E-LEARNING IN HIGHER EDUCATION: REFLECTION OF THE TERM IN MIND MAPS

Ivana Šimonová
Applied Languages Department, Faculty of Informatics and Management,
University of Hradec Králové, Rokitanského 62, Hradec Králové, Czech Republic
ivana.simonova@uhk.cz

Abstract

The paper presents results of the survey monitoring individual concepts of e-learning of university students. The survey ran at the Faculty of Informatics and Management, University of Hradec Kralove, Czech Republic. The research sample consisted of 104 respondents who enrolled in the first year of bachelor study programme of Applied Informatics and master study programme of Information Management. In the first phase, students did not design their mind maps by themselves but the Khan´s model of e-learning was used. This model includes 17 terms which are structured in eight dimensions. In the first phase students worked with these terms and structured them into their own concept; adding other terms or omitting any of them was encouraged. In case of completely different concept, students might have designed their own mind maps. The results showed students´ concept of e-learning had not been completely built despite their field of study is Informatics, i.e. they are expected to have close relation to modern technologies in general, including the field of education.

Keywords

higher education, university, tertiary education, mind map, e-learning, information and communication technologies, ICT, concept, model

Introduction

As generally accepted, the main objective of the ICT (information and communication technologies) implementation into the instruction is to optimize the educational process. But this new approach does not only mean adding new teaching aids, methods, forms to the existing ones. It requires revision of the whole system and active ICT implementation in the process. The 1990´s events in the Czech Republic evoked changes in all spheres of the society, including education. General development towards democracy and information and knowledge society transformed the existing structure of the educational system and brought following consequences:

- new competences reflected in new learning content were defined;

- demands for new teaching methods, organizational forms, ways of evaluation were detected;

- new relations between elements participating in the educational process arose;

- different subjects and competences were emphasized, i.e. Humanities and foreign languages, Informatics, Environmentalistics;

- learner's responsibility for his/her own education, creativeness and motivation; economic aspects of education and competitiveness;

- and last but not least the call for lifelong education appeared.

These features have been slowly but steadily included into the new educational system, which is hardly to be imagined without implementation of modern information and communication technologies. Having undergone the starting period of material and technical problems, the time came we dealt with didactic aspects of ICT implementation into the instructional process. And what are the results? Analysing the current state, following questions appeared:

- Are teachers able to apply suitable means, create and use those which are offered by new technologies?

- Do students have higher level of knowledge if they attend lessons supported by ICT or those run traditionally by teachers?

- Are the new didactic means (methods, forms and aids supported by modern information and communication technologies) really able to optimize the process of forming knowledge (Šimonová, Poulová, 2012)?

Research activities

Research activities should deal with various aspects of the above mentioned questions and problems. In this paper, we focus on monitoring the concept of e-learning in learners´ mind maps.

All these research activities relate to foreign language instruction focusing on English for Specific Purposes (ESP). They were held at the Faculty of Informatics and Management, University of Hradec Kralove, Czech Republic, and sample groups included students of Applied Informatics and Information Management study programmes.

Monitoring the concept of e-learning in learners´ mind maps

Receiving realistic and objective feedback is the key problem of each educational concept. Searching for new approaches to education which would provide teachers with deeper reflection of students´ knowledge is evoked by crucial efforts towards improving the process. There exist various approaches to taking it, and the mind mapping (mental mapping, semantic mapping, concept mapping) is one of them.

The term of mind mapping first appeared in 1970s in the concept introduced by psychologist Buzan (2001) who searched ways of remembering experience and concluded they were saved in individual's memory in the form of clusters showing mutual interrelations. In the field of education the mind mapping relates to developing meaningful learning, i.e. a new piece of knowledge becomes meaningful to learners if in-built in their existing knowledge structures which he understands to be are identical with mind maps.

The mind map as a research method was first applied by Novak (1998) in late 1970s. In his concept mind maps are understood as diagrams expressing significant relations between terms in the form of statements. These are represented by links between terms which describe their mutual relations. This concept was later adapted by Åhlberg (2004). Buzan (2010) says the mind maps thus can be understood as external expressions of knowledge integrated in individual´s mind. He emphasizes the mind map is neither "correct", nor "incorrect", but it must be always accepted in a certain context, while it could be rejected in another one.

The mind maps can be applied in different phases of instruction, e.g. for revising, practising and fixing the knowledge, and as a means of feedback. Novak (1998) distinguishes four ways how the mind maps can be used, i.e. learning strategies, teaching strategies, means to forming concept and content of single subjects and the instruction as the whole, and a means of collecting information about learner's understanding of the learning content. He also mentions other ways, e.g. strategies towards acquiring new learning content, evaluation etc. The information and communication technologies can be used for the same purpose, e.g. electronic applications for creating and analysing the mind maps, which are available on web pages of iMind-Map (2011), brainstorm and mind map online (2011), Edraw Mindmap (2011) etc.

Research design and methodology

The main research objective was to monitor how students understand the term of e-learning. Despite the term has been generally and widely used within the field of education for more than two decades, there still does not exist a generally accepted, common definition of e-learning. Until this is provided, two approaches can be applied. First, the definition presented in main European administration documents, e.g. (EC, European Commission growth, competitiveness and employement, 1993), (EC, 1995) saying that e-learning means using modern multimedia technologies and the Internet towards improving the quality of education thanks to easy approach to sources and services (EC, 2001). Second, e-learning can be considered from two different points of view (Zlamalova, 2001):

- the educational process supported by information and communication technologies;
- a set of technological tools supporting education.

Above all, Zlamalova (2001) emphasizes that under no circumstances eLearning means the technical "*e*-" only, but the traditional didactic "-learning" must not be omitted.
Or, as Khan says (2006), "e-learning may be considered a new approach to providing a quality, interactive learning environment, easy available to everybody, anytime, anywhere, using

features and sources of various digital technologies, and also other learning materials which suit to open, flexible and distributed learning environment".

And, last but not least, a completely different approach is introduced by Logan (2010) who defines that "The *e* doesn't stand for electronic. Better to think of the *e* as *e*volving, or *e*verywhere, or *e*nhanced or *e*xtended ... and don't forget *e*ffective".

Czech university research activities also focus on e-learning from the point of individual learning styles (e.g. Kostolányová, 2012; Šimonová, Poulová, 2012) and this research may contribute substantially to this process.

The research sample included 104 respondents, the 1st-year students (aged 19 - 20 years) of the Faculty of Informatics and Management who in 2011/12 enrolled in the Applied Informatics and Information Management study programmes.
Respondents had not had any experience in being tested in this way, so the method of mind mapping was not used in the traditional form, i.e. the respondents did not create the mind map themselves, but they were provided the eight-dimensional schema of e-learning designed by Khan (2006).

His eight-dimension schema replies to the question what is required for the open, flexible and distributed learning. It is presented in two versions which differ in graphic presentation. In the middle of the first schema the figure of a human being is presented. Khan does not explain how this symbol should be understood, so two basic approaches can be applied: either e-learning as a learner-oriented process; or e-learning as a way of learning which enables/provides highly individualized approach to learning which is defined by each learner and is reflecting individual learning style preferences and other didactic-psychological characteristics (i.e. requirements-oriented learning). In the second schema the word e-learning is placed in the centre instead of the human figure, which might evoke the entire ICT-supported process of learning.
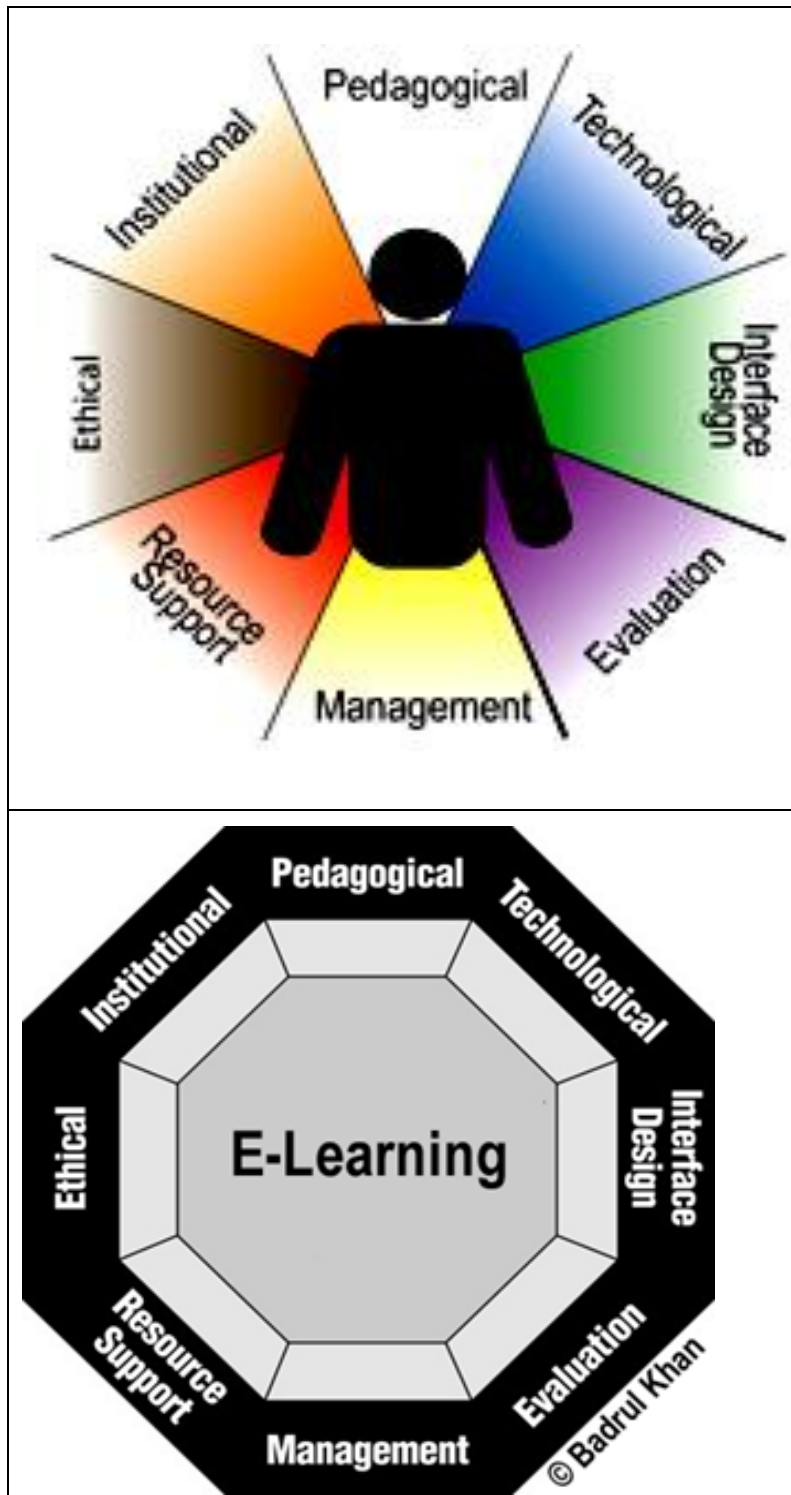
Fig. 1: Concept of e-learning: two versions of schema (Khan, 2006)

Before the research started, the principle of mind mapping and Khan's schema were explained to the respondents. Then, students modified the Khan's schema and adjusted it to their individual mind concepts by matching 17 terms defining e-learning by Khan to the eight dimensions and describing each match by an appropriate verb. In case of disagreement respondents removed the term or dimension. Additionally, they were provided several other terms by the researcher which were not mentioned by Khan (learning, tutor, communication)

and which focused on concrete subjects and foreign language learning (a subject, foreign language/s, English (ESP). In case of total disagreement with the concept provided, respondents were encouraged to draw their own schema.

The Khan's structure of e-learning includes eight dimensions as follows: Pedagogical (P); Technological (T); Interface Design (D); Evaluation (in this research marked as feedback, F); Management (M); Resource Support (R); Ethical (E); Institutional (I). The 17 terms defined by Khan are listed below: analysis of objects, content and media used, analysis of participants (dimension P); organization, methods, strategies used in the environment (T); infrastructure design (hardware, software) (D); design of e-learning programme (design of pages, content, navigation, tools for testing) (F); management (evaluation of learner's work during the instruction using the assignments, evaluation of the learning environment (M); resource support (learning management, ways of providing and spreading information, online support, maintenance (R); social influence, cultural and geographical differences, differences in level of entrance knowledge, differences in accessibility to information, ethical and legal rules (E); institutional support in the field of e-learning services for students (I).

Research results

In this paper selected results are presented focusing on:

–   Dimensions and levels used in the respondent's concept of e-learning.

–   Dimensions not included in the respondent´s concept of e-learning

–   Additional terms included in individual concepts.

–   Defining a new model of the mind map.

The collected data were processed by the method of frequency analysis.

Dimensions and levels used in the respondent's concept of e-learning

First, respondents matched 17 terms to the eight dimensions of the Khan's concept of e-learning. Results are displayed in figure 1 showing that one third of respondents (33.6 %) did not make any changes in the concept, they used all eight dimensions and matched one term to each dimension at least; 16.3 % respondents worked with seven dimensions; 15.3 % used six dimensions; 14.4 % of respondents matched terms to five dimensions and 17.3 % to four ones; 3 % of respondents used only three out of eight dimensions. Results are displayed in figure 2.

If the presented Khan's schema is considered to be the first level of the mind map, then 92.3 % of respondents added the second level and 6.7 % of respondents designed the three-level model.
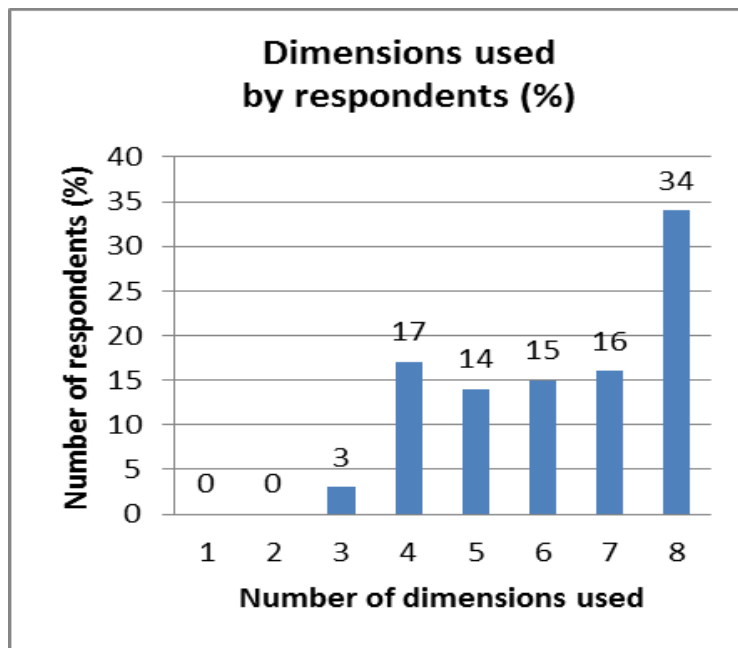
Fig. 2: Dimensions used in the respondent's concept of e-learning

Dimensions not included in the respondent´s concept of e-learning

As mentioned above, respondents can match terms to eight dimensions. Results are displayed in figure 3 and showed that nearly 34 % of them had done it while 66 % of respondents used from three to seven dimensions. Not a student worked with one or two dimensions only. If respondents did not accept any dimension for the concept, they deleted it form the schema; if no term was matched to the dimension, it was accepted as it is. Reasons of such decisions were not analysed at this phase of research. Results are displayed in figure 2. The figure shows that the least frequently used dimension, i.e. the one which respondents did not match any term, is the institutional dimension (I) - this result appeared with 39.4 % of respondents. Further on, other rarely used dimensions were the ethical one (E, 30.8 %), resource support (R, 28.8 %), management (M, 22.1 %) and the technological dimension (T, 19.2 %). Remaining three dimensions were the most frequently used ones, i.e. the interface design (D, 2.9 %), pedagogical dimension (P, 6.7 %) and evaluation (F, 16.3 %). Thus the results show that nearly all respondents (97 %) understand e-learning from the point of interface design (D), which relates to the respondents´ study programme, i.e. Applied Informatics and Information Management. Respondents also consider the pedagogical dimension of e-learning (P, 93.3 %) and its evaluation role (F, 83.7 %), followed by the technological dimension (T, 80.8 %), the dimension of management (M, 77.9 %) and resource support (R, 71.2 %). One term at least was matched to the ethical dimension (E) by 69.22 % of respondents and the institutional dimension (I) which was used by 60.6 % of respondents. This result reflects the research sample structure (students of IT study programmes) and confirms the above stated conclusions.
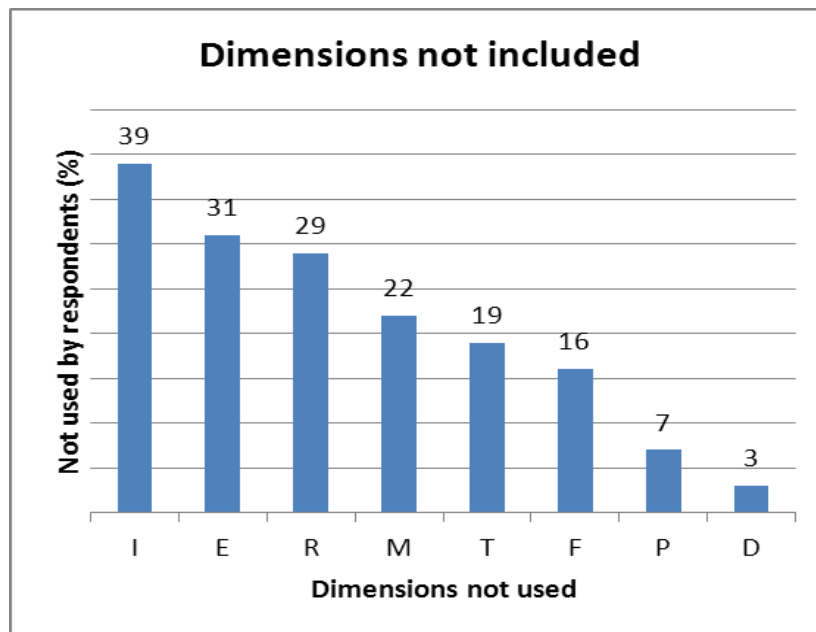
Fig. 3: Dimensions not included in the respondent´s concept of e-learning

The detailed analyses discovered that 17.3 % of respondents did not match terms to the couple of dimensions, i.e. the institutional and ethical one. This couple (I, E) also appeared in combination with other slightly used dimensions, i.e. resource support (R, 6.7 %) and management (M, 3.8 %), evaluation (F, 3.8 %) and technological dimension (T, 2.9 %). Other rarely used dimension was the ethical one (E) in combination with resource support (R, 15.4 %), evaluation (F, 10.6 %), management and evaluation (M, F, 3.8 % each). Apart from the above mentioned, the institutional dimension (I) was detected in the 26 combinations of 2 - 4 dimensions.

Additional terms included in individual concepts

Except of the above mentioned terms, there exist other ones which were not mentioned by Khan but in our opinion strongly relate to the topic: *learning, tutor, communication*. The results show that only few students included any of them in their individual concepts: learning 7.7 %; tutor 3.9 %; communication 1.9 %. Totally 3.2 % of respondents used one of the terms in their mind maps, no respondent implemented two or three terms.

The reflection of a particular subject, foreign language/s and/or English (ESP) was also monitored. The results showed no respondent had included any of these terms in the individual mind map; English was mentioned by one respondent as the language of professional communication in the LMS Blackboard which was used for the ICT-supported instruction at FIM and language of IT professionals, not the subject taught/learned with the ICT-support. Our expectations were different in this field – we expected at least EPS and/or a foreign language and an IT subject would be mentioned in mind maps, even under the circumstances, when the ESP teacher and Database Systems teacher were the main organisers and present within this

research activity. In the given academic year the ESP teacher taught approximately 20 % of respondents and all of them attended lectures of Database Systems.

Defining a new concept of the mind map

Nine respondents (8.6 %) drew their own, totally different concept (model) of the mind map. Eight of them first started with re-organizing the Khan's concept but finally they designed their own schema; one respondent rejected the Khan's concept at the very beginning and designed a completely new model (Figure 2). Similarly to Khan the human body was situated in the centre but it was not defined who s/he is, because the teacher and learner were displayed separately. Several from the above provided terms were included in this schema; others were added according to the respondent's choice (friendship, stressfulness). In the text below the mind map, other two items were mentioned (motivation, responsibility) being related to all dimensions. The centre of the circle was called the system. Within the following interview the respondent explained he had considered the whole schema to be a system, not only the body in the centre which was not linked to any other dimension or described by other characteristics. Examples of individual concepts of e-learning are displayed in figure 4.

Summary and discussions of results

The results of researching the term of e-learning by the method of mind mapping showed that one third of respondents (33.6 %) had not made any changes in the provided Khan's schema; respondents had matched at least one term to each dimension; the others adjusted the schema and matched terms to 4 - 7 dimensions. The least frequently used dimension was the institutional one (more than one third respondents did not match any term to it), followed by the ethical, resource support, management and technological dimensions which were not used 20-30 % of respondents. This result proves that 97 % of respondents understand e-learning from the point of design interface, pedagogical dimension (93.3 %) and evaluation (83.7 %), followed by management, ethical and institutional dimensions and group of dimensions, e.g. IER, IEM, IEF, IET. This result reflects the structure of the sample group consisting of students of the Applied Informatics and Information Management study programmes who attend the institution where e-learning and ICT-supported instruction have a relatively long tradition and have become standard. The mind maps were structured in two levels by most respondents, 7 % of them designed three-level mind maps. Respondents matched 17 terms to eight dimensions of the Khan's concept; in general, they used 6-17 terms. One third of respondents (33.6 %) matched all 17 terms to the dimensions, using fewer dimensions step-by-step decreased from 12.5 % up to 1 %. Nine respondents designed their own mind map; eight of them worked with the provided Khan's schema first.

It is hardly possible to sum up all the collected data to a single and homogenous conclusion. Results mostly express agreement on the Khan's concept of e-learning, which can be appreciated because this concept is complex, considering e-learning from the whole width of this phenomenon. On the other side, it should be taken into account that the respondents were students of study programmes of Applied Informatics and Information Management who focus

on this field from the point of profession and interest and pay more attention to technological aspects.

Proposals for further research activities

For the future, similar research should be held so that to monitor the e-learning concept of students of teachers´ training and other faculties and check whether their concepts are influenced by their future profession, i.e. whether e.g. pre-graduate teachers emphasize the pedagogical dimension of e-learning as the Informatics students do with dimensions closely relating to information technology and how the didactic approach is reflected in the e-learning concept.
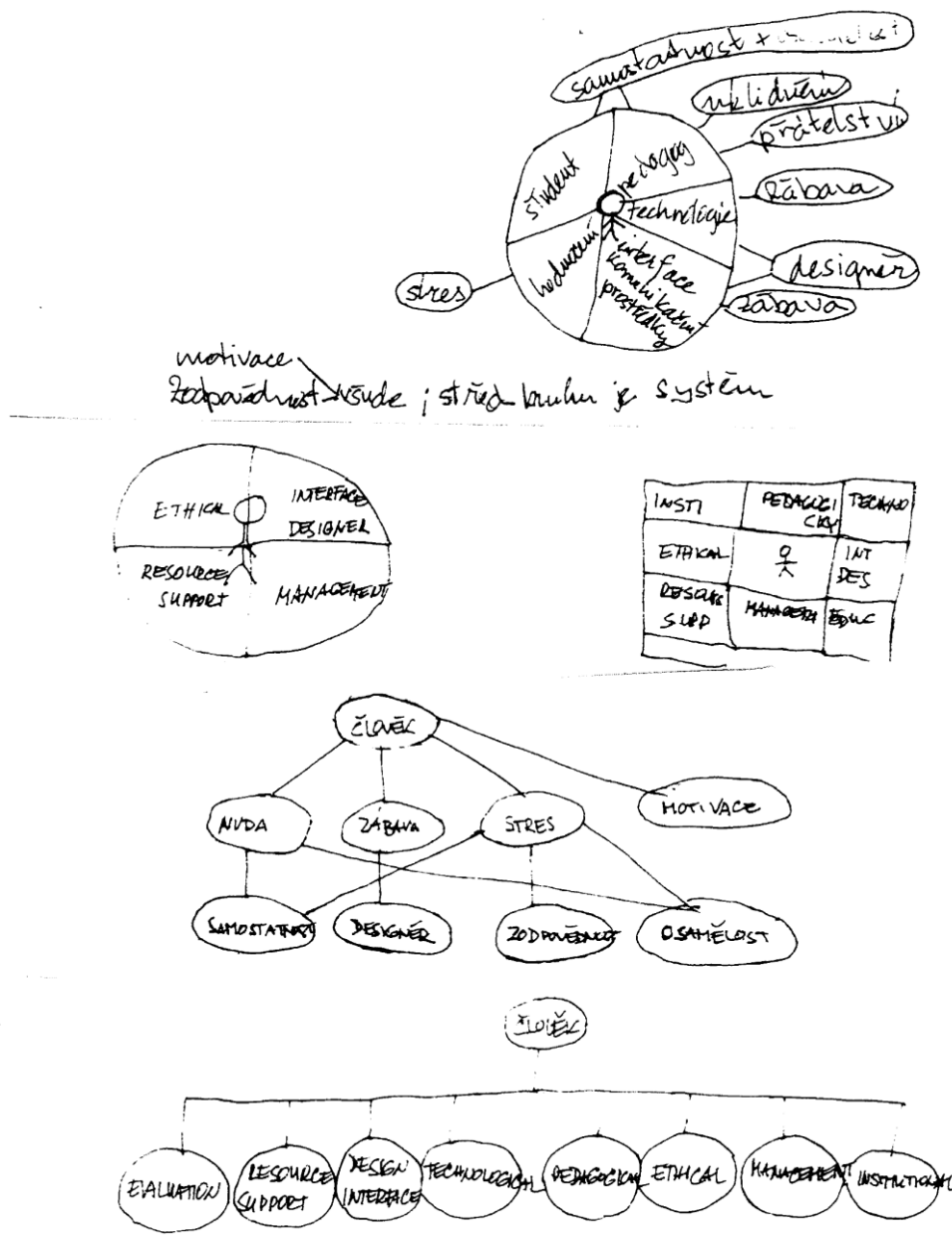
Fig. 4: Concept of e-learning: individually designed mind maps 1 – 5

English translation of Czech expressions used in mind maps:
samostatnost – self-reliance, osamělost – loneliness, uklidnění – calming, přátelství – friendly relations, zábava – entertainment, stres – stress, komunikační prostředky – communication means, hodnocení – evaluation, motivace a zodpovědnost všude – motivation and responsibility in all dimensions, střed kruhu je systém – centre of the circle is the system, člověk – man, nuda – boredom, zodpovědnost – responsibility.

References

ŠIMONOVÁ, Ivana and Petra POULOVÁ. *Learning style reflection within tertiary e-education.* 1ˢᵗ issue. Hradec Králové: CZ WAMAK in Miloš Vognar M&V Publishing, 2012. ISBN 978-80-86771-51-9.

BUZAN, Tony. *The power of creative intelligence.* London: Thorsons, 2001. ISBN 0-72-254050-7.

NOVAK, Joseph Donald. *Learning, creating, and using knowledge. Concept maps as facilitative tools in schools and corporations.* Mahwah: Lawrence Erlbaum Associates, 1998. ISBN 0-8058-2625-4.

ÅHLBERG, Mauri. Varieties in concept mapping [online]. [cit. 20140104]. Available from: http://academia.edu/829330/ varieties of_concept_mapping

BUZAN, Tony. *The mind map book. Unlock your creativity, boost your memory, change your life.* New York: Pearson BBC Active, 2010. ISBN 9781406647167.

How to make a mind map. [online] [cit. 20131211]. Available from: http://www.mind-mapping.co.uk/make-mind-map.htm

Brainstorming made simple. [online]. [cit. 20131211]. Available from: https://bubbl.us/.

Edraw mindmap. [online] [cit. 20131211]. Available from: http://www.edrawsoft.com/freemind.php

EUROPEAN COMMISSION. *Growth, competitiveness, and employment. The challenges and ways forward into the 21st century.* Brussels: European Commission, 1993.

EUROPEAN COMMISSION. *White Paper on Education and Training - Teaching and Learning - Towards the Learning Society.* Brussel: European Commission, 1995.

EUROPEAN COMMISSION. *The eLearning Action Plan: Designing tomorrow´s education.* Brussel: European Commission, 2001.

ZLÁMALOVÁ, Helena. *Úvod do distančního vzdělávání.* Olomouc : Univerzita Palackého, 2001. ISBN 80-244-0276-9.

KOSTOLÁNYOVÁ, Kateřina. *Teorie adaptivního e-learningu.* Ostrava: Pedagogická fakulta, 2012. ISBN 978-80-7464-014-8.

KHAN, Badrul. H. *E-learning : osem dimenzií otvoreného, flexibilného a distribuovaného e-learningového prostredia.* Nitra: SPU, 2006. ISBN 80-8069-677-2.

LOGAN, Robert K. 2010. *Definition of eLearning. eLearning Concept.* [online] 2010. [cit.20120430.] Available from: http://www.managersforum.com/eLearning/