



The 6th International Conference
“New Perspectives in Science Education”

Education for Science in
Engineering and Business



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1. Introduction
2. Motivation and Independent Work
3. Creative Abilities
4. Transfer of Research into Education
5. Conclusion





- ❖ Author of the paper is interested in information systems (IS) and knowledge management systems (KMS) for engineering and business uses in research and education.
- ❖ Its experience in teaching information and communication technology (ICT) is summarized in education rules that are a result of approaches verified over the long term in teaching for future engineers and business people.





- ✓ During the education process, the students' knowledge must be permanently deepened by merging theory and practice using repetitive curriculum in exercises and practical tasks.
- ✓ Students must be the subject of the ongoing validation of acquired knowledge.
- ✓ The student's motivation must be constantly maintained by the teacher.
- ✓ The students' work should be independent and minimally influenced by the teacher.

- The teacher supports the development of students' creative abilities by setting tasks with no detailed explanation, so students have to look for original approaches and innovative solutions.
- In addition to the educational themes, the teacher should contribute to students' soft skills: teamwork, managerial approaches, project management, and PROFI presentations.



2. Motivation and Independent Work 1/5

- An example is the course Information Management (IM) for students of the distance study program in Magister's degree at TBU. The lessons include the topic of IM, creation of an IS and other themes related to the IS issues.
- The motivation aspect of the course is the choice of the IS theme according to student's interest. It is easier to create an IS when the student is familiar with its environment and has a positive relationship to it.



2. Motivation and Independent Work 2/5

- After several years of assigning this task, it can be summarized that the most popular topics for IS creation are:
- ✓ ICT (computers, graphic cards, mobile phones, software, data media).
 - ✓ Business (car or motorcycle sales, car repair service, phones).
 - ✓ Music (music bands and singers, DVD, musical instruments).
 - ✓ Sports and hobby (soccer, fire sports, athletics, body building, food).
 - ✓ Education (student records, future praxis for students).
 - ✓ Machinery (cars, motorcycles, weapons).



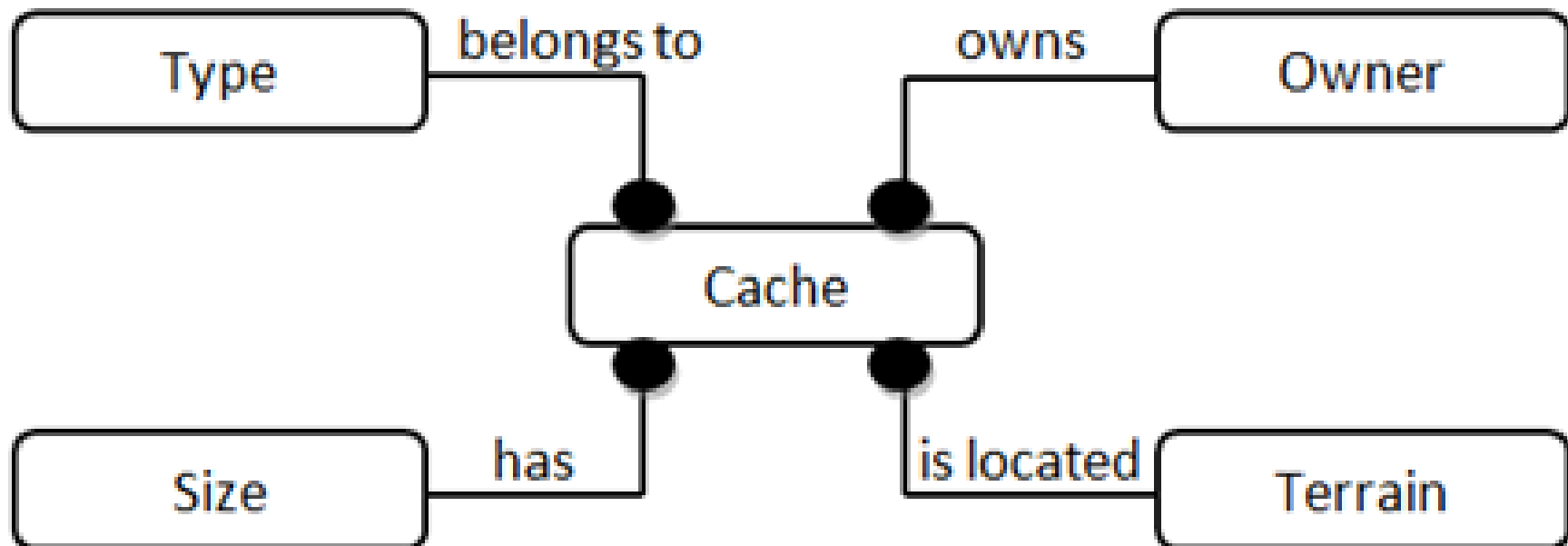
2. Motivation and Independent Work 3/5

- ✓ The students' work should be (if possible) independent and influenced by the teacher only to the extent necessary.
- ✓ The structure of instruction and prepared tasks lead the students to independence. Brief orientation and the basic demands are given to students in the form of written instructions. After the approval the theme of the IS, students follow on their own.
- ✓ The important progressive phases of work are discussed with the teacher.

2. Motivation and Independent Work 4/5

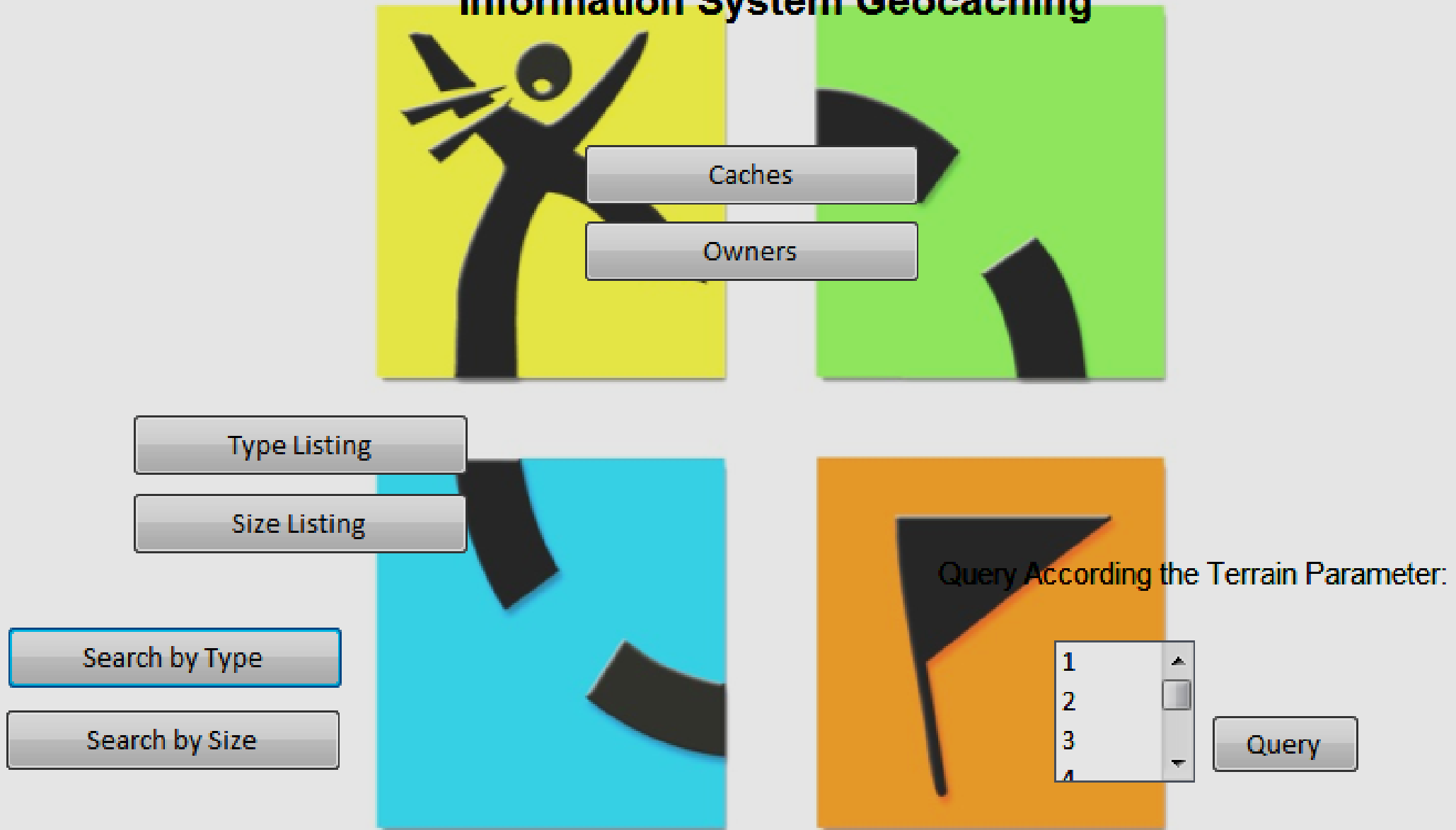
The IS example is 'Geocaching', it is presented:

1. Assignment for the IS development.
2. Entity Relational Diagram.
3. Data Dictionary.
4. Functional Scheme.
5. Relational Data Model.
6. Description of the final application.



2. Motivation and Independent Work 5/5

Information System Geocaching

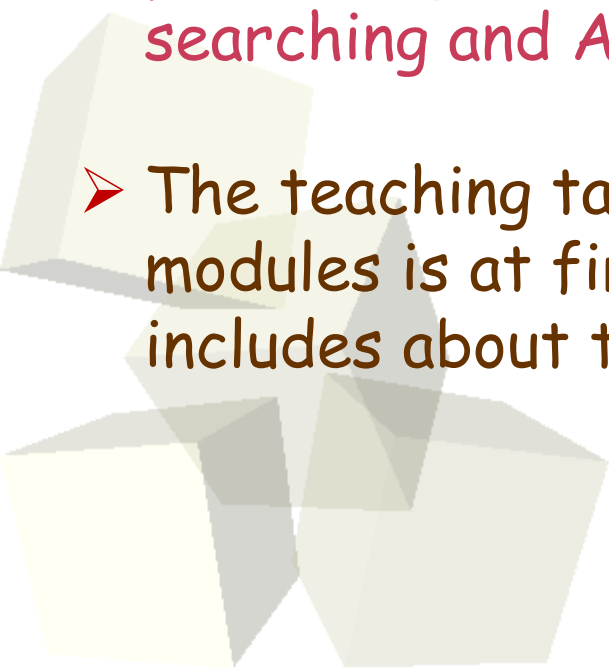


GEOCACHING



3. Creative Abilities 1/5

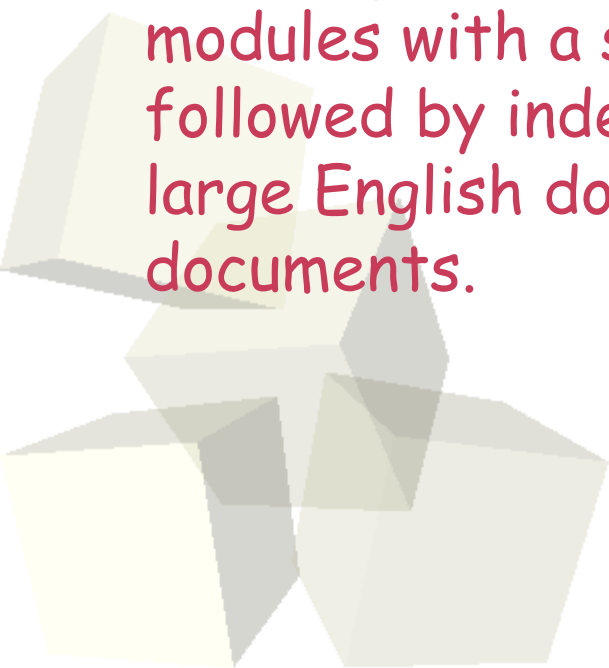
- An example is the course Information Analysis (IA) for students of the study program in Magister's degree at UoD. The lessons include the topic of IA, explanation of basic terms, the historical horizon of data search is mentioned: from library systems through Boolean to the concept search.
- The further teaching block deals with phases of text processing and with SW Tovek Tools (TT) modules for searching and AI.
- The teaching takes the form of training. Working with TT modules is at first tried on a small document base which includes about two hundred documents.





3. Creative Abilities 2/5

- Searching in the document base is performed at first with individual key words, then with a pair of words linked with different operators; the search result is explained and students must always understand it.
- Interesting for students is creation more complex query in the form of TOPIK (hierarchy structure of key words). The last teaching block includes controlled individual work with all modules with a small English document base subsequently followed by independent work of the students who analyze a large English document base, comprising several thousands of documents.



3. Creative Abilities 3/5

- The search in the extensive base of documents and the analysis of the demanded text in particular are focused on developing **independence and creative abilities**. The students receive a brief specification of the task and are only roughly methodically guided.
- They pick a topic from a list of documents subject to analysis. The topics include issues which appear in the news with greater frequency, for example, terrorism, the war in Afghanistan, NATO's missions abroad, corruption, economic crisis, etc.
- The students develop the strategy of the work procedure first and consult it with the lecturer. It is an individual process. They mostly start with approximate analysis, which determines the documents dealing with the respective topic.

3. Creative Abilities 4/5

- ✓ For the creative implementation of correct procedures, the approaches and processes of Competitive Intelligence can be applied.
- ✓ It is necessary to ask appropriate questions, which will direct the students to the desired result.
- ✓ During the analytical process, the persons, organizations, things, events, resources, places are determined and adequately categorized.

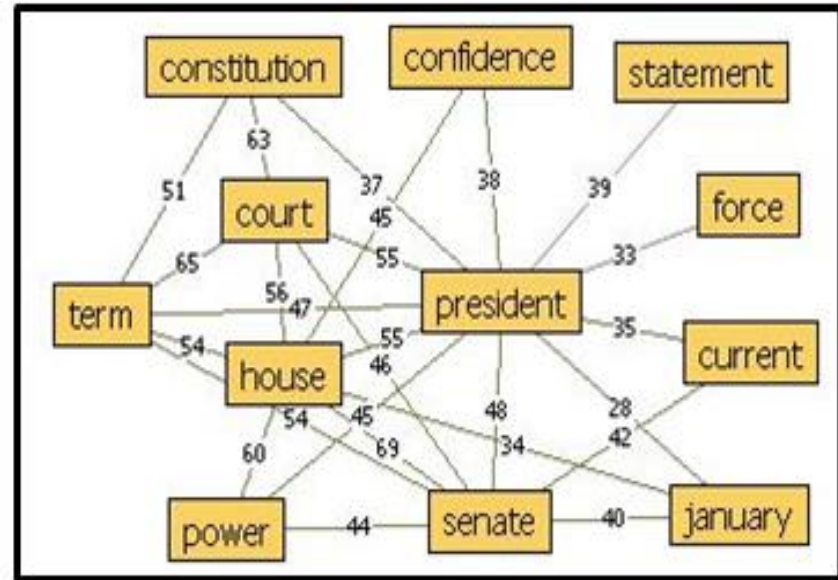
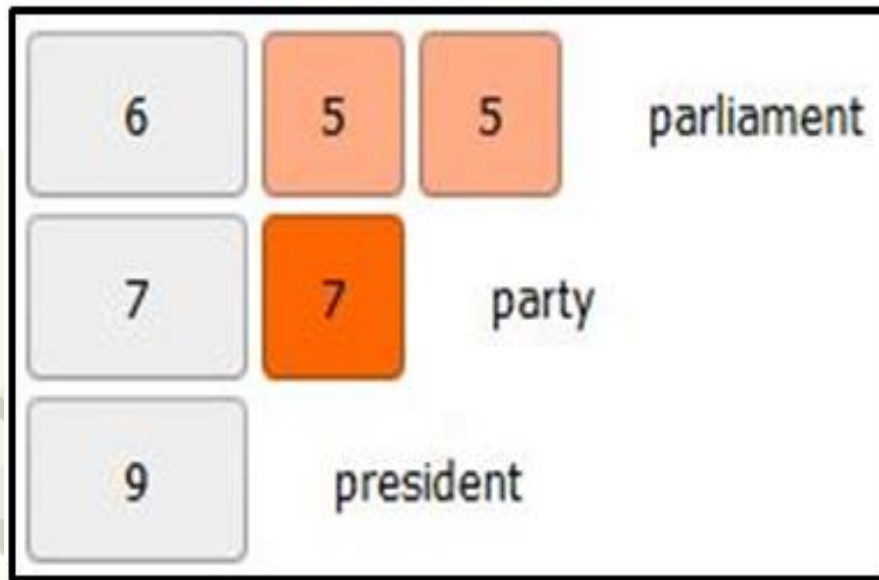


3. Creative Abilities 5/5

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4. Transfer of Research into Education 1/5

- The validated results of research convert immediately into teaching. The departmental research activity in KMS resulted in systems that are in practical use.
- An example is the CEFME (Central European Forum for Military Education) portal for cooperation at <http://beta.cefme.eu/>.
- The main feature is a user-friendly access to the information about universities, research and conference activities, etc.





4. Transfer of Research into Education 2/5



Cefme ► [Main Page](#)

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CEFME 2016 Annual Meeting, Croatia



25.10.2016
Annual CEFME meeting held in Zagreb, Croatia, on 25-27 October 2016



25.2.2016
International Conference on New Trends in Signal Processing
NTSP 2016, Demanovska dolina, Slovakia, 12th – 14th October 2016. The conference covers main topics: Signal Processing, Applied Electronics, Information and Communication Engineering,

Core information

- All universities
- All organizations
- CEFME universities
- CEFME meetings
- CEFME workgroups

Cooperating communities

- iMAF universities
- iMAF meetings
- iMAF workgroups
- LoD7 universities
- LoD7 meetings
- LoD7 workgroups

Activities



4. Transfer of Research into Education 3/5

- ✓ The structure of the portal is organized by a knowledge principle. It means that information is in context and builds the network; it is possible to browse in one query from information to another without interruption.
- ✓ The work was based on the methodology which include:
 1. Collecting information sources and their processing utilizing analytical software.
 2. Clarification of the terms in the area in focus and verification them against the document base.
 3. Ontology design, implementation and its verification.
 4. Creating a knowledge base.



4. Transfer of Research into Education 4/5

- ❖ The procedure and method of teaching the knowledge approaches and creation of knowledge-based systems to students were direct transferred from the research project into the education.
- ❖ A simple example is from the domain of conferences. The task assignment for student work is intentionally general and ambiguous, so that the students have to search their own approach to the analysis of information sources.
- ❖ For example: *"Analyze the information sources of the conferences, produce an overview of the information systems field, the processing of knowledge, social networks and communication systems that were discussed at conferences".*



4. Transfer of Research into Education 5/5

- ✓ At the same time, the students get familiar with the specific domain, as a preparation for building the knowledge base.
- ✓ Consequently, the students are introduced to knowledge approaches, creating ontologies
- ✓ The opportunity of the KSM for learning is resulting from its characteristics. The embedded information and knowledge can be divided into small parts and connected in requirement net.
- ✓ Ontology driven KMS offers the chance to study various themes according ontology concepts (classes). The last step is creating the knowledge base of the KMS.



5. Conclusion

- The aim of the paper was presentation the basic approaches to teaching for science:
 1. Motivation and Independent Work
 2. Creative Abilities
 3. Transfer of Research into Education

- Examples were from the:
 1. Course Information Management
 2. Course Information Analysis
 3. Project CEFME

- It was presented the seemingly simple measures that implementation in needed attention, can have good results.



Thank you for your attention!

