Tallinn Pedagogical University

Faculty of Mathematics and Natural Sciences

Department of Informatics

Report of Self-Evaluation

Accreditation of Master Curricula in Computer Science

Informatics (Multimedia and Learning Systems)

Management of Information Technology

Tallinn 2004

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Introduction

An Overview of the Tallinn Pedagogical University

The predecessor of the Tallinn Pedagogical University the Tallinn Teacher Training Seminary held its festive opening ceremony on 15 September 1919. That opened a new era in Estonian national pedagogy. Most outstanding teachers of their time who were known all over Estonia worked at the seminary.

Over the years the institution has been renamed several times, the names being the Tallinn Teacher Training College, the Tallinn Teacher Training Institute, the Tallinn Pedagogical Institute of the name of Eduard Vilde (TPedI). In 1992 the university was renamed the Tallinn Pedagogical University (TPU). In 1995 the University Act of the Republic of Estonia stated TPU as one of the six Estonian public universities. In 1997 the former institutes of the Estonian Academy of Sciences, the Institute of International and Social Studies and the Institute of Ecology were integrated with the University. Two new institutes: Institute of Educational Studies and Estonian Institute of Demography were also founded. In 1998 the College of Haapsalu and in 1999 the College of Rakvere was founded. In 2003 the Estonian Academic Library (the former library of Estonian Academy of Sciences) was integrated with the University.

Agreements of cooperation have been signed with several Estonian universities: Tallinn Technical University, the Estonian Institute of Humanities, Estonian Academy of Arts, Estonian Business School, Academy Nord, as well as with 27 universities abroad.

The role of the Tallinn Pedagogical University in the field of Estonian education and research increases yearly. At the moment the number of students of TPU is 7,756 (stand 15.09.2003).

(See appendix 1 for the contact details of the University and appendix 2 for the academic structure of the University).

A Brief Survey of the History of the Department of Informatics

The Department of Informatics in TPU was established as an autonomous unit only on September 1, 2001. Up to then the development of the curricula of Computer Science had taken place within the Department of Mathematics and Informatics.

The first informatics-related courses (mathematical machines and programming) had been switched into the curricula of Mathematics already in the 1960s. In March, 1971 TPU got its first computer Nairi-2; in 1974 another Nairi-2 was obtained.

In 1986 there began a transition to the new curricula in the training of mathematics teachers in Tallinn Pedagogical Institute and the graduates obtained the profession of High School Teacher of Mathematics and Informatics and Basic School Teacher of Physics. The main mathematical subjects maintained their bulk in this curriculum. The number of lessons dedicated to physics and astronomy was considerably reduced. But at the cost of that the amount of informatics and calculus lessons increased from 120 to 384 lessons.

In 1988 the first students enrolled in the speciality of *Mathematics-Informatics*.

In 1989 the Chair of Informatics was founded and Associate Professor Peeter Normak became the head of it.

In 1991 there was a transition to new curricula. Three different versions of the curriculum were enforced in the preparation of mathematics teachers. The majority of the students chose the first among the following:

- High School Teacher of Mathematics and Informatics – duration of study 5 years.
- Basic School Teacher of Mathematics – 4 years.
- High School Teacher of Mathematics and Basic School Teacher of Physics – 5 years.

Together with these new curricula a system of subjects was adopted.

In 1993 the department of Mathematics and Informatics was reorganised into four chairs: Chair of Mathematical Analysis, Chair of Algebra and Geometry, Chair of Didactics of Mathematics and Chair of Informatics.

In 1998 ten first students enrolled in the diploma studies of *Applied Computer Science*.

In 1999 the speciality of *Information Technology* was opened at TPU Haapsalu College.

In 2000 due to the curriculum reform the first students enrolled in the 3-year bachelor studies of Informatics.

In the autumn of 2001 the master programmes *Informatics (Multimedia and Learning Systems*) and *Management of Information Technology* were started. The competition was tough among the applicants from the very beginning: in 2001 there were 38 applicants for the first and 19 for the second programme.

In 2001 the Department of Informatics was formed (based on the former Chair of Informatics), separate from the Department of Mathematics. It is run by Katrin Niglas – the alumna of the first year of the speciality of Mathematics-Informatics.

In 2002 the BA curriculum *Computer Science* got full accreditation and master curriculum *Informatics (Multimedia and Learning Systems)* got provisional accreditation for the two years period.

The Place of the Department in the Structure of the University

The Department of Informatics is a part of the Faculty of Mathematics and Natural Sciences and is made up of the Chair of Informatics (Katrin Niglas, Deputy Head) and the Lectureship of Computer Studies (Inga Petuhhov, Head). The function of the Chair is to develop the curricula of Computer Science, to organise the training and to carry out scientific research. At the same time the chair administers computer-related training in the colleges of the university. The Lectureship of Computer Studies offers computer-related training to other specialities in the university. It also offers lower level and intermediate level Computer Science Studies (as a Minor Speciality) to other departments, especially to the students of Mathematics. In addition, the Department of Informatics organises computer-related in-service training to academic staff, administrative personnel, secondary school teachers and other people from outside the university.

The Mission and Vision of the Speciality

The main objective of the master programme of Informatics (Multimedia and Learning Systems) is to educate IT specialists who have extensive knowledge and skills in order to design hypermedia

based software and to implement it in different environments (CD, Internet, Learning Management Systems).

In the design of the curriculum international standards and compatibility with the curricula of other Estonian and foreign universities have been taken into consideration.

The main objective of the master program Management of Information Technology is to educate specialists who are able to plan and implement ICT strategy of a company as well as manage ICT projects.

The curriculum bases strongly on the Estonian national standard for profession "Chief Information Officer V" as well on the needs of Estonian companies. Leading specialists from companies are involved in running the curriculum; the courses contain a number of real-life case studies.

In addition, it is important to examine, in cooperation with other departments, the training programmes and starting points of general studies offered to other specialities, concerning the transition to a new curricular system (3+2) and the improvement of computer-related knowledge in new students.

In the mission and vision of the speciality an important role is played by scientific research, especially through the training of the staff in master and doctoral studies. Here the main objective is to provide, above all, teachers of didactics. Therefore the best of the graduates have been directed to research on didactics.

Self-Evaluation in the Department

The process of self-evaluation is led by the Head of the Department of Informatics but all the academic staff is involved in compiling it. It needs to be emphasised that constant self-evaluation is one part of the everyday work of the department, as on one hand both teachers and the department regularly have to report about studies and scientific research, on the other hand the "youth" of the department and the development of new curricula have brought about the situation where it is necessary to reflect upon the present experience and learn from it.

The following people took the most active part in the compilation of the self-evaluation report:

Peeter Normak	Head of the master curricula
Katrin Niglas	Head of the Department
Heli Tohver	Assistant to the Head of the Department
Inga Petuhhov	Head of the Lectureship of Computer Studies
Mart Laanpere	Researcher
Andrus Rinde	Lecturer
Rain Haviko	Master student, IT specialist

Other teachers and students were involved in a compilation of the self-evaluation report to a lesser extent.

1. EDUCATION POLICY WORK ARRANGEMENT

1.1 A Brief Overview of The Estonian Higher Level Education System

The Estonian post-secondary education system is undergoing radical changes, which among other factors takes into consideration the integration with the European Union. In accordance with the international education standards classification of UNESCO, education has the following levels: Pre-Education, Basic education (the Primary level), Middle level of education (Secondary level) and Higher education (Higher level).

For each level there are standards which are articulated in the state guidelines for educational programs. The curriculum guidelines determine the content of the compulsory programs, the time to be spent teaching and description of the demanded knowledge and materials.

The principles of the educational system and general structure are proclaimed by the Parliament of Estonia. The government is responsible for the state side of the programs and regulates the founding of Universities and other learning Institutions. The Ministry of Education and Science is responsible for the curriculum and development of standards as well as implementation.

Institutions providing post-secondary education in Estonia are divided in two, the Universities and institutions of applied higher education. The University is an educational, cultural and research institution where students can acquire an academic education. The purpose of the University is to advance knowledge through academic methods, create and develop on the basis of integrated learning and research opportunities to acquire an up-to-date post-secondary education which is up to standards, arrange for continuing education and provide society with needed knowledge and research services.

Academic higher education is provided at three levels: BA degree (a 3-year program); master degree (usually a 2-year program) and a PhD degree (usually a 4-year program). The applied higher education institutions are schools where students can obtain a higher education through studies toward Diplomas and program offering vocational training. Their responsibilities are to provide an opportunity for post-secondary education, continuing education, and for conducting studies in applied research and development in their area (Diplomas can usually be acquired in three years).

Noteworthy is the concept of state commissioned education, which on one hand brings in financing from the public sector to post-secondary education and on the other hand allows direct education policy on a local and regional basis. Laws were passed which gave the right to Universities to charge fees for providing education, where either the student or some organisation pays for the student. The Universities are using this to a large extent and this undoubtedly assists to increase educational funding.

As of January 1, 2004, there are 6 Public Universities in Estonia (The Estonian Arts Academy, The Estonian Music Academy, The Estonian Agricultural University, The Tallinn Pedagogical University, Tallinn Technical University, Tartu University) and 9 Private Universities. In addition there are 18 institutions of applied higher education.

1.2 Curriculum Development in Tallinn Pedagogical University

Tallinn Pedagogical University is the fastest developed Estonian public university over the past decade. The number of students has increased from two and half thousand to more than seven thousand. Alongside with traditional teacher training tens of new curricula have been developed in arts, science and social sciences.

General issues of development plans, policies and practical arrangement of teaching are worked out by the TPU Council committee of studies under the leadership of the academic vice rector. The materials are prepared by the study department and the dean's offices of the faculties.

The general structure of the curricula is uniform and it has been worked out in the TPU Council committee of studies and approved by the University Council. The objectives of the curricula and the training programmes within them are drawn up by the respective departments according to certain confirmed rules. Then, after discussion in the faculty council they are presented to the committee of studies for amendments and additions. The final version of the curriculum is presented to the University council for approval. The fact that the curricula are published in the University Catalogue both on paper and electronically, indicates that their objectives are made fully open to public.

The quality assurance system of curricula in the University is based on the results of the EU TEMPUS program No 13313 "Quality Assurance of Curricula", which was taking place from 1998 to 2000 and was coordinated by TPU.

Recent years have been characterised by an extensive reform of the teaching system: the subject based system has been resorted to, the Master's and Doctor's studies have been opened. Both the arrangement and content of studies are in constant development.

The 3+2 system brought about a principal renewal of the curricula in the University. While transferring to the 3+2 system (3 years of the Bachelor's Studies + 2 years of the Master's Studies) new curricula were developed, offering the students knowledge of their speciality as well as social competencies, developing readiness for life-long learning and creating possibilities for inter-curricular and inter-university transitions. Now the transition process from the local credit point system to ECTS has been initiated (see Appendix 8 for the comparison of ECTS credits and the Credit System in Estonia).

The advantage of the 3+2 system from the student's point of view is first and foremost a multitude of options after passing the Bachelor's degree. For example a student of Estonian Philology who has passed the Bachelor's studies can choose between various Master's curricula: teacher of the Estonian language and literature, Linguistics, Literary Science, Philosophy, Communication, Organisational Behaviour, Andragogics. Some Master's curricula (those based on the major speciality) presume that the student has passed the Bachelor's level in a specific subject: the curriculum of the teacher of the Estonian Language and Literature presupposes the Bachelor's degree in Estonian Philology or a respective qualification. Some Master's curricula (the so-called open Master's curricula) like Communication, Organisational Behaviour, Philosophy. are based on the Bachelor level education, not on any specific subject. Some Master's curricula require the Bachelor's education in a specific study area (the so-called partially open Master's curricula): Linguistics and Literary Science, where the precondition is the Bachelor's degree in Philology or a respective qualification. More successful Master's graduates have the possibility to continue the studies for the Doctor's degree. The system is described in Figure 1.

The TPU Bachelor's curricula and partly also the Master's curricula are built up according to the study areas. In determining the areas, in addition to the international classification of science and study areas, the interconnection and development prospects of the existing study areas in the University have been taken in consideration.

The TPU study areas are:

- humanities
- social sciences
- natural sciences
- science
- teacher training

Computer sciences belong to the area of science.

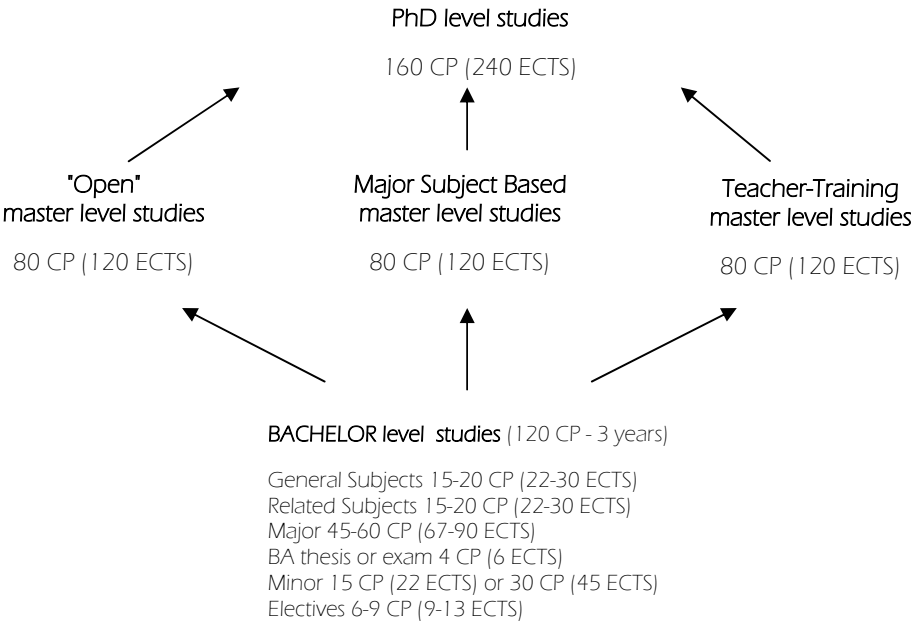

Figure 1. The system of studies in TPU as of 2003.

1.3 The activities of the Department of Informatics in assuring the quality of the curriculum and studies based on IT

Proposals for opening specific curricula in the University are made as a rule by the academic departments where also the objectives and content of the curriculum are worked out. So far the process has been guided mainly by heads of departments but since 2001 it is required that there has to be a curriculum manager responsible for compiling the curriculum and strategic arrangement of studies.

Prof. Peeter Normak is the manager of both master level computer science curricula presented for accreditation. Peeter Normak was elected Professor of the Chair of Informatics in 1993 and his main research area in the field of Computer Science is *Curriculum development in Computer Science*, but also the study of *S-acts* (S-act is an automaton which has a semigroup structure on its input set), which belongs both to the area of algebra and theoretical computer science; currently he also is the principal investigator of a targeted research project financed by the Ministry of Education and science and devoted to the study of electronic learning management systems. Although his Professorship has been stopped due to his nomination to the post of the Vice Rector of Research and Development the University until the year 2005, he is continuing work in the Department of

Informatics as the curriculum manager, working out the curricula and basic policy of the strategic arrangement of studies.

Katrin Niglas, Head of the Department is responsible for the day-to-day running of speciality teaching and studies arrangement. Teaching is organised and checked by the Head's assistant Heli Tohver who draws up the time tables, informs students and teachers on issues connected to teaching arrangements. The assistant also reports to the Head of the Department on the results, the latter analyses them and takes the necessary measures to solve the problems arising.

The questionnaires on students' feedback and teachers' self-analysis play an important role in quality assurance. These, alongside with the annual research and development reports create a good basis for analysing the role of each teacher in the work of the department and carrying out the objectives of the curriculum. For setting individual goals there are development discussions with the teachers. The development discussions are carried out by the Head of the Department with an aim to become aware of the possible problems, to take joint efforts for planning measures to raise the quality of the teaching and research and involve the teachers as specialists in participating more actively in the planning of the curricula and teaching processes.

1.4 The Department of Informatics in the education policy

The staff of the Department of Informatics take an active part in developing the education policy both inside and outside the University. The University education policy works in two directions. The general requirements concerning all specialities proceed from the University Government, Council or the Council Study Committee. Issues concerning specialities get the initial solution in the Department, both parties being responsible for carrying out their decisions.

The Department and the University administration exchange information. As provided in the University Statutes and other relevant documents, cooperation is carried out via the following basic structures:

- The Department has its representative in the University Council and in some of its committees. According to its regulations the University Council can only discuss issues prepared by or discussed in its committees;
- Professor P.Normak belongs to the University government and university Council, but also to the University research and academic committees as the vice rector for research and development. The University government carries out the decisions of the University Council and deals with other current general matters;
- The Department is in contact with University administration via the head of the Department and the Dean of the Faculty. The Dean's office keeps record of students' academic progress, the study department uses these data to have an overview of students excluded and matriculated. The main responsibility for the quality of teaching lies with the Department.
- In case of matters of importance the head of the Department has always access to the Rector or Vice Rectors without prior registration.

Since the end of 1995 the faculties and academic departments have maximum freedom in solving problems within their competence. Certainly the University regulations have to be observed (University Statutes, faculty regulations, regulations concerning the teaching process and internal order etc.) which are relevant and balanced to guarantee an efficient teaching process.

The University is principally oriented to developing teacher training and social sciences, but also humanities and natural sciences, which does not exclude developing other sciences and the respective studies on the Master's and Doctor's level. Training and further education in Computer Science are obviously of great national importance and this gives hope for state financing to increase. The Department of Informatics can have a say here if well-founded applications are

presented for state financed student places. It must be mentioned that the master program Multimedia and Learning Systems was the only new curriculum in 2001 within Estonia, which got state order (i.e. state financed study) places.

To form the national education policy in the field of Computer Science close cooperation is carried out with the Ministry of Education and Science and with the Estonian Information Technology Society (EITS). Prof. P.Normak and researcher Mart Laanpere are the principal partners and consultants of EITS in the field of curriculum development but also in the field of state information policy development. Besides, the lecturers of the Department have been members of the organising board and jury of the national pupils' Computer Science Competition since 1995.

The Department has been working in close cooperation with the national Tiger's Leap Foundation since its beginning in 1997. A number of our teaching staff are represented in its committees and working groups at various levels:

- Peeter Normak - chairman of the training expert committee;
- Inga Petuhhov - general expert of the software committee;
- Hans Põldoja - member of the Tallinn working group.

P.Normak belongs to the Tiger University Program Committee of Estonian Information Technology Foundation. The aim of the committee is to help the universities in implementing the ICT policy of the Foundation in public universities.

In the Department of Informatics, Tiger Leap Foundation supported several projects during last years, for example:

- further education courses for teachers in Computer Science;
- Masters' course on Multimedia and Learning Systems for in-service teachers to enable them obtain higher education on Computer Science.

Even more projects (12 projects in 2003) submitted by the Department were supported by Tiger University program. Among them were, for example, the following projects (more detailed description of these projects are given in Subsection 4.3.4):

- Software for producing multimedia applications;
- Production of learning materials in ICT;
- Mobile ICT-set for lecturers (consisting of an LCD-projector and a notebook computer);
- Computer lab for 20 computers;
- Grant for a visiting professor to have a lecture course for master students.

Our people also participate in international educational organisations. Prof. Peeter Normak was assigned by the Ministry of Education to represent Estonia on the UNESCO Institute for Information Technologies in Education (IITE) seminar "Towards Policies for Integrating Information and Communication Technologies into Education" in 2001 and in the seminar within the framework of the Project "Learning and teaching in the communication society" in Strasbourg, 29-30 November 2001 organised by the Council of Europe, Directorate of School, Out-of-school and Higher Education. He also represents Estonia in Expert Group on Information and Communication Technology set up by the Commission of the European Communities.
(see http://europa.eu.int/comm/education/policies/2010/et_2010_en.html)

Lecturer Katrin Niglas is a member of the degree students' working group of the European Educational Research Association (EERA) and she was invited as national correspondent of International Association for Statistical Education (IASE). She also participated as a TPU representative on EUA 5th Conference "Working Together: Joint Degrees" in Cluj-Napoca, 24-25 Oct 2003.

TPU is a partner of a consortium of 15 European universities called EUDORA, dedicated to design and delivery of European Doctorate in Teaching and Teacher Education. Together with Sheffield

Hallam University (UK) and Pädagogische Akademie das Bundes im Linz (Austria), TPU represented by researcher Mart Laanpere is responsible for organizing a summer school on e-learning in higher education for doctoral students (in Tallinn, July 2004). Mart Laanpere is also the member of an editorial board of the only ICT-related scientific journal in Estonia A&A.

2. CURRICULA

2.1 General Description of the Curricula

Department of Informatics presents the following two curricula to be accredited by the international committee:[1]

Master programme	80 CP	Informatics (Multimedia and Learning Systems)
Master programme	80 CP	Management of Information Technology

The master programme **Informatics (Multimedia and Learning Systems)** was developed in the process of TEMPUS Joint European Project No 12418. The project was coordinated by Department of Informatics and its partners were Tallinn Technical University, Tartu University and Estonian Academy of Arts, but also Tallaght Institute of Technology in Dublin, Tampere University of Technology and Twente University (http://www.cs.tpu.ee/tempus/mmjep). The curriculum is mainly meant for teachers of different subjects, but it is feasible to any specialist with higher education. So, in order to pursue master studies one does not need to have computer-related higher education, but one's IT skills have to meet certain requirements (for example, should be at least on the level of European Computer Driving Licence).

Development of the master programme **Management of Information Technology** has been started due to a strong request of Estonian IT companies. In the Computer Science bachelor program there is a course "Current problems in IT development" consisting of seminars which are taking place in Estonian leading ICT companies and ICT departments of companies (more information about these seminars can be found in [Normak, P. (2003) University-enterprise joint seminars as a tool for entering students into the world of work", Industry and Higher Education, Vol 17, Nr 2, 103-108]). Every seminar is devoted to experience of one such company/department: determination of the niche, production development, marketing, staff development, cooperation with the partners, innovation management, planning of long term development strategies, main problems in software development, experience and solutions to the problems etc. During these seminars it turned out that the biggest problem in the field of IT in Estonia is a huge lack of qualified IT managers. On the other hand, a number of graduate students expressed their strong interest in master level studies in information technology management. As no university in Estonia offered such a program on master level it was decided to develop one in TPU. Good prerequisite for that was the fact that in 2000 a national professional standard for IT managers was developed and accepted.

[1] (see also Appendix 3 and Appendix 4).

2.2 The Development of the Curricula

As computer science is a new and rapidly changing field in TPU; the curricula presented to be accredited have been in constant development in recent years and they have got their present form only in the year 2003.

In Figure 2 there has been depicted the development of the curricula of Computer Science and informatics-related programmes in TPU. The vertical axis in the figure represents the time and the horizontal axis the different levels of curricula. Those curricula that the Department of Informatics continues to launch in the academic year of 2004/05 have been marked with an arrow pointed upwards. Curricula presented for current accreditation have dark background and the curricula already accredited have bold frame. The curriculum *Teacher of Computer Science and IT Manager at School* can be presented for accreditation in 2005 after there will be the first graduates.

Additionally, it has to be mentioned that in 1998 the curriculum of *Mathematics and Informatics* (giving a profession of a high school teacher of both subjects) was accredited. The results were very positive, especially what concerns informatics. We give a short summary of the final report in Appendix 5. This is why the 40 CP and its successor 30 CP minor specialities in Computer Science (the leftmost region in Figure 2) are marked as accredited. *Computer Science* bachelor program got accreditation in 2002.

The former version of Computer Science (Multimedia and Learning Systems) master program got provisional accreditation for a two years period in 2002 (see Appendix 6); activities for improving the curriculum according to suggestions of accreditation committee are discussed in Appendix 7.

2.3 The Objectives of the Curricula; Admission and Graduation Requirements

The aim of the **Master's program Informatics (Multimedia and Learning Systems)** is to provide the knowledge and skills which enable students to independently design up-to-date hypermedia based learning software. The graduate may work as a software developer or manager of software projects in educational institutions or in any company developing hypermedia-based software, but he/she can continue in doctoral studies as well.

The prerequisite for admittance is a Bachelor's degree or a corresponding academic qualification in any speciality. But it is assumed that the candidate's IT skills meet the requirements of *European Computer Driving Licence*. There is also a professional suitability test. Having a three-year experience one can say that due to a very high competition to the study places only those have succeeded who already had a remarkable experience in application of ICT tools in education.

In order to graduate the student has to accomplish his/her studies according to the curriculum and to defend his/her master's thesis successfully. After that the student will get a diploma with an academic rectification of receiving an Master degree in Informatics.

The aim of the **Master's program Management of Information Technology** is to provide skills and knowledge necessary for planning and implementing ICT strategy of a company as well as for managing ICT projects. The graduate may work as a CIO of a company, a manager of software projects or to continue in doctoral studies. In the following we list specific principles that were considered important while developing the curriculum.

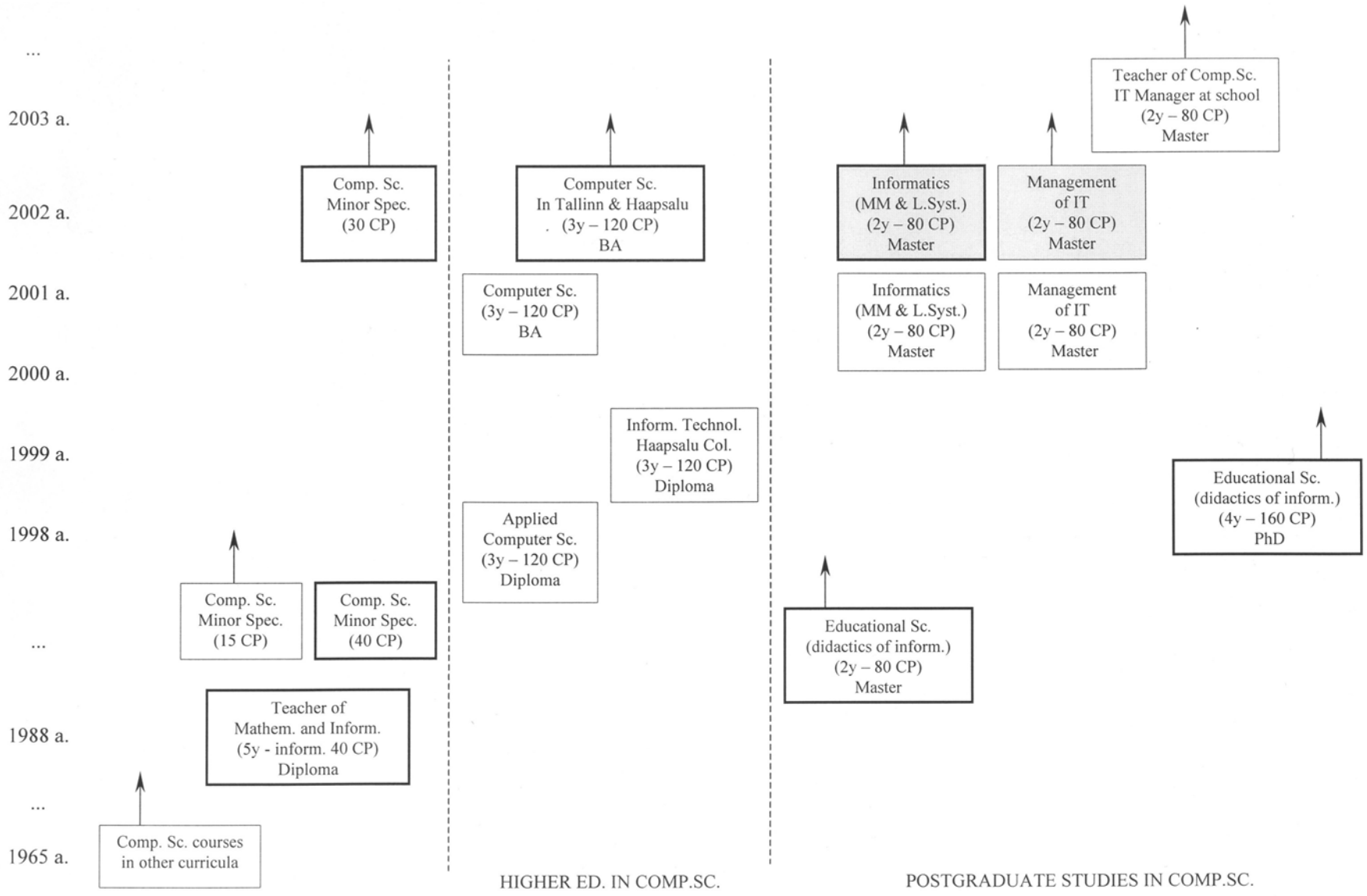

Figure 2. The development of studies and curricula in the field on Computer Sciences in TPU.

The master program bases on the documents declaring the standards for IT specialists and for the related curricula:

- Estonian national standard for profession "Chief Information Officer V" (http://www.kutsekoda.ee/doc/it/Infotehnoloogia%20juht%20V.doc);
- Curriculum Development Guidelines. New ICT curricula for the 21st century: designing tomorrow's education. CEDEFOP. Luxembourg: Office for Official Publications of the European Communities, 2001. ISBN 92-896-0074-8 (http://www.career-space.com/downloads/curdevguidelines.doc);
- Generic ICT skills profiles. Future skills for tomorrow's world. CEDEFOP. Luxembourg: Office for Official Publications of the European Communities, 2001, 84 pp. ISBN 92-896-0070-5 (http://www.career-space.com/downloads/allprofiles_2205_EN.pdf).

The master program is open for graduates of different bachelor programs; the applicants should have knowledge and experience in IT on the level corresponding to the bachelor in IT.

The courses in the curriculum can be divided into three blocks: 1) courses necessary for general management; 2) specific courses necessary for IT-management; 3) preparation of master thesis and courses related to this. For teaching of the second block high-level IT-experts from leading Estonian companies are invited. This ensures that the students will analyse during various courses problems and cases they could be confronted in their future professional activities.

The majority of the courses in master programs are taking place on weekends. This is caused by the fact that the majority of students are working and therefore not able to take too many courses on regular working hours.

2.4 The Structure and Content of the Curricula

In this part the structure and content of the curricula are briefly described. Detailed descriptions of the curricula together with all the syllabi can be found in Appendixes 3 and 4.

Table 1. The structure of the curricula presented to accreditation.

	Informatics (MM&Learn.Syst.)	**Management of Information Technology**
Duration of study	2 years	2 years
Amount of credit points	**80 CP**	**80 CP**
Among these:		
General Subjects	14 CP	8 CP
Major	40 CP	46 CP
Electives	6 CP	6 CP
Thesis	20 CP	20 CP

2.4.1 The General content of the master programme Informatics (Multimedia and Learning Systems)

The general subjects give students knowledge and skills to apply IT tools in related fields – mathematics and physics, but also basics in the design of web-based learning environments.

Compulsory speciality subjects have to ensure students with basic knowledge and skills that enable them independently to design multimedia-based software. Compulsory subjects are divided into two groups: 1) Subjects which guarantee the student's general technical and methodical-artistic skills to design multimedia-based software (Design of Multimedia, Development of Multimedia, Production of Multimedia), 2) Subjects which have to provide necessary skills to design multimedia-based learning software (Design of Multimedia-Based Learning Systems, Text Analysis and Writing, Information Technology in Curriculum Development, Management of IT Projects). The multimedia courses are mainly based on Macromedia Authorware.

Optional speciality subjects are subjects through which it can be better prepared for studying compulsory courses (for example, the Multimedia course) or deal with certain professional topics in detail (Educational Technology, Distance Education Technology, Didactics of Computer Science, Strategic Management of Information Technology).

Individual speciality subjects can be chosen from among any subjects necessary for one's master's research and are taught in TPU or other universities.

Optional subjects can be chosen from among any subjects taught in TPU or other universities.

The studies for compiling the **master's thesis** consist of designing a software product that advisedly deals with a topic in the secondary school curriculum, testing it pedagogically, and writing the theoretical part concerning the product and design process.

2.4.2 General content of the master programme Management of Information Technology

The general subjects give students the basic knowledge and skills necessary for managers of all levels (*Theories of Organisation* and *Strategic Management*).

Compulsory speciality subjects have to ensure students with basic knowledge and skills necessary for acting as a ICT manager. Compulsory subjects are divided into two groups: 1) Subjects which are directly necessary for the profession (*Strategic Management of Information Technology, Development of Infrastructure of Information Technology, Administration of Information Technology, Administration of Information Systems, Management of IT-Projects*,), 2) Subjects which have applied nature and are more or less related to preparation of master thesis (*Applied Professional Activities, Special Seminaris, Professional Placement*).

Optional speciality subjects are subjects through which students can be better prepared for studying compulsory courses.

Individual speciality subjects can be chosen from among any subjects necessary for one's master's research and are taught in TPU or in other universities.

Optional subjects can be chosen from among any subjects taught in TPU or other universities.

The **master's thesis** consists of analytical study of a research problem that advisedly is devoted to some aspect of the student's profession.

2.5 Opportunities to Individualise the Curriculum and the Role of Independent Work in the Curriculum

In the subject-systematical study the students can learn subjects in a somewhat different order and take up courses of their interest to some extent. As a result the student can acquire unique education, although the core overlaps as to all the graduates. Every student can choose optional courses from the given list up to the given extent of credit points. In addition the students can study any subjects as their free electives.

The amount of individual work in the curriculum of master studies is in average 50%: in Computer Science master curriculum the amount of compulsory courses is about 45%, and in the Management of Information Technology master curriculum 54%. Therefore every student has a good opportunity to compile his/her own individual curriculum. The master's thesis (20 CP) covers 25% of the curriculum. It can be concluded from the above-mentioned that the curriculum enables the student to spend maximum one year – in the first place, the second year – in some foreign university; at the same time the credit points gathered there can be taken into account as the individual or free elective subjects of the curriculum.

An organic part of the studies in Management of Information Technology program is the professional placement which aim is to fix and apply the knowledge acquired during theoretical courses. The professional internship takes place in a private, public, or state enterprise, whereas in the choice of the company the wishes and interests of students are taken into consideration if possible. As the tasks fulfilled during the internship are assigned by a concrete company, then clearly the internship has an individual nature. Department of Informatics developed its own regulations for internships where among other items also duties for all parties involved (receiving institution, supervisors, department of Informatics) are described. A special agreement with every institution receiving internship students will be signed. Every student has two tutors, one from the receiving institution and another from the department.

We find it extremely essential to mould our students' habits of independent studies; To promote that we are also developing an electronic support environment. Independent work plays a specifically big role in the curriculum of Computer Science master studies. The first year is basically dedicated to regular lectures and practical lessons and the second year to individual research and activities related to one's master's thesis (individual courses, seminars, master's thesis).

Independent work has not been regulated in the curriculum, therefore its bulk and form can be different not only in different programmes but also in different subjects of the same programme.

In the study programmes of Computer Science there can be brought out the following main forms of individual work:

- Solving home assignments, preparing for practical assignments and seminars, but also lectures (collecting information, revising lecture notes, etc.);
- More intensive periodical learning of the lecture and practice notes and studying with special literature (preparation for tests, prelims and examinations);
- Constant work with seminar presentations, preparations for master's thesis (working with literature, carrying out research, drawing up one's work);

In the Department of Informatics a lot of attention is paid to the problems of individual work, especially to the three aspects mentioned below:

- Increasing the amount of independent work is possible only if there are enough textbooks and other teaching materials. Therefore the department has been seriously engaged with the publishing and copying of lecture notes for students in recent years; the list of course materials developed by the teachers of the Department is presented in Appendix 13;
- In order to increase the amount of individual work, the independent working habits of students need to be formed. Therefore, students are provided with a profound knowledge about the location and availability of different information sources (in all subjects), so that it is possible to use seminars (in some subjects), where the topics have been prepared for by students themselves;
- There is a need for coordinated cooperation between academic staff to guarantee that individual work will not be piled up in different subjects (e.g. when tests land up on the same week); on the contrary, work should be distributed evenly throughout the term;
- Independent work is supported by a learning management system – mainly by IVA (*Interactive Virtual Academy*). IVA is a joint product developed by the Department of

Informatics and the Centre of Educational Technology of TPU; more detailed information about IVA is presented in Appendix 17.

It is also confirmed by the companies that graduates usually have most needed technical skills but it takes time to get into the spirit of working process. This is why in addition to the development of student's habits to work individually, the curriculum gives much attention to discussions, and, if possible, to work in teams.

2.6 The Compatibility of Curricula and Their Peculiarities in the Background of Estonian and European Educational Systems

There is a speciality in Computer Sciences in three Estonian public universities: Tallinn Technical University (TTU), Tallinn Pedagogical University (TPU) and University of Tartu (UT). In the process of curriculum development there has been continuous cooperation and exchange of information. For example our curriculum in Multimedia and Learning Systems was developed in the framework of an official cooperation TEMPUS project financed by European Training Foundation with the involvement of both other universities, TTU and UT. Curricula in all universities mentioned above are of 3+2 type. The leading principle is that on the bachelor level (first 3 years of study) all universities give broadly the same competencies, but on the masters level (2 years postgraduate programs) the curricula are different, giving for all graduates the possibility to choose the narrower speciality according to their interest and ensuring that there will be specialists for different needs of employers.

Comparison of Master programs (80 credits each)

As it was said previously the master programs in different Estonian universities are relatively different, according to the division of work. Currently, there are the following master programs in IT available in Estonian universities:

TPU: the following master programs

- Informatics (Multimedia and Learning Systems),
- Management of Information Technology,
- Teacher of Computer Science, IT Manager at School.

TTU: following specializations

- Informatics (Information systems and software engineering),
- Informatics (Networks and logic),
- Business Information Technology,
- Open Curriculum in Informatics.

UT: following specializations

- Computer Science (Theoretical computer science)
- Computer Science (Language technology)
- Computer Science (Cryptology)
- Information technology (Software),
- Information technology (Hardware).

The common part of TPU curricula with the master programs from other universities ranges from 0 to 12 credits. Common part is biggest between the curricula Management of Information Technology and Business Information Technology of TTU. The latter prepares managers and developers of information systems and e-commerce applications; this curriculum does not base on Estonian national standard for profession "Chief Information Officer V".

Recently Estonian Business School (EBS) developed an IT Management master program; this two-year master program will be started in 2005. However, the general concept of this program is different from this of TPU: as for TPU, the entry conditions require a bachelor degree in informatics or corresponding qualification, the entry conditions for EBS master program require a management qualification (In IT Management bachelor program of EBS, the ICT-related courses have 42 credits in total).

2.7 In-Service Training

The Department of Informatics has actively dealt with the development of the projects of in-service training and has offered computer-related training to different target groups for years. Active teachers of different subjects have been one of the most important target groups. In collaboration with Tartu University, Tallinn Technical University, Barcelona University and Strathclyde University in the frames of Tempus Jep 07256-94, there was worked out a whole system of computer courses – the so-called system of modules (introductory course, design of teaching materials, multimedia, data processing, etc.). As a result, taking part in the course enables the teacher to acquire computer education of different levels. There are nine courses delivered since 2002:

Course	participants
Design of Web-based teaching aids	17+17+15=49
Basic course of computer graphics	18+17=35
Using multimedia devices in the study process	18+11=29
Presentation equipment and software, design of teaching aids	8
Design of teaching aids (in Russian)	17

The Department of Informatics also plays an important role in the so-called in-the-house training. The department organises a lot of different computer-related courses for the workers of TPU, mediated by the Academic Vice-Rector and Human Resources Department. Some time ago the most popular were basic computer courses, which have given up their place to the courses dealing with Web maintenance and designing of teaching materials, but also with the design and the use of databases.

In addition, the department has offered introductory courses of the statistical analysis software package SPSS to the employees of different companies (Board of Medicine Statistics, Estonian Surveys Ltd, Ministry of Social Affairs, Ministry of Internal Affairs, etc.) for years. Courses connected with data analysis have continually been organised also for the academic staff and postgraduates of TPU.

People who have passed any of the courses are asked to fill in the feedback forms about the courses and teachers. So far the opinions about the content, form and teachers of the courses have in principal been exceptionally positive.

To some extent we can call the Minor Subject provided by the department of Informatics also in-service training. It is offered in the volume of 15 credit points to any Bachelor students in TPU. When the system of minor subjects was launched, the minor of Computer Science consisted only of the

courses rated as major speciality subjects of computer science. In recent years we have more and more complied with the wishes of other departments, which have added Computer Science as a recommended minor into their curriculum; and we have adapted the curriculum of the minor so that it would fully meet the requirements of the students of the corresponding major.

To the students of Mathematics we continuously offer the 30-CP Minor Subject of Computer Science. In principle, this additional subject can be chosen by any student of teacher training programmes, but here arises the problem of compatibility between timetables. Therefore, the interest in the additional subject in Computer Science has been rather small from outside the speciality of Mathematics.

3. STUDENTS AND ORGANISATION OF ACADEMIC WORK

The student body of the University consists of students, master's students and doctoral students. Students of continuing education courses and external students do not belong to the student body. The student status is attested by the decree of matriculation and a student identity card. The student body is an institution, which executes students' right for self-government – to independently decide about and to organise the matters of student life in agreement with legislation and legislative acts, proceeding from the interests, needs, rights and obligations of students. The Student Council of TPU represents the student body.

3.1 Admission to the speciality

The speciality of Computer Science is suitable for an applicant who is interested in contemporary information technology including its technological aspects as well as software development. High motivation and active attitude as well as a habit of independently seeking for solutions while solving problems are expected from the student candidates. At the same time readiness and skills for teamwork and for coordinating cooperative work are appreciated.

Although a previous extensive work experience with computers is an advantage, it is not a defining prerequisite to enter the BA level studies as we take into account the differences there exist in the provision of schools with computers and the status of informatics as an optional subject. However, as the **master program Management of Information Technology** is a major subject based master level course the applicants should have knowledge and experience in IT on the level corresponding to the bachelor in IT. **Master program Informatics (Multimedia and Learning Systems)** is so called "open" master level course, meaning that it is available to all applicants who have a Bachelor's degree or a corresponding academic qualification in any speciality. Nevertheless, it is assumed that the candidate's IT skills meet the requirements of *European Computer Driving Licence*.

In the contract between the Ministry of Education and Science and the University the number of specialists with master's degree required by the state is defined. At the same time it places the University under obligation to create 1.5 times more state commissioned student places for bachelor's programme than for master's programme. Thus, for example, if the state commissioned student places for master's programme in Computer Science were 20, the University would have to create 30 state commissioned student places for respective bachelor's programme. The majority of students successfully passing the BA level studies, can continue their studies towards master's degree in the selected field of study after successfully passing the bachelor's programme. However, the system that the applicants are first admitted only to the bachelor's programme and for the admission to the master level studies everybody has to apply anew, gives equal possibilities for graduates from earlier years to apply for master programs.

Admission to TPU takes place according to the admission regulations adopted by the Council of TPU. The Ministry of Education and Research defines the number of state commissioned student places by fields of study. Studying in state commissioned student places is free of charge for students because the Ministry covers the cost of their studies until the end of the nominal period of study. The Rector approves division of the state commissioned student places between the fields of study

according to the proposals from the deans of the faculties. The University Government approves the number and cost of the non-state-commissioned student places according to the proposals from respective departments. The Admission Committee of the University is responsible for admission of students. Each department forms an entrance examination board for the speciality entrance exam.

Both state commissioned and non-state-commissioned student places are filled pursuant to the shortlist of applicants. Separate shortlists are made for state commissioned and non-state-commissioned student places.

For admission to both master programs, presented for the accreditation, an entrance examination has to be taken (professional suitability exam), which is graded in 20-point system (the scales of positive grades range from 6 to 20 points). The professional suitability exam consists of two parts: an oral and a written part. The written part is an essay which has to elaborate the motivation of an applicant to enter the master level studies in particular area, the related previous experience and the ideas for master thesis. In the oral part the themes of an essay are further discussed. In addition general bias towards the speciality, knowledge of foreign languages and skills of solving related real life situations of the applicant are assessed.

The language of tuition is Estonian. Graduates from the Russian-language schools and foreigners are expected to have a sufficient knowledge of Estonian for coping in the Estonian-language academic environment. Foreign language speakers take an Estonian language test in the course of the professional suitability exam. Pursuant to the shortlists those applicants are admitted who are able to understand lectures in Estonian. The Department of Informatics plans to open the program Informatics (Multimedia and Learning Systems) for English-speaking students during few years.

Table 2. Applicants and admission to master level student places (2001-2003)

Year	Speciality	State commissioned places			Non-state commissio-ned places
		Number of applicants	Students admitted	Competi-tion	Students admitted
2001	Informatics (Multimedia and Learning Systems)	37	8	4,6	16
2002	Informatics (Multimedia and Learning Systems)	34	8	4,3	6
2003	Informatics (Multimedia and Learning Systems)	25	8	3,1	3
2001	Management of Information Technology	-	-	-	16
2002	Management of Information Technology	-	-	-	17
2003	Teacher of Computer Science and IT Manager at School*	15	8	1,9	3

Although there has been less state commissioned student places than we consider useful, our master level programs *Informatics (Multimedia and Learning Systems)* and *Teacher of Computer Science and IT Manager at School* have got relatively high number of state commissioned student places in the context where the overall number of state commissioned places has decreased and where it is very hard to get funding for newly opened curricula. This gives an evidence from the state policy favouring the filed of IT on the one hand, but the high quality of our curricula on the other hand. The latter is asserted also by the competition for the student places in IT related

specialities, which has been considerably higher in TPU than in other Estonian Universities. The program *Management of Information Technology* has got no state commissioned places as there is a requirement for accreditation to be able to apply for state funding.

In Table 3 we give an overview of student distribution by funding and sex. Student groups attending the lectures and seminars are usually bigger than given in the table, as there is a certain overlap between our three master level curricula. The last column in Table 3 gives two important performance indicators: the number of students dropped out before completing their compulsory and optional courses and the number of students who have successfully defended their master theses. Only the students who have started their studies on 2001 have finished their nominal time for the program (2 years).

Table 3. Composition of student groups of master level IT related programs.

Year	Speciality	Number of state commissioned students		Number of non-state-commissioned students		Number of students admitted	Comments on performance
		Women	Men	Women	Men		
2001	Informatics (Multimedia and Learning Systems)	2	6	7	9	24	11 defended 3 dropped out
2002	Informatics (Multimedia and Learning Systems)	4	4	4	2	14	
2003	Informatics (Multimedia and Learning Systems)	4	4	2	1	11	
2001	Management of Information Technology	-	-	9	7	17	7 defended
2002	Management of Information Technology	-	-	3	14	17	
2003	Teacher of Computer Science and IT Manager at School*	6	2	2	1	11	

3.2 Academic calendar

The academic calendar of TPU defines the beginning and the end of academic year and terms. The academic year traditionally commences on 1 September or the working day closest to it. Organisation of academic work is based on the detailed academic calendar. The academic year lasts for 40 academic weeks and is divided into two terms. The length of a term is 16 academic weeks. A term is preceded by a preliminary week, during which the students are allowed to take the examinations and assessments they did not take or pass during the last term. Each term is followed by a three-week examination session. Classroom work does not take place during the Christmas and summer holidays.

It is compulsory for all academic units, students and administrative staff of the University to follow the academic calendar. Information about the annual academic calendar is available for students at the beginning of each academic year. The calendar is published in the TPU Guide for Students, student leaflets and on the notice boards of specialities. It is also available on the Universities' webpage: http://www.tpu.ee/ylikoolist.html or more precisely

http://www.tpu.ee/editmode/ylikoolist/alusdokumendid/valitsus/2003/akad_kalender.html

3.3 Organisation of tuition

The proportion of classroom and individual work is regulated by the TPU Regulation for the Organisation of Tuition, which prescribes that classroom work should normally not overcome 40 percent of the curriculum on BA level and 20 percent of the curriculum on master level, whereby 1 CP (credit point) equals to 40 academic hours independent of the form of the work (lectures, seminars, training visits, practical placement, independent work, etc.). One Estonian academic credit point equals to 1.5 ECTS credits. During an academic year a full time student has to collect at least 30 credit points. A student will be dismissed for poor academic progress when he has collected less than 20 credit points per academic year. Students who collect 20 to 29,5 credits per academic year will be considered as part time students.

Academic work is carried out according to the timetable in pairs of classes (90 minutes), which are followed by a 30 minutes break. While BA level courses are held at working hours, many master level courses, including our three programs, take place mostly in the evenings and in the weekends because of two reasons: 1) to meet the needs of our master level students who are usually employed, and 2) for better allocation of resources (e.g. lecture halls, staff, etc.).

Timetables are compiled by the academic departments responsible for the specialities according to the rules prescribed by the Department of Curriculum and Instruction. Cooperation with other departments of the University is necessary while compiling the timetable, as part of the subjects in the curriculum will be ordered from other departments. In the Department of Informatics compiling the timetable is the responsibility of the assistant to the head of the department who consults the head of the department when a need arises. The assistant to the head of the department is also responsible for preparing employment agreements with supernumerary members of academic staff.

As students have many rights at compiling their study plan, it is necessary to register for the subjects they have selected within the first two weeks of the term. The subjects registered for make up the student's study plan for the current term. The status of the student depends on the volume of the study plan and fulfilling it. Based on registration the assistants of the departments fix the lists of listeners to the courses and issue forms for examiner's reports.

At the beginning of each course the member of academic staff hands out to the students a detailed syllabus of the subject listing all the topics discussed, the proportion and the dates of lectures, seminars and practical lessons, the volume and content of individual work, a list of recommended literature and requirements for passing the course. All the subject syllabi have also to be presented to the Department of Curriculum and Instruction before the beginning of the term. The assistant to the head of the department coordinates the process. In addition to the detailed subject syllabus subject cards are compiled, which give a brief description of the subject and are published in the study guide and in the web (http://www.tpu.ee/oppeinfo/) where they are accessible to everybody interested. It allows the students of TPU as well as of other universities but also those who are interested in continuing studies to get an overview of all the subjects offered by the University and to listen to extra courses as electives or through the Open University in addition to their curriculum.

In order to mediate the information related to tuition more efficiently the following has been done:

- each student group has its own mailing list allowing communication with group mates and the members of teaching staff;
- the staff members have their own mailing lists;
- the department has its homepage: http://www.tpu.ee/informaatika_osakond.html where students can obtain various information about the regulations and other aspects of their studies;
- the timetable and notices are displayed on the notice board as well as on the homepage.

3.4 Reforming the process of tuition and methods of teaching

The speciality of Computer Science is new in Estonia and therefore it has been necessary to reform the syllabi and teaching process all the time. The main methods of teaching of the subject are: lecture, practical lesson, seminar, individual training tasks, review, work with recommended literature and other forms of classroom and individual work. Practical placement and compiling a bachelor or master's thesis also belong to that list.

The main direction in reforming the teaching process is to dedicate more time to students' individual work, supporting the development of efficient methods of individual learning. On the other hand the focus lies in an attempt to pay more attention to the questions of methodology and education technology (active learning, project method, web-based training, etc.). The role of individual learning increases in the senior stages and is especially important at the level of master's studies (see section 2.5).

Developing presentation skills and ability of using presentation technology is very important. Therefore elective seminars where students compile reports on a given topic play an important role in the academic work. In order to train presentation skills also open defence of proseminar, bachelor and master's theses take place, where each student has to give a brief overview of his/her work and answer the questions asked by the audience.

Project method has also been applied where students have been divided into groups in order to solve more extensive tasks. In spite of the fact that the necessity of this method from the aspect of the future work of the students has been recognised, there occur problems in using it – how to guarantee equal contribution from all the members of the team, how to assess the result, whether to give the whole team one grade only or to try to grade the contribution of each member separately, etc.

We consider important to improve integration between various subjects, which should guarantee a systematic nature of the education provided. Although the curriculum has been compiled following the principle of a holistic system of education, there is still much to be done, because there are some visiting lecturers used, which makes it sometimes difficult to organise cooperation of the members of academic staff in compiling syllabi and carrying out tuition.

In conclusion it can be said that the didactic structure of the curriculum allows fulfilment of the curriculum within the limits of the established period without difficulty. There are no serious problems at the moment. The issue of the lack of contemporary technology, which constituted a grave problem at applying certain methods of study some time ago, has been successfully resolved (for example, every computer lab has its own video projector and an overhead projector). The main factor that inhibits the students from being successful stands outside the department: the need for extra income and the accompanying decrease in the time spent on academic studies.

There is a change in the use of electronic learning environments at the moment. Until 2001 the main platform was WebCT, but due to the rapid increase in the licence cost the University did not prolong the contract. From 2001 to Summer 2003 every faculty member used the most convenient freeware (mainly Learnloop and Yahoogroups) or did put his/her materials to the personal WebPages. At the same time the original learning environment VIKO (VIrtuaalne KOol - Virtual School) for Estonian schools has been developed and tested.

In January 2002 the University started the project called *e-ülikool* (e-university), which is lead by Prof. Peeter Normak. One of the main goals of the e-university project was to develop an electronic learning management system (*ELMS*) which would be based on new pedagogical concepts. This *ELMS* (called *IVA*) has been developed jointly by Department of Informatics and the Centre of Educational Technology.

IVA is a Web-based learning management system, which is developed in Tallinn Pedagogical University in order to advocate constructivist approaches and practices in e-learning. The name"IVA" is a metaphor in Estonian language and means "a seed" (also "point" or "meaning"). Learning

management system IVA is a modification of another open-source Zope product called FLE3. Just like FLE3, IVA is released under GPL as free software. Anyone could download the latest version of IVA source code from CVS at Savannah and install it on one's own server (Zope should be installed first, see installation guide). Further information about IVA can be obtained from web page: http://www.htk.tpu.ee/iva/index.php

Since spring term 2003 IVA has been tested and used by the lecturers of the Department of Informatics to support their courses. There has been two master theses defended, one of the aims of which has been to develop particular courses in the IVA environment. At the moment the Estonian e-university consortium is testing *IVA* with the intention to suggest this as an official e-learning platform for Estonian universities (http://www.e-uni.ee/main.php).

3.5 Assessment of academic progress and grading scale

Examinations and assessments are determined in the curriculum and their aim is to fix the level of knowledge and skills achieved by students in acquiring the subjects included in the curriculum. The prerequisite for being allowed to take an exam may be fulfilment of all required tasks during the term or defending a report of an individual task. The questions selected to the examination programme are first and foremost those, reflecting the aims of teaching the subject. A non-graded assessment can be considered passed as a result of student's successful current work during the term.

An examination or an assessment is taken during the examination session following the term the subject was taught, whereas the right to take the same examination is retained during one calendar year since the last day of the examination session following the term when the subject was taught, but not longer than to the beginning of a new academic cycle of the subject. Depending on the subjects, examinations can be oral, written or practical (e.g. executing programming tasks, etc.). Due to the nature of the curriculum the last two are in the majority.

In order to grade examination results a 6-point scale is used.

A (5) – Excellent	(91-100 %)	
B (4) – Very good	(81-90%)	
C (3) – Good	(71-80%)	
D (2) – Satisfactory	(61-70%)	
E (1) – Poor	(51- 60%)	- allowed to retake the exam to improve the grade
F (0) – Fail	(0-50%)	- allowed to retake the exam up to two times

In special cases the non-differentiated assessment of subjects or parts of subjects is carried out in the form of preliminary exams, where the positive result is expressed as 'Pass' and the negative result as 'Fail'.

The conclusions of the academic year and ranking lists are drawn once a year – by the commencement of the academic work of the following academic year. The mean of the grades received for the exams taken during the academic year is considered so that in addition to the grades also the volume of respective subject in credit points is taken into account.

In the defence boards of bachelor and master's theses also external members outside TPU are invited, whereby the policy is not to change more than half of the board members on the consecutive defence events, as to retain the conformity of the assessment. In the interest of integrity of Estonian higher education and quality assurance, we consider the practice of using external examiners right and necessary.

3.6 Academic mobility

Estonian Ministry of Education and Research implements the policy according to which the BA level programs have to be comprehensive and in accordance with similar programs of other Estonian universities. This is to allow extensive student mobility, especially after the bachelor level is completed. At the same time to ensure the preparation of possibly wide range of high level specialist, needed for versatile development of Estonia, master level courses in Estonian universities are not allowed to be considerably overlapping.

Therefore the students who have enrolled in master level program at a certain university are usually not changing their home university until the end of program. Concerning the possibilities for every single student to take courses at other universities, the compulsory part of our curricula takes only up to 50%, meaning that the students have good opportunities to take courses at other universities either in Estonia or abroad.

The options of mobility of students have been defined in the agreements between the universities and they depend on the preliminary studies of the students. At arrival of a student from another university the student counsellor compares the syllabi with these of the curriculum of Computer Science and fixes the subjects that can be transferred. The transfer will be made according to the decision of the member of academic staff responsible for the subject (who can demand acquisition of additional material when the volume or content of respective subject does not coincide).

According to the agreements between the universities students can listen to certain courses at other universities (as visiting students). A visiting student is a student matriculated by another university, who according to respective agreements has gained a right to study one or several subjects at the given university whereby home university will transfer the results of the study.

The option of studying as a visiting student at Tartu University, Tallinn Technical University, Tallinn Pedagogical University, Estonian Academy of Arts, Estonian Agricultural University and Estonian Academy of Music was established by the minutes of the meeting of the rectors of public universities on 17 September 1995 "Studying as a visiting student". Admission of visiting students and sending students to other universities as visiting students is determined by agreements between universities.

A visiting student has

- the right to participate in tuition on equal grounds with the students of receiving University;
- the right to use the library of the University;
- the right to reside in the hostel of the University on availability of vacancies;
- the obligation to abide by the regulations of tuition and house rules of receiving University.

The University has

- the right to prefer its own students to visiting students if number of course participants is limited;
- the right to terminate the studies of the visiting student if the visiting student has not abided by the regulations of tuition of the University and its house rules;
- the obligation to create for the visiting student conditions for the study of subjects indicated in his/her application.

Currently the students of Computer Science have been given a chance to apply various grants for studying at universities abroad, e.g. SOCRATES in the framework of subprogram of higher education ERASMUS. The aim of the grants received is to develop cooperation in the sphere of

higher education in Europe in order to increase professional qualification of people of participating countries. A period of studies abroad of the student is treated as an equal part of the curriculum at home university.

3.7 Counselling

Student applicants have access to information about the choice of speciality and admission requirements in the Office of Student Counsellor of TPU and in the Admission Board as well as in the department responsible for respective speciality. In addition faculties organise the so-called 'days of open doors' when the university as a whole as well as each faculty and speciality is introduced. The department has published an information leaflet on each speciality, which includes the curriculum and requirements of admission. The leaflets are handed out to the applicants during the 'days of open doors' and the education fair "Teeviit", which provides school leavers and other interested people with information about options of further education in Estonia. Regional events to introduce the specialities taught at the University are also organised. The University yearly publishes the "Guide for Applicants" where all specialities and admission requirements are introduced. All that information is also available on the Internet homepage of TPU.

In order to counsel students there is an Office of Student Counsellor where students can receive assistance related to tuition but also psychological counselling. In the Department of Informatics there is a counsellor assisting students with questions about curriculum and tuition. In addition to the counsellor students can also turn to the assistant to the head of the department.

Mainly in order to assist the first year students student tutors have been appointed among the senior students. Student tutors participate in a one-term special training and are able to communicate with freshmen and help them to cope in the new environment. Very often freshmen find it most difficult to come and consult the staff of the department whereas it is much easier to communicate with another student.

Students can draw up an individual study plan if they choose to. There are optional and elective subjects determined by the curriculum, which can be elected among the subjects offered by the University and by the Department of Informatics. If a student has specific interests he/she can choose among the subjects offered by other Estonian universities or by universities abroad. Before participating in tuition of subjects at other universities the students have to consult the student counsellor and/or curriculum manager about the compatibility of the subjects with the curriculum and the counsellor has to monitor that the interests of the student would not be too one-sided. The individual study plan has also to be coordinated with the student counsellor or curriculum manager and the head of the department who will check whether the subjects chosen by the student are in agreement with the curriculum.

The Department of Informatics monitors academic progress of its students and signals when they develop problems with fulfilling the curriculum.

No direct vocational counselling is offered to the students. However, an agreement between the University and one of the largest personnel firms CV-Online, which also offers its services over the Internet, is being drafted at the moment to provide students with more extensive options of finding suitable employment. As the need for qualified specialists on informatics and information technology is still great in Estonia the problem actually works the other way round – students find a well-paid job before graduation and therefore completing the studies within the limits of nominal period of studies sometimes proves difficult. Master level students are usually already employed when they enter the program.

The study guide and news bulletin of TPU have their share in counselling student applicants and students, but also the newspaper "Üliõpilasleht". There is also a special guide for postgraduate students.

3.8 Admission planned for the coming years

The following factors have been considered while planning the volume of admission:

- development strategy of the country;
- the needs for IT specialists in the world of work;
- the development plan of the department.

In connection with rapid expansion of computer training and quick spread of Internet applications it is vital to train specialists who would be able to plan and carry out respective software engineering. The specialities under evaluation also mesh with the development strategies of the country, as in connection with realisation of the model of information society respective competence has to increase on all levels of the society. There is a high demand for IT managers and support persons in educational, public and local government institutions as well as in other institutions and organisations. One should mention here that in the document "Knowledge-based Estonia: Estonian Research and Development Strategy 2002-2006" approved by the Estonian Parliament, information technology has been declared as one of three key areas for Estonia to develop in coming years.

According to a study performed by Estonian Information Technology Society, there is a constant demand for IT specialists. The assessed average annual need for IT specialists in Estonia is about 500. In planning yearly intake to the master curricula the Department of Informatics bases on the following considerations:

For the master program Informatics (Multimedia and Learning Systems).

Development of original educational software for small nations is often extremely difficult, as the software companies are not interested in it due mainly to the small market. In coming years, similar problems will be more and more evident for bigger nations as well. The reason lays on an evolutional nature of educational systems, on the constant change of the learning content and constant pressure from life-long learners to increase the flexibility and individualization of the instruction. Therefore development of learning materials and other aids should in a great extent take place in an educational institution, conducted by the teachers who are competent not only in their subject matter but also in educational technology. There are already several successful examples. For instance, overwhelming majority of learning/teaching materials in Estonian educational portals *Koolielu* (http://www.koolielu.ee) and Miksike (http://www.miksike.ee) is developed by teachers. According to the statistics of the Ministry of Education and Research there are 431 teachers of informatics in Estonian schools of general education, only 180 (42%) of whom have special higher education. In addition to that 70 (16%) teachers have special higher education without teacher's qualification. The average proportion of teachers with special pedagogical higher education in the schools of general education is 57%. Thus computer science with its 42% is one of the lowest.

For the master program Management of Information Technology.

An average ICT working group (subsection, project team, etc.) in Estonia consists of 5-7 members. This means that a yearly need for ICT managers is about 70-100. In reality only about 50% of them possess a relevant formal qualification. At the moment there are only two institutions who educate congruous specialists: Estonian Business School on bachelor level (expanding to the master's level in 2005) and Tallinn Pedagogical University on master's level.

Proceeding from the above, the planned admission to the master's curricula for the following years is altogether about 30 students a year. This will somewhat depend on the number of state commissioned places. It is expected, for example, that this number for the master program Informatics (Multimedia and Learning Systems) will increase from 8 in 2003 to 15 in 2006.

4. RESOURCE ANALYSIS

4.1 Personnel

4.1.1 Teaching staff

The teaching staff of the Department of Informatics is one of the youngest in the University with the average age of the teachers under forty. A number of our young teachers have, however, remarkable teaching experience and they are renowned and highly appreciated lecturers. Still, they are continuing studies at degree level. For example, Mart Laanpere is finishing his Doctoral dissertation; our graduate and lecturer Hans Põldoja has just started his doctoral studies. Beside the young teachers there are well known and acknowledged specialists in their field Prof. Peeter Normak, Prof Aleksander Pulver, Prof. Peeter Lorents and experienced practical specialists Paul Leis and Priit Parmakson lecturing on various courses of our master curricula (Appendixes 9 and 10).

The curricula presented for accreditation are fully covered with teachers. The nature of the curricula demands that certain number of courses is taught by teachers from outside the Department of Informatics. On the one hand the practitioners' experience is valued and therefore several excellent specialists who have proved to be a good lecturers, have been invited to deliver some courses. On the other hand there is a policy in TPU that every department masters only the subjects of its area of speciality and orders other courses from other departments of the University.

According to the Higher Education Standard 75% of the master level subjects have to be taught by teaching staff with the Doctor's (or another equivalent) degree. In the both of our Master's curricula out of 74 credit points at least 58 credit points (78%) are supervised by Doctors or Candidates (see Appendix 9). The supervisors of Master's thesis are as a rule teachers or research scientists with a Doctor's or Candidate's degree who are also supervisors of master seminars or individual subjects. However, as in the Estonian context sometimes the best specialists in the areas related to our curricula do not have a doctoral degree, we have launched the policy that our master students may have two supervisors from which at least one has to have PhD. For our first master students it has been the head of master curricula prof. Peeter Normak, as to assure the even and sufficiently high standard for the theses (see Appendix 12).

The Department of Informatics has at present nine permanent teaching staff; in addition to them there are some lecturers with per hour contracts teach curriculum subjects in the field of Computer Science and other related subjects are taught by teachers from other departments of the University. Shortage of faculty members with the Doctor's degree has been a problem for the Department (this is a common problem to all computer science related departments in Estonian universities). This has various reasons. As on the one hand Computer Science in Estonia is a fairly new field, there are relatively few experienced scientists and teachers with a required degree. The issue is made more difficult because of the low pay level in academic educational institutions, which is not competitive with the salaries offered to the high IT qualification staff in the companies. The few available highly capable teachers are often lured over from universities to companies.

The low salary level and minimum state support to those studying for the Doctor's degree has caused several very capable and promising young teachers give up their studies and leave the

University and it is very difficult to find new ones. Another problem here is a peculiarity of the transition period in the Estonian higher education system according to which one had to pass two-year Master's studies after the five-year university course in order to undertake the four-year Doctor's studies. Thus, in order to obtain the Doctor's degree, one had to pass eleven years of nominal study period and defend three theses. In reality this time is even longer, because people are forced to have full time jobs to earn money for survival.

However, lately there has been a considerable progress – two key staff members have accomplished their doctoral studies; some master level graduates have been employed in the Department and they continue their studies on PhD level; in addition the best students from master programs are expected to continue their studies on PhD level and give an alleviation to the situation in the near future (new 3+2+4 system allows faster accomplishment of doctoral degree and therefore the faster increase in the number of staff with required educational level). In addition, two researchers who have Doctor's degree and needed teaching experience are involved in teaching as well. A third new teacher with PhD degree Tom Toomsalu returned from Canada recently and starts supervising students' Master's theses already this term and will start to deliver some courses in spring term 2005.

It can be concluded, that all the main subject areas are covered by highly professional full time teaching staff either employed in the Department of Informatics or in some other department of the University. The quality of teaching has constantly improved thanks to essentially broader international cooperation and involving experienced specialist from outside the university.

Table 4. Age structure of the academic staff related to the curricula.

Occupation	...-30	31-40	41-50	51-60	61-65	65-...	Total
Professor			4	6	2		12
Ass. Prof.		1	1	1	1		4
Researcher		1		2			3
Lecturer	5	5	3	3			16
Total	5	7	8	12	3		35

Table 5. Working record of the academic staff related to the curricula.

Years:	1 - 5	6-10	11-15	16-20	21-25	26-30	31-...	Total
Count	5	8	4	5	4	6	3	35

4.1.2 Assistant staff

At present there are six assistant staff in the Department of Informatics: assistant to the head of the department, secretary, IT specialist and three computer-lab assistants. The systems administrator and one computer-lab assistant are doing the job for additional pay, working at the same time in the University computer centre. The Department has taken considerable efforts to normalise the situation where two years ago, due to the enforcement of the new act on work and leisure time, there was only two full-time assistant staff employed. At the moment the number of assistant staff satisfies the needs of the department.

4.2 Scientific research and cooperation with other organisations

The Department of Informatics sees its potential first and foremost in researching the possibilities of efficient application of information technology in education as no other Estonian university is filling this niche and the area has become a national and international priority.

The main research areas of the staff of Department of Informatics are the following:

- Web based learning environments and their applications in higher education,
- Research methodology, especially the combined use of quantitative and qualitative research methods,
- Curriculum development in informatics,
- Applying multimedia in the teaching process,
- S-act theory.

In major research and development projects, master and PhD students are involved. In the following subsections we will describe the most significant research and development projects currently running; Appendix 11 lists projects (including those with international participation) completed during last five years.

Because of the nature of our master curricula there is a number of staff outside the Department of Informatics involved in teaching. We can not give an thorough overview of their research here, but it can be confirmed that most of the teachers listed in Appendix 9 are outstanding researchers acknowledged in Estonia and also abroad. Appendix 13 brings the list of publications of teachers related to the curricula, which should give an overview of the wide scope of research interests of our teachers.

4.2.1 Pedagogical foundations and implementation models for constructivist web-based environments in Estonian higher education context

Targeted research grant Nr. 0132492s03 of Estonian Ministry of Education and Science, Duration: 2003-2005,

Finances: 348 000 EEK (in 2003).

Reasearch team: Peeter Normak (principal investigator), Kaido Kikkas, Jaagup Kippar, Mart Laanpere, Hans Põldoja, Reelyka Rannala, Olev Räisa, Sirje Virkus.

Summary of the project:

Despite the strong public and administrative support to e-learning, the use of Web-based Learning Management Systems (LMS) has been quite marginal in Estonian higher education institutions. Reasons for this can be related with high cost, poor learnability, no localized versions and narrow didactical arsenal of existing LMS. The main goal of this research project is specification of pedagogical, design and implementation models for a new LMS, which is 1) designed according to the users needs, 2) compatible with emerging semantic web and instructional technology standards, 3) supporting various learning/teaching scenarios and methods, and 4) accessible by various input-output devices (mobile phone, PDA, screen reader). Based on the results of this study, the prototype of a new LMS will be developed and piloted in Estonian as well in six 6 European universities accompanied with a comparative study of learning cultures.

Main results for 2003:

Survey about the e-learning/e-teaching readiness and support/training needs was conducted among the six partner institutions of Estonian e-university consortium (University of Tartu, Tallinn Pedagogical University, Tallinn Technical University, Estonian Agricultural University, Estonian Business School, Information Technology College). A comparative survey was carried out among university staff in University of Turku (Finland), University of Aberdeen (UK), Kaunas Technical University (Lithuania), Mälardalen University (Sweden), University of Aberta (Portugal), Copenhagen Adult Education Centre (Denmark) and CEEnet association (Association of Central and Eastern European Academic Network Organisations). A comparative study in information literacy and learning in the members of European Association of Distance Teaching Universities has been carried out. A conceptual model of Web-based learning environment was developed, based on the social-constructivist learning theory. The model was used for creating a prototype of an innovative Learning Management System with code name IVA. The prototype of IVA system was then pilot-tested locally in TPU and also on international level (summer schools of European Doctorate in Interactive Learning in Riga, Linz and Kranska Gora). After the successful pilot test, an agreement was reached with the steering group of European Doctoral School in Teaching and Teacher Education (EUDORA) for implementing IVA system as the main e-learning platform for EUDORA courses in 2004 and 2005. This allows us to collect valuable empirical data for comparative studies on effectiveness of our conceptual model.

As another line of study, research was conducted on the possibilities of increasing interoperability between different Learning Management Systems via designing an IMS-specifications compatible export-import interface for learning objects. A new methodology for combining qualitative and quantitative research methods in educational science was developed.

Members of the research group had presentations on ten international conferences in 2003. They supervised six master theses, which were successfully defended in 2003. A doctoral dissertation was accomplished by a team member (M.Laanpere), another two members have been enrolled in PhD programmes (R.Rannala and H.Põldoja, in Tallinn Pedagogical University and in Helsinki University of Art and Design) with topics related to the research. Six articles have been published by research group members in international peer-reviewed journals, another two have been accepted for publication and another two are in the state of being submitted shortly.

4.2.2 Compactness properties of act-type algebras

Grant Nr. 5073 of Estonian Science Foundation

Duration: 2002-2004,

Finances: 40 000 EEK (in 2003),

Research team: Peeter Normak, Ellen Redi, Kerli Koppel, Tiina Sard (until June 2003).

The long-term objective of the project is to develop the theory of equationally compact and congruence compact acts (algebraic automata) and to generalize it to arbitrary act-type algebras. Special attention will be paid to the following problems: 1) Determination of the structure and properties of congruence compact acts; 2) Clarification of structure and properties of equationally compact acts; 3) Clarification of relations between congruence compact and equationally compact acts; 4) Study of properties of congruence compact act-type structures; 5) Study of properties of equationally compact act-type structures.

Main results for 2003:

The properties of CC-congruences have been studied, as well as wreath products of two-based algebras. One article in a peer-reviewed journal and two papers in conference materials were published; two manuscripts are in the state of being submitted shortly.

4.2.3 Other projects and cooperation

Our people have also participated in research projects led by other departments or organisations. For example, Katrin Niglas has been or is participating in the following projects as the data analysis expert:

- The EU accession and public opinion in Estonia (co-ordinator TPU Institute for Iinternational and Social Studies IISS);
- Political trust to state institutions in Estonia (co-ordinator TPU IISS);
- EL PHARE program on teaching Estonian language: study to clarify the teachers need for advanced training (co-ordinator Pro Konsultatsioonid);
- Health and Equity in Estonia (co-ordinator Estonian Centre for Health Education and Promotion).

The active participation of our teachers in other research and development organizations was already mentioned in Section 1.4. It is also important to mention the participation in local and international conferences and seminars with a number of presentations (Appendix 13.3). More active participation in conferences is hindered by scarce financial resources. Still, considering that the Department has fairly broad international contacts and that the teachers have had sufficient possibilities of sabbaticals in other countries for research purposes (owing to the above mentioned joint projects and various scholarships) it should be remarked that the situation is satisfactory and more active participation in conferences in the future could be expected.

In a Memorandum of cooperation between Tallinn Pedagogical University and Tampere University, signed in September 2003, computer and information sciences – especially ICT in education – is agreed as one out of three main cooperation areas. The cooperation consists of exchange of information, academic staff mobility, student's mobility, joint study programs, especially e-learning programs and joint research projects. As an example, in the framework of this agreement, Professor Pertti Järvinen gave a course in research methods at TPU as well he was an opponent of PhD disseration of K.Niglas.

Within the framework of Socrates/Erasmus staff exchange program, three invited foreign lecturers have been giving lectures and workshops to graduate students of Multimedia and Learning Systems:

- Risto Alkonen from University of Joensuu (Finland) gave twice lectures and workshops on digital audio and video processing (September 2002 and May 2003).
- Wil Meeus from K. De Groot Hogescool (Antwerp, Belgium) gave lectures and workshops in Ocotober 2002 on the use of digital portfolio in higher education, resulting with joint scientific article on the similar topic (Meeus, van Looy, Laanpere Portfolio in teacher education).
- Dr. Wolfram Laaser from Fernuniversität Hagen (Germany) gave a two-day workshop on designing educational multimedia in November 2003.
- Prof Jaan Teng from Canada gave a course "21 Century Concepts in Information and Meaning" on the spring term 2003.

Series of one-day international workshops have been carried out during 2002 in cooperation between TPU and Helsinki University of Art and Design (HUAD), as parts of the process of developing our in-house learning management system IVA. IVA is based on an open-source product FLE3, developed in HUAD. As a result of this cooperation, one of the graduates of TPU Masters programme on multimedia and learning systems (Hans Põldoja) has been enrolled to doctoral programme at Media Lab in HUAD and Sirje Virkus to Doctoral program at Manchester Metropolitan University.

Since October 2003, TPU has launched new cooperation initaitives with HUAD and Univeristy of Joensuu, within the framework of Socrates/Minerva project "UNIVe - Creating network-based e-university model for the small countries in the context of e-learning in Europe".

TPU is a partner of a consortium of 15 European universities called EUDORA, dedicated to design and delivery of European Doctorate in Teaching and Teacher Education. Together with Sheffield Hallam University (UK) and Pädagogische Akademie das Bundes im Linz (Austria), TPU is responsible for organizing a summer school on e-learning in higher education for doctoral students (in Tallinn, July 2004).

TPU has had long and fruitful cooperation with University of Twente (the Netherlands). Currently four graduate students from TPU are studying in UT (educational technology MSc programme) with financial support from Dutch governmental MATRA foundation. UT and TPU have started planning a new joint international MSc programme on educational multimedia, application to European structural funds will be submitted by fall 2004.

4.3 Material resources

4.3.1 Rooms

The Department of Informatics belongs to the Faculty of Mathematics and Natural Science and is situated in Tallinn, Narva mnt. 25. The Department has at its disposal 4 computer labs (81 workplaces), one specialised computer lab for multimedia and 3 rooms for the teaching staff and assistant staff (13 workplaces). For lectures 40-, 56- and 80-seat lecture halls can be used (bigger ones also for general groups).

The need for computer class workplaces is satisfied at the moment. For years there were problems with insufficient ventilation and poor lighting as the building is quite old. Now these problems have been solved thanks to the extensive repairs, which took place last summer.

Due to the repairs there were some rearrangements in room allocation also. This enabled us to set up a new room for teaching staff, which was badly needed to allow normal conduct of work. At the present moment all full time staff members have their personal workplace equipped with a computer and network connection. There are also several common workplaces for part time and visiting teachers. However, in the future, as the department grows, we will need additional rooms because our present rooms do not allow accommodate new workplaces for perspective members of staff. It has been declared that in the end of 2005 the new building for the University will get ready and then it will be possible to get some new rooms for the Department also.

4.3.2 Hardware and software

Most of the teaching takes place in the four computer classrooms of the Department using computers corresponding to all modern requirements (see Appendix 15). Three out of these classrooms have 21 computers and one has 17 computers. Outside teaching time students can use one of our computer labs, multimedia lab and the new (built in 2000) 50 seat open access computer lab on the attic floor.

The computers are connected both to the local LAN as well as to the Internet. The Department has five servers: a file server, a web server, two database servers and a server for study purposes. The first four are quite modern and satisfy the needs of the Department well. All the server computers have the RedHat Linux operating system.

The IT infrastructure (incl. the software) has mainly been created with the TEMPUS JEP 12418 and more recently EITSA (Estonian Information Technology Foundation) resources (see for details Subsection 4.3.4). Usually EITSA projects call for at least 30% of funding from the department budget, which we have been able to provide. To keep up with the technological developments, in an ideal case in each classroom the computers should be renewed every third year. This objective has been included in the development plan of the Department.

In recent years the University has prioritised legalising the software. The software used in the Department of Informatics is practically legalised by today. Still, it has to be mentioned that we cannot yet afford to obtain more expensive multimedia software in full capacity. Fortunately there is a growing number of freeware available in all areas of multimedia which reduces the need for expensive commercial software. Still, we are making some efforts towards obtaining the necessary licensed software to meet the standards of educational software industry.

Another important trend has been to develop technical teaching aids: during the past few years the classrooms of the Department have been supplied with video projectors. The teachers and students consider that this has increased the teaching efficiency by at least 30%. For teaching purposes the Department is also using a digital camera, a video camera, a video recorder, a TV set, a slide scanner and two synthesisers. Lately we obtained a Mobile ICT-set (LCD-projector, special screen and a notebook computer) for lectures which are not held in the computer lab.

The staff workplaces have been supplied with modern computers mainly with high quality LCD-monitors. The Department also has a sufficient number of printers. Few years ago we bought a good modern photocopier which fully satisfies the needs of the staff for copying teaching materials and other documents.

4.3.3 Textbooks and study aids

The need for textbooks has so far been fully satisfied, mainly in the following way:

- lecture notes compiled by the teachers (see Appendix 13.4 & 13.5),
- means of the University library (incl. full text databases of journals) ,
- project resources (primarily TEMPUS JEPs),
- self-earned means of the Department,
- donations of cooperation partners from other countries,
- Internet.

According to the reform of research and development activities in Estonia the system of institutes of Academy of Sciences has been dismissed and research institutes merged to the public universities. The former library of Academy of Sciences being the best research library in Estonia with its 2,4 Million publications has been given to the Pedagogical University. As the priority areas for the Library have always been exact and natural sciences, and as Katrin Niglas belongs to the council deciding ordering the books and journals for the Library, all courses are covered by necessary literature. The Library has access to some full text databases as well; most popular of them are Science Direct and EBSCO.

Scientific literature can be borrowed from other libraries as well; National Library serves as the most often used by the students and teachers. Books and journals not available in Estonia are mainly borrowed from the Universities of Helsinki and Stockholm (the waiting period, however, might last up to six weeks).

The Department of Informatics has got its own small library with the most needed books. The books in it have mainly been obtained as a result of various projects (TEMPUS Phare, Open Estonia Foundation etc.) and also from our partner universities. Some teachers keep their own personal books in the Department to enable access to them to other teachers and students.

The need for literature varies from subject to subject: e.g. quite efficient built-in help systems have been created for the newest software, the printed materials accompanying the software are also of sufficiently good quality. Teachers' lecture notes play a relatively big role among the study aids.

The basic textbooks are listed in Appendix 14.

4.3.4 Financing

The Department of Informatics has two independent budgets: A-budget, which is state financed and is based on the number of syllabus credits earned by students in the previous academic year and the number of defended degrees. B-budget comprises self-earned resources, made up by students' fees, incomes from advanced training courses etc. The fees are determined by the Departments and approved by the University government. The budgets are confirmed at the Department meeting and the head of the Department is responsible for the implementation of the budget.

From this year on all the resources for teaching (both for state commissioned and non-state-commissioned students) will be dispensed through the one central and unified system (A-budget). The B-budget will consist only from additionally earned resources like advanced training, consultations, etc.

As the number of state financed study places will be known only in May, and thus the data of the second half of the financial year are not available when the budget is being compiled, it is not easy to draw up the budget. The provisionary budget for coming year is still compiled in December (see Appendix 16). The University will confirm the amended budgets after the information about the number of the state financed students becomes clear and students are registered for the fall term courses.

Despite these difficulties we are optimistic, because within the independent Department of Informatics (which was founded in autumn 2001) it is easier to arrange financial matters than when we were the part of the bigger department of Mathematics and Informatics. The A-budget enables to cover all the teachers' salaries on the level of the previous year and the residual resources of the B-budget enable some pay rise of the staff. Recently we have also been able to rise extra money for various development projects.

Development projects financed by Estonian Information Technology Foundation

Estonian Information Technology Foundation was founded in 2000 with the purpose to support ICT education in Estonia. The priorities for years 2000-2002 were to support applied higher education IT-education; 2002 was started the *Tiger University* subprogram for supporting university level ICT education and application of ICT tools in public universities. In 2003, the Department of Informatics got in total approximately 880 000 EEK for financing 13 projects. In the following we list the names of the projects, amount in Estonian croons (EEK) and short description of the project:

1) Software for ICT curricula; 38 581 EEK.

   To obtain special software and educational literature.

2) Multimedia lab for master students; 130 000 EEK.

   To establish small multimedia lab including two PC-s and one Mac, necessary software (authoring tools, audio and video editors, graphic tools, etc.) and multimedia equipment. (microphones, digital video and still cameras, colour printer, scanner, etc.)

3) Software for producing multimedia applications; 65 000 EEK.

   To renew the licences and obtain latest versions of multimedia software.

4) Production of learning materials in ICT; 86 500 EEK (three projects).

   Materials for basic course in Java
   Materials for graphic and music programming
   Materials for the course Multimedia Production

5) Mobile ICT-set for lecturers; 55 000 EEK.

   To obtain an LCD-projector and a notebook computer

6) Support for participation in foreign conferences; 18 600 EEK (two projects).

   The stipends were given to K.Niglas to visit her academic consultant prof. Donald McIntyre in Cambridge University and to a PhD student R.Rannala to visit the EDEN (European Distance Education Network) conference in Oldenburg (Germany).

7) Computer lab with 20 computers; 116 000 + 205 000 EEK.

   To establish a new computer lab for IT-students (20 work places; LCD projector)

8) Grant for a visiting professor to have a lecture course; 24 000 EEK.

   To cover the costs (tickets, hotel, subsidence) for Professor Pertti Järvinen of Tampere University to teach the Research Methods course for master students in IT.

9) Additional salary for IT-teachers; 115 742 EEK.

   The purpose is to close the salary gap between the IT university teachers in the Department of Informatics and IT specialists in industry.

10) Hardware for the courses on Information Systems; 29 000 EEK

    To obtain two computers, which will be used as Oracle servers.

The resources of the above mentioned projects have significantly enhanced the material base of the department and increased the incomes of the staff during the past year. The earlier project TEMPUS JEP-12418 (1997-2001) should also be highly appreciated as it enabled to get a considerable amount of hardware and software. Peeter Normak, the project coordinator was declared by the University development committee as the best applicant of resources from outside the University in 2001.

The teachers of our Department have got various grants to support teaching and research from the following bodies:

Open Estonia Foundation

Foreign Exchange Foundation of Estonian Academy of Sciences

Estonian Science Foundation

Tiger Leap Foundation

Estonian World Council, Inc. & Estonian World Freedom Fund

Cambridge Commonwealth Trust & Cambridge Overseas Trust

Centre for International Mobility (CIMO)

Deutscher Akademischer Austauschdienst (DAAD)

Association of Universities and Colleges of Canada (AUCC)

British Council

Estonian Information Technology Foundation (EITSA)

SA Archimedes Kristajan Jaak Scholarship Fund

5. Feedback and Quality Assurance

5.1 Contacts with graduates

As the master programs in Multimedia and Management of IT were opened only three years ago there are relatively few graduates – the first eighteen students finished their studies last year. The list of the graduates together with the titles of their graduation papers and their present work places are given in Appendix 12. The Department maintains the mailing lists of the graduates and has been in contact with all of them after the graduation.

Two of our graduates are continuing their studies at the doctoral level (G.Piho at Tallinn Technical University and H.Põldoja at Helsinki University of Arts and Design). In TPU only one place for doctoral studies in Didactics of Informatics was financed by the state this year (autumn 2003) and it is occupied by R. Rannala, a master level graduate from our Department (year 2002).

5.2 Contacts with employers and professional unions

Cooperation with employers and professional unions is one of the corner stones in the development of the curricula. Five teachers and researchers (J.Kippar, M.Kusmin, M.Laanpere, P.Normak, I.Petuhhov) are members of Estonian Information Technology Society.

In curriculum development the following activities were undertaken during last years:

1) IT division of Estonian Union Bank has been chosen as a strategic partner in designing the Management of Information Technology master program, and in further delivering of some specific IT-management courses. Selection of strategic partner based on the following main principles:
   - All main activities related to IT (development, management, services) should be strongly presented;
   - The partner should work in a critical (involving high risks and responsibilities) area;
   - Presence of academically highly competent staff members with experience of university teaching;
   - Willingness to co-operate in curriculum development.
2) Official public presentation of the Informatics (Multimedia and Learning Systems) master curriculum took place on 26 February 2001 with involvement of all interested institutions (the national Tiger Leap Foundation, Ministry of Education, Teachers Newspaper etc).
3) The both master curricula were discussed at the seminar "Future IT skills in today's world. Employers' needs and expectations" on 21 February 2002 organized by Estonian Information Technology Society (*EITS*).

4) The guidelines of the curricula were presented in the following publications:

- P.Normak, Creation of Multimedia and Learning Systems master program, European Union higher education TEMPUS program in Estonia 1992-2000, European Commission, Directorate for Education and Culture, Estonian TEMPUS Office, pp. 31-33.
- P.Normak, IT management master program started, Arvutustehnika ja Andmetöötlus (Computing Technology and Data Processing) No.6, 2001, p.45-47.
- P.Normak, From subject teacher to educational software developer, Õpetajate Leht, May 30, 2003.
- M.Laanpere, P.Normak, Training teachers to become educational software developers. Special issue on "Information Society and Education". Journal of Digital Contents, Vol.1 Issue 1, 146-150 (2003), ISBN 84-607-8369-3.

In teaching process the following activities were undertaken:

1) Possible ways in further cooperation with the employers were discussed on January 10, 2002 at the seminar organized by The Association of Estonian Information Technology and Telecommunications Companies (ITL).

2) On March 6, 2001 an agreement was signed with the company Reaalsüsteemid AS (Real Systems Ltd) what is one of the main developers of Estonian state registries. According to this agreement the development of the courses in Information Systems at TPU was agreed with the involvement of highly qualified specialists from the company.

3) On contractual bases, three leading specialists in the IT division of *Estonian Union Bank* – the second biggest bank in Estonia – were involved in preparation and delivery of three IT management courses (Strategic IT Management; Development of IT Infrastructure; Organization of IT Maintenance).

4) Highly qualified specialists from IT companies are included into graduation committees. At the moment professor emeritus Leo Võhandu is the head of master thesis defence committee; Dr. Ants Sild, the President of the Baltic Computer Systems Ltd and the head of ITL education section belongs to the defence committee as well.

The course *Current Problems in IT Development*

From the year 2000, we started regular (taking place once a week) university-enterprise joint seminars. These seminars have turned out to be very useful for all parties involved: 1) the students get a broad overview about the activities and problems in IT as well as find companies for their practical placements; 2) university teachers get feedback from the companies useful in curriculum and course development; 3) the companies have good opportunities to present themselves and to find (hire) new specialists.

According to feedback from the students this course is rated (without any exception) very highly. Experience obtained from these seminars is discussed in [P.Normak, University-enterprise joint seminars as tools for preparing students for the world of work: a case study from Estonia, Industry and Higher Education Vol 17, Nr 2, 103-109 (April 2003)].

Feedback from the Alumni

The Department maintains mailing lists for alumni serving as a tool for discussions in different topics, including curriculum development, course contents, practical placements, requirements for graduation papers etc. Feedback obtained by corresponding questionnaires will be discussed further.

5.3 Quality Assurance

Overall questions about the quality of teaching, research and development are discussed on the general meetings of the department. We have organized joint meetings of faculty members and students as well. In the case of personal questions or problems the head of the department turns to the concrete staff member to find more effective ways and solutions to improve the situation. On the other hand, every faculty member has the possibility to turn to the head of the department whenever (s)he feels the need for that. The departmental and inter-departmental seminars play an important role in the quality assurance of research. Seminars are held on a regular basis and they consist of: 1) presentations and discussions about the current research of faculty members and 2) presentations or lectures on topics of common interest.

5.3.1 The curricula councils

There are formed councils for both master curricula. The main aim of a council is to ensure the quality of the curriculum (including compatibility of the curriculum to the needs of the industry).

The council for the curriculum *Manager of Information Tech*nology:

- Paul Leis, Estonian Union Bank, Head of IT-security division
- Katrin Niglas, Head of Informatics Department;
- Peeter Normak, Head of the curriculum;
- Priit Parmakson, a teacher of information systems;
- Gunnar Piho, Systek Informationssystems Ltd, graduate from the master program;
- Ants Sild, General Director of Baltic Computer Systems;
- Herki Sula, a student.

The council for the curriculum *Informatics (Multimedia and Learning Systems)*:

- Tõnis Eelma, Teacher of Informatics;
- Mart Laanpere, Researcher;
- Katrin Niglas, Head of Informatics Department;
- Peeter Normak, Head of the curriculum;
- Hans Põldoja, Helsinki University of Arts an Design, a PhD student;
- Andrus Rinde, a teacher of multimedia;
- Marius Kuningas, a student.

The council comes together at least once a year, after feedback information from the students, but also from the graduates and their employers is available. The council meetings are publicly announced and open to all interested persons.

5.3.2 Personnel policies

For every academic position the university proclaims a public election. To apply for the post of professor or associated professor the applicant needs to have a doctoral degree or its equivalent. All the candidates for these posts have to pass the habilitation process. The important aspects here are the candidate's productivity and level as a researcher, but also his/her teaching skills and contribution to the developmental work (composition of textbooks and aids in teaching, etc.). The members of habilitation committee are well known specialist on the subject area and are usually chosen from outside the university.

A lecturer must have the master's degree or its equivalent. Assistants and teachers have to have higher education and assistants are expected to pursue an academic degree (masters or doctoral degree). On the election to the posts of lecturers, assistants and teachers the main criteria are the candidate's achievements in the developmental work on the area of education and teaching skills. Lecturers and teachers do not have to be involved in research, although lecturers may choose to do both: teaching and research, which is agreed with the head of department. Assistants have to be involved in research projects. Lecturers with research responsibilities and assistants are expected to be the next generation of associated professors and professors.

As in the present situation the primary way to increase the number of highly qualified academic staff in the area of computer sciences is to educate the new generation, we have given great importance to the direction of our graduates to continue their studies on postgraduate level. We also pay a lot of attention to the inservice training of faculty members. Staff and master students of the department have got several scholarships which have provided them periods of study and research abroad. Studies have been conducted in Germany, England, Ireland, Canada, Spain, the Netherlands and Finland.

There is a very rigorous and adequate salary system in the university. For faculty members only the results of the last 3 years are considered when the amount of salary is decided. All aspects of academic work: research, teaching and development, are taken into account. Every faculty member has to submit a structured self-assessment to the head of the department, which forms the basis for the determining of the salary rate. The university has fixed the minimum salary rates for every academic, but also non-academic post. By the new salary precept of the university one has to achieve certain amount of the points to get the recommended salary rate according to his/her post; if one achieves more points than required the head of the department is free to increase the salary if the department has funds for that. This system is very stimulating for faculty members. It is also possible to pay extra if the workload is temporarily higher than usual or the results of the work of the staff member are outstanding.

In the Department of Informatics we have used the gratification system effectively. We have compiled a file, which lists all the duties of every staff member. This helps a lot to organise the work and it gives a visible basis for determining ones salary.

5.3.3 Feedback questionnaires

To ensure the quality of teaching, a feedback system has been established. At the end of every semester we conduct a students survey (anonymous questionnaires – see Appendix 18). The results of these surveys are taken into account and used to enhance the quality of teaching. In addition to the feedback surveys, there have been discussions with students about the grading principles, exam arrangements, but also about the results of tests and other forms of student work. If needed, the faculty members have individual discussions with students.

Questionnaires were first worked out in the department of informatics in cooperation with all faculty members and for several years the surveys were carried out on the initiative and responsibility of departments. Few years ago the board of the university initiated the project with the aim to standardize the feedback questionnaires and to turn student surveys into a common practice in all departments. In connection with that the responsibility for the surveys was taken to the level of faculties. In principle it was intended that the deans organise the analysis of data, draw up the preliminary summary and then give the analysed materials to the department heads. However, as the head of the Department of Informatics Katrin Niglas is a data analysis expert and the centralised system does not work very effectively yet, our Department has so far took the full responsibility both for data collection and analysis. It ensures that the data concerning the staff of the department is always available when needed. To enhance the conduct of the feedback surveys and the analysis of the results the Department of Informatics is developing an electronic web-based system, which should be in use already at the end of next semester.

For some past years there are data, which allow to compare the feedback results of the Department with other departments of the faculty and also with the mean results for the university. It has to be stressed that for all questions the results of the Department of Informatics were higher than the average in the faculty and in the university. The professional level of our lecturers rated on the 5-point scale was very high (average 4.5) and the contact between the students and faculty members was rated to be good (average 4.0). Compared to other departments' students regarded our courses to be more motivating for further studies in the area (average 4.0) and appreciated the skills of our lecturers to use visual aids in teaching and to encourage students (average 4.0). If take into account the members of faculty of our department as a whole, one can not find any aspects which would have got serious critics from the students.

The results of the feedback survey for the courses of our master curricula as assessed in 2003 are given in Table 6. The main analysis of the results is done by the head of the department who draws the conclusions and imparts the summary to the faculty members (Appendix 19). If there has been the need, the staff members have had access to the data concerning his/her courses. The department head is also obliged to solve the problems, which may come up, in cooperation with the faculty member. Usually the results of the problematic courses are discussed in detail with the head of the curriculum and on that basis, in cooperation with a teacher, the attempt is made to improve the content and the form of the particular course. Lately we have decided even to change lecturers for two courses on the basis of student feedback (see MII7048 Financial Management in Table 6; the other course was MII7031 Development of Infrastructure of Information Technology, which was not held in the year 2003). It was done because both lecturers were from outside the Department and their workload did not allow full devotion to improvement of the course.

Table 6. The results of feedback survey (year 2003).

Course	Mean (on the scale 1-5)
MII7003 Multimedia Development	4,9
MII7007 Management of IT Projects	4,9
MII7001 Web Based Learning Environments	4,8
MII7004 Multimedia Production	4,8
MII7006 Design of Multimedia Based Learning Software	4,8
MII7042 ICT in Curriculum Development	4,6
MII7008 Distance Education Technology	4,5
MII7002 Multimedia Design	4,5
SPK7002 Strategic Management	4,4
SPK7015 Personality and Social Psychology in Organisations	4,3
SPP7002 Basics of Research	4,3
MII7040 Legal Issues Related to IT-Development	4,2
SPK7017 Group Processes in Organisations	4,2
SPK7001 Theories of Organisation	3,9
MIA7007 Research Methods	3,8
MII7030 ICT Strategic Management	3,6
MII7032 Administration of Information Technology	3,5
FEL7045 Text Analysis and Writing	3,5
MLR7001 Modern Physics	3,4
MMG7001 Mathematical Modelling and Simulation	3,3
MII7048 Financial Management	3,2
Average for all courses:	4,2

As it can be seen from Table 6, the speciality courses are rated extremely high. The courses in *Mathematics* and *Physics* get so low student feedback mainly because students consider the courses too theoretical or irrelevant to their interests. These general courses are compulsory part of the curriculum because of the new regulations for the curricula fixed in our University. There have been several meetings with the staff of Mathematics and Physics Departments to discuss the possibilities to arrange the courses so that they would more closely meet the needs of our students. The course *Text Analysis and Writing* was held for the first time this year. We had to replace the previous course because of the serious health problems the other lecturer has. It was obvious that the short preparation time did not allow the new lecturer to accommodate to the special needs of our curricula. These problems have been also discussed and for the next year the course will be reviewed.

There are three courses which were held by the IT-specialists of one partner institution:

- MII7030 ICT Strategic Management
- MII7032 Administration of Information Technology
- MII7031 Development of Infrastructure of Information Technology

As it turned out that the courses overlap to a certain extent (it is the main reason for the low feedback results), one lecturer was changed, as stated above, and the structure of these three courses has been reviewed in parallel to make sure that each of these courses would focus on different topics in the future.

There were also an open-ended questions about the aspects that students liked and disliked the most in connection with a course in the questionnaires. A summary of these answers affirms the results described before: many students mention the impressing professional level of the lecturers as well as the high quality and usefulness of provided lecture notes and other training aids. Some Multimedia students who do not have a bachelor degree in Informatics have been critical about the fast pace and little number of auditory hours of some courses where the material was complicated for them. The different background of students makes it sometimes difficult for the lecturer to offer maximally useful information for every single student of the group. Some students found it too difficult to study such an important course like Research Methods in English; they suggest that basic courses should be taught in Estonian and some optional courses in English. Also some students have raised the question about the usefulness of the general courses for their practical needs and interests. All the mentioned problems have been discussed in the Department and extensive measures have been taken to improve the quality of teaching as well as the content of courses as described above.

As since past spring we have our first master level graduates, we have also asked feedback from their employers. The short questionnaires were sent and received by an e-mail. Most of the employers have supported their employees' studies as all of our present graduates were working in parallel with taking the master's course. Employers consider especially important the rise in competence which the studies in our department have given to the graduates and the contemporary knowledge in the field of IT they bring into the company. The only negative aspects some of the employers mentioned were the lack of money to support their employees' studies financially and the fact that sometimes the lectures are held at working hours. One employee was worried (school director) that better educated employees may leave the institution because the salaries in IT companies are considerably higher.

Summary

Short description of the problems as well as strong sides related to the Informatics (Multimedia and Learning Systems) and Management of Information Technology curricula at the Tallinn Pedagogical University are listed in the table below:

Advantages	Problems
A-national level	
The curricula are unique in Estonia; Curricula are competence based; in the implementation specialists from other institutions are involved.	The universities in Estonia do not get enough support from the state to develop their IT infrastructure; The number of state financed study places does not correspond to the needs.
B-university level	
Curriculum development proceeds in concordance with the objectives of the University; The university gives additional support for both running the Informatics curricula and for doing research.	There are some minor problems with the coordination of the studies with other departments (mainly related to accommodating general courses to the needs of our curricula).
C- department level	
There are fairly good conditions for implementing the curricula (including modern hard- and software); High professional level of the teaching staff.	Because of a relatively low salary level at the university it is difficult to employ highly qualified specialists from the industry.
D- student level	
Student-centered: possibilities to adapt the curricula to personal needs and interests, relatively small study groups, good student-teacher personal relations.	Lack of the scholarships to support studies, which is the reason why many students have to have jobs in parallel with studies.

Main emphasis in the Department's activities during last few years has been the curriculum development. The priority for the coming years is research, first of all initiation of and participation in both Estonian and European research programs, but also continuous support to young faculty members pursuing their academic degrees. Next PhD theses will be defended in Spring 2004 (M.Laanpere) and in Autumn 2005 (S.Virkus).

The overall aim of the Department is to create an internationally accepted competence centre in ICT-based educational technology.

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APPENDIX 1 Location and contact of TPU

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APPENDIX 2 The Faculties of TPU

The Tallinn Pedagogical University has six Faculties and two colleges: Haapsalu College and Rakvere College.

The Faculty of Philology	**F**
Departments:	
Germanic-Romance Philology	FG
Estonian Philology	FE
Nordic Philology	FP
Slavonic Philology	FV
Language Center	FK

The Faculty of Social Sciences	**S**
Departments:	
Philosophy	SF
Information Science	SI
Psychology	SP
Public Administration	SA
Social Work	ST
Sociology	SO
Advertising and Media	SPM

The Faculty of Educational Sciences	**E**
Departments:	
Educational Sciences	EK
School Pedagogy	EA

The Faculty of Physical Education K

Departments:

Physical Education	KD
Physical Science	KT

The Faculty of Mathematics and Natural Sciences M

Departments:

Mathematics	MM
Informatics	MI
Natural Sciences	ML
Handi- and Housecraft	MT

The Faculty of Fine Arts C

Departments:

Culture Science	CC
Fine Arts	CA
Music science	CM
Audio-visual arts	CV

APPENDIX 3 Curriculum: Informatics (Multimedia and Learning Systems)

TALLINN PEDAGOGICAL UNIVERSITY

Faculty: Mathematics and Natural Sciences

7464159
(code of the curriculum)

Title of the curriculum in Estonian

INFORMAATIKA (MULTIMEEDIUM JA ÕPISÜSTEEMID)

01.11.2001
(accepted by the faculty council)

Title of the curriculum in English

INFORMATICS (MULTIMEDIA AND LEARNING SYSTEMS)

11.02.2002
(accepted by the university council)

Level: **Master**
Load: **80 credit points** (CP)
Standard period of study in years: **2**

Admission requirements: bachelor degree or a corresponding qualification
Additional requirements: ECDL-level computer skills
Entrance examination: career suitability test

Objectives: to provide the students with knowledge and skills, enabling them to develop and implement modern multimedia based (CD, Internet) learning software; the graduates can work as software engineers or software project managers in educational or other software development institutions. On completion the students will be equipped to enter a doctoral programme.

Short description of the curriculum and studies.
Core subjects: 14 CP
Major Subject: 40 CP
Free electives: 6 CP
Master thesis: 20 CP

The studies involve a great deal of independent work (one credit point involves approximately 28 hours of independent work). The first year primarily involves class work while the emphasis during the second year is placed on research and the master thesis (individual courses, seminars, writing of the thesis, etc.). The studies are delivered in the form of modules.
Conditions for graduation: completion of the curriculum and the defence of a master thesis.

Documents issued at graduation: master diploma and academic report

Degree: Master in Informatics

CURRICULUM FOR INFORMATICS (MULTIMEDIA AND LEARNING SYSTEMS)

Gerneral subjects 14 CP

Code	Title of a subject	CP	Type of assessment*
MMG 7001	Mathematical Modelling and Simulation	4.0	E
MLR 7001	Modern Physics	4.0	E
MII 7001	Web Based Learning Environments	3.0	H
	Optional subjects (to be chosen 3 CP)		
EKA 7002	Andragogy	3	H
FEL 7003	Argumentation and Rhetoric	3	H
MIA 7002	Data Analysis	3	H
SFF 7001	Contemporary Social Philosophy	3	H
SOT 7002	Project Planning and Management	3	H

Major 40 CP + master thesis 20 CP

Code	Title of a subject	CP	Type of assessment*
MII 7002	Multimedia Design	4.0	E
MII 7003	Multimedia Development	4.0	E
MII 7004	Multimedia Production	4.0	H
MII 7006	Design of Multimedia Based Learning Software	3.0	H
FEL 7045	Text Analysis and Writing	3.0	H
MII 7042	ICT in Curriculum Development	3.0	H
MII 7007	Management of IT projects	4.0	H
MII 7009	Master Seminar	4.0	A
MII 7015	Individual Subject in the Area of Specialisation	5.0	H
MII 7016	Master Thesis	20.0	E
	Optional subjects (to be chosen 6 CP)		
MIA 7007	Research Methods	3.0	E
MII 7008	Distance Education Technology	3.0	H
MII 7044	Didactics of Informatics	4.0	H
MII 7030	ICT Strategic Management	3.0	E
MII 7040	Legal Issues Related to IT-Development	3.0	H
MII 6023	Computer Graphics	3.0	H

* E – examination
H – graded assessment
A – pass-fail assessment

SUBJECT DESCRIPTIONS

Symbols below in the subjects name are: number of credits, nominal number of contact hours in a week, hours for lectures-hours for practical exercises, type of assessment, semester (S – autumn, K – spring).

MMG7001 Mathematical Modelling and Simulation
4.0 CP 2 14–14 E S
Mathematical modelling, applications. Mathematical abstractions of real life problems. Solutions to open problems. Principles of modelling. Deterministic and stochastic models. Simulation and corresponding software. Population models. Ecological and economical models. Mini projects.
Lecturer prof Paul Tammela

MLR7001 Modern Physics
4.0 CP 2 14-14 E S
Classical physics before quantum physics. Particles, waves and quanta. The main principles of quantum mechanics. Quantum computers. Atomic structure. The atomic nucleus and nuclear energy. Principles of thermodynamics. Entropy. Space and time, their relativity. Equations of electric and magnetic fields. The electro-magnetic field. Semiconductors and semi-conducting devices. Elementary particles and fields. Quantum field theories. High energy physics and modern experiments in particle physics. Accelerators and detectors. Curved space-time and black holes. The Big Bang. The evolution of the Universe.
Lecturer prof Ülo Ugaste, assoc prof Tõnu Laas

MII7001 Web Based Learning Environments
3.0 CP 2 14-14 H S
Web development history and possibilities. File formats. HTML, CSS. Standards. HTML-editors. Planning a web site. Java script possibilities, syntax. Using VBA and PHP in Web development. XML.
Lecturer lect Jaagup Kippar

EKA7002 Andragogy
3.0 CP 30-15 H K
Development of andragogy as a field of science, problems, trends, values. Problem of andragogy - development of subject of self-development. Adult education as a field of activity and its role in social processes. Lifelong learning as a function, aim, principle and opportunity. Lifelong learning - myth, idea, reality. An adult as a learner. Role of experience in learning. Importance of meta-cognition in learning. Learning in adulthood (an overview of theoretical viewpoints). Self-managed learning. Formal, non-formal and informal learning. Developing the profession of an adult educator. Roles, activities, tasks and the competence of an educator. Application fields for adult education. Adult education as a process and management function. Managing a training process (planning, carrying out and evaluation).
Lecturer assoc prof Larissa Jõgi

FEL7003 Argumentation and Rhetoric
3.0 CP 30-15 H S
History of rhetoric. Theory of rational argumentation. Theory of myth creation. Means of demagogy: argumentum ad hominem, argumentum ad populum, changing the subject etc. Linguistic influence. Analysis of media texts. Public speaking. Preparation and delivery of speech. Style. Listening skills. Debate. Obligation to prove and rebut.
Lecturer lect Katrin Aava

MIA7002 Data Analyses
3.0 CP 2 14-14 H K
Statistical data and preparation for analysis. Different types of data. Descriptive statistics: frequency and summary tables, statistics and charts. Relationships: measures of association and crosstables. Population and sample. Statistical inferences: confidence intervals, tests of statistical significance: t test, chi-square test, ANOVA. Parametric and nonparametric tests.
Lecturer lect Katrin Niglas

SOT7002 Project Planning and Management
3.0 C 3 16-32 H S

The concept of project, types and history. The structure of a project organisation. The phases, inputs and outputs of a project. Identification phase: problem analysis, development of ideas. Preliminary study: market-research, risk analysis, SWOT-matrix. Formulation of project objectives. Project proposal, competition. Planning phase and compiling the plan: developing the activity schedule, the budget, planning the human resources and the quality management system. Planning communication, information and co-ordination system, leadership strategy and management tactics. Implementation phase. Evaluation phase: analysis, evaluation, compiling the final report. Project management software.
Lecturer lect Sigrid Salla

MII7002 Multimedia Design
4.0 CP 2 16-16 E S
Principles of using multimedia elements. Design of Human Computer Interaction (HCI): introduction, people and computers (input and output devices, styles of interaction, user support), evaluation (role and methods). Creation of multimedia based software using authoring system Macromedia Authorware.
Lecturer senior researcher Kaido Kikkas, lect Andrus Rinde

MII7003 Multimedia Development
4.0 CP 2 16-16 E K
Creation of digital media and multimedia: digitising graphics and sounds, operating systems support, types and uses of multimedia authoring systems, distribution of multimedia applications (CD, WWW, hybrid, etc). Design and development of multimedia applications: basics and rules of communication. Management of a multimedia project.
Lecturer prof Jaak Henno, lect Andrus Rinde

MII7004 Multimedia Production
4.0 CP 2 16-16 E K
Different types of media, their representations in analogue and digital form, digitising and editing: text, vector- and bitmap graphics, digital sound, MIDI, digital video, animation, compression of media files. Multimedia resources.
Lecturer lect Andrus Rinde

MII7006 Design of Multimedia Based Learning Software
3.0 CP 2 12-12 H S
Theories of learning and practice of teaching. Computer-based instruction, computer-assisted learning, computer-supported collaborative learning, intelligent tutoring systems. Pedagogical foundations and models of instructional design. Strategies and tactics of instructional systems design. Front-end analysis of target group needs, job or domain. Task analysis, specifying the learning goals. Selecting and sequencing supporting knowledge. Selecting and sequencing learning activities. Developing lessons. Formative and summative evaluation of learning systems.
Lecturer lect Mart Laanpere

FEL7045 Text Analysis and Writing
3.0 CP 2 10-10 H S
Concept of text, trends in text analysis. Text creation and reception. Function of texts. Classification of texts. Literary and applied texts. Narrative, descriptive and argumentative texts. Text creation: gathering material, structuring, elaboration. Structure analysis. Classification and function of paragraphs. Media texts and influence of media. Journalistic genres. Entitling of texts. Argumentation and means of demagogy. Language use in influencing.
Lecturer lect Heidi Meier

MII7042 ICT in Curriculum Development
3.0 CP 2 12-12 H S
Overview of different approaches and perspectives to curriculum. Methods of curriculum design and development. The history of national curriculum development in Estonia, in comparison with neighboring countries. Computer-supported curriculum development. ICT in national and school curriculum: as a subject and as a cross-curricular theme.
Lecturer lect Mart Laanpere

MII7007 Management of IT Projects
4.0 CP 2 28-8 H K

Introduction to the course. Basic concepts. Project management (PM) body of knowledge PMBOK and PM maturity model. Project initiation and planning. Writing recommendations and reviews, PR activities. Launching a project: management plan, information management. Managing a project: resources management, meetings, quality control, reporting, staff development, creating the necessary environment. Completion of a project. Specific features and success factors of software projects. Software project life cycle, phases and stages. Software process models. Planning of a software project: requirements development and analysis of software architecture detailed design. Planning and execution of stages. Quality management. Usage of project management software. Software process maturity. Software metrics, cost models. COCOMO II cost model. Case studies.
Lecturer prof Peeter Normak

MII7009 Master Seminar
4.0 CP 0-30 A K
The main features of the topic as well as the historical view and possible further implementations will be discussed, both in local (Estonian) as well in international perspective.
Lecturer prof Peeter Normak, Lect Katrin Niglas

MII7015 Individual Subject in the Area of Specialisation
5.0 CP H S
The list of topics, learning materials used and regulations related to study and assessment are determined by the supervisor. If accepted by the supervisor, a regular course at the home university or at some other university can be taken.

MII7016 Master Thesis
20.0 CP E K
As a rule the master thesis is supposed to consist of two main parts: 1) a theoretical part dealing with some problems related to ICT application in education 2) a developmental part consisting of either the creation of an educational software item based on findings from the theoretical work, its pedagogical piloting and conclusions or of the realisation of a module for an electronic learning environment, pedagogical piloting and elaboration of relevant methodical recommendations. The masters thesis should fulfil requirements outlined in, Master studies and defence of master thesis in Tallinn Pedagogical University.

MII7008 Distance Education Technology
3.0 CP 2 12-12 H S
History of distance education. Integrating technology in the learning process. Radio, TV, steaming audio and video in distance education. Audio- and videoconferencing technologies. Strenths and weaknesses of different technologies in distance education, media selection methods. Web-based learning management systems, e-university. Learning technology standards, learning object metadata, interoperability of LMSs. Comparing different LMSs: IVA. Luvit, VIKO, WebCT, Fronter, Moodle. Designing an online course with IVA LMS. E_learning and adult learner. Copyrights of digital learning materials. Cross-university and cross-national accreditation of e-learning.
Lecturer lect Mart Laanpere

MII7044 Didactic of Informatics
4.0 CP 2 10-15 H K
Foundations of didactics, its three main components educational objectives, content and methods. The role, aims and contents of school informatics in Estonian National Curricula, comparison with other countries. History and future trends of school informatics in Estonia and other countries. Curriculum design and informatics as a subject on the school level. Lesson planning. Instructional tasks and assessment in school informatics. Informatics as integrative and integrated subject. Informatics and information technology as cross-curricular topics in school curriculum, ICT-based multidisciplinary projects. Using presentation equipment and groupware tools, active learning in informatics lesson. Development of electronic learning materials and automated quizzes.
Lecturer lect Mart Laanpere

MII7030 ICT Strategic Management
3.0 CP 2 24-8 E S
The aim of the course is to obtain knowledge and skills in methods how to develop ICT management strategies and how to implement them. The main topics discussed are: ICT organization, staff, processes, methods. Technologies discussed: multi layer applications, component technologies, data warehouses, decision systems and *Total Cost of Ownership* IT strategies. Relatively big part of the course will be devoted to the problems related to data security management and to development of a strategic plan of a company. Analyse of strategic plans and their implementations of different companies.
Lecturer assoc prof Paul Leis

MII7040 Legal Issues Related to IT-Development
3.0 CP 2 24-4 H S
Position of copyright law in the structure of the legal system. Sources of the law. Statutory acts and bylaws. Copyright and the other forms of intellectual property. Works protected by copyright law. Copyright law and computer programs. Copyright contracts. General principles of conclusion of contracts. Licences. Rights related to the right of the author. Rights of the database maker.
Lecturer lect Eero Johannes

MIA7007 Research Methods
3.0 CP 2 28-8 E S
Overview of research designs for empirical and constructive research (design research). Classification and main features of research methods. The choice of methods depending on research purposes and questions. Philosophical underpinnings for different research methods.
Lecturer prof Pertti Järvinen, lect Katrin Niglas

MII 6023 COMPUTER GRAPHICS
3,0 AP 4 20-40 H K
Computer graphics basic and specific features and general development trends. Computer graphics application areas. Commonly used software packages for professional computer graphics designers. General concepts of design and color theory. Color space and color models. Vector and pixel images. File formats and files properties. Task classes based on vector graphics, defining the goal, solution phases and solutions. Raster graphics application areas. Training tasks for different application areas and their CorelPhotopaint 11 – based solutions. Web pages design, concepts and techniques. Creating animations and dynamic elements for Web pages. SVG - graphics based applications and development tools. SVG – graphics basic elements and techniques. Processing units calibration (display, scanner, printer). Graphical information input / output devices and technologies, problems with scanning and publishing quality.
Lecturer researcher Mari Plakk, lect Olev Räisa

APPENDIX 4 Curriculum: Management of Information Technology

TALLINN PEDAGOGICAL UNIVERSITY

Faculty: Mathematics and Natural Sciences

7343993

(code of the curriculum)

Title of the curriculum in Estonian

INFOTEHNOLOOGIA JUHTIMINE

23.01.2002

(accepted by the faculty council)

Title of the curriculum in English

MANAGEMENT OF INFORMATION TECHNOLOGY

11.02.2002

(accepted by the university council)

Level: **Master**
Load: **80 credit points** (CP)
Standard period of study in years: **2**

Admission requirements: bachelor degree or corresponding qualification in the field of informatics
Entrance examination: career suitability test

Objectives: to provide students with skills and knowledge, enabling them to plan and implement ICT strategy of a company as well as to manage ICT projects; the graduates can work as a CIO of a company, a manager of software projects, etc. On completion the students will be equipped to enter doctoral programme.

Short description of the curriculum and studies.

General subjects:	8 CP
Major:	46 CP
Electives:	6 CP
Master thesis:	20 CP

The studies involve a great deal of independent work (one credit point involves approximately 28 hours of independent work). The first year primarily involves class work while the emphasis during the second year is placed on research and the master thesis (individual courses, seminars, writing of the thesis, etc.). The studies are delivered in the form of modules.
Conditions for graduation: completion of the curriculum and the defence of a master thesis.

Documents issued at graduation: master diploma and academic report

Degree: Master in Management of Information Technology

CURRICULUM FOR MANAGEMENT OF INFORMATION TECHNOLOGY

General subjects 8 CP

Code	Title of a subject	CP	Type of assessment*
SPK 7001	Theories of Organisation	4,0	E
SPK 7002	Strategic Management	4,0	E

Major 46 CP + master thesis 20 CP

Code	Title of a subject	CP	Type of assessment*
MII 7030	ICT Strategic Management	3,0	E
MII 7031	Development of Infrastructure of Information Technology	3,0	H
MII 7032	Administration of Information Technology	3,0	E
MII 7033	Administration of Information Systems	3,0	E
MII 7007	Management of IT Projects	4,0	H
SPK 7017	Group processes in organisations	2,0	H
MII 7048	Financial Management	3,0	H
MII 7038	Professional Placement in the Area of Specialisation	4,0	H
MII 7039	Master Seminar	4,0	H
MII 7041	Master Thesis	20,0	E
	Optional subjects (to be chosen 17 CP)		
SPP 7002	Basics of Scientific Research	3,0	H
MIA 7007	Research Methods	3,0	E
MIA 7002	Data Analysis	3,0	H
MII 7037	Applied Activities in the Area of Specialitsation	4,0	H
MII 7040	Legal Issues Related to IT-Development	3,0	H
MII 6015	Information Systems	3,0	E
SOT 6026	Social, Ethical and Psychological Aspects of Computer Usage	3,0	H
SPK 7015	Personality and Social Psychology in Organisations	3,0	E
SPK 7018	Public Presentation Skills	2,0	H
SPK 7019	Personnel Management	3,0	E

* E – examination
H – graded assessment
A – pass-fail assessment

SUBJECT DESCRIPTIONS

Symbols below in the subjects name are: number of credits, nominal number of contact hours in a week, hours for lectures-hours for practical exercises, type of assessment, semester (S – autumn, K – spring).

SPK7001 Theories of Organisation
4.0 CP 3 32-16 E S
Organization and its main subsystems; organizational goals, tasks, strategy and tactics; organizational structure; organization and technology; organizational culture; distribution of power in organizations.
Lecturer prof Harry Roots

SPK7002 Strategic Management
4,0 CP E S
The aim of the course is to develop the understanding and knowledge how to use the links between the company and its commercial, legal and social environment for achieving the long-term goals. The course discusses different strategic alternatives on the level of a company, of a production unit or of a function, as well as the impact of a strategy to development, for example, of organizational structure or ICT-policy of a company.
Lecturer prof Tiit Elenurm

MII7030 ICT Strategic Management
3.0 CP 2 24-8 E S
The aim of the course is to obtain knowledge and skills in methods how to develop ICT management strategies and how to implement them. The main topics discussed are: ICT organization, staff, processes, methods. Technologies discussed: multi layer applications, component technologies, data warehouses, decision systems and *Total Cost of Ownership* IT strategies. Relatively big part of the course will be devoted to the problems related to data security management and to development of a strategic plan of a company. Analyse of strategic plans and their implementations of different companies.
Lecturer assoc prof Paul Leis

MII7031 Development of Infrastructure of Information Technology
3,0 CP 2 14-14 H S
The goal of the subject is to obtain knowledge necessary for development IT infrastructure based on commercial needs of a company. The notion of IT infrastructure. Necessity for planning IT infrastructure. Planning through organisation, processes and technology. Main processes of a client centred organisation. Main activities for planning IT infrastructure and possible organisational structures. Structure of a company in planning its IT infrastructure. The components of architecture: commercial, information systems and technological architecture. Principles for planning architecture of information systems and technology. Standards and change management for infrastructure development. Sourcing of infrastructure. Bottlenecks in planning IT infrastructure in Estonian companies. Trends in IT infrastructure development.
Lecturer Guido Leibur

MII7032 Administration of Information Technology
3,0 CP 2 14-14 E K
Development of IT administration practices in Estonia. The roles and interrelations between different actors in an IT organisation.
Main tasks: ensuring a stable production environment, costs control, competitiveness, increasing performance.
IT maintenance: management, network administration, designing and maintenance of an information system, applications, maintenance of terminals, inventory, user support, quality assurance, testing, data security, assurance of functioning continuity.
IT and business relations: internal and external clients, cooperation models.
Lecturer Indrek Hiie

MII7033 Administration of Information Systems
3,0 CP 2 14-14 E K

The course intends to study the current state of field of Information Systems and its many issues— in the organizational context and mostly from the IT manager's viewpoint. The roles and tasks of it manager/it department in developing the organization's information system. The theory of information systems. Information quality. What can information system contribute to the success of organization? Opportunities and limitations. Modeling and specification of business processes: the administrative aspect. Evaluation of the information system. Strategic architecture of information systems.

Lecturer lect Priit Parmakson

MII7007 Management of IT Projects
4.0 CP 2 28-8 H K
Introduction to the course. Basic concepts. Project management (PM) body of knowledge PMBOK and PM maturity model. Project initiation and planning. Writing recommendations and reviews, PR activities. Launching a project: management plan, information management. Managing a project: resources management, meetings, quality control, reporting, staff development, creating the necessary environment. Completion of a project. Specific features and success factors of software projects. Software project life cycle, phases and stages. Software process models. Planning of a software project: requirements development and analysis of software architecture detailed design. Planning and execution of stages. Quality management. Usage of project management software. Software process maturity. Software metrics, cost models. COCOMO II cost model. Case studies.
Lecturer prof Peeter Normak

SPK7017 Group Processes in Organisations
2.0 CP 2 10-20 H K
Group work, team concepts and categories. The role of the workgroup in the organisation, team-centred views of organisation (TQM). Characteristics of a group. Psychological characteristics of groups. Forming a workgroup, bases and means (FIRO-B). Functioning of a group. Leadership and management. Team development and training (skill training, optimisation of interpersonal relationships, learning methods). Technology of teamwork, tools for generating ideas, structuring and decision-making (brainstorming, analysis of force fields, Open Space).
Lecturer prof Aleksander Pulver

MII7048 Financial Management
3.0 CP 2 24-0 H S
The course provides insight into financial management. It is aimed at students who are not majoring in financial management. The main topics are: introduction to financial accounting, financial statements, time value of money, making capital investment decision, financing a small business, managing working capital. The accounting framework for the course consists of International Financial Reporting Standards as promulgated by the International Accounting Standards Board. The development of Estonian GAAP will be featured during the course. Recording transactions. Accounting standards and principles. Recording assets, liabilities, revenue and expenses. Financial analysis using ratios. Cash flow analysis. Financial planning. Company valuations.
Lecturer Eve Lamberg

MII7038 Professional Placement in the Area of Specialisation
4.0 CP 0-80 H K
During professional placement the student either 1) checks the validity of the results obtained in master studies or 2) applies the knowledge obtained in master studies for development of a certain integrated solution based on an institution.

MII7039 Master Seminar
4.0 CP 0-30 H K
The seminar deals with problems based on individual study and research carried out by the students. The main features of the topic, the historical view and possible further implementations will be discussed with a local (Estonian) as well as an international perspective.
Lecturer prof Peeter Normak, lect Katrin Niglas

MII7041 Master Thesis
20.0 CP E K
The masters thesis should fulfil requirements stated in Requirements for master thesis in IT management

(http://www.cs.tpu.ee/ITjuhtimine/osakond/nouded/mag_too_nouded.html), as well as Master studies and defence of master thesis in Tallinn Pedagogical University.

SPP 7002 Basics of Scientific Research
3,0 CP 4 28-8 A K
The aim of the course is to give an overview of a research paradigm, its stages and principles. In parallel to acquiring theoretical knowledge, the students will gain practical skills necessary for composition and defence of a master project. The course gives basics for performing independent scientific research activities and using results in professional life.
Lecturer prof Mati Heidmets

MIA7007 Research Methods
3.0 CP 2 28-8 E S
Overview of research designs for empirical and constructive research (design research). Classification and main features of research methods. The choice of methods depending on research purposes and questions. Philosophical underpinnings for different research methods.
Lecturer prof Pertti Järvinen, lect Katrin Niglas

MIA7002 Data Analysis
3.0 CP 2 14-14 H K
Statistical data and preparation for analysis. Different types of data. Descriptive statistics: frequency and summary tables, statistics and charts. Relationships: measures of association and crosstables. Population and sample. Statistical inferences: confidence intervals, tests of statistical significance: t test, chi-square test, ANOVA. Parametric and nonparametric tests.
Lecturer lect Katrin Niglas

MII7037 Applied Activities in the Area of Specialisation
4.0 CP 0-0 H K
Dissemination of knowledge and skills obtained during master studies in any form, for example 1) composition and piloting a course 2) presentation at a conference 3) writing an article 4) composition of learning material etc.

MII7040 Legal Issues Related to IT-Development
3.0 CP 2 24-4 H S
Position of copyright law in the structure of the legal system. Sources of the law. Statutory acts and bylaws. Copyright and the other forms of intellectual property. Works protected by copyright law. Copyright law and computer programs. Copyright contracts. General principles of conclusion of contracts. Licences. Rights related to the right of the author. Rights of the database maker.
Lecturer lect Eero Johannes

MII6015 Information Systems
Information and its quality. Information system and its life cycle.
Information system development. The professions of system analyst and system developer. Development activities: interviewing, modelling, designing, evaluating.
System architecture. Process modelling. Data modelling. Objekt-oriented modelling
and design. Co-design of physical and virtual. Method development. A
selection of development methods and techniques.
Lecturer lect Priit Parmakson

SOT 6026 Social, Ethical and Psychological Aspects of Computer Usage
3,0 CP 3 48-0 H K
The role of technology in cultural context (ethical dimension, value systems, habits etc), especially of information technology in post-modern world will be discussed. Social aspects of IT mediated communication, including person to person and person to software relations. Principles of computer usage (netiquette, illegal software usage, professional codes of ethics etc). Possibilities and obstacles of computer usage; computer as a tool for work, learning and leisure. Phenomenon and emerging mechanisms of computer psychology; I-psychology, cyberspace and MUD. Virtual reality and its effects; avatars. Internet dependency and its diagnosis.
Lecturer prof Voldemar Kolga, senior researcher Indrek Tart

SPK7015 Personality and Social Psychology in Organisations
3.0 CP 2 28-8 E S
Psychological paradigms. Psychology of personality. Academic and practical intelligence. Self-esteem and the concept of self. Emotions and emotional regulation. Relationships and models of relationships. Cooperation and conflict. Social perception and group.
Lecturer prof Aleksander Pulver

SPK 7018 Public Presentation Skills
2,0 CP 4 16-8 A S
The goal is develop knowledge and basic skills for public presentations, develop self-confidence and presentation techniques.
Lecturer prof Tõnu Lehtsaar

SPK7019 Personnel Management
3.0 CP 2 28-8 E K
The nature and directions of personnel management, strategic human resource management. Supplying the organisation with human resources (overview). Application and development of the human resource. Personnel planning. Personnel recruitment. Personnel selection. Planning work-related development. Personnel development. Assessment. Evaluating the effectiveness of personnel management, the roles and competencies of a personnel manager.
Lecturer prof Mare Pork, lect Kadi Liik

APPENDIX 5 Accreditation of the curriculum "Teacher of Mathematics and Informatics" from 1998

JOINED FINAL REPORT

VISITED INSTITUTION:

Department of Mathematics and Computer Science,

Tallinn Pedagogical University

ASSESSED PROGRAMME(-s):

Mathematics-informatics

DATE of VISIT

March 26 - 27, 1998

EXPERT TEAM MEMBERS:

(1) Professor Olli Martio, University of Helsinki

(2) Professor Erik Christenssen, University of Copenhagen

(3) Professor Jean-Louis Clerc, University Henri Poincare

(4) Professor Rudi Hirschfeld, Belgium

J.-L. CLERC

Excerpt of the final report (parts related to computer science)

The Department provides excellent facilities and experienced teachers for the training of school teachers in computer science. This kind of continuous education should be used more.

Computer training is extensive and very well organised.

Computer classes are of up to the best standards in Europe. However, the students complain that the free access to the computers is limited.

For most courses there is material in Estonian prepared by the teachers. In some cases this is rather old. New, computer based material is up-to-date.

The nature of Computer Science is such that there is no danger to be far behind.

At this moment there is a need for more students in Computer Science.

In general, it seems that there is enough staff for teaching. The new computer science diploma studies might require new teachers.

The staff has been active in a number of Tempus programs. This has been beneficial for the computer science developments in particular. Connections to foreign institutions and personal foreign contacts should be developed further. The exchange of teachers provides a good starting point.

Access to information networks and resources is very good in general but there are difficulties with software licenses.

There are very good contacts with former graduates of the University. In Computer Science contacts with the former students measure up to the best standards. This has opened up new possibilities for the fast growing educational market in the field.

Computer facilities are good and the staff is well aware of the modern teaching methods.

APPENDIX 6 Accreditation of the curricula "Computer Science (Bachelor)" and "Informatics – Multimedia and Learning Systems (Master)" from 2002

Higher Education Quality Assessment Centre of Estonia

Joint Final Accreditation Report

Tallinn Pedagogical University

Programs Assessed

6464120 Computer Science (Bachelor)
7464114 Informatics - Multimedia and Learning Systems (Master)

Visit Dates

2002 May 14 &16

Expert Team

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Part I

General Overview

The Higher Education Quality Assessment Centre of Estonia has invited five university experts from Denmark, Finland, Germany, Latvia, and the United States to review and to make accreditation recommendations for two computer-related programs at Tallinn Pedagogical University (the "university"). The programs under review are the three-year bachelor program in Computer Science and the two-year master program in Informatics (Multimedia and Learning Systems). The Faculty of Mathematics and Natural Sciences (the "faculty") directs and oversees these two study fields.

The expert team (the "team") visited the university. Two representatives of the team visited the satellite college at Haapsalu on Tuesday, 14 May. The representatives met with six students and several members of the faculty and administration. The full team visited the Tallinn on Thursday, 16 May 2002. The team met with several full-time members of the faculty and administration. It also conducted a joint interview with a group of seventeen students (six of whom were female) of which fifteen were in the bachelor program and two were in the master program. At each campus, the representatives of the team visited the library of the university and some of the laboratories and conducted discussions with members of the faculty. The faculty and the administration accommodated the needs of the team and in the team's opinion, the outcome of the visit appeared to be a constructive experience for the faculty and the university.

What follows are the findings of the expert team (Part II), its accreditation conclusions (Part III), and its general recommendations (Part IV). In Part II, the findings are relative to the program requirements and criteria as established by the Ministry of Education and approved by the Minister of Education 14 December 1998. These *Requirements for Accreditation of Educational Programme of University* (RTL 1999,9,101), hereinafter called "standards" of accreditation, form the basis for the evaluation by the expert team. The team uses the term "deficiency" to indicate that the program did *not satisfy* a criterion relative to the standards; the university must remove the deficiency as a necessary condition for full accreditation. The team uses the term "concern" to indicate an apparent *weakness* of a program relative to a criterion of the standards; the university should remove a concern before an accreditation renewal. Concerns relative to the standards will be of particular interest during the review by the next expert team. The six categories, indicated by Roman numerals I through VI, correspond to those shown in the standards. Numbers indicated by brackets refer to the particular requirement or criterion in the standards. (For example, [23] refers to requirement number 23 that appears in category III of the standards.)

This team visit constitutes an initial visit for the bachelor program and the master program. Where appropriate in this report, there will be a distinction made between these two programs within each category.

Part II

Findings

The following are the findings of the expert team relative to the standards. The self-study report submitted by the university, the observations made at the time of the visit, and the supplementary material received by the expert team during the visit form the basis of these findings. The findings reflect the team's general observations about the bachelor and master study field.

The expert team observed rather modern computer laboratories at the university where it existed. Unfortunately, not all areas and laboratories possess ample and modern technological equipment,

particularly the hardware laboratory environment. The team expresses its gratitude to those individuals who prepared the self-analysis reports for their clear presentations.

I: Structure and Management of Educational Policy

The university has restructured its computer-related programs falling under the Faculty of Mathematics and Natural Sciences. The responsibilities for each area seem clear [1]. The team has found a general level of satisfaction regarding the goals of the unit. However, there is some confusion how these goals fit into the vision and mission of the university; such mission are currently not clear and is a concern relative to the standards [2]. There appears to be a concerted effort to develop a systematic procedure to analyze the academic quality of the bachelor program [3]. However, because the master program has existed for less than a year, no procedure is yet in place to analyze the quality of the master program, which is a deficiency relative to the standards [3]. The university has initiated a plan to monitor performance of its teaching staff of the bachelor program [4]. However, little has taken place with regard to the master program, which is a deficiency relative to the standards [4]. The faculty members do monitor the performance of its students on a regular basis for both programs [4]. The participation of the unit in other study fields appears satisfactory at the bachelor level and commendatory for the master level [5].

II: Students

Application of admission quotas function according to prescribed regulations, but their paucity appear to halt the potential growth of the two programs [6]. The Ministry of Education should strongly consider a significant expansion of these quotas in these programs to accommodate the need of quality computer professionals in Estonia. The educational levels of the bachelor and master students correspond to admission requirements and mechanisms are in place to amend deficiencies students might have [7]. Admission procedures and counseling seem complete, adequate, and well-organized [8]. The faculty has a system in place to monitor student achievement in the bachelor program [9]. However, little has taken place at the master level, which is a deficiency relative to the standards [9]. It appears that bachelor students, who may wish to transfer from one program to another at the university, can do so with the approval of the faculty. It is not clear how it is possible to transfer to other universities due to the weak level of mathematics; this is a concern relative to the standards [10]. The newness of the master program makes this transfer ability unclear and is a concern relative to the standards [10].

The team interviewed fifteen bachelor students and two master students from the respective programs. Of the seventeen individuals, eleven were male and six were female. Students were very enthusiastic, strongly motivated to study at this university, expressed satisfaction with their programs of studies and had praise for the dedication and support of their faculty teachers. They did raise a concern that the research facilities of the university are sometimes marginal, particularly regarding hardware facilities and software licenses for multimedia. The team suggests strongly that the university make every effort to ensure that modern facilities are available to the students of the bachelor program by increased funding, cooperation with industry and business, and through grants and other available resources.

A definite need exists for more modern equipment in laboratories, especially those related to hardware. Some laboratories appeared crammed for space, particularly the "lego lab" facility. While students have access to research materials through their professors, there is a serious need for greater expansion of library facilities including current research journals and digital libraries. For example, publications from the world's two largest computing societies (the Association for Computing Machinery – ACM and the IEEE Computer Society) are neither present nor accessible. The team recommends that the university join the digital libraries of ACM and IEEE/CS to ensure the greatest exposure of current research for its students and faculty. Indeed, due to the rapid development of information technology, there is a continuous demand for newly published information course books. At the Haapsalu campus, neither a hardware/network laboratory nor an effective library exists at this time.

III: Study Program (Curriculum)

The faculty has formulated the objectives of each study field [11]. The two programs are comparable with similar programs at other institutions in Europe [12] and are adaptable to the changing circumstances of Estonia [13]. However, the faculty has not assembled an advisory board from business and industry to make recommendations as to the actual needs of the Estonian society. Graduates of the programs should be able to compete in the Estonian labor market [14] and have developed sufficient learning habits to professionally develop in the future [15].

The educational program appears sound [16] and the graduating procedures appear fair and in conformance to the graduation requirements [17]. The laboratories appear adequate (except for hardware) and students should be able to transfer newest knowledge and skills through them [18]. The faculty and the university have recently initiated formal measures to assure program quality at the bachelor level. However, they have not had the ability to use those measures effectively to improve the program, forming a concern relative to the standards [19]. For the master program, no system is in place to measure quality assurance, which is a deficiency relative to the standards [19].

The compulsory part of the area studies of the master program includes courses on mathematics and physics that seem to be incompatible with the general objectives of the program. The team strongly suggests that the faculty replace these courses with more adequate courses.

IV: Educational Process (Teaching)

Teaching methods are up to date with data projection systems where needed [20] and computers and licensed software are a natural part of the two programs [21]. There appears to be no inhabitance for students to transfer between the computer science bachelor program and other bachelor programs at the university [22]. The newness of the master program makes it unclear whether transfer to other master programs is possible; this is a concern relative to the standards [22]. The university and the faculty provide a detailed academic calendar and a well-organized program of study [23]. The manner of conducting student assessment appears comprehensive and fair [24].

V: Organization of Studies and Resources

The programs of study appear well organized to the rational use of the students' time that fosters independent learning [25]. Faculty advisors are accessible by email or phone and can counsel students on a regular basis [26]. The faculty is susceptible to continuously improving its programs [27]. Members of the faculty abide by established procedures for academic duties and promotion to improve the overall goals of the program [28]. At the bachelor level, however, there is a concern that the faculty lacks sufficient number of positions and funding to ensure ongoing research and professional development [29]. At the master level, there is a definite lack of information technology teachers possessing a doctorate degree to ensure ongoing research and development at the graduate level and is a deficiency relative to the standards. This is especially true in the future when students will graduate from the master's program and will look for corresponding doctorate programs in multimedia [29]. A concern also exists regarding the lack of sufficient funding and material resources (expressed earlier) necessary for the development of the programs [30]. Relationships among members of the faculty and between the faculty and the administration appear congenial and in support of the goals of the programs [31].

VI: Feedback and Quality Assurance

The faculty has begun the process of collecting data to assess the outcomes of the bachelor program [32]. No such method exists at the master level, which is a deficiency relative to the standards [32]. However, the faculty does not do this assessment systematically and has not provided evidence that it uses the information to improve the quality of the bachelor program, which is a concern relative to the standards [33]. As no process is yet in place at the master level, by default the lack of a systematic gathering of data on the program is a deficiency [33]. Furthermore, although the faculty and the administration have initiated a quality assurance process with student participation at the bachelor level, they did not demonstrate the methods by which they would correct any weaknesses in the programs [34]. These are serious concerns relative to the standards. At the master level, by default this is a deficiency. Despite these concerns and deficiencies, the team is optimistic that the faculty

and the university will engage in a full outcome assessment process with feedback policies in place in the near future.

Part III

Accreditation Conclusions

Summary

The faculty has dedicated members with strong technical competencies in information technology. The bachelor and master students of the two programs have a strong interest in the study of computing and have commented on the interest shown them by their teachers.

Bachelor Program

Concerning the standards of the Ministry of Education, the team has found no deficiency relative to these standards for the bachelor program. However, while not considered deficiencies relative to the standards, the team has found areas of concern that should be address to improve the future development of the programs and to assist the next evaluation team. These areas include the following.

1. It is not clear how bachelor students can transfer easily between this program and other universities. [10]
2. Although the faculty recently initiated formal measures to assure program quality at the bachelor level, they have not had the ability to use those measures effectively to improve the quality of the program. [19]
3. The faculty lacks sufficient number of positions and funding to ensure ongoing research and professional development. [29]
4. The lack of sufficient funding and material resources inhibits the necessary development of the program. [30]
5. The faculty does not systematically assess the outcomes of the program and has not provided evidence that it uses the information to improve the quality of the program. [33]
6. Although the faculty and the administration have initiated a quality assurance process with student participation at the bachelor level, they did not demonstrate the methods by which they would correct any weaknesses in the programs. [34]

Master Program

Concerning the standards of the Ministry of Education, the team has found several deficiencies relative to these standards for the master program. These are as follows.

1. No procedure is yet in place to analyze the quality of the master program. [3]
2. The university has initiated a plan to monitor performance of its teaching staff of the master program, but little has taken place concerning the master program. [4]
3. It is not clear how students can transfer easily between this program and similar programs at other universities. [10]
4. Although the faculty recently initiated formal measures to assure program quality at the bachelor level, they have not had the ability to use those measures effectively to improve the quality of the program. [19]
5. There is a definite lack of information technology teachers possessing a doctorate degree to ensure ongoing research and development at the graduate level. [29]
6. No process of collecting data from employers currently exists. [32]
7. The faculty neither collects information systematically to assess the program nor uses the information to improve the quality of the program. [33]

8. Faculty has not initiated a quality assurance process with student participation and has not demonstrated the methods by which they would correct any weaknesses in the programs. [34]

While not considered deficiencies relative to the standards, the team has found additional areas of concern that should be address to improve the future development of the programs and to assist the next evaluation team. These areas include the following.

1. The newness of the master program makes transfer ability within the university unclear. [10]
2. The newness of the master program makes it unclear whether transfer to master programs outside the university is possible. [22]
3. There appears to be a lack of sufficient funding and material resources necessary for the development of the program. [30]

Accreditation Recommendation

The expert team has considered the information received, has reflected on the outcome of the accreditation visit. The team makes the following recommendations.

Bachelor Program

The team has found no deficiency relative to the standards, and has found only the concerns cited herein regarding the bachelor program under consideration. Therefore, it recommends to the Accreditation Council to bestow *full* accreditation status to the bachelor program for a period of seven years.

Master Program

The team has found at least one deficiency relative to the standards and several concerns. Therefore, it recommends to the Accreditation Council to bestow *provisional* accreditation status to the master program for a period of two years.

Part IV

General Recommendations

The expert team offers the following recommendations to the faculty and the university. All parties should view these recommendations as suggestions from colleagues as an extension to its official findings mentioned in Part II. The team has not given these recommendations in any order of priority and the parties may consider them for the general improvement of its programs.

- The university must ensure that it will maintain the quality, level, and content of courses that it offers at the two campus locations.

- The Estonian credit point system (40 credits per full study year) differs from other credit point systems. For example, universities in USA use 30 semester-credits per year; European Union countries use the European Credit Transfer System (ECTS), which is 60 credits per year. Nevertheless, students can transfer credits by using the formula ECTS credits equal 1.5 times Estonian credits. However, it may be difficult to convince foreign universities on the transfer equivalence using the current system, especially since there are strong prospects for the incorporation of Estonia in the European Union. The team realizes that this question is out of the hands of the faculty or university, but offers it as a helpful suggestion.

- The faculty and the university should consider joining digital libraries, particularly those of the ACM and the IEEE Computer Society. Digital libraries have the power of desktop access to tens of thousands of professional articles at a fraction of the cost of paper copy publications.

- The expert team realizes that an important challenge for development of the Estonian society is a harmonious and fast development of IT professionals together with the unavoidable surge of IT industry. A balance must be found such that industry does not impoverish IT education and research by attracting young talented researchers exclusively to industry. It is vital for development of Estonian society that industry is backed by a strong publicly financed research and education. The university can accomplish this by having a proportion of young scientists devote their talent to research and education.

- A necessary component in a policy to reach this goal is to offer salaries to young scientists to teach at the university. These salaries must be competitive with those offered by industry. In return, the university must provide an exciting research environment to compete with Estonian industry for talents. Perhaps, and maybe most importantly, it must induce young scientists who have traveled abroad to increase their knowledge and to return to Estonia for their future career. The universities of Estonia should optimize the research possibilities for young lecturers. This touches upon another delicate balance in Estonian science policy. Estonia may send its students abroad to bring back the newest knowledge. The danger is that the young may choose to stay away. It is our firm impression that students want to return to Estonia if financially possible. Hence, competitive salaries for young scientists combined with optimal research possibilities are the guarantee for a prosperous development.

APPENDIX 7 Activities to improve the curriculum Informatics (Multimedia and Learning Systems) according to the suggestions of accreditation committee from May 14-16, 2002

Deficiences:

1. No procedure is yet in place to analyse the quality of the master program.

Comments:

The master program was proposed for accreditation shortly after the program has been launched (the first students were on the first year of their studies). It was not possible to get feedback on the quality of the master program from the employers of the graduates. Meanwhile 11 master theses have been completed (and defended). Extensive measures have been taken to analyse and improve the quality of the master program (for details, see Section 5.3).

One of the graduates (Hans Põldoja) already started his PhD studies abroad (at University of Arts and Design of Helsinki) where the competition to the student places was extremely high – this gives a proof of the high quality of our program.

2. The university has initiated a plan to monitor performance of its teaching staff of the master program, but little has taken place concerning the master program.

Comments:

The monitoring system to measure performance of the teaching staff was already started while expert team visited the university in 2002. However, as the courses had been just started (only one semester was passed) there was only a little number of data available. It has turned out that the quality measures for Informatics (Multimedia and Learning Systems) program were significantly above the University's average: 4,3 against 3,7 this year. Afterwards, performance of the teachers has been systematically monitored at the end of every semester (for details, see Section 5.3.3).

3. It is not clear how students can transfer easily between this program and similar programs at other universities.

Comments:

In Estonia there are no similar programs in other universities. This is caused mainly by the following reasons:

- To ensure possibly wide covering of a subject area by different specialities the Ministry of Education and Research propagates a duplication prevention policy; this means, for example, a new program can be started only if it differs from every existing program at least 30%;
- To be competitive the universities are in the development of their curricula followed their niches where they are the market leaders in Estonia.

Concerning the possibilities for every single student to take courses at other universities, the compulsory part of the curriculum takes only up to 50% of it, meaning that the students have good opportunities to take courses at other universities. (see also Section 3.6 and 2.6)

4. Although the faculty recently initiated formal measures to assure program quality at the bachelor level, they have not had the ability to use those measures effectively to improve the quality of the program.

Comments:

The quality assurance principles and procedures are unified for the bachelor and master programs; now we have had time to use those measures also to improve the quality of our master programs.

5. There is a definite lack of information technology teachers possessing a doctorate degree to ensure ongoing research and development at the graduate level.

Comments:

The teaching staff corresponds to the quality requirements. Meanwhile, Katrin Niglas defended *her* PhD dissertation and two new teachers with PhD degrees (K.Kikkas and M.Plakk) have been employed; a state financed targeted research program and several international joint programs have been started (for details, see Section 4.2). Another teacher with PhD degree – Tom Toomsalu – returned recently from his long-term visit to Canada (University of Toronto).

At the moment, only two subject teachers (Andrus Rinde and Jaagup Kippar) do not have or did not apply for PhD degrees; the presentation of PhD thesis of a third teacher without PhD degree – Mart Laanpere – has already been agreed to take place on March 30, 2004. (see also Section 4.1)

6. No process of collecting data from employers currently exists.

Comments:

The feedback questionnaires were sent to the employers of our first graduates, the data collected and analysed immediately after the completion of the master program (see Section 5.3.3).

7. The faculty neither collects information systematically to assess the program nor uses the information to improve the quality of the program.

Comments:

A systematic collection of the information for assessing the program has been started after the first year of the program has completed (in June 2002). On the bases of the information collected the master program has been slightly modified in 2003. (see also comments to the items 1, 2, 4 and 6)

8. Faculty has not initiated a quality assurance process with student participation and has not demonstrated the methods by which they would correct any weaknesses in the programs.

Comments:

A quality assurance process with student participation has been started after the first year of the program has completed (in June 2002). The findings have been used to improve the program. (see also Section 5.3)

Concerns:

1. The newness of the master program makes transfer ability within the university unclear.

Comments:

Within the university, the closest master program is *Teacher of Computer Science, IT Manager at School;* the overlap between programs is up to 40 credit points (out of 80 credit points), which makes the transfer easily possible.

2. The newness of the master program makes it unclear whether transfer to master programs outside the university is possible.

Comments:

It has been already commented under item 3.

3. There appears to be a lack of sufficient funding and material resources necessary for the development of the program.

Comments:

In 2003, the Tiger University program has been fully started in Estonia. In 2003, the Department of Informatics got 880 000 EEK from this program. Most of the grants are beneficial to development of the master program as master and doctoral studies are declared as the priority areas to support from Tiger University program (more exactly, only 18 600 EEK from the grants are not related to the master programs). (see also Section 4.3.4)

APPENDIX 8 European Credit Transfer System (ECTS)

ECTS – a common language for academic recognition

ECTS, the European Credit Transfer System, was developed by Commission of the European Communities in order to provide common procedures to guarantee academic recognition of studies abroad. It provides a way of measuring and comparing learning achievements and transferring them from one institution to another. This is achieved through the use of common ECTS credit unit and a common ECTS grading scale. ECTS also improves access to information on foreign curricula.

The following elements form part of this implementation

- Exchange of information packages with partner institutions, which provides general information on the host institution as well as detailed descriptions of the degree programs and courses available.
- Student application forms, which are in addition to students giving personal data.
- Learning agreements, which describes the program of study to be taken and the ECTS credits to be awarded for their satisfactory completion.
- Exchange of transcripts of records, which shows the learning achievements of the student prior to and after the period of study abroad. The transcript indicates the course taken by the student, the number of ECTS credit completed and the grades awarded to the students.
- Recognition of credits. The student should be able to continue at his/her home institution after the exchange semester without any loss of time or credit.

ECTS (Europe credit transfer system) grading scale:

A	EXCELLENT- outstanding performance with only minor errors
B	VERY GOOD-above the average standard but with some errors
C	GOOD- generally sound work with a number of notable errors
D	SATISFACTORY-fair but with significant shortcomings
E	SUFFICIENT -performance meets the minimum criteria
FX	FAIL - some more work required before the credit can be awarded
F	FAIL - considerable further work is required

ECTS credits and the Credit System in Estonia

One academic credit in Estonia is calculated as 40 hours of work. This may be awarded for a lecture series, book examination, independent research or another combination of 40 hours of student work. **One academic credit in Estonia equals approximately 1.5 ECTS credits.** ECTS credits express a relative measure of the student workload. In ECTS, 60 credits represent the workload for the full academic year of study.

In order to receive a BA or BSc at the Tallinn Pedagogical University, students are required to achieve successfully a minimum of 120 credits (180 ECTS) over three years of study. Programs are designed to offer 40 credits (60 ECTS) per year (20 (30 ECTS) per semester) to allow students to complete their degree objectives in the required time. However, students may take additional courses for credit to work toward a second major.

APPENDIX 9 Academic staff related to curricula

Name	Degree*	Academic occupation	Teaching at Man. of IT	Teaching at MM & LS
Aleksander Pulver	PhD	professor	+	
Harry Roots	PhD	professor	+	
Mare Pork	PhD	professor	+	
Mart Raukas	PhD	professor		+
Mati Heidmets	PhD	professor	+	
Paul Tammela	PhD	professor		+
Peeter Lorents	PhD	professor	+	
Peeter Normak	PhD	professor	+	+
Tiit Elenurm	PhD	professor	+	
Tõnu Lehtsaar	PhD	professor	+	
Ülo Ugaste	PhD	professor		+
Pertti Järvinen	PhD	professor emeritus	+	+
Jaak Henno	PhD	associate professor		+
Larissa Jõgi	PhD	associate professor		+
Paul Leis	PhD	associate professor	+	+
Tõnu Laas	PhD	associate professor		+
Indrek Tart	PhD	senior researcher	+	
Kaido Kikkas	PhD	senior researcher		+
Mari Plakk	PhD	researcher		+
Katrin Niglas	PhD	lecturer	+	+
Tom Toomsalu	PhD	lecturer	+	+
Mart Laanpere	MSc/PhD	lecturer		+
Priit Parmakson	MSc	lecturer	+	
Kadi Liik	MSc	lecturer	+	
Eve Lamberg	MBA	lecturer	+	
Jaagup Kippar	MA	lecturer		+
Heidi Meier	MA	lecturer		+
Katrin Aava	MA	lecturer		+

Name	Degree*	Academic occupation	Teaching at Man. of IT	Teaching at MM & LS
Sigrid Salla	MA	lecturer		+
Andrus Rinde	HE5y	lecturer		+
Eero Johannes	HE5y	lecturer	+	+
Indrek Hiie	HE5y	lecturer	+	
Olev Räisa	HE5y	lecturer		+
Guido Leibur	He5y	lecturer	+	

- Degrees "Candidate of Science" given before 1992 are officially equal to the PhD and are marked in the table accordingly
- HE5y – higher education (5 years program) – the level is equal to the new masters degree
- For holders of masters degrees the nominal period of study has been HE5y plus 2 years of master studies

Teaching Staff related to the curriculum Informatics (Multimedia and Learning Systems)

General subjects 14 CP

Code	Title of a subject	CP	Teachers
MMG 7001	Mathematical Modelling and Simulation	4.0	Prof Paul Tammela (PhD)
MLR 7001	Modern Physics	4.0	Prof Ülo Ugaste (PhD) Assoc prof Tõnu Laas (PhD)
MII 7001	Web Based Learning Environments	3.0	Lect Jaagup Kippar (MA)
	Optional subjects (to be chosen 3 CP)		
EKA 7002	Andragogy	3	Assoc prof Larissa Jõgi (PhD)
FEL 7003	Argumentation and Rhetoric	3	Lect Katrin Aava (MA)
MIA 7002	Data Analysis	3	Lect Katrin Niglas (PhD)
SFF 7001	Contemporary Social Philosophy	3	Prof Mart Raukas (PhD)
SOT 7002	Project Planning	3	Lect Sigrid Salla (MA)
In this block usually 11 CP (78%) from 14 CP are supervised by the teachers with PhD			

Major 40 CP + master thesis 20 CP

Code	Title of a subject	CP	Teachers
MII 7002	Multimedia Design	4.0	Researcher Kaido Kikkas (PhD) Lect Andrus Rinde (He5y)
MII 7003	Multimedia Development	4.0	Prof Jaak Henno (PhD) Lect Andrus Rinde (He5y)
MII 7004	Multimedia Production	4.0	Lect Andrus Rinde (He5y)
MII 7006	Design of Multimedia Based Learning Software	3.0	Lect Mart Laanpere (MA/PhD)
FEL 7045	Text Analysis and Writing	3.0	Lect Heidi Meier (MA)
MII 7042	ICT in Curriculum Development	3.0	Lect Mart Laanpere (MA/PhD)
MII 7007	Management of IT projects	4.0	Prof Peeter Normak (PhD)
MII 7009	Master Seminar	4.0	Prof Peeter Normak (PhD) Lect Katrin Niglas (PhD)
MII 7015	Individual Subject in the Area of Specialisation	5.0	Supervisor of MA thesis (PhD)
MII 7016	Master Thesis	20.0	At least one supervisor with PhD degree
In this block 47 CP (87%) from 54 CP are supervised by the teachers with PhD from 2004 on.			
	Optional subjects (to be chosen 6 CP)		
MIA 7007	Research Methods	3.0	Prof Pertti Järvinen (PhD) Lect Katrin Niglas (PhD)
MII 7008	Distance Education Technology	3.0	Lect Mart Laanpere (MA/PhD)
MII 7044	Didactics of Informatics	4.0	Lect Mart Laanpere (MA/PhD)
MII 7030	ICT Strategic Management	3.0	Prof Paul Leis (PhD)
MII 7040	Legal Issues Related to IT-Development	3.0	Lect Eero Johannes (He5y)
MII 6023	Computer Graphics	3.0	Researcher Mari Plakk (PhD) Lect Olev Räisa (He5y)

In the curriculum Informatics (Multimedia and Learning Systems) 58 - 64 CP (78-86%) from 74 CP are supervised by the teachers with PhD degrees (6 CP from 80 CP are free electives).

Teaching Staff related to the curriculum Management of Information Technology

General subjects 14 CP

Code	Title of a subject	CP	Teachers
SPK 7001	Theories of Organisation	4,0	Prof Harry Roots (PhD)
SPK 7002	Strategic Management	4,0	Prof Tiit Elenurm (PhD)

Major 40 CP + master thesis 20 CP

Code	Title of a subject	CP	Teachers
MII 7030	ICT Strategic Management	3,0	Prof Paul Leis (PhD)
MII 7031	Development of Infrastructure of Information Technology	3,0	Lect Guido Leibur (He5y)
MII 7032	Administration of Information Technology	3,0	Lect Indrek Hiie (He5y)
MII 7033	Administration of Information Systems	3,0	Lect Priit Parmakson (MSc)
MII 7007	Management of IT Projects	4,0	Prof Peeter Normak (PhD)
SPK 7017	Group processes in organisations	2,0	Prof Aleksander Pulver (PhD)
MII 7048	Financial Management	3,0	Lect Eve Lamberg (MBA)
MII 7038	Professional Placement in the Area of Specialisation	4,0	Supervisor of Master Thesis (PhD)
MII 7039	Master Seminar	4,0	Prof Peeter Normak (PhD) Lect Katrin Niglas (PhD)
MII 7041	Master Thesis	20,0	At least one supervisor with PhD degree
In this block 37 CP (76 %) from 49 CP are supervised by the teachers with PhD			
	Optional subjects (to be chosen 17 CP)		
SPP 7002	Basics of Research	3,0	Prof Mati Heidmets (PhD)
MIA 7007	Research Methods	3,0	Prof Pertti Järvinen (PhD) Lect Katrin Niglas (PhD)
MIA 7002	Data Analysis	3,0	Lect Katrin Niglas (PhD)

MII 7037	Applied Activities in the Area of Specialitsation	4,0	Supervisor of Master Thesis (PhD)
MII 7040	Legal Issues Related to IT-Development	3,0	Lect Eero Johannes (He5y)
MII 6015	Information Systems	3,0	Lect Priit Parmakson (MSc)
SOT 6026	Social, Ethical and Psychological Aspects of Computer Usage	3,0	Senior researcher Indrek Tart (PhD)
SPK 7015	Personality and Social Psychology in Organisations	3,0	Prof Aleksander Pulver (PhD)
SPK 7018	Public Presentation Skills	2,0	Prof Tõnu Lehtsaar (PhD)
SPK 7019	Personnel Management	3,0	Prof Mare Pork (PhD), Lect Kadi Liik (MSc)

In the curriculum Management of Information Technology 59 - 62 CP (80-84%) from 74 CP are supervised by the teachers with PhD degrees (6 CP from 80 CP are free electives).

APPENDIX 10 Academic staff and their area of teaching

Name	Year of birth	Teaching service	Speciality by diploma	Area of teaching
Aava Katrin	1963	16 a	Teacher of estonian language and literature	Estonian language, communication, rhetoric
Elenurm Tiit	1952	25 a	Economist (industrial management and planning)	Management and Organization
Heidmets Mati	1949	23 a	Psychologist	Social psychology, research methodology
Henno Jaak	1941	39 a	Mathematic	Multimedia Development
Hiie Indrek	1969	5 a	process engineer	Administration of Information Technology
Johannes Eero	1975	7 a	Law	Patent & Copyright
Jõgi Larissa	1958	21 a	Educational scientist	Andragogy
Järvinen Pertti	1940	41 a	Mathematician	Research methodology, information systems
Kikkas Kaido	1969	9 a	Engineer	Educational technology
Kippar Jaagup	1976	8 a	teacher of sciences and informatics	Programming
Laanpere Mart	1963	12 a.	teacher of mathematics and informatics	Multimedia, Learning System Design, IT in Curriculum Design
Laas Tõnu	1969	7 a	Physicist	Applied and general physics
Lamberg Eve	1958	8 a	Business administrator	Financial management

Name	**Year of birth**	**Teaching service**	**Speciality by diploma**	**Area of teaching**
Lehtsaar Tõnu	1960	16 a	psychologist	Public Presentation Skills
Leibur Guido	1948	15 a	engineer	Development of Infrastructure of IT
Leis Paul	1946	33 a	IT-specialist	ICT Strategic Management
Liik Kadi	1961	18 a	Psychologist	Organizational psychology
Lorents Peeter	1951	29 a	teacher of mathematics	Intelligent Systems
Meier Heidi	1977	3 a	Teacher of Estonian language and literature	General and applied linguistics
Niglas Katrin	1970	9 a	teacher of mathematics and informatics	Data Analysis, research methodology
Name	Year of birth	Teaching service	Speciality By diploma	Area of teaching
Normak Peeter	1952	26 a	Mathematician	Theoretical Computer Science, Management of IT projects
Parmakson Priit	1961	18 a	IT-specialist	Information Systems
Plakk Mari	1951	5 a	Engineer	Multimedia, computer graphics
Pork Mare	1950	26 a	psycologist	Personnel Management
Pulver Aleksander	1956	23 a	psychologist	Group processes in organization, coping and stress management
Raukas Mart	1960	17 a	Mathematician, philosopher	Philosophy
Rinde Andrus	1971	10 a	Teacher of mathematics and informatics	Multimedia
Roots Harry	1950	30 a	Teacher of history and social sciences	Organization theory, strategic management
Räisa Olev	1948	13 a	Engineer (area: electronic computers)	Computer Graphics, general computer science courses

Name	**Year of birth**	**Teaching service**	**Speciality by diploma**	**Area of teaching**
Salla Sigrid	1974	5 a	Teacher of Estonian language and literature	Project management
Tammela Paul	1945	29 a	Mathematician	Geometry, mathematical modelling and simulation
Tart Indrek	1946	10 a	Physicist, (MA in information science and PhD in comparative literature)	Sociology, ethics
Toomsalu Tom	1955	23 a	Mathematician	Programming, IT management
Ugaste Ülo	1939	28 a	Physicist	Physics

APPENDIX 11 Research projects of faculty members completed during 1999-2003

Project name	**Cooperation partners**	**Source of financing**	**Size of grant**
"A New Curriculum in the Application of Mathematics";	University of Sunderland Tampere Univ. of Technology Tallinn Technical University Tartu University	TEMPUS JEP-11202 (1997-2000)	In total 390850 ECU
"Creation of Master Program in Multimedia and Learning Systems"	Tampere University of Technology Tallinn Pedagogical University Tallinn Technical University Tartu University Estonian Academy of Arts Universiteit Twente, Enschede Institute of Technology, Tallaght	TEMPUS JEP-12418 (1997-2001)	For TPU ~ 972 000 EEK

Topic	**Date**	**Supervisor**	**Researchers**
The Combined Use of Quantitative and Qualitative Methods in Educational Research	1997-2003	Prof. Peeter Normak	K.Niglas
Web-Based Electronic Learning Environments	2001 – 2003 first phase	Prof. Peeter Normak	M. Laanpere, O. Räisa, J. Kippar, R. Rannala, H. Põldoja
Teacher's Support Systems for Web-Based Environments	2000 - 2002	Prof. Peeter Normak	R. Rannala
Integrated Approach for Web Programming	2000 - 2002	Prof. Peeter Normak	J. Kippar

APPENDIX 12 Graduates

Management of Information Technology

No	Name	Title of the thesis	Supervisor(s)
1	Andro Kull	Information Systems Strategic Planning in Estonian Government Institutions	Paul Leis (PhD)
2	Nele Pihlak	Integration Issues in the Balance of Payments Information System of the Bank of Estonia	Priit Parmakson (MSc) Consultant P. Normak (PhD)
3	Kaidi Ilves	Skills, Personality Traits and Know-how of IT Leader	Peeter Lorents (PhD)
4	Anne Parts	IT Risk Assessment on the Example of Elektroskandia AS	Monika Oit (PhD)
5	Gunnar Piho	Introducing XP-methodology in a Small Estonian Software Company	Peeter Normak (PhD)
6	Viktoria Jurtšenko	Software Acquisition Strategy Development	Paul Leis (PhD)
7	Teet Lõhmus	Strategic Analysis of Information System of IT Infrastructure Development Organisation	Rein Kuusik (PhD)

Informatics (Multimedia and Learning Systems

No	Name	Title of the thesis	Supervisor(s)
1	Hans Põldoja	User Interface Design for a Web-based Learning Management System	Mart Laanpere (MSc) Consultant P. Normak (PhD)
2	Riina Randmaa	Application of the Means of Multimedium for Teaching Wood Elaboration at Vocational Schools	Ants Tarraste (PhD)
3	Tõnis Eelma	The Website for the Project "Hello Spring!"	Eno Tõnisson (MSc) Consultant P. Normak (PhD)
4	Valdeko Kalamees	Process of Setting up Web-Based Learning on the Example of Tõrva Gymnasium	Anne Villems (MSc) Peeter Normak (PhD)
5	Martin Sillaots	Project Management e-conspectus	Peeter Normak (PhD)

6	Margit Konno	Multimedia-Based Study Software for Application of Vocational Curriculum on the Example of Marketing Module	Sirje Rekkor (MA) Peeter Normak (PhD)
7	Toomas Rähn	Vector and Bitmap Graphics by CorelDRAW Graphics Suite	Viivi Jokk, (MSc) Peeter Normak (PhD)
8	Sirje Klaos	Basic Course on Educational Technology for Teacher Education - Multimedia Textbook for Self-study	Mart Laanpere (MSc) Peeter Normak (PhD)
9	Tiina Puusalu	Study Program on Ratio and Percentage for Lower Secondary School	Madis Lepik (PhD)
10	Janek Solodin	Multimedia-based Tutoring System for Users of the State Register of Criminal Cases	Mart Laanpere (MSc) Peeter Normak (PhD)
11	Andres Krall	Multimedia Textbook on Computer-assisted Product Design – Development and Formative Evaluation of a Prototype	Mart Laanpere (MSc) Peeter Normak (PhD)

Management of Information Technology

No	Name	Company	Occupation
1	Andro Kull	Estonian Labour Market Board	Head of IT Department
2	Nele Pihlak	Bank of Estonia	Administrator of Information Systems
3	Kaidi Ilves	AS Profit Software	Project Manager
4	Anne Parts	Elektroskandia AS	IT Manager
5	Gunnar Piho	Systek Informationsystems OÜ	Project Manager
6	Viktoria Jurtšenko	Hansapank AS (Bank)	Designer-programmer
7	Teet Lõhmus	Microlink AS	Head of Client Management

Informatics (Multimedia and Learning Systems

No	**Name**	**Company**	**Occupation**
1	Hans Põldoja	Helsinki University of Art and Design	PhD student
2	Riina Randmaa	Võrumaa Kutsehariduskeskus (Center for Vocational Education)	Lecturer in the field of IT
3	Tõnis Eelma	SA Archimedes	IT support person
4	Valdeko Kalamees	Tõrva Gymnasium	IT Manager
5	Martin Sillaots	AS Audentes	Assistant Dean of the Faculty of Information Technology
6	Margit Konno	Kehtna Economy and Technology School	Teacher in the field of IT
7	Toomas Rähn	Viljandi Maagümnaasium (Gymnasium)	Teacher of Math. and IT
8	Sirje Klaos	Tallinn Pedagogical University	Lecturer in the field of IT
9	Tiina Puusalu	Sinimäe Põhikool (School)	Director
10	Janek Solodin	Ministry of Justice	Administrator of Information Systems
11	Andres Krall	Jakob Westholm Gymnasium	Teacher in the field of IT

APPENDIX 13 Publications

13.1 Refereed articles

Borowiecki M., De Chiara P., Dubrovsky A.V., Dyomina E.V., Gribkov V.A., Ivanov L.I., Maslyaev S.A., Mezzetti F., Miklaszewski R., Pimenov V.N., Pizzo L., Scholz M., Szydlowski A., Ugaste Y., Volobuev I.V. (2001). Experimental study of a powerful energy flow effect on materials in PF-1000 installation. Nukleonika, 46 (Supplement 1), S117-S122.

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Danielewski M., Bachorczyk R., Bozek B, Milewska A., Ugaste Ü. (2001). Diffusion structures and diffusion paths in ternary systems - comparison of Onsager and Darken models. Def. Dif. Forum, 194-199, 1737-1744.

Gribkov V.A., Pimenov V.N., Ivanov L.I., Dyomina E.V., Maslyaev S.A., Miklaszewski R., Scholz M., Ugaste U.E., Doubrovsky A.V., Mezzetti F., Kulikauskas V.S., Zatekin V.V. (2003). Interaction of High Temperature Deuterium Plasma Streams and Fast Ion Beams with Condensed Materials in Dense Plasma Focus Device. J. Phys.D: Appl. Phys., 36, 1817 – 1825.

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Heidmets, M., Raudsepp, M (2001). A conceptual framework for studying environmental mentality and behavior. Trames, 5 (55/50), 3, 198-210

Holmberg P., Lember T., Perkkiö J., Ugaste Ü. (1999). Physics III. General course with samples from biology and medicine. - Tallinn: TPU Press, 202 p. (in Estonian)

Ivanov L. I., Pimenov V. N., Ugaste Ü., Dyomina E. V., Maslyaev S. A.,.Gribkov V.A, Mezzetti F. (2001). Diffusion loss of hydrogen isotopes from ferrum-based alloys. Def. Dif. Forum, 194-199, 1093-1098.

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Kropman D., Kärner T., Abru U., Strik M., Ugaste Ü. (2001). Point defects interaction with extended defects in the Si-SiO2 system during the process of its formation. Def. Dif. Forum, 194-199, 1737-1744.

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Henno, J. "Computer Graphics" (Toolbook-book, also available on WWW)

Henno, J. "Digital Media" (Powerpoint Presentation in WWW, also available on WWW)

Henno, J. "Introduction to Toolbook" (Toolbook-book, also available on WWW)

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Personnel Management

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APPENDIX 15 Resources

15.1 Hardware in computer labs

P-321:

17 workstations for students
CPU: Intel Pentium 4 1.6GHz
RAM: 512MB
HDD: 40GB
Graphics adapter: Aopen TNT2 32MB
Sound card: Ceative SB Live
Network adapter: NetVin 10/100Mbps
CD-ROM: 52x
Keyboard: KeyTronic, EST layout
Mouse: Logitech
Monitor: Samsung 151S 15" (LCD)

1 teacher workstation:
CPU: Intel Pentium 4 1.6GHz
RAM: 512MB
HDD: 2 * 40GB
Graphics adapter: Aopen TNT2 32MB
Sound card: Creative SB Live
Network adapter: NetVin 10/100Mbps
CDRW: SONY 52x
CDROM
Keyboard: KeyTronic, EST layout
Mouse: Logitech
FireWire
Monitor: HP D8911AHP91 19" (CRT)

Other devices:
Scanner: HP Scanjet 5400c
Dataprojector: Mitsubishi LVP-X250U

P-415:

21 workstations:
CPU: Intel Pentium III 667MHz
RAM: 128MB
HDD: 20GB
Graphics adapt.: ATI Xpert2000Pro 16MB
Sound adapter: integrated
Network adapter: 3Com 10/100Mbps
CD-ROM: 52x
Keyboard: KeyTronic, EST layout
Mouse: Logitech
Monitor: Hansol 17" 710P (CRT)

Other devices:
Dataprojector: AstroBeam X211

K-303:

20 workstations:

CPU: Intel Celeron 400MHz
RAM: 128MB
HDD: 6GB
Graphics adapter: ATI Xpert98 8MB
Sound card: Creative SB64PCI
Network adapter: Genius 10Mbps
CD-ROM: 40x
Keyboard: KeyTronic, EST layout
Mouse: Logitech
Monitor: Hitachi 17" CM643 (CRT)

1 teacher workstation:

CPU: Intel Celeron ??300
RAM: 64 MB
HDD: 20 GB
Graphics adapter: integrated
Sound card: integrated
Network adapter: realtek
CD-ROM:
Keyboard: KeyTronic, EST layout
Mouse: Logitech
Monitor: ADI provista 17"

Other devices:

Dataprojector: SHARP Notevision XG-NV5XE

P302:

20 workstations:

CPU: Intel Pentium 42,4GHz
RAM: 512MB
HDD: 80GB
Graphics adapter: integrated
Sound card: integrated
Network adapter: integrated
CD-ROM: CD-RW Lite-On (52x32x52)
Keyboard:Logitech Est
Mouse:Logitech S69 Optical Wheel

Other devices:

Data-videoprojector Sharp PGC-45X

1 teacher workstation:

CPU: Intel Pentium P4 2,4GHz
RAM: 512MB
HDD: 80GB
Graphics adapter: integrated
Sound card: integrated
Network adapter: integrated
CD-ROM: CD-RW Lite-On (52x32x52)
Keyboard: Logitech Est
Mouse: Logitech S69 Optical Wheel
Monitor: 17" LCD Samsung SM 172s
FireWire

P509:

CPU: Intel Pentium 4 2,8GHz

RAM: 2x 512MB DDR

HDD 1: 250GB SATA

HDD 2: 160GB SATA

Graphics adapter: 128MB AGP GF4 Ti-4800 Gainward

Sound card: Creative SB Audigy 2 ZS Platinum Pro

Network adapter: integrated

CD-ROM:Sony Dual DVD+/- Writer DRU-510A

Keyboard: Keytronic KT-1000 Est

Mouse: Logitech MX300 Optical

Monitor: 17" LCD Samsung SM 172S

Maxtor FWire PCI 2-port

Other devices:

Video capture board: Fast DV-NOW-av for digital video mastering/editing.

Scanner: HP ScanJet 5550C (C9919A)

Loudspeakers: Creative inspire 2.1 380

Headphones: Sennheiser HD20

Microphone: AM dynamic microphone

Digital video camera: Sony DCR-TRV33

Tele-conversion lens: VCL-2030

Tripod: VCT-D680RM

Digital camera: Canon Powershot G5

Tablet: Wacom XD-1212U-D A4 Intuos2

MIDI keyboard

Slide scanner: HP Photo S20 USB

CPU: Intel Pentium 4 2,4GHz

RAM: 2x 512MB DDR

HDD 1: 120GB SATA

HDD 2: 160GB SATA

Graphics adapter: 128MB AGP GF4 Ti-4800 Gainward

Sound card: Creative SB Audigy 2 ZS Platinum Pro

Network adapter: integrated

CD-ROM: Sony Combo CRX-300A (DVD/CD-RW)

Keyboard: Keytronic KT-1000 Est

Mouse: Logitech MX300 Optical

Monitor: 17" LCD Samsung SM 172S

Apple eMac 1GHz/128/60G/COMBO-IEA, Apple Keyboard, Wht, iMac - SWE

Mobile laptop for lecturer

CPU: 1,5GHz Intel Centrino HP NX700

RAM: 512MB

HDD: 40GB

Graphics adapter: integrated

Sound card: integrated

Network adapter: integrated

CD-ROM: DVD/CD-RW

Monitor: 15,4'' WSXGA ekraan

fire-wire

bluetooth

Dataprojector: Sharp PGM20X

Portable screen with stand (200*200 cm)

15.2 Servers in the department

Bitt - fileserver:

CPU: Celeron 2.5GHz
RAM: 256MB
HDD: 20GB + 4*120GB in RAID5 array
NIC: Inter EtherExpressPro100 10/100Mbps

Minitorn - Webserver:

CPU: Celeron 533
RAM: 192MB
HDD: 20GB + 1GB
NIC: Intel EtherExpressPro100 10/100Mbps

Greeny – students use it for designing and testing web applications and programming:

CPU: Celeron 366MHz
RAM: 64MB
HDD: 1GB + 4GB + 10GB
NIC: 3Com Corporation|3c905C-TX [Fast Etherlink] 10/100Mbps

Prunt – Database server

P4 2,4GHz
1024MB RAM
120GB HDD
CD-ROM
10/100Mbps ethernet

Secondary database server

P4 2,4GHz
512MB RAMr
120GB HDD
CD-ROM
10/100Mbps ethernet

15.3 Other equipment

Digital camera: Kodak DC120 Zoom and Olympus Zoom C3000

Video camera: Sony DCR TRV320E

VideoCasetteRecorder: Sony SLV-SE700

Slidescanner: 35mm Minolta Dimâge Scan Dual

Yamaha PSR-220 synthesizer - MIDI keyboard

Roland SoundCanvas SC-88 MIDI synthesizer

Dataprojector: CTX EzPro 500

Printer: HP CLJ 2500L

15.4 Software

In computer labs K303, P415, P321 we use the operating system Windows 98 SE, in computer lab P302 we use the operating system Windows 2000 Pro.

All servers use operating system: RedHat Linux.

P321:

MS Office 97
Adobe Premiere 5.1
Macromedia Flash 5
Jdk 1.3
Mozilla 1.5
OpenOffice 1.1.0
Internet Explorer 5.5
SPSS For Windows 10.0
Borland C++ Builder 5.0

P415:

MS Office 97
OpenOffice 1.1.0
Free Pascal 1.04
Netscape Communicator 4.8
Internet Explorer 5.5
Mozilla 1.5
Opera 7.11
Adobe Acrobat 5.0
Adobe Illustrator 8.0
Adobe Photoshop 5.5
CorelDraw 10
Macromedia Flash 5
Macromedia Generator 2
Norton Antivirus 2001 PRO
Java2 SDK 1.4.0
Netscape Communicator 4.79

K303:

MS Office 97
Mathematica 4.1
Type Trainer 2.1
Free Pascal 1.04
Studyworks
OpenOffice 1.1
CorelDraw 7
Ghostview 4.2
Ghostscript 7.04
MikTex 0.98
Netscape Communicator 4.79
SPSS For Windows 10.0
Internet Explorer 5.5
djgpp - C compiler

P302

Windows XP PRO OEM
CorelDRAW Graphics Suite 11 Academic

P509

MS Windows XP Professional (2)
Macromedia Authorware 6.5 Edu
Macromedia Flash MX Edu (2)
Macromedia Director MX Euro Edu
Adobe Premiere 6.5 (2)
Adobe Aftereffects 6.5
CorelDraw 11 Graphic Suite Academic (2)
ToolBook Instructor 8.5 Educational
CoolEdit Pro
FineReader 6.0 professional

Mobile laptop for lecturer

MS Office Pro XP
MS Windows XP operating system

In addition we have 1 licence for:
CorelDraw 9
CorelDraw 10
MS Visual Basic 5.0

APPENDIX 16 Budget of Computer Science Department.

Expenditure in 2003

salaries	taxes 33,5%	other expences	Scholarships	Total
1 760 000	589 600	582 000 + from EITSA 200 000	90 000	3 221 600 EEK

Budget for 2004

salaries	taxes 33,5%	other expences	Scholarships	Total
2 000 000	670 000	700 000 + from EITSA 500 000	100 000	3 970 000 EEK

There is an additional backlog approximately 2 500 000 EEK which comes from the residue of past years.

APPENDIX 17 Learning Management System IVA

LEARNING MANAGEMENT SYSTEM IVA

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Keywords: learning management systems, knowledge building, constructivism.

IVA is a Web-based learning management system, which is developed in Tallinn Pedagogical University (Centre for Educational Technology and Department of Computer Science) in order to advocate constructivist approaches and practices in e-learning.

We have tested and tried to implement various commercial and free learning management systems in our university in previous years. We started using WebCT in 1998 but due to important rise of licence fees we had to move on to more affordable solutions. In last few years many new learning management systems have become available. Often these programs include more pedagogical innovation than commercial products that have been in the market since mid-90's. Unfortunately there was no free learning management system that would cover the full functionalities needed by the university. Also most of the tested learning management systems had important usability problems and were difficult to learn (Põldoja and Laanpere 2002).

In autumn 2001 it was decided to develop our own e-learning platform. The project started in summer 2002 with the financial support from the Estonian Ministry of Education and Science. We decided than we are going to build learning management system using available open source products and release our product under GPL license. Zope-based learning management system FLE3 which is developed in Helsinki University of Art and Design seemed to be the most suitable starting point for us.

IVA is a metaphor in Estonian language and means "a seed" (also "point" or "meaning"). In 1817, reverend Otto Reinhold von Holtz published a series of moralist stories for Estonian peasants under a slogan "story is a shell, meaning is a seed". Since then this slogan has been widely used among teachers and teacher educators in Estonia, when they want to stress the importance of looking deeper below the surface in order to understand better the meaning, or "the point" of phenomena. On another hand it could be read as an acronym, but we are still uncertain if it is Interactive Virtual Academy or *Ilus Vaba Asjalik* (in Estonian: beautiful, free, useful).

As opposed to many commercial Learning Management Systems, IVA is not "pedagogically neutral". The structure and functionalities of IVA system advocate constructivist approaches to learning and teaching. For constructivists, learning is not merely transmission of objective knowledge - each learner constructs actively his/her own "picture of the world", associating new meanings with previous experiences and communicating with others. According to D.H.Jonassen (1994) , the three most important conceptual pillars for designing a truly constructivist learning environment are three C-s:

- Meaningful and authentic Context for learning,
- Tools, support, time and space for personal knowledge Construction
- Support for Collaboration and group reflection and production.

Referring to these three pillars, we designed IVA user interface in three sections (Laanpere et al 2003):

- Bookshelf, a space and tools for providing context for meaningful learning
- Webtop, a space and tools for personal knowledge construction and reflection
- Workshops, a space and tools for student collaboration and group communication.

Webtop is divided to two sections which are public Portfolio and private Drawer. These sections can hold such objects as files, web links and simple text documents (memos). All the forementioned objects can be grouped into folders. At the end of the course portfolio will include all documents and presentations made by the student during the course. This way it can be a major part of assessment. In the Drawer each student can access his or her activity monitoring data, quiz results and course grades.

Webtop also includes simple textbased content management system Wiki which can be used to produce hypertext documents inside IVA environment. Wiki is based on powerful yet simple concept that allows everyday users to create and edit every page in a Wiki site. A good example of what can be done with Wiki is Wikipedia – free online encyclopedia which can be edited and updated by every visitor (see www.wikipedia.org).

Bookshelf has basically the same functionalities as Webtop but it is designed for course materials prepared by the teacher. Under the Bookshelf section students can also access course information page. No objects in Bookshelf can be edited by students and therefore Bookshelf does not include Wiki.

The most interesting and innovative part of IVA is Workshops section which offers different tools for computer supported collaborative learing. Some of the tools like Knowledge Building and Jamming are inheritated from FLE3, others like Subgroups and Quiz are developed by us.

Knowledge building is a structured discussion environment. Teacher can add a context (description of a problem) and there is a separated threaded discussion under each course context. Knowledge building discussions are also organised by thinking types – each author have to choose a thinking type which best describes his or her note (see Figure 1). By default there are two thinking type sets included with IVA. *Design thinking types* support the process of making design decicions in web based discussion environment while *progressive inquiry* is a good tool for developing students own theories (Leinonen et al 2002). Each note may include a picture and a hyperlink.

Jamming is a tool for collaborative construction and versioning of digital media objects. All students can make a new version of a media file and upload it to IVA environment. The inheritage of objects is shown graphically and all objects can be commented by other students.

There is a course Wiki under the Workshops section which can be used by all members of the course. For group work we developed subgroups which are closed areas for sharing Webtop objects between members of a group. All webtop items except Wiki are possible in Subgroup.

In Estonian universities there is a strong need for testing tool in learning management system although automatic quizzes are not the best assessment method according to the social constructivist learning theory behind IVA. Therefore we have developed quiz tool for IVA. The question types include all the question and tests interoperability standards compatible question types such as matching, multiple choice, numerical, mark all correct, yes/no, paragraph and short answer. Besides that we have added automatic question generation engine, which can be used in chemistry for solving percentage calculation exercises (e.g. solution strength). In the future we are planning to add more question generation engines such as kinematic problems in Physics. This kind of engines are unique and can not be found in any other learning management system

we have encountered yet.

IVA is currently used in Tallinn Pedagogical University, Linz Pedagogical Academy (Austria), European doctoral summer school and several schools in Estonia. IVA is currently available with English, German and Estonian user interface. Finnish, Russian and Portuguese localizations are under work and should be available by the end of year 2003.

IVA is a true open source software project and we are looking forward to establish a wider community of programmers and users who would help us to develop new features, looks, translations and knowledge types for IVA. For more information about IVA learning management system you should visit our website: http://www.htk.tpu.ee/iva/.

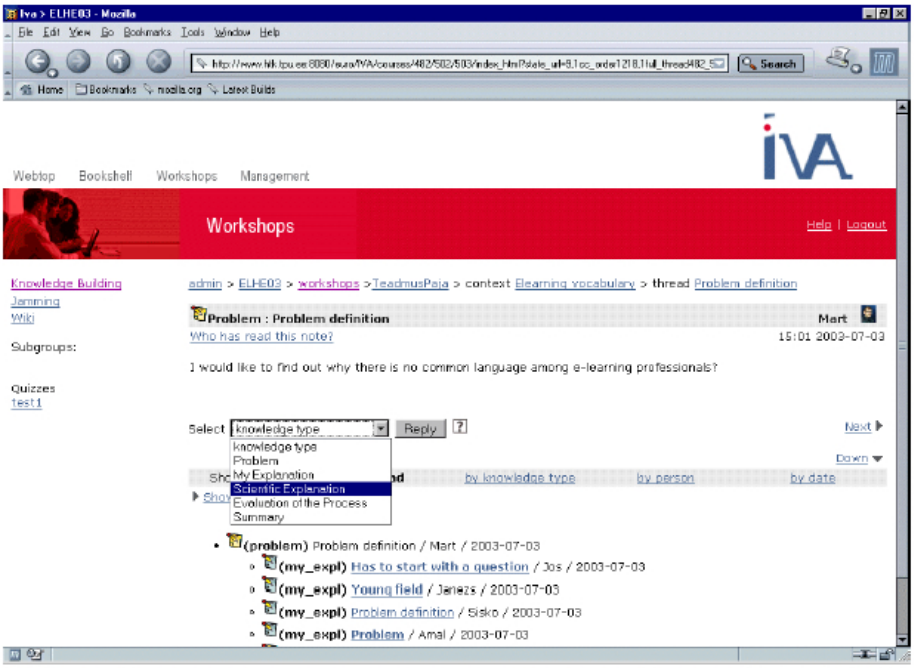

Figure 1. Choosing a thinking type for a message in Knowledge Building forum

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APPENDIX 18 An example of feedback questionnaire

Dear ..... student

Please evaluate the courses you took on the last semester. Fill in the following table by writing in every cell the mark which you want to give for that aspect (use the scales given in the header of the table).
Survey is anonymous (thus do not write your name on the questionnaire).
Your sincere and well-founded answers will help a lot in the process of improving the course planning and conduct of study.

Thankfully, Dean

NB! Questionnaire continues on the next page!

1	2	3	4	5	6	7	8
	Course (name and code), lecturer	The course was for me 5. very catching and interesting ..... 1. boring	For my speciality that course was 5. very useful ..... 1. not useful	The content and aims of the course were explained 5. exhaustively ..... 1. not at all	The structure of the course was 5. clear, logical, understandable ..... 1. hard to follow	Lecturer's knowledge of the subject matter was 5. excellent ..... 1. poor	Used aids in teaching were 5. very useful ..... 1. useless
1							
2							
3							
4							
5							
6							
7							

9	10	11	12	13	14	15	16	17
	The use of visual aids (blackboard, slides, web, etc) was 5. sufficient, skilful ..... 1. insufficient	Possibility for students to take active part in the lessons was 5. sufficient ..... 1. insufficient	As a result of the course I 5. wish to continue to explore that subj. by my own ..... 1. have no further interest for the subject	The contact between the lecturer and students was 5. very good ..... 1. bad	In the future I would attend the courses of that lecturer 5. willingly ..... 1. reluctantly	Workload compared to AP-s was 3. average 2. higher than average 1. lower than average	Of the planned sessional work actually took place .....%	I attended ... % of lectures/seminars/ practical 3. 100-80% 2. 80-50% 1. less than 50%
1								
2								
3								
4								
5								
6								
7								

Any comments about the courses (what did you liked or disliked, etc.) .....

.....

.....

.....

.....

Thank You!

APPENDIX 19 An example of personal results list of feedback questionnaire

Results of the feedback survey

NAME: ***XXX*** **Chair:** XXX

SUBJECT CODE: XXX **Number of students:** 32

Question:	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	mean	own rating	chair mean	department mean
1 The course was for me (5. very catching and interesting ...1. boring)	3,1	9,4	18,8	40,6	28,1	3,8	3	3,7	3,6
2 For my speciality that course was (5. very useful ...1. not useful)	0,0	3,1	6,3	25,0	65,6	4,5	5	4,1	4,1
3 The content and aims of the course were explained (5. exhaustively ...1. not at all)	6,3	3,1	18,8	31,3	40,6	4,0	4	3,7	3,8
4 The structure of the course was (5. clear, logical, understandable ...1. hard to follow)	0,0	3,1	15,6	37,5	43,8	4,2	4	3,8	3,9
5 Lecturer's knowledge of the subject matter was (5. excellent ...1. poor)	0,0	3,1	6,3	18,8	71,9	4,6	5	4,5	4,6
6 Used aids in teaching were (5. very useful ...1. useless)	0,0	0,0	25,9	48,1	25,9	4,0	3	3,9	4,0
7 The use of visual aids (blackboard, slides, web, etc) was (5. sufficient, skilful ... 1. insufficient)	0,0	0,0	12,5	37,5	50,0	4,4	4	4,0	3,9
8 Possibility for students to take active part in the lessons was (5. sufficient ...1. insufficient)	0,0	6,3	25,0	25,0	43,8	4,1	4	4,0	3,8
9 As a result of the course I (5. wish to continue to explore that subj. by my own ...1. have no further interest)	6,3	9,4	15,6	43,8	25,0	3,7		3,6	3,3
10 The contact between the lecturer and students was (5. very good ...1. bad)	0,0	12,5	15,6	21,9	50,0	4,1	4	4,0	3,9
11 In the future I would attend the courses of that lecturer (5. willingly ...1. reluctantly)	12,5	6,3	3,1	34,4	43,8	3,9		3,7	3,6
12 Workload compared to AP-s was (3. average, 2. higher than average, 1. lower than average)	6,5	12,9	74,2				3		
13 I attended ... % of lectures/seminars/ practical (3. 100-80%, 2. 80-50%, 1. less than 50%)	3,1	25,0	65,6				3		
Mean for the present course:						4,1		3,9	3,9
Mean for all courses:						4,0		3,9	3,9