

IMPLEMENTATION MINDTOOLS IN PROBLEM SOLVING

FajarArianto

State University of Surabaya
fajaraarianto@rocketmail.com

ABSTRACT

Using information and communication technology (ICT) must do it, now. Implementation ICT in instructional is computer. Using computer in instructional shouldn't tools, but as cognitive tools in solve to problem. Mindtools is computer applications that, when used by learners to represent what they know, necessarily engage them in critical thinking about the content they are studying. Instructional activities should be directed to the problem solving process. Mindtools very appropriate to be applied to solve the problem. Various computer applications in a mindtools to be able to solve the problem. Computer applications that can be used as mindtoolsie Organization Tools, Dynamic Modeling Tools, Information Interpretation Tools, Knowledge Construction Tools, Hypermedia, and Conversation Tools. Problem solving using technology consists of five stages identification of the problem, determine which keywords, search, checking, and communicate. The five application contained in such computer support problem-solving process. Implementation mindtools in the problem solving process will bring learners to think critically, and creatively.

Key word: computer, mintools, problem solving, ICT

A. INTRUCTION

The development of information and communication technology (ICT) at this moment in mobile technology. Computers have changed the direction of development of information and communication, especially in the way of learning. The use of computers in learning activities will bring learners in the problem solving process so that learning becomes meaningful.

The use of computers in learning should not as tools, but as a tool for thinking or mindtools in the learning process. Mindtools is a computer tool that has been adapted or created to expand thinking (Land, Smith, & Zimmerman, 2013). In educational technology, mindtools as a means of knowledge construction that extends the thought processes of users, allowing new forms of knowledge representation and manipulation tasks (Jonassen& Carr, 2000; Jonassen& Reeves, 1996 in Land, Smith, & Zimmerman, 2013). Mindtools not located on the device, but in the planning, decision making, and self-regulation in learning is the responsibility of learners (Jonassen, 1998) and the mental and computing support, guide, and expand the thinking processes of their users (Derry, 1990 in Jonassen, 1995). The device contained in the mobile technology serves as mindtools to help learners relate their experiences with authentic practice, problems, and contextual knowledge (Jonassen, 2013). The use of innovative approaches involving mindtools not only develop the motivation to learn, but also can improve learning achievement (Chu, 2010). Chu (2010) revealed that the

use of PDAs based mindtool assist in promoting interest in natural science learning, raises motivation to learn, support cooperative learning activities, and enhance learning. Mindtool support in improving the structure of knowledge as well as direct observation (Hwang, 2011). Mindtools has been recognized as an effective way to help learners in interpreting and organizing personal knowledge (Hwang, Shi, & Chu, 2011).

B. MINDTOOLS

Mindtools is officially defined by Jonassen, Carr, and Yueh (1998) as written by Hwang (2011) is a computer application when used by learners to represent what they know, to involve them in critical thinking about content learn it. Mindtools as how to use a computer application program to involve learners in a constructive, high-level, critical thinking about the subjects they are learning (Jonassen, 1999). The use of computers as a learning partner will enable learners to think more productively (Jonassen, 1995). Mindtools is a computer application such as concept maps, databases, expert systems, and tools-modeling system that can be used by learners to build semantic models of any discipline or topic being studied (Jonassen, 2011). Land, Smith, & Zimmerman (2013) formulate mindtools as a computer tool that has been adapted or created to broaden thinking. Mindtools not intended to make learning easier but harder to make learning about the learned material domain (Jonassen, 2014).

Mindtools characteristic according to Jonassen (2000) in Spector (2013; 275-276) there are five, are

- a. Mindtools have the cognitive ability to strengthen and reorganize that lets users go beyond the limitations of the human mind by doing things more accurately and at a higher speed
- b. Mindtools are generalizations and may be used in a variety of settings and domains to engage and facilitate cognitive processes
- c. Mindtools user has the ability to think critically, helps to think for themselves, make new connections between concepts, and create new knowledge
- d. Mindtools as intellectual partners in the learning process of the work. Devices or applications in mobile technology or computer must mengkalkulsi, store and retrieve information, while users tool should be responsible for identifying and assessing patterns of information and organization

- e. Mindtools is a concept. This is a way of thinking and the use of information and communication technology (ICT), other technologies, the learning environment, or the intentional and incidental learning activities / opportunities (constructivist in nature) so users of these tools can represent, manipulate, and reflect on what they know instead reproduce what others tell them

Learning with mindtools depends on the conscious involvement of learners in the tasks assigned by the tools and that there is the possibility of qualitatively improving system performance together students plus technology. Mindtools usage in learning will assist learners in problem solving. Mindtools not intended to make learning easier but harder to make learning about the domain material he learned and thinking more meaningful because it builds reality by building their own knowledge base (Jonassen, 1998).

Mindtools not just machinery and systems, but has represented a concept that includes the use of constructive, critical berfikir high level modeled and supported by the use of computer applications (Jonassen, 2008 at Spector, 2013). Mindtools represent constructivist use of technology, are concentrated with the process of how to construct knowledge (Jonassen, Carr, &Yueh, 1998). Furthermore, Jonassen, Carr, &yueh explained that the constructivist approach to learning seeks to create an environment where learners are actively participating in the environment in a way that is intended to help them build their own knowledge, and learners are actively involved in the interpretation of the outside world and reflect their interpretation. Active Here are learners must participate and interact with the surrounding environment to create pandangan about the subject.

C. PROBLEM SOLVING WITH MINDTOOLS

Problem solving is a skill in solving problems. Problem solving begins with the initial state (the knowledge and resources owned since the beginning) and work until it reaches the destination (goal state) (Newell and Simon, 1972 Reisenberg, 2007). Problem solving includes finding the right way to achieve the goal (Santrock, 2011). Problem solving can be interpreted as laying, intentionally directing learners, oriented activity in an effort to find a different solution to the problem that is authentic to completion through the interaction between fixers, tools and other resources (Kim and Hannafin, 2011). Success in solving the problem requires learners to produce and try the solutions in their mind (mental models or space issues) before trying the real world (Jonassen, 2011).

Learners who show signs of having been doing problem solving skills as follows

1. willing to spend the time to read, gather information and defining the problem.
2. the use of a process, as well as a variety of tactics and heuristics to solve the problem.
3. monitor the process of solving their problems and reflect on their effectiveness
4. emphasis on accuracy rather than speed.
5. write down their ideas and create charts / figures, when solving the problem.
6. organized and systematic.
7. flexible (keeping its options open, to see the situation from various perspectives / viewpoints).
8. The drawing on knowledge of the subject in question and objectively and critically assess the quality, accuracy, and precision of knowledge
9. willing to take risks and overcome the ambiguity, a welcome change and managing stress.
10. The use of a comprehensive approach that emphasizes fundamental than trying to combine different solutions (Woods, et al, 1997 and Mourtos, Okamoto & Rhee, 2004).

Of the ten signs skills of problem solving above, Mourtos, Okamoto & Rhee (2004) noted that the signs above are from cognitive domains (2, 3, 5, 8, 10) and affective (1, 4, 6, 7, 9). Furthermore Mourtos explains that it takes to develop certain attitudes prior to the learners before they acquire the necessary skills to tackle open issues.

The application of problem solving skills, according to Rooney, Poe, Drescher, and Frantz (1993), there are five principles to be followed by learners and learners. These five principles are

1. learners and learners have to identify the problem from the angle of learners
2. Understand and agree with the real issue
3. Once the real problem must be identified, learners must change it according to his needs
4. learner, not learning, should solve the problem
5. the learners should focus on how, not whether.

Problem solving with the help of mobile technology or computer connected to the internet, the author proposes the stages of problem identification, keyword, search, check and deliver. Problem identification stage, learners understand their problems and find the crux of the problem. The second stage of keywords, keyword learners formulate the problems that will be used in the third stage, are the search. Third, search, learners find solutions by using keywords for search purposes by using existing devices in mobile technology. Fourth, check,

check this stage is a confirmation or determine compliance with the results of solving the problem. The fifth stage is to communicate or convey the results of problem solving.

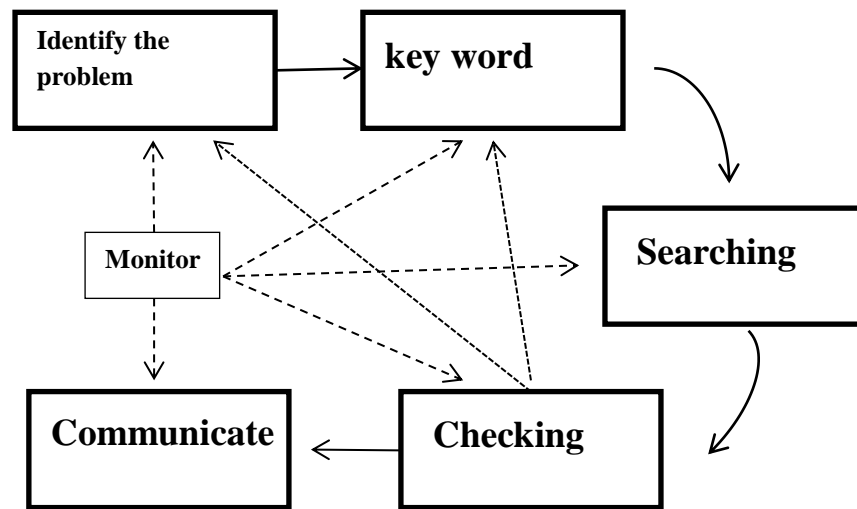


Figure 1.Mindtools as problem solving

The fifth stage of problem solving with mindtools described as follows:

1. Identify the problem. Learners to identify the issues presented. Learners assessing the problem to find the core of the problem. Assessment activities include reading problems, specify the subject matter and pinpoint the problem to be solved.
2. Assign a keyword. The results of the identification problem, learners define keywords of the problem to be solved. Keywords are the core of the problem which may consist of one to three words. Keywords obtained from the subject matter, or subject / matter.
3. Search. Search at this stage is to use keywords to solve the problem by utilizing the applications contained in the mobile technology, such as networking, spreadsheets, expert, or an application that supports problem solving. The search process, learners in determining the solution has passed the stage of analysis, synthesis, and evaluation.
3. Checking. This stage is to check the result of solving the problem, the goal is to examine the truth. Checking the breakdown can be done by checking the solution by reviewing the results through compliance with desired of the problem, and keywords

4. Delivering the results of troubleshooting. When you're sure, learners present the results of the final solution of the problem.

The fifth stage, learners do monitor at every stage. Monitor here is self-monitor every step has been done whether in accordance ?, whether it has correctly ?, whether in accordance with the objectives? At each stage, the learner to monitor the process does. Monitor here is cognitive monitor. Cognitive Monitor includes metacognitive knowledge, (b) metacognitive experiences, (c) goals (or tasks), and (d) actions (or strategies)

D. CONCLUSION

Mindtools is a way of thinking by using applications found on the computer. Mindtools success lies not in the application, but on how we think by using the applications found on the computer. And computer not as a tool, but it should be as a partner in thinking. Mindtools very supportive in problem solving. Problem solving with support mindtools to do with the five stages, ie the identification of the problem, determine which keywords, search, checking, and communicate. At each stage of the monitoring carried out.

RESOURCES

- Huang, I.-C., Sugden, D., & Beveridge, S. (2009). Assistive devices and cerebral palsy: the use of assistive devices at school by children with cerebral palsy. *Child: care, health and development*, 35(5), 698–708.
- Hwang, G.-J., Shi, Y.-R., & Chu, H.-C. (2011). A concept map approach to developing collaborative Mindtools for context-aware ubiquitous learning. *British Journal of Educational Technology*, 778-789.
- Jonassen, D. (2001, Oktober). CanYou Train Employees to Solve Problems ? *Performance Improvement*, 40, 18-24.
- Jonassen, D. H. (1995, Spring). Computers as Cognitive Tools: Learning with Technology, Not from Technology. *Journal of Computing in Higher Education*, 6(2), 40-73.
- Jonassen, D. H. (2000). Toward a Design Theory of Problem Solving. *ETR& D*, 48(4), 63-85.
- Jonassen, D. H. (2004). *Learning to Solve problems : an Instructional Design Guide*. San Francisco: Pfeiffer.
- Jonassen, D. H. (2011). *Learning to Solve Problems : A Handbook for Designing Problem-Solving Learning Environments*. New York: Routledge.

- Jonassen, D. H. (2011). *Learning to Solve Problems: A Handbook for Designing Problem-Solving Learning Environments*. New York: Routledge.
- Jonassen, D. H. (2011). *Learning to Solve Problems: An Instructional Design Guide*. San Francisco: Pfeiffer.
- Jonassen, D. H. (2014). Mindtools (Productivity and Learning). *Encyclopedia of Science Education*, 1-7.
- Jonassen, D. H., Carr, C., & Yueh, H.-P. (1998). Computers as Mindtools for Engaging Learners in Critical Thinking. *TechTrends*, 24-32.
- Land, S. M., Smith, B. K., & Zimmerman, H. T. (2013). Mobile Technologies as Mindtools for Augmenting Observations and Reflections in Everyday Informal Environments. In J. M. Spector, B. B. Lockee, S. E. Smaldino, & M. C. Herring., *Learning, problem solving, and mindtools: essays in honor of David H. Jonassen* (pp. 614-654). New York: Routledge.