with students input and results. LMS supports classroom management and management at the organisational level with the focus on student-centred learning. The penetration and use of LMS was studied in 17 European countries by Paulsen [15]. Since that study was made the LMS systems became more widely used and many open source LMS systems became available. The introduction of LMS into the tutoring system supports individual and group activities in the tutoring process. Chosen has been the open source LMS solution called Moodle [12]. At university level, Moodle was first introduced in in-service training courses for higher education teachers in 2003 by Istenič Starčič, also at the Faculty of Civil and Geodetic Engineering of the University of Ljubljana [3]. Since 2003, LMS has been introduced at two out of three Slovenian universities (University of Ljubljana, University of Primorska).

Tutoring activities are based on the individual and group methods. Group methods, according to Vygotsky's theory of the social negotiation of meaning, support the exchange of experiences and ideas among students who are at a similar developmental stage and level of understanding [21]. Johnson and Johnson discovered that the manner of interaction during group work influence the students motivation [7]. The way groups are structured in the process of group work affects individual motivation.

The system provides information and the data on the study process and tutoring process. It supports coordination of tutors, and of tutors and heads of departments. Tutors provide all the necessary tools for planning, organisation and performance of tutoring for individuals as well as groups of students.

4 Conclusion

In the paper we presented the student support system, which has been developed in order to promote quality teaching and learning and to help students in their process of professional orientation. “Student support systems are essential. Whilst it is easy to focus on the delivery and management of academic content, the support of students is an essential feature of any educational system [18].” A precondition for quality teaching and learning is organisational culture that supports the facilitative/supporting role of the teacher and strengthens good relations between the teachers and students.

References:


