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From the editor...

Welcome to the October 2008 issue of Learning Technology.

Learning Technology Newsletter concentrates in publishing advanced learning technologies and emerging technological innovations in education. Innovations and new developments form the core for this newsletter. This issue of the newsletter covers open and closed didactical systems, adaptive learning functionality, interactive asynchronous communication in hypermedial reading, and discussion forums.

Railean looks at the difference in teaching and learning between closed and open didactical systems and presents educational system as an open system. She also outlines how the open system develops a self-regulatory learning experience in a powerful learning environment.

Morales et. al. discusses their research on adaptive learning functionality in learning management system. They base this functionality on using evaluation tests within learning processes. McCormack et. al. describes a study conducted in an Argentinean context where the application of interactive asynchronous technologies on hypermedial reading was tested.

Finally Thomas and Molelu discusses a study conducted to show the pedagogical potential of discussion forums.

This newsletter focuses publishing new and emerging technologies in education focussing on advanced learning technologies and its usage in different contexts. Please feel free to bring forward your ideas and views.

Besides, if you are involved in research and/or implementation of any aspect of advanced learning technologies, I invite you to contribute your own work in progress, project reports, case studies, and events announcements in this newsletter. For more details, please refer author guidelines at http://ltf.ieee.org/learn_tech/authors.html.

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Aspects of teaching and learning processes in the closed and open didactical systems

ABSTRACT: The Internet changes our vision about teaching and learning. The educational system has become more open and flexible. What is the difference in teaching and learning processes in closed and open didactical systems?

Key words: *knowledge, learning, closed system, open system, didactical systems*

Introduction

Educational has enlarged beyond the transmission and reception of knowledge, presentation the models of actions and imitation. At the beginning of the XXI century one can observe the passing from didactic of transmission and communication to active and participative pedagogy that put actions at the base of the individual cognition for adaptation and accommodation to real world. It is the symptom of shift from training to learning, situation in which the learner is the centre of the learning process and where his /her activity and learning is privileged in regard to the education service [1, p.157].

There is a change for a new paradigm of learning. The main point is that learning is the core process of the educational system. But, educational system is, first of all, a system that can be real or artificial. The real educational system is open, “complex and dynamic”[6], the artificial created system - is a closed pedagogical system. In comparison, an open system is influenced by events outside of the declared boundaries and a closed system is self-contained: outside events can have no influence upon the system.

Didactical System as Closed System

The first artificially designed instructional and programmed systems were closed systems [7; 9, p.14-16]. The main figure of the system is the teacher, which is an expert in domain and in management of the learner’s cognitive activity. As result, the instructional processes are regulated both by A (leader) and B (leaded object). Z represent a channel for transmission the information from A to B, and X –for transmission the information from B to A (figure 1). The efficiency of such a process is the coefficient of assimilation.

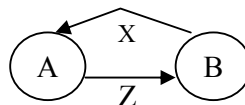


Fig.1 The closed systems

For the computer aided instruction software this is the case of interactive and adaptive tutors. So, the process of learning consists of successful passing the knowledge (system B) from stage α_0 to state α_k . The system B had traversed a lot of the intermediary cognitive states after positive answers of proposed items in the operational cadre. Each of the intermediary states is

characterized by one of the knowledge' level: R_0, R_1, \dots, R_k and can be represented using n – size vectors:

$$\overline{R}_i = (r_1, r_2, \dots, r_n)$$

Transformation of the system B from α_1 to α_{i+1} is the result of the student cognitive activity. The system A stimulates the cognitive processes happening in the system B and the stimulation is mainly positive. In the case of positive stimulation the system passes from stage α_1 to aimed stage α_{i+1} , but maintain the equilibrium. In the open system there is a negative stimulation. In this case the cognitive system loss the equilibrium and pass from α_1 to one of possible stage $\alpha_1, \alpha_2, \dots, \alpha_n$. The bidirectional transmission of dates depends of the nature of perturbation factors (globalization, digital natives, and the specific output: digital competences). The Internet changes our visions about the learning process. A lot of the Web - based educational applications is expected to be used by very different groups of users with different backgrounds, *a priory* knowledge and learning aims without the assistance of a human teacher.

Educational System as an Open System

We haven't discovered anything that say that the student will learn only in case when he/she will be motivated to do this activity and when this information is important. Is it possible to be a reality, if the knowledge is duplicated every two years? Lets us analysed the approach deeper. In the contemporary world the “student will have to learn to navigate through large amounts of information, to analyse and make decisions about it, and to master new knowledge domains in an increasingly technological society” [14, p.32]. Really learning occurs in the open and flexible didactical system where the negative feedback determines the self – regulation.

The open system is limited from the input/ output, and is self-regulated to the external influences (figure 2).

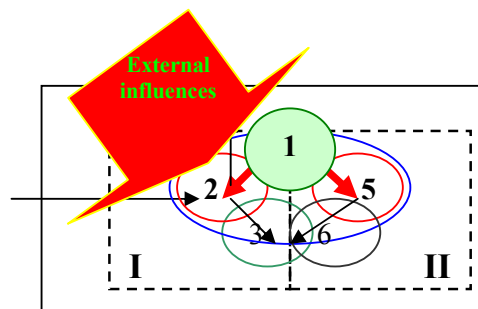


Figure 2 Self-regulation in the open systems

I –system “didactical task”

II-system “technology of instruction”

1-aim of instruction and education; learners; instructional context;
didactical processes; teachers and resources and 6-organizational forms.

Flexible, Dynamic and Instructional Strategy

The most important problem in the design of the open systems is the learning strategy. One of the possible solutions is based on using the inductive –deductive model of structuring the instructional context and heuristic – algorithmically methods. Our argument is: this model will activate the metacognition. Using the inductive variant will initiate the psychopedagogical processes of forming a totality in knowledge from separate to common facts. The deductive variant will adapt instructional context to real and pragmatic examples. The heuristically method of the learning will adapt the rules and the successions of the actions to the learning style of students and the algorithmically methods will learn to learn. The idea is to structure the instructional context differently and to include the heuristic – algorithmically methods as important final task. So, if the initial stage is equal to the first module, the heuristic activities will be presented, but the algorithmically method will occur the main point. Nevertheless, the design of the context and test requires a strong integration between reproductive and productive activities (figure 3).

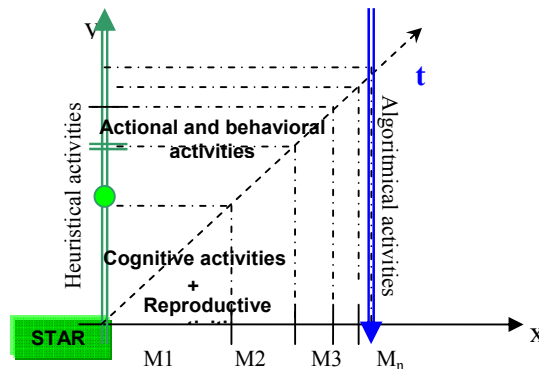


Figure 3. *The dynamic and flexible instructional strategy*

The situation however, is made particularly difficult by the fact that students have different levels of knowledge and the activities need a suitable preparation in heuristically activities. To solve this problem were designed a specific fist module. So, first module integrates the base notions of the domain and the techniques of learning. In the second module (M2) the notions will be applied in the personalized context. The idea is fixed on the concept of extinction the cognitive scheme, proposed by Piaget and Bartlett.

Conclusions

The open system intends to offer a means of developing a self-regulated learning experience in a powerful learning environment. This model explains that a promising approach is to emphasize the systemic approach of pedagogy in context of globalization. Structuring the text based on this model gives a functional structure for the learning text. The dynamic and functional instructional strategy offers many promises for principles of developing the contemporary instructional process. One possible way to achieve this is the electronic textbooks in the electronic portfolio technology.

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An approach to standard-based integration of learning processes and evaluation tests

Abstract. Nowadays, there are several challenges for providing standard-based adaptation processes in learning management systems (LMS). Among them, evaluation tests represent an interesting alternative to support adaptive students' interactions flows. This paper describes the work done by the aDeNu research group to offer adaptive learning functionality in LMS. This functionality is based on using evaluation tests within learning processes as described by the IMS Consortium.

Keywords: Adaptation, learning management system, specifications, IMS-LD, IMS-QTI.

Introduction

Nowadays, every online course must not only offer information and communication channels, but it also has to be able to guide the student's interaction to educational goals clearly specified and learning tasks that can measure those goals success. In addition, the most relevant educational standards insist on focusing on learning activities, beyond the contents. They facilitate a better use of the resources used in every learning course such as materials, tools and configuration of the course. Under this new approach, the contents are not isolated and available at an appropriate time to complete the learning activities [1].

In adaptive educational hypermedia there has been done a variety of research work about adapting learning processes to learners. aDeNu (Adaptive Dynamic online Educational systems based on User modelling)¹ has been researching the best way to improve the effectiveness of the learning process by providing adapted responses to the students needs in Learning Management Systems (LMS). In this context, the objective of ADAPTAPlan (Adaptation based on machine learning, user modelling and planning for user oriented complex tasks)² project is to reduce the design effort, which is proven as a bottleneck in adaptive standard-based LMS. It is unaffordable to design in advance all possible situations such as learners' performance, needs and preferences, etc. Another project in this context is EU4ALL (European Unified Approach for Accessible Lifelong learning)³, which seeks to define and develop an extensible architecture of European-wide services to support Lifelong Learning for all. Both approaches come from an earlier project called aLFanet [2], which aims to build a LMS that offers adaptability to learners and tutors in the instructional design, interaction and presentation.

This work intends to take advantage of integrating learning processes and evaluation tests with the support of educational specifications, which enable the reusability and interoperability of the learning materials. Moreover, as stated in the aLFanet project, if the course design follows standards, it can also facilitate the adaptation process at runtime, since it can provide the appropriate context for a dynamic support that overcomes those limitations that have not been foreseen at design time.

¹ <http://adenu.ia.uned.es/adenu/>

² <http://adenu.ia.uned.es/adaptaplan>

³ <http://www.eu4all-project.eu>

Application to ADAPTAPlan and EU4ALL projects

To cope with the adaptive functionality support, ADAPTAPlan and EU4ALL projects rely on an intensive use of educational specifications (IMS family) and standards (IEEE-LOM). In particular, two IMS specifications have been relevant for the latest jobs: IMS Learning Design (IMS-LD) and IMS Question and Test Interoperability (IMS-QTI). IMS-LD formalizes the design of learning processes in units of learning meanwhile IMS-QTI provides a data model suitable for representing evaluation tests and its results. The most interesting related to adaptation is the use of both specifications together, so that a learning process can be guided to different goals depending on different evaluation tests and the student's results.

Related to ADAPTAPlan, aDeNu group defined some learning processes according to IMS-LD, the Felder-Silverman learning styles model and the Bloom's Taxonomy. In particular, an online course about basic concepts in object oriented programming has been developed. These learning courses are now being redefined to exploit the adaptability that offers IMS-QTI. Related to EU4ALL, real scenarios for that take into account the daily needs of the Spanish National University for Distance Education (UNED) are being defined. These scenarios take advantage of evaluation tests to offer personalization processes to the students.

Contributions

There is a need of a real integration between learning processes and evaluation tests in current learning scenarios that jointly manage IMS-LD and IMS-QTI specifications. This support has been implemented by the aDeNu research group in dotLRN LMS, a full-featured application for rapidly developing web-based learning communities built on top of OpenACS framework. dotLRN architecture is made by different packages, Grail and Assessment packages. The Grail package implements the learning process publication according to IMS-LD and the Assessment package implements the evaluation test publication according to IMS-QTI. These two packages can be used together and users can publish learning processes with evaluation tests inside. This development represents an improvement in the adaptability of the learning process in LMS, as each adaptive functionality needs a previous work of evaluation. Now it is possible to define alternative routes in learning paths that consider the outcomes of the assessment done by the learners in the course. Implementation details are described in [4].

On-going works deal with extending the assessment package of dotLRN to implementing question selection and ordering functionality in order to offer adaptive tests, to collect traces and improve the adaptation response that now is reflected in the recommendations presented in [5].

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Identity and social context in the integration of interactive asynchronous communication in hypermedial reading

Online education in foreign language learning is currently undergoing research that advances in the integration of new information and communication technologies into the foreign language classroom. Studies in the area of applied linguistics, including hypermedial reading, are underpinning new ways of communication. Such studies not only include concerns regarding learning development in relation to educational content, but also propose a close relationship between knowledge construction and the projection of the online learner's own identity into a social context.

The objective of this paper is to present the theoretical background of a study on the application of interactive asynchronous technologies of hypermedial reading as the scenario for the development an identity in English as a foreign language learners in the context of an Argentinian university.

Among investigations on the social nature of computer-mediated activities, the studies of Laffey, Lin and Lin, 2006; Gunawardena and Zittle, 1997; Tu, 2002a; Tu, 2002b; Tu and McIsaac, 2002; Weisband and Reinig, 1995, are worth mentioning. Professors and researchers have acknowledged that education is a social activity where people make sense of information through interactions that support internalization and externalization (Amelung, 2007:501). Other researchers emphasize on the relevance of socialization and interaction where interaction and participation make up key elements in online education and highlight the importance of the teachers' presence in the online classroom (Blignaut and Trollip, 2003:347) based on situated practice and social context.

The articulation of situated practice in a social context and its implications in the design of learning experiences are framed in the social learning theory, which proposes that a key idea in the social learning theory is that identity and learning are inseparable (Wenger, 1998). In this line of thought, the author accentuates that the learner's identity is part of the context and of the process of a learning act, and that the transformation of the identity is one of the products of the social activity of learning.

According to Amelung (2007:502), social learning may be facilitated granted that online learning environments are adapted to the learners' needs and support tacit forms of communication such as, user's awareness, co-presence, social navigation, recommendation systems and social agents. Moreover, participants in the online community may become conscious of their own activities through their teachers' and peers' support, and increase their knowledge of what the other participants are doing, thus generating collaboration opportunities and shared knowledge construction.

The social learning situation may thus be relevant to the context of hypermedial reading where students who read texts published on the Web interact with other participants (teachers or students) and may construct their own knowledge provided that learning is directly related to identity (Wegner, 1998).

The context of hypermedial reading, in which our students are faced nowadays, suggests a particular type of interaction in the social context: the interaction with technology (Hillman,

Willis and Gunawardena, 1994); an interaction which presents a new setting where students should get familiar with electronic elements included in the reading process bringing about positive or negative effects as a result. According to Norman (1993), technologies are never neutral. These prevent some actions from being performed and help with others. In spite of the fact that many of the new technologies provide friendly interfaces which facilitate the learning process, students in these contexts need to feel comfortable when using technologies and should achieve a certain level of ability when interacting with them. Given this premise, students' abilities to self-monitor their activities, self-regulate their comprehension, use resources and accept support from their peers, are of vital importance when students aim at obtaining a better knowledge of these rather complex skills (Blocher, 2002).

Conclusion

Several theories derive from the epistemological beliefs that precede the learning paradigms of situated learning and critical theory which offer the foundations for constructivist learning. The use of technological tools in modern education may respond to these beliefs considering that these tools promote meaning making, knowledge construction, reflexive thinking and the development of social identity. It is expected that further research in the applications of technologies in the reading process of foreign language students may shed light to new ways of modern learning and education, thus contributing to a new pedagogical dimension in contexts where interaction and knowledge construction are developed.

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Online Discussion Forum: Promises and Possibilities

Introduction

Due to calls for increased accountability with regard to teaching quality and relevant learning outcomes, educators are challenged to integrate innovative instructional strategies that encourage student engagement and ownership of the learning process. The importance of social interaction for achieving expected learning outcomes through effective collaborative and networked learning has been well established in the literature.

Theoretical Framework: Pedagogical potential of discussion forum

Theories advocating learning as a socially constructive process have become foundation for the significance of interaction for effective and efficient student learning. Vygotsky's (1978) social development theory accentuates the vital need of social interaction, scaffolding by more able peers or co-learners and the use of language as a mediation tool for cognitive development. Moore and Kearsley (1996) described three types of interactions as critical to student learning: learner to learner, learner to content and learner to instructor. For constructivists, social interaction introduces multiple perspectives through reflection, collaboration, negotiation, and shared meaning. Many constructivists also claim that learning can't happen at all unless there is social interaction. The "Seven Principles for Good Practice in Undergraduate Education", created by Chickering and Gamson in 1987 and its revision by Chickering and Ehrmann in 1997 basically focus on interaction by students with the content, the teacher and each other, and technology's potential in facilitating it. From a constructionist point of view, it is important for students to be actively engaged in personally creating a product meaningful to themselves and others (Papert, 1993). The constructivist and constructionist perspectives on learning suggest that learning is not solely an individual process but is the outcome of interactions of people with others and their surroundings (Vosniadou, 1996).

This means that, for knowledge building to occur, the teacher needs to create opportunities for constructive discourse in order to support student learning and collective knowledge building. Again, it is only in highly interactive environments that learning can be individualised to the needs of each student.

In the traditional classroom, the potential for student-teacher and student-student interaction is quite high; but, generally, students actually get limited opportunity to participate in organized discussions due to constraints such as large student enrolments, fixed class timetabling, and the like.

Technology as a tool for social interaction

One of the most important educational application of technology is its capability for learners to interact with peers and tutors without space and time constraints. Dialogue and discussion can continue outside of the classroom, with learners engaging in discussion from home,

extending their learning and exploring topics in more depth (Richardson, 2008). Social constructivists recommend that students' construction of knowledge is enhanced when they engage in the co-construction of knowledge with peers and with their tutors (Salomon & Perkins, 1998). This also puts in perspective the potential of reciprocal teaching and the use of technology as a scaffolding instructional tool. Scaffolding as an instructional strategy is derived from the "zone of proximal development" theory, that is, the distinction between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). Chen and Bradshaw (2007) also support the view that both supportive and reflective scaffoldings promote students to transfer the application of abstract principles to real-world problems. Scaffolding helps to reduce the complexity of tasks and focus learners' attention.

Because of the above mentioned benefits, colleges and universities are making every possible effort to introduce new technologies to their campuses (Authorware to the Web2.0 technologies, WebCT, etc).

Online discussion forum

Practices and evidences indicate that online discussion forum is an excellent vehicle for effectively facilitating appropriate type and depth of interaction both inside and outside of the classroom, thus extending cognitive processes beyond the time and space limitations. It can engage users deeply and provide mechanisms for timely feedback. As a result, higher education institutions around the world are adopting a blended model (with elearning as a component) in recognition that the traditional classroom instruction can be enhanced and complemented by the use of appropriate online tools. The University of Botswana is no exception. This paper summarizes a qualitative study which documents the reflections of students on their experiences in using the WebCT discussion forum.

A discussion forum is like the "real" world in that, participants are able to understand a given problem from different perspectives, to contribute towards the understanding of peers, and solve problems more efficiently as a group, thus taking advantage of collaborative intelligence and strengths. In a collaborative environment, human diversity is being transformed to better, deeper, and more comprehensive levels of learning because students bring ideas and experiences to learning situations that advance and enrich the understanding of others. "Social negotiation enables learners to construct common interpretations of events and objects ..." (Jonassen, 2000, p. 13). Evaluation of one's own understandings of concepts in the light of views of others help learners become critical thinkers.

The Study

This study of online discussion forum involved 32 interviews and 36 responses to an online survey in which a total of 68 students participated. While student perceptions about the discussion forum have been largely positive, their opinions were varied regarding the added value. All in all they indicated that they thought the discussion forum was a valuable tool to be included in any course because it eases learner stress and anxiety in several ways. Some participants thought they had the opportunity to gain a lot of support from the more experienced colleagues where some of the experienced colleagues thought that others slowed

them down. One of the more experienced participant supported the idea of collaboration but she preferred to choose people to collaborate with. Based on their comments, the following conclusions were drawn.

Conclusions

The study found that:

- students valued the use of online discussions as a valuable supplement to traditional face-to-face approach because it allowed them to interact anytime, anywhere with their peers and teachers;
- asynchronous online approach necessitated *all* students to actively participate in discussions at their own pace in a relaxed environment;
- active exchange of ideas within small groups in a non-competitive environment increased interest among the participants, suggesting this approach may affect learners' attitude and stimulate participants' thinking process;
- collaborative learning facilitated the development of critical thinking through discussion, clarification of ideas, and evaluation of others' ideas;
- it helped them develop and enhance important skills related to teamwork, self-directed learning, research, communication and presentation (both orally and written);
- the depth of interaction that occurs in an asynchronous discussion forum is often much greater than in a traditional face-to-face classroom.

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Book Review on Semantic Web and Education by Devedžić, Vladan (2006)

Semantic Web and Learning

According to Tim Berners-Lee, the Semantic Web is an advanced Web, in which information is given well-defined meaning. This enables computers and people to work in better cooperation. Especially information and knowledge management (should) benefit from these new developments of including meta-data and the possibility of intelligent reasoning.

Learning is in a way connected to knowledge management. But whereas knowledge management focuses on content or the result of learning, learning focuses on the process of competence acquisition. Not surprisingly, the Semantic Web evokes ideas and projects which try to develop or adapt semantic application to learning tools in the web.

This reviewed book is one of the first attempts to show how the Semantic Web can support education: It concentrates on formal learning settings (education/teaching) but does not take into account self organised learning. This and other forms of non-formal and informal learning occur also in the web and could also be enriched or enhanced with semantic.

Background

The author of this book, Vladan Devedžić is professor of Computer Science at the University of Belgrade. He has several publications and project experience in the field of knowledge modelling, Semantic Web, and transfer of artificial intelligence into the field of education and other application area. This book is published in the series “Integrated Series in Information Systems” edited by Prof. Ramesh Sharda (Oklahoma State University) and Prof. Dr. Stefan Voß (Universität Hamburg).

Content

In the first two chapters, Vladan Devedžić gives an introduction in Web-based education and the Semantic Web by giving an overview about different definitions and concepts in this field.

In chapter three he starts combining the two topics Semantic Web and education and describes the actors and their support with Semantic Web-based education: the views of the learners, teachers and authors. He goes on with educational content and the concept of learning objects, educational modelling languages, educational servers, educational web services, pedagogical agents, educational ontologies and describes existing or fictitious realisations of Semantic Web features.

Chapter four is about “architectural issues”: Learning objects, repositories, architectures of web-based intelligent tutoring systems, p2p networking, adaptive learning systems and ontology processor.

The next chapter describes learning technology standardisation efforts: Here the author lists and illustrates important standards in learning technologies and then focuses on “Semantic Web issues related to learning technologies standards”, e.g. additional requirements.

Under the headline “personalisation issues” the next chapter introduces concepts of learner modelling and describes TANGRAM, a case study on integrated learning environment in the domain of Intelligent Information Systems.

Chapter 7 focuses on “ontological engineering for semantic web-based education”, e.g. ontology visualisation, semantic annotations, and authoring frameworks.

The book ends with a short chapter about “applications and research”: Here the author describes ideas and some realisations and introduces in short the concept of learning communities and gives examples how the Semantic Web could support their collaboration and learning.

Comment: E-Learning through the perspective of a computer scientist

Reading this book, especially the first chapter, we wondered several times about the way how Vladan Devedžić deals with the different definitions of e-learning and the way he looks at education. But we dare to generalise this to more (not all ;-)) computer scientists: For many of them, education and learning is something which “automatically” occurs when the content of the learning is well described and fits exactly to the learner’s individuality. This is illustrated in a figure which should show “teaching, learning, collaboration, assessment and other educational activities on the semantic web” (p. 72) where a person (symbolising a learner/teacher/author) is in interaction with several interconnected educational servers, some pedagogical agents hopping around (see p. 73): In this book, the importance of communication for learning and the construction of knowledge (and the consequences or possibilities of the Semantic Web) is just a fact for some subordinated clauses. For example, the concept of learning communities is introduced in the last chapter and fills only three pages.

This book also shows that the marginal importance (compared with e.g. prior learning experiences) of “general” learning styles (as it was shown in research) is still not recognised in the world of artificial intelligence and computer science; they still deal with the idea of several cognitive styles and the possibilities for adaptation of e-learning materials. By the way: We were surprised that the different ways of reasoning seemed not important to Vladan Devedžić.

Some could say that we should not be so harsh with our comments on this book, because it is one of the first longer publications on this topic (published 2006). Yes, we agree – but we would not have been as harsh, if there were not some very interesting older publications, where we find a deeper understanding of what learning and education is and could mean in the Semantic Web. Nevertheless, we will use this book and can recommend it as a standard

work about education and the Semantic Web with the clear strength in an overview about relating technical concepts.

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