Guided discovery learning approach

Go to the main contents Go to the table of contents Reference work entryDOI: Guided discovery learning is based on a discovery learning model that also forms the basis for problem-based learning, simulation-based learning, and case-based learning, terms that are similar in origin but not identical to guided discovery learning. The word to find comes from the late Latin word discooperire, finding, revealing, defined as the first to find out, see or know, discover, learn about existence or understand. Guided discovery learning combines the guide's path to understanding or problem solving with facts, relationships, and solutions found by students themselves as they study, manipulate objects, discuss or conduct experiments based on their own experience and existing knowledge. Guided discovery learning combines didactic teaching directed by a teacher, lecturer or writer and more -... This is a preview of the order content, sign in to check the access. Bruner, J. (1973). Exceeding the information provided. New York: W.W. Norton.Google ScholarDe Jong, T. (2006). Scaffolding for scientific discovery. Create J. Elen & R. E. Clark (Eds.), Handling complexity in learning environments (p. 107–128). Oxford: Elsevier.Google ScholarKlahr, D., & Nigam, M. (2004). Equivalence of learning pathways in early science education: The effects of direct teaching and discovery studies. Psychological Science, 15, 661–667.Google ScholarMayer, R. E. (2004). Should there be a three-punch rule against learning to clean discoveries? Guided teaching methods. American Psychologist, 59, 14–19.Google ScholarPapert, S. (1980). Mindstorms: Kids, computers and powerful ideas. New York: Basic Books.Google Scholarspencer, J. A., & Jordan, R. K. (1999). The learner focused approaches to medical education. British Medical Journal, 318, 1280–1282.Google Scholar© Springer Science+Business Media, LLC 2012Robert A. LavineEmail author1. Department of Pharmacology and Physiology and Department of Neurology (ret.)The George Washington University School of Medicine and Health SciencesWashingtonUSA2.Reston Psychological CenterRestonUSA 15. Elmore, B., Jawaharlal, M., & Hays, G. (2003a). Improve performance through simulation: A scenario-based learning model. White Paper: Experia Solutions, MN. 16. Elmore, B., Jawaharlal, M., & Hays, G. (2003b). Scenario-based learning vs. role-playing and case studies. White Paper: Experia Solutions, MN. 17. Kindely, R. (2002) The Power of Simulation-Based E-Learning (SIMBEL), Web Learning Developers. 18. Kolb, D. (1984). Experiential learning: Experience as a source of learning and development. New Jersey: Prentice Hall. 19. Jawaharlal, M., Saeed, M., & Fan, U. (2005). Enhancing authentic learning experiences through learning a community design service. American 2005 procedures of of Engineering Education Southwest Regional ASEE Conference, Los Angeles, Loyola Marymount University. 20. Jawaharlal, M., Shih, A., & Schrader, B. (2004a). Use of scenario-based learning in static teaching, session 2666, 2004 ASEE Annual Conference, Salt Lake City, Utah. 21. Jawaharlal, M., Shih, A., Schrader, B., & Elmore, B. (2004b). Scenario-based learning and multimedia in improving engineering training, ASME Design Engineering technical conferences and computers, and information at an engineering conference in Salt Lake City, Utah. 22. Aleven, V., Stahl, E., Schworm, S., Fischer, F., & Wallace, R. (2003). Help find and help plan in an interactive learning environment. Review of educational research, 73, 277-320. 23. Faryniarz, J. V., & Lockwood, L. G. (1992). The effectiveness of microcomputer simulations in promoting environmental problems for community college students. Science Education Research Journal, 29, 453-470. 24. Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit intelligence theories predict achievements throughout adolescent transition: longitudinal research and intervention. Children's development, 78, 246-263. 25. Dweck, C. S. (1999). Self-theories: Their role in motivation, personality and development. Philadelphia: Psychology Press. 26. Dweck, C. and Legget, E. L. (1998). A socially cognitive approach to motivation and personality. Psychological Review, 95, 256-73. 27. Ajzen, I., & Madden, T. J. (1986). Predicting goal-driven behavior: Attitudes, intentions, and perceived behavioral control. Journal of Experimental Social Psychology, 22, 453-474, p. 457. 28. Ajzen, Icek (December 1, 1991). The theory of planned behavior. Organisational behaviour and human decision-making processes 50 (2): 179–211. 29. Hecker, B. Me, & Ajzen, I. (1983). Improving health behaviour prediction: An approach based on the theory of justified action, Academy of Psychology Bulletin, 5, 11-19. 30. Fishbein, M. & Ajzen, I. (1975). Faith, attitude, intent and behavior: Introduction to theory and research. Reading, MA: Addison-Wesley. 31. Butler, Judith (1999). Gender problems: Feminism and the subversion of identity. New York: Routledge. p. 9-11, 45-9. 32. Crawley, F. E., & Black, C.B. (1992). Causal link to the intentions of secondary school science students to enroll in physics. Journal of Science Education, 29, 585-599. 33. Davis, L. E., Ajzen, I., Saunders, J., & Williams, T. (2002). African-American students' decision to complete high school: Applying the theory of planned behavior. Journal of Educational Psychology, 94, 810-819. 34. Koballa, T. R. (1988). Attitude and related concepts in science education. Science education, 72, 115–126. 35. Meece, J. L.,Wigfield, A., & Eccles, J. S. (1990). Predictors of math anxiety and its consequences for young " course enrolment intentions and math presentations. magazine, 82, 60 – 70. 36. Aiken, L. R. (1970). Attitudes towards mathematics. to paragraph 1.2. 40, 551-596. 37. Parsons, J. E., Karabenick, J. D., Adler, T. F., Futterman, R., Heller, K. A, Kaczala, C., & Meece, J. L. (1979). The paper was presented as part of a symposium Authors influencing women's participation in mathematics at the American Psychological Association Conference, New York, NY. 38. Sparks, P., Guthrie, C. A., & Shepherd, R. (1997). Dimensional structure of the observed behavioral control structure. Applied Journal of Social Psychology, 27, 418-438. 39. Parsons, J. E., Adler, T. F., Futterman, R. Goff, S.B., Kaczala, C.M., Meece, J. L, & Midgley, C. (1980). Self-perception, mission concepts and academic selection: Origin and change. Final report to the National Institute of Education, Washington, D.C. This article or chapter is incomplete, and more attention needs to be paid to its content. Some information may be missing or may be incorrect, spelling and grammar may need to be improved, use your judgment! Students find information without guidance and develop their own understanding. The purpose of teaching is simply to provide a suitable environment that software can have a microworld or simulation. Studying discovery, i.e. unsedalted learning, involves the formulation and testing of the hypothesis (Goodyear et al. 1991, Shrager and Klahr 1986). (Stephen Bostock), retrieved, 5:17 p.m., 3 p.m. See also : computer simulation, SimQuest, science simulation 2 Why guided discovery? de Jong and van Joolingen (1998) cite the following problems that learners face in scientific discovery learning: producing hypotheses is difficult. For example, learners may not know what a hypothesis should look like. They're having trouble modifying their hypothesis so they can afford the information they collect. Or they draw conclusions based between variables that remain unchanged between the two experiments. Designing experiments to decide the accuracy of the hypothesis is also a major challenge. For example, the learner has a certain tendency to seek information that confirms their hypothesis rather than trying to falsify their hypothesis. Or they are planning experiments that vary too many variables at once so that no conclusion can be drawn. Self-content in the discovery learning process is a key issue that distinguishes successful learners from failed learners. Successful discoverers usually follow a plan that goes through their experiment, in which failed learners use a more random strategy. - Summary by R. Reichert (2005). Review de Jong, Ton; van Joolingen, Wouter R. (1998) It can generally be said that successful discovery learning is associated with reasoning, from hypothesis to systematic and planned discovery process (such as systematic variations in changing values) and the use of high-quality heurist experiments. (de Jong, T. & van Joolingen, W. (1998, Preliminary edition). Since this is not natural, it requires guidance. Alfieri et alfieri et al. (2011:1) carried out two meta-analyses to concludes that uncontrolled discovery learning does not benefit learners, while guided discovery learning leads to better results than clear teaching. The first studied the effects of unassisted discovery compared to clear teaching, and the second studied the effects of enhanced and/or assisted discovery compared to other types of guidelines (e.g. clear, unwanted discovery). Random effects analyses from 580 comparisons revealed that the results were favourable for explicit teaching compared to the unaided finding in most circumstances (d = -0.38.95% CI [−.44, −.31]). By contrast, analyses of 360 comparisons revealed that the results were favorable for enhanced findings compared to other forms of teaching (d = 0.30.95% CI [.23, .36]). Our findings suggest that finding unaided does not benefit learners, while feedback, working examples, scaffolding and the explanations raised will benefit. Finally, the authors drew up the following recommendation: Based on current analyses, optimal approaches should include at least one of the following: (a) guided tasks with scaffolding that help learners; There may not be opportunities for constructive learning when learners are left unaided. (Alfieri et al. , 2011:13) 3 Features of learning discoveries Guided discovery was developed by Dr. Charles E. At the Wales Center for Guided Design at the University of West Virginia (Leutner, 1993). Learning discoveries is much older and other forms of structure exist. Guided discovery is characterized by conversing thinking. The instructor prepares a set of statements or questions that guide the learner step by step and make a series of discoveries that lead to one predetermined goal. In other words, the instructor initiates the stimulus and the learner reacts by participating in the active survey and thus finding an appropriate response. Mosston (1972:117) defines ten cognitive operations that may occur when a learner participates in an active survey: identifying da analysis, synthesizing, comparing and comparing, drawing conclusions, stating by exterior, inquiring, inventing, and discovering. By actively working and explaining facts or concepts, the learner understands and thus remembers the topic. Mosston (1972:122) warns that discovery cannot be done if answers are given. He also points out certain drawbacks of this teaching method: it accurately controls and manipulates learning behaviour and can therefore be misused and is designed for individual rather than group use. - Discovery LearningConcept, referred to, 17:17, 15.9.2006 (MEST) according to Spencer (1999), the key features of guided discovery study are: and a framework for learning for students Learners are responsible for studying content needed for understanding through self-directed learning Study guides are used to facilitate and guide self-directed learning Understanding is strengthened in an application-oriented problem-oriented, task-oriented and work-related experience The guided discovery learning plans can be enhanced with various calculation tools. One of these is a simulation. According to reichert(2005) de Jong and Joolingen (1998), the following scaffolding should be included in the design of computer simulations for learning discoveries. Direct just in time access to domain knowledge seems to have a positive impact on problem solving and knowledge transfer. Supporting the emergence of hypotheses, for example by providing hypothesis construction tools, appears to have positive effects on learners' performance. Supporting the design of exams by providing tips and advice seems to have a positive impact on learners' experimental abilities (but does not seem to affect the learning outcome). Support forecasting, for example by providing them with a graphical tool for drawing a curve describing the forecast. Support for regulation The learning process includes various measures: the progress of the model, such as a step-by-step model extension (e.g. broadening the complexity of the model). Planning support (e.g. through guiding questions, tasks, or even tasks). Follow-up support (e.g. shows what has already been done in the simulation) Structing the discovery process (e.g. providing a sequenced structure to students such as structures, tea, reflect). De Jong and Jooling's extensive review of litter showed that generally controlled simulations lead to better results than unguided ones. Compared to exposure teaching, guided simulation can increase aspects of deep learning, such as understanding concepts and, of course, better training for the discovery process itself. See also some of the discussions reported in the discovery learning article. In short: it is still open... There are many principles of guided discovery or similar principles, such as Laurillard's discussion framework 4 Example in vocational education According to Allen (2002), DaimlerChrysler uses guided discovery learning principles to teach maintenance engineers to electrical systems in the automotive industry. Below we summarize its main features, which are described in this article. Finding out the source of the bugs is a very complicated task. Maintenance engineers must use diagnostic aids and equipment together with a carefully thought-out strategy to locate and solve the problem. Since employees do not remember the configurations of all vehicles, training can no longer be specific to a single system. Training must focus on strategic thinking and specific facts, procedures and concepts. Education must build flexible skills and adaptive skills contextual variations in the sequencing of tasks. That's why learning systems allow maintenance engineers: Plan their own problem-solving; Conduct simulated tests on circuits using simulated diagnostic devices used to report accurate indicators; Access to reference data; Order repairs and test results; Continue repairs to vehicles returned by customers who have complaints about an earlier service; and get feedback on efficiency (completion time and cost of completion), incorrect assumptions and decisions, and how to approach diagnosis more effectively. The risk and conditional result of the DaimlerChrysler discovery learning app gives the exercises a game-like quality. Learners are motivated to try exercises repeatedly to improve their performance scores. Complete simulation makes the learning task realistic and supports the transfer of learning to real, on-the-job learning. 5 Discussion The question is not whether guided learning is better than unsuitable discovery. It would have re-emphasised how much guidance is needed at some level of learning (and perhaps in learning objectives and thematic areas). See also some discussion about the science simulation. 6 Links Discovery Gallery, Royal Ontario Museum 7 References Allen, Michael (2002), Discovery Learning: Repurposing An Old Paradigm, LTI Newsline, HTML, Referenced, 5:17 p.m., September 15, 2006 (MEST). Aleven, V., Stahl, E., Schworm, S., Fischer, F., & Wallace, R. (2003). Help find and help plan in an interactive learning environment. Review of the Education Survey, 73(7), 277-320. de Jong, T. & van Joolingen, W. (1998). Scientific discovery learning with computer simulations of conceptual domains. Review of the Education Survey, 68(2):179-201, 1998. Abstract/PDF Preprint Faryniarz, J. V., & Lockwood, L. G. (1992). The effectiveness of microcomputer simulations in promoting environmental problems for community college students. Journal of Science Education, 29(5), 453-470. Abstract and PDF (Access Limited). Feldon, David, F. Dispeling a Few Myths about Learning, UrbanEd PDF Gokhale, Anu A. (1996), Computer Simulation Efficiency to Improve Higher Order Thinking, Journal of Industrial Teacher Education, Volume 33, Number 4. Html. Goodyear, P., Njoo, M, Hijne, H & van Berkum, J.J.A. 1991. Learning processes, learner characteristics and simulations. Education and calculation (6) 263-304. Kirschner, P., Sweller, J., & Clark, R. E. (2006). Why non-connected learning doesn't work: Analysis of the failure of discovery, problem-based learning, experienties learning, and survey-based learning. Educational psychologist Vol. 41, Iss. 2 PDF Pre-printing Kirschner, P. A., Sweller, J., & Clark, R. E. (2006) Why minimal guidance during teaching does not work: Analysis of constructivist, discovery, problem-based, experiential and survey-based teaching Second draft version of the aforementioned PDF Leutner, Detlev, Detlev, Guided discovery learning with computer-based simulation games: Effects of adaptive and non-adaptive teaching support, learning and teaching, 3 (2) p113-32. Lindström, B., Marton, F., Ottosson, T., & Laurillard, D. (1993). Computer simulations as a tool for developing intuitive and conceptual understanding in mechanics. Computers in Human Behavior, 9, 263-281. Mosston, Muska (1972), Teaching: Command to Discovery. Belmont, California: Wadsworth Publishing. Mott Bradford W. , Scott W. McQuiggan, Sunyoung Lee, Seung Y. Lee and James C. Lester, narrative-centered environments for Guided Exploratory Learning, PDF Reichert, Raimond (2005). Review de Jong, Ton; van Joolingen, Wouter R. (1998) Scientific Discovery Learning with Computer Simulations of Conceptual Domains, elearning reviews, [www.elearning-reviews.org/publications/270 HTML] Shulman, L. and Keisler, E. (1966). Learning Discovery: Critical Evaluation. Rand McNally. Shrager, J & Klahr, D. 1986. Education-free learning about a complex device: paradigm and observation. Int. J. Man-Machine studies. 25, 153-198. Spencer, John A., (1999) Learner-centric approaches in medical education, BMJ318:1280-1283 (open access)