

# INFORMATION CULTURE IN ENGINEERING EDUCATION

**Anda Zeidmane, Anna Vintere**

Latvia University of Agriculture,

E-mail: Anda.Zeidmane@llu.lv; anna.vintere@tl.lv

## Abstract

*One of the characteristic features of the development of modern society is a rapid growth of the information flow. It is more and more complicated to find one's way in it at present. That is why the issue of acquiring the necessary knowledge, abilities and skills for work increase the flow of information. It means that nowadays the question about information culture is becoming more and more important.*

*The process of forming information culture is aimed to train and develop a creative person and his self-development. In the authors' opinion information culture is an extent of knowledge, abilities and skills connected to the search for, processing, storing and creation of information items using new information technologies, realizing the necessity of using information resources; principles and rules of the person's behavior in information and communicative systems; vital aims, estimations and attitude to the world.*

*The report summarizes and presents some aspects (cognitive, operational and contextual, communicative, valuable and reflexive) of information culture and describes the information culture as a methodological devise of cognition and ways of forming the person's information culture.*

**Key words:** *information culture, information literacy, technology literacy.*

## Introduction

Recent development of engineering education has to fulfill many tasks given by the modern trends in the development of society. Different studies define new goals of engineering education and technical universities have to face these aims. More than ever technical universities are challenged to make deep changes in their programs and structures in order to form the engineer to perform in the future and it has been a very hard task everywhere.

Continuous technical development is bringing new technologies which result in changes in living conditions. Among the dramatic changes in the labor market it has been noticed that now more jobs are part time; more people appear self-employed; less staff is needed to accomplish work; paid and unpaid overtime work is increasing; Moreover - growing global competitiveness, flatter organizational structures, companies downsizing, less job security - are some, more of the changes. Human beings are living now in a changing work environment full of surprises and unpredictable events on daily basis. The best way to overcome and to survive is to be prepared for achieving knowledge and be willing to develop new skills.

One of the characteristic features of the development of the modern society is a rapid growth of the information flow, and it is more and more complicated to find one's way in it at present. Paradox situations arise when the creation of new information products is more profitable and convenient than the search for essential analogues. That is why the issue of acquiring the necessary knowledge,

abilities and skills for work with increasing the flow of information, or the issue of developing information culture, is important at present.

Technology is the portal through which information is exchanged, but people's ability to handle information (to solve problems and think critically about information) tells us more about their knowledge of specific hardware or software. Skills known as information and computer literacy comprise a 21<sup>st</sup> century form of literacy in which researching and communicating information via digital environments are as important as reading and writing were in earlier centuries.

## Methodology of Research

The issue has been approached by using the method of theoretical literature analysis. The article includes theoretical analysis of topical issues like definitions and directions among the definitions of information culture, cognitive and other aspects of information culture, methods and ways of forming information culture, as well as the components assessment of information and computer literacy.

Engineering education is connected with such information cultures aspects like information aspects of person and information culture as methodological means.

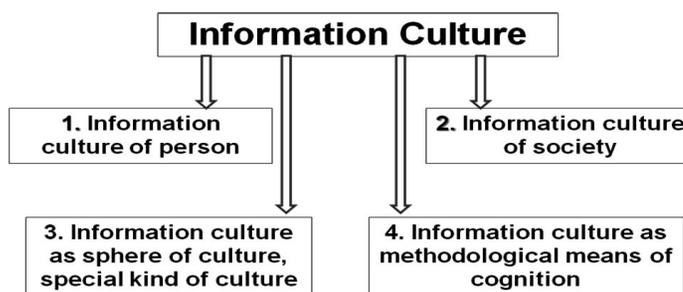
New technologies develop the personality and help students achieve better results in a shorter time. As a skillful information user will be the main economic development factor in Latvia (Busmanis & Tomsons, 2001), questioning of students of Latvia University of Agriculture (LUA) was carried out in the course of study in order to find out the level of ICT application among students, as well as obtain information about ICT application in the process of education. 218 students from different faculties participated in the questioning, except the students from the Faculty of Information Technologies, as they have absolutely different availability for these things. The groups of students have not been purposefully created therefore the results cannot be applied to all student groups.

## Results of Research

### *Directions among the Definitions of Information Culture*

In the information society the main education indicator is not gaining information and even not the skill of working with the sources, but the ability of a person to decide what information is needed and where to look for it (Davidova, 1998).

Information culture is defined logically as the culture of work with information. In order to remove the existing contradictions in the concepts of information culture and to systemize them, it is necessary to make the analysis of such concepts as information and culture, and then to synthesize them into the general concept 'information culture'. The versatility of the concept 'information culture' determines the basic difficulties in defining the information culture. Directions among the definitions of information culture include (Asherov & Bodanova, 2007). 1) information culture of person; 2) information culture of the society; 3) information culture as the sphere of culture, special kind of culture; 4) information culture as the methodological means of cognition (see Figure 1.)



**Figure 1. Directions' of the definition of information culture (adapted by A.Asherov).**

Information culture of a person is the **complex of knowledge, skills and habits** of work with information and with information technologies. Here we are speaking about **user's information culture**. On the other hand information culture could be defined as the **process** and the **result** of a person's development in the information society. Information culture characterizes the level of a person's development in the information society. Here we are speaking about **specialist's information culture**. Both user's and specialist's information culture determine the style of thinking.

Describing information culture as the methodological devise of cognition it could be mentioned that information culture has some cognitive (*skills and ideas about new information image of the world at hypotheses and theories*), operational and contextual (*practical skills and habits, connected with the receiving, storing, transmitting and processing information*), communicative (*principles and rules of person's behavior in information and communicative systems*), valuable and reflexive aspects (*vital aims, estimations and attitude to the world*).

Information culture could be defined as the: 1) culture of **work with information** and 2) **interaction** culture of the man and information. The interaction takes place at the level of the society and at the level of a person. The authors are interested in the information culture of an engineer, therefore it is defined as the extent of knowledge, abilities and skills connected to the search for, processing, storing and creation of information items using new information technologies, typical in the given field, realizing the necessity of using the information resources of modern society in a professional activity. The concept 'information culture of an engineer' is explained through concepts of computer and information literacy.

Computer and information literacy of students of technical disciplines are the components of information culture. Computer literacy could be defined as the:

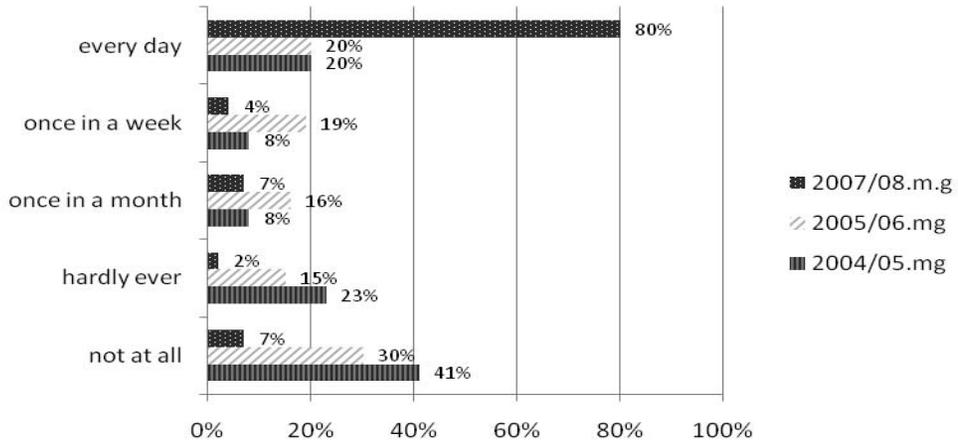
1. knowledge of basic concepts of information science and computer facilities;
2. knowledge of equipment principles and functional possibilities of computing technique;
3. knowledge of modern operation systems, program shells, instrument systems and program means of general purpose;
4. knowledge of modern specialized computer programs and complexes, automating professional activity; possessing some of them;
5. knowledge of training program languages and skills to use them practically;
6. skills to use functional possibilities of computer facilities while preparing, organizing and providing professional activities, as well as renewing one's professional knowledge.

The information literacy is a rather new concept in Latvia. This concept in „The Survey of the National Development 2004/2005” was defined as the ability and skill to find, select, assess, manage and use information; skills to assess the obtained information and its sources critically, connect the selected information with the existing knowledge; skills to use the obtained information efficiently also for solving other problems.

According to the investigations of American librarian association, possessing information literacy means:

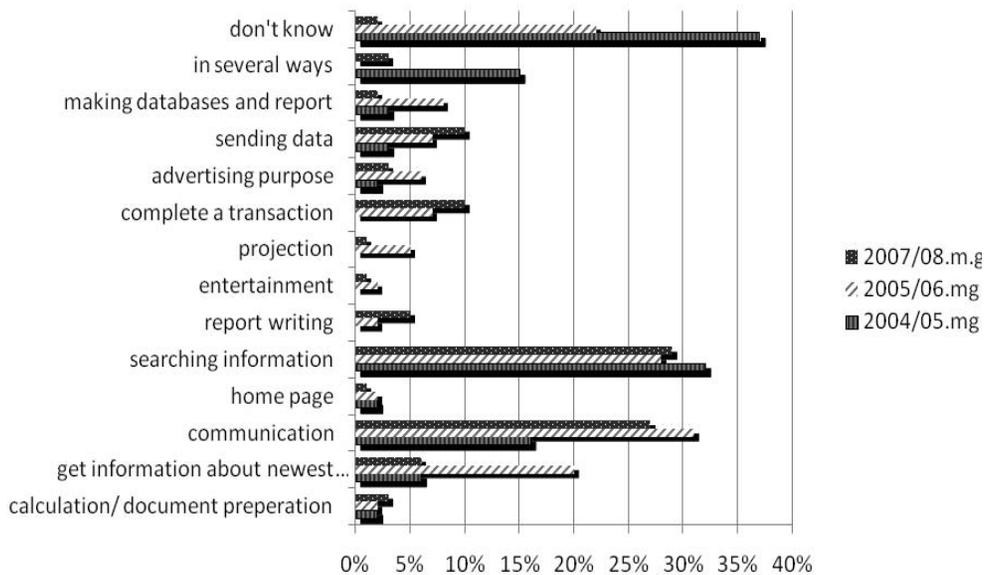
1. Understanding necessity of actual and significant information;
2. skills to find the information sources, using the most effective search strategy;
3. skills to estimate information critically and competently, to differ facts from opinions;
4. skills to estimate the information found creatively;
5. skills to use the received habits on information search for personal purposes and in professional activities;
6. understanding the meaning information in the development of a democratic society;
7. knowledge and following ethical standards in the sphere of information technologies;
8. skills to cooperate in search and use of information, skills to share the results of one's activity.

In order to discuss computer literacy it is significant to find out the frequency of ICT application among students at Latvia University of Agriculture. Comparing the results of the respondents in the last three years, it has been found that the Internet is used every day (see Figure 2.). However, 7% of the respondents do not use the Internet at all. To the authors' view point, the reason is that many students come from the rural areas where the infrastructure of information technologies has not been developed enough.



**Figure 2. Frequency of the use of the Internet resources.**

The level of information culture as the methodological devise of cognition characterizes obtaining information communication technologies application in the process of education. During the survey it was found out that information technologies at LUA are used successfully in the general subjects – physics, chemistry and mathematics. Information technologies are being integrated in special engineering subjects, but in social sciences information technologies are mainly used as the tool of presentations.



**Figure 3. Responses of engineering students about applying ICT in speciality.**

During the survey the students were also asked how they might use information technologies in their specialty. The question did not provide multiple choice answers. All the responses had been grouped and reflected in the table below. As it has been derived from the survey, the number of students who are not aware of the potential use of the Internet has decreased. The survey of the academic year 2007/2008 provides more detailed responses compared to the responses in 2005/2006.

## Discussion

### *Methods and Ways of Forming Information Culture*

Information and computer literate students master the contents faster; they are better at solving problems, become more self-directed and assume greater control over learning [4]. Beyond the classroom information and computer literacy it is essential to be a productive citizen in a knowledge-driven society. Employers want their employees to have these skills (Herman, 2000). As a result universities are beginning to require them as competencies for graduates. This focus has led to campus-wide initiatives to improve students' information culture (Candy, Crebert & O'Leary, 1994).

Methods of forming person's information culture could be used according to the source of knowledge and skills (practical, visual, verbal and work with a book), according to the cognitive activity (reproducing and searching) and connected with integrated methods of training.

In order to use the useful method successfully as a means of forming information culture one could apply reading, word, graphic, musical processors, electronic tables, programming languages, computer and information networks, means of telecommunication; applied program systems, as well as interdisciplinary links.

There are several ways to form information culture:

1. a classes on information science;
2. non-computer disciplines and special disciplines;
3. distance education;
4. in a library;
5. formation of the independent course "The bases of information culture".

Some specialists insist on creating the compulsory course 'The Basics of Information Culture', which must be implemented in the system of secondary education and in the system of higher education. However, this way of forming Information culture is unacceptable as a result of limiting the impact on curriculums. An alternative to this approach can be the re-determination of the aims of computer science courses from elimination of computer illiteracy to forming information culture. It means partial changes in the contents of computer science, methods, means and pedagogical technologies, but without changes in the number of training hours and in the position of the course in the curriculum.

However, there are several challenges to designing and implementing effective information culture instruction. First, students in higher education often believe themselves to be competent users of information resources because of their daily interaction with the internet (Macklin & Fosmire, 2003). This can lead to disinterest in learning skills to improve their use of search engines and electronic research databases. Second, the case of transferring between social and academic environments, using the same technology, can cause disruptions in classroom activities.

Without effective assessment it is difficult to know if students' information culture skills are improving. The assessment focuses on the cognitive problem solving and thinking skills associated with using technology to handle information. As much, scoring algorithms target cognitive decision-making, rather than technical competences (Katz, 2005). The assessment measures information and computer literacy through seven areas which represent important

problem-solving and critical thinking aspects of information culture skills (Educational Testing Service, 2003). The seven components of assessing information and computer literacy are:

1. using digital tools to identify and represent the need for information;
2. collecting and retrieving information in the digital environment;
3. using digital tools to apply the existing organizational or classification scheme for information;
4. interpreting and representing information, such as by using digital tools to synthesize, summarize, compare, and contrast information from multiple sources;
5. judging the degree to which digital information satisfies the needs of an information problem, including determining authority, bias, and timeliness of materials;
6. adapting, applying, designing or constructing information in the digital environment;
7. disseminating information relevant to a particular audience in an affective digital format.

## Conclusions

Directions among the definitions of information culture include information culture of a person, information culture of the society, information culture as the sphere of culture, special kind of culture and information culture as methodological means of cognition. User's and specialist's information culture determine the style of thinking. The concept 'information culture of an engineer' is explained through concepts of computer and information literacy.

There are several ways to form information culture, such as classes of information science, non-computer disciplines and special disciplines, distance education, library work and formation of the independent course "The Basics of Information Culture".

The results of the survey show the frequency of using the Internet resources has increased rapidly during last year (80% of students use the Internet every day). Yet there are students who do not use the Internet at all – 7%.

According to the analysis of the literature of the survey and the authors' personal experience, information technologies play a significant role in building information culture. Technology is the portal through which information is exchanged. Therefore, integration and use of information technologies in the learning process is an important task for all educational institutions, including universities. On the other hand, the results of the survey prove that there is still much to do nevertheless much has been achieved.

## References

- American Association of School Librarians & Association for Education Communications and Technology (1998). *Information literacy for students learning: Standards and indicators*. Retrieved February 12, 2007, from <http://www.ala.org/ala/aasl/aaslproftools/informationpower/>
- Asherov A., Bodanova T. (2007). Information culture in engineering education. *Proceedings SEFI and IGIP Annual Conference 2007*: Copyright 2007, University of Miskolc.
- Bu manis, P., Tomsons, V. (2001). Studiju informatizācija. *Informācija – izglītības vides sastāvdaļa*. Mācību metodiskā konference: referātu materiāli. Jelgava: LLU.
- Candy, P.C., Crebert, G., O'Leary, J. (1994). *Developing lifelong learners through undergraduate education*. National Board of Employment, Education and Training. Sydney: Australian Government Publishing Service.
- Davidova, J. (1998). Skolotājs Latvijas skolā. *Mūsdienų izglītības galvenās attīstības problēmas*. RPIVA konferences tēzes. R: Vārti, 1998.

Educational Testing Service (2003). *Succeeding in the 21<sup>st</sup> century*: What higher education must do to address the gap in information and communication technology proficiencies.

Herman, A.M. (2000). A skills shortage, not a worker shortage. *Remarks at the National Skills Summit*. Washington, D.C.: U.S. Department of Labor.

Katz, I.R. (2005). Beyond technical competence: Literacy in information and communication technology. *Educational Technology Magazine*, 45(6).

Macklin, A., Fosmire, M. (2003). Becoming an information leader at Purdue University. *College and Research Library News*, 64.

*Advised by Uldis Iljins,  
Latvia University of Agriculture, Latvia*

**Anda Zeidmane** Associated professor, Latvia University of Agriculture, Liela street 2, Jelgava, LV-3001, Latvia.  
Phone: + 371 63005675  
E-mail: Anda.Zeidmane@llu.lv  
Website: <http://www.llu.lv>

**Anna Vintere** Lecturer, Latvia University of Agriculture, Liela street 2, Jelgava, LV-3001, Latvia.  
Phone: +371 63005652  
E-mail: [anna.vintere@tl.lv](mailto:anna.vintere@tl.lv)  
Website: <http://www.llu.lv>