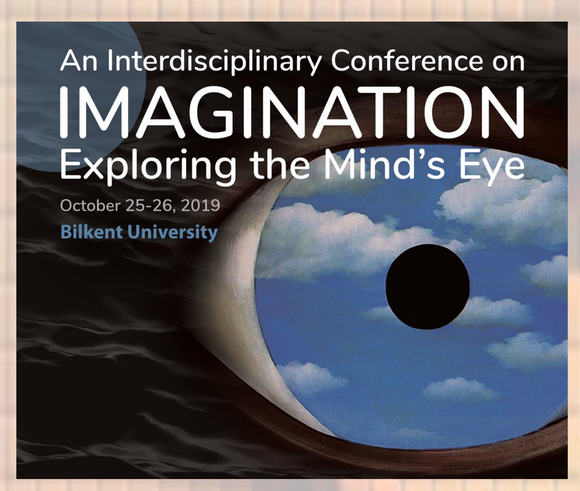

Mind maps for education

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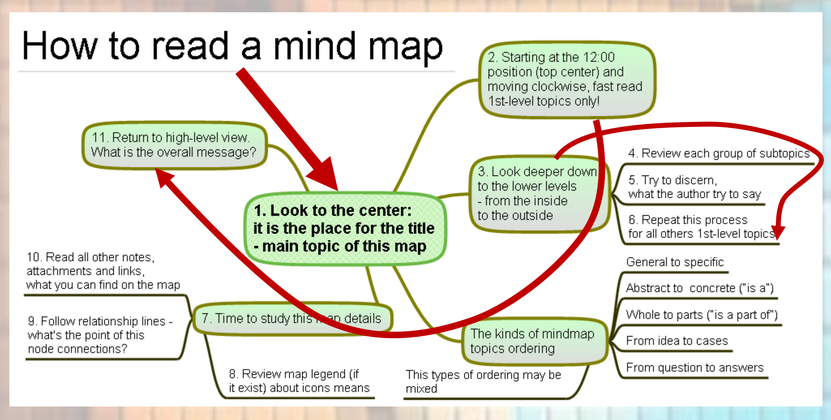

Figure1. Instructions how to read a mind map

Mind map is a well-known approach for information visualization. It gained wide popularity in the 20-th century. The imagination is extremely important for learning. In the process of mind map building, students need to imagine, understand and organize relationships between concepts/entities, and select or create relevant graphic images/icons.

Throughout the last decades many enthusiastic teachers tried to start using mind maps in education practice. They usually report about the positive results. However, mind maps still don't become the common practice in education.

The studies about effectiveness the mind maps approach show the inconsistent results with significant heterogeneity and strong influence from various third-party factors, like level of students' ability, engagement or motivation level, and topic area of courses as well.

There are two main different ways for embedding mind maps into the teaching. We will call it passive and active.

In the passive way, the course author (teacher) creates the set of mind maps as addition course documents. Its appear like visual "table of content" with indicating the current point and like the other kind of visual illustration. This way is convenient for the teacher - the once made mind map can be reused for all students, like other typical kinds of educational course content. Unfortunately, for some students this mind map will be too simple and uninteresting, and it will be too hard and complex for some others. But is there a significant difference between a textbook with mind maps and the one with other high-quality illustrations or infographics? This is the subject of further research. Our point of view is that for creating the modern effective education course the passive way is not enough.

There is the other way - active. Let each student create their own mind map for the current part of the training course. Students can select the complexity and size of their own mind map, they can build it according by to their interests and background knowledge, demonstrate their own understanding of the topic. Teacher will check student's mind maps and point out the mistakes. Student can also correct and update their maps.

The main disadvantage of this way is that it demands additional time. Students make the mind map instead of practical task or MCQ testing. We also need an additional time for learning the skill of creating mind maps (via software tool). And checking the students mind maps usually cannot be automatic.

So it means the impossibility of simple adding the active mindmapping to the education course. Usually we have limited fixed time for each course. So adding the new kind of student activity will require time reducing for other student actions or decreasing the set of course topics parts. Also it determines the impossibility of checking the mind maps effectiveness by setting the experiment with an experimental and control group of students.

Thus, the passive way does not give an increase of teaching efficiency, and implementation by the active way is impossible without reliable confirmations of efficiency, and it needs a full rebuilding the education courses. We understand what the solution can be found only as a synthesis of the active and passive ways.

Like in the active way, students will create mind maps. But we intend to try to limitate imagination and set the boundaries for creativity in the time of mindmapping:

+ several simple templates for mind map and only standard software,
+ soft restrictions for mind map building (with warning messages to user,
+ a specified set of node which a student can place on the mind map by the topic,
+ marking the sense of connections is necessary (by listbox item selection),
+ the set of pictures/stickers/emoji as visual elements of mind maps (limited ability to draw/add new/other),
+ automatically evaluation the complexity and similarity the created map with teacher map.

Finally, we hope that this combined synthetic way can help students to use imagination more actively in the learning time. Beside, it can increase education efficiency avoiding much extra time expenses.

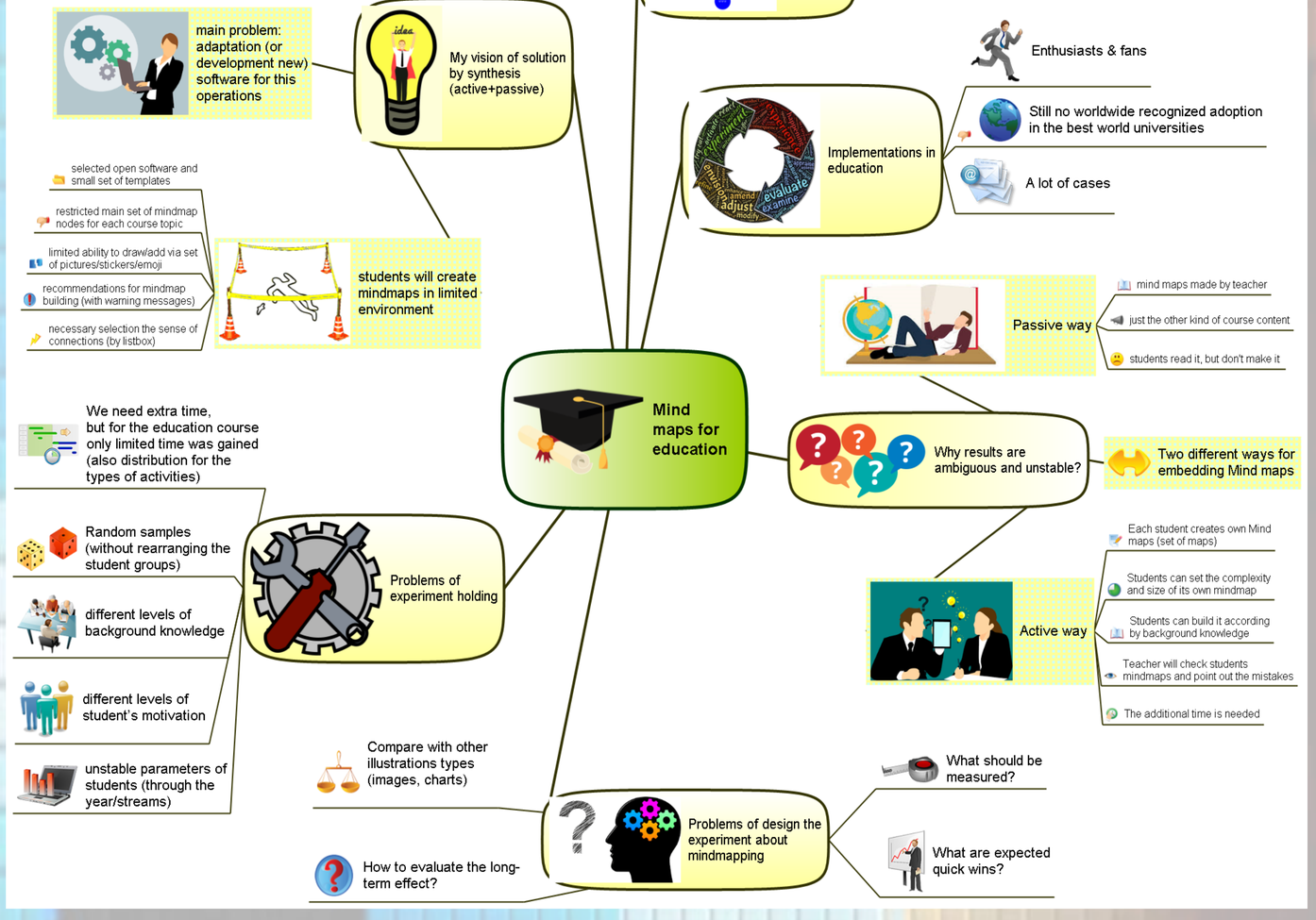

Figure2. The main content of this poster

Figure3. First step case: simple text-only mind map draft about Databases and DBMS (Russian language). Made by free online tool *text2mindmap*

Figure4. Real case: mind map with images about Computer Networks. Some branches are collapsed (child nodes are invisible). Made by *ConceptDraw MINDMAP* software.

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