Micro world program

Microworlds is a kind of educational technology used in construction training structures. See also: Brent Wilson (1995) i.e. classifies microlights as a kind of learning environment, which is an idea expressed as follows: Like the class metaphor, thinking about learning as an environment gives emphasis on the place or space where learning takes place. At a minimum, the learning environment contains: a teacher; settings or space in which students use tools and devices, collect and interpret information, interact, possibly with others, etc. This metaphor has considerable potential because learning designers like to think that effective learning requires a degree in student initiative and choice. An environment in which students are given room to study and identify goals and learning activities seems like an attractive concept. Students who are given generous access to information resources - books, printed and video materials, etc. and tools - word processing programs, email, search tools, etc.-are more likely to learn something if they are also given proper support and guidance. Under this concept, learning is promoted and maintained, but is not controlled or dictated in any rigorous way. Microworlds appeared in the 1980s along with the pedagogical constructivism defined by Wilson (1995), as: a place where pupils can work together and support each other as they use different tools and information resources in their quest for learning goals and problem-solving activities. Microsloves continue to evolve in different forms. The main ongoing debate focuses on the question of how much structure or scenarization is required in effective learning constructs. See also scaffolding and pedagogical scenario, opening training against managed opening training. 2 Definition of Microworlds is a small playground of mind (Clements, 1989, p. 86 quoted by Rieber, 1996:587), Microworlds are tiny worlds inside which a student can explore alternatives, test hypotheses, and discover facts that are true about this world. (Larry Latour). Microworld implements a constructivist model of educational design that allows the student to play in an artificial or real (for example, sandbox) environment and learn by building things. The goal is to give students the resources to build and refine their own knowledge. Microworld is a type of computational document aimed at embedding important ideas into a form that students can easily explore. The best microcosms have an easy-to-understand set of operations that students can use to attract value tasks for them, and in doing so they come to understand powerful core principles. You can understand ecology, for example, by building your own little creatures that compete and depend on each other. (diSessa, 2000, p.47) 3 History Papert did in 1980 concepts developed around the logo programming language, the design of which was influenced by a specific building vision of education. The logo included turtle geometry, drawing a pen in the form of a turtle that children could move and draw on the screen or floor. The turtle is an object to think with, that is, a cognitive instrument. Since logo many other environments in the same vein have been built, but the scope of modern micro-worlds goes a lot of beyound programming environments for kids. Papert (1980) gave the first formal definition of the microcosm as:... a subset of reality or constructed reality whose structure fits a given cognitive mechanism to provide an environment where the latter can work effectively. The concept leads to a project to invent a microcosm so structured as to allow a human student to carry out specific powerful ideas or intellectual skills. (19 December 2018) For Papert, microcosm is based largely on a path in which a person is able to use a technological tool for the kinds of thinking and cognitive research that would not be possible without technology. But Papert knew we needed auxiliary structures: ... The use of microcosm provides a model of learning theory in which active learning consists of a study of a microcosm student, limited and transparent enough for constructive study and, but rich enough for a significant discovery. (1990-08-208). Although it demonstrates the importance of Papert placed on research and discovery learning, it also shows the need for a teacher or microcosm designer to define the limits for learning. Papert may have underestimated the complexity of designing such boundaries, especially determining where the limits lie for a particular child in a particular domain, but he certainly acknowledged the need for guidance, both in the microcosm itself and in helping a teacher to a child using it. As Papert writes (1980) ... Building a microcosm network provides a vision of education planning, which in important aspects is the opposite of the concept of the curriculum. This does not mean that learning is not necessary or that there are no behavioral goals. But the teacher's relationship with the student is very different: the teacher introduces the student to the microcosm in which the discovery will be made, not with the find itself. (19 December 2018) Originally logo-like environments were timed to coincide with the computer and individual users. More recent events (e.g., in the MIT lifelong kindergarten group) relate to a wide range of construction training facilities such as: 4 Microworld Microcosm Features will consist of (Edwards, 1995) A set of computing objects that model the mathematical or physical properties of a microworld links domain multiple representations of the main properties of the model The ability to combine objects or operations in complex ways, similar to the idea of combining words and sentences in the language Of a set of measures or challenges that are inherent or programmed in the microcosm; the task of solving problems, achieving the goal, etc. Thus, microcosms allow more and younger people to understand the very meaningful and applicable concepts and principles underlying all complex systems. are objects from which to think to empower our intellectual capabilities. The turtle logo is an example: a turtle becomes a way for a child to grapple with mathematical ideas generally considered too heavy or abstract. The main role served by the turtle is how it concretizes abstract ideas. are central to some forms of intelligence training. there is an idea of debugging: errors in problem solving problems become a rich source of information, without which it was not possible to find the right solution. The software can be seen as a microcosm ... or not, whether microcosm software can be considered depends on this relationship when the software is actually in use. Student must: understand the simple aspect of the domain very quickly (Rieber, 1996b); explore the domain further with microcosm (Rieber, 1996b); be able to manipulate objects and features of the microcosm in order to induce or identify their properties and functioning of the system as a whole (Edwards, 1995, p. 144). interpret feedback received by the software based on their actions and change the microcosm to achieve its goal (i.e. debugging). use objects and operations in the microcosm either to create new entities or to solve specific problems or problems (or both) (Edwards, 1995, 144). Thus, microworld should be defined in the interface between an individual user in a social context and a software tool that has the following five functional attributes: domain-specific; provides a doorway for the domain for the user, offering a simple example of a domain that is immediately understandable to the user; leads to activities that can be gently motivated by the user - the user wants to participate and persist in the task for some time; leads to immersive activity, which is best characterized by words such as game, query and invention; and is in the constructivist philosophy of teaching (requires a very skillful teacher who defends a dual role: an asfacilator teacher and a teacher-student). Microworlds microcosms do not necessarily have two important characteristics that cannot be present in simulation (Rieber, 1996). microworld presents the student's simplest case of the domain, even if the student is usually given the means to reformat the microcosm to explore more and more complex ideas. the student's cognitive and active state. Students immediately know what to do with the microcosm - little or no training should start using it (imagine first teaching the child how to use the sandbox). student is encouraged to think of it as the real world, not just as a syming of another world. (larry/microworlds/microworld.html) Alternative names and/or specialized species (see Rieber, 1996, p. 583) computing media (diSessa, 1989), interactive simulations (White, 1992), participation simulation (Wilensky & Stroup, 2002), computer manipulators (Horwitz & Christie, 2002). Expressive digital media participants in learning environments (Barab, Hay, Barnett and Squire, 2001) 5 Theory basis for learning in microcosm Representations help solve problems in 3 ways: proper representation reduces cognitive load and allows students to use their precious working memory for higher-order tasks. clarify the problematic space for students, for example by organizing a problem and a search path. good representation reveals immediate consequences. Microworlds offer means of maximizing all 3 benefits of representations, when used in the context of appropriate scientific pedagogical pedagogy, such as one based on the scientific method of generation hypothesis and testing hypothesis. In the ThinkerTools microcosm, for example, students interact directly with a dynamic object, having discrete forces they apply to an object horizontally or vertically displayed on a simple but effective datacross. Students can also manipulate different parameters in the microcosm, such as gravity and friction. ThinkerTools reliably creates a space problem in which numerical, high-quality and visual representations consistently work together. In addition, Perkins and Enger (1994) suggest that microlights provide themselves with the integration of structural structures based on analogies and metaphors. Similarly, the microcosm can be designed to provide an idea that purposefully directs a student to focus on the most strained relationship phenomena being studied. Of course, such benefits do not come without certain costs or risks. For example, if users misunderstand the mapping structure of an analogy, the benefits will be lost and students could potentially form misconceptions. Simply providing microcosms to students, without pedagogical foundations, should not be expected to lead to learning. The role of the teacher and the resulting practice in the classroom is crucial here. Microworlds rely on a culture of learning in which students are expected to ask, test and justify their understanding. Students should actively engage in the construction and evaluation of their understanding complex and reliant problematic contexts (1.27). As Perkins and Enger (1994) point out, microworld designers need to adequately articulate the components and relationships between domain components to be explored. Next, they should build an illustrative world that exemplifies this target domain. Finally, the illustrative world must provide natural or familiar referents that, when placed in correspondence with each other and mapped to the target domain, provide a better understanding of the domain. (pl. 30) 6 Construction: microcosm research is developing Construction is strongly rooted in student projects. Projects offer a critical way to link motivation and thinking and can be defined as relatively long-term, problematic and meaningful learning units that integrate concepts from a range of disciplines or learning fields (BLUMENFELD et al., 1991, p. 370). The projects have 2 main components: driving issues or problems and activities that lead to one or 5 artifacts (BLUMENFELD et al., 1991). The artifacts are compressed and criticized e liberalization of students' cognitive work in classrooms and go through intermediate phases and are constantly subject to revision and improvement (Blumenfeld et al., 1991, pp. 370–71). It is important that the driving issue is not excessively restricted by the teacher. Instead, students need plenty of space to create and use their own approaches to project design and development. Projects like external artifacts are public insights into students' decisions. Artifacts developed over time reflect their understanding of the problem over time. In contrast, traditional school assignments have no driving issue and thus there is no authentic purpose to motivate the student to draw or rally the complex cognitive processes needed to comprehensively solve problems. In an early study of construction, Harel and Papert (1991) strongly suggest that what changed was not the logo or any particular group of strategies, but rather that a general learning environment (1. 70) was created, allowing the culture of design work to flourish. They particularly point to the avocative effects of this environment. These students developed different relationships with fractions (1, 71), that is, they came to like fractions and saw the relevance of this mathematics to their daily lives. Many reported seeing fractions everywhere. Harel and Papert resist any tendency to report success as caused by logo. Instead, learning to program and use the logo allowed these students to become more involved in thinking about fractions of knowledge (1. 73). They indicate that the Logo allows such designs about factions to occur. But successful project-based training is not a panacea. Success is on many critical assumptions or characteristics and failures in any can disrupt the experience. Examples include assessing the complex relationship between learning and motivation, emphasis on issues or problems related to students, and the teacher's commitment and his willingness to organize a class to allow the complexities of project learning to occur and be sustained (BLUMENFELD et al., 1991). Fortunately, the recent and long-term development of rich technological tools directly supports both teachers and students in the creation and exchange of artifacts. Students should be motivated enough over a long period to gain the benefits of project learning: Among the factors that contribute to this motivation is whether students consider the project interesting and valuable, whether they perceive that they have the competence to engage and complete the project, and whether they focus on learning rather than results and evaluations (Blumenfeld et al. 1991, p. 375). The role of the teacher is critical in all of this: to create project-based learning opportunities, support and guide students, learn through scaffolding and modeling, encourage and help students manage learning and metacogantive processes, help students evaluate their own learning and provide feedback. Whether teachers can meet these requirements relies heavily on their own understanding of the content embedded in projects, their ability to teach and acknowledge students' difficulties in learning content (i.e. pedagogical awareness), their willingness to take on a constructive culture in their classrooms. 7 Examples of microcosm Many microcosms have become available since 1980: AgentSheets Beguile (Reiser et al.) BioLogica Boxer (diSessa, Abelson, & Ploger, 1991), Design (design series) Cool Modes (Hoppe, etc.) Crickets (Resnik) Crocodile ICT E-Slate (Kynigos, etc.) Functional Machine (Feurzeig, 1999), GenScope (Horwitz & Christie, 2000), Sketchpad Geometer (Olive, 1998), GeoGebra (multiplatform dynamic maths software for learning and teaching) LEGO Mindstorms Logo and options such as Lego-LOGO, Starlogo Model-IT (Jackson, Stratford, Krajczyk, & Soloway, 1996; Spitulnik, Krajcik, & Soloway, 1999), NetLogo Scratch SimCalc (Roschelle et al., 2000), SimQuest (Van Jolingen, King and de Jong, 1997) Squeak based on StarLogo systems (Resnick, 1991, 1999), Stella (Forrester, 1989; Richmond and Peterson, 1996). Strategy Dynamics microworlds (commercial sets for business education) Teaching genetics with dragons (Geniverse, GeniGame, GeniVille) ThinkerTools (White, 1993), ToonTalk Virtual Water WISE See also programming microcosm computer simulation Repositories MathTools in mathematical form. This is a large library (not just for microcosm) 8 Abelson, H. (1982). Logo for Apple II. Peterborough. Bytes/McGraw Hill. Barab, Sasha A. ,Kenneth E. Hay, Michael Barnett and Kurt Squire (2001). Building virtual worlds: tracking the historical development of teacher practice, cognition and learning, 19(1), 47-94. 1991.C— 1991. Motivation of training on the basis of projects: Support of implementation, support of training. Educational Psychologist, 26(3 &4), 369–398. Clements, D. (1989). Computers in primary mathematics education. Englewood Rocks, New Jays: Prentice Hall. 1989 Computing media as the basis for new cultures of learning. G5 technical report. Berkeley: University of California. 2000 Change of mind: computers, training and literacy. Cambridge, ma: MIT Press. 1991— 1991. Boxer review. Journal of Mathematical Behavior, 10, 3–15. Edwards, L.D. (1995). Microcosm as an representation. AA DiSessa, C. Hoyles, R. Noss, &; L. D. 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