Learning Wiki – Digital Ways of Learning in the Training of Apprentices

Christina Schachtner1

1 Alpen-Adria-University Klagenfurt/Institute for Media and Communication Sciences, Klagenfurt, Austria

Abstract—This paper is dedicated to the possibilities of digitally aided learning for apprentices. In this context, a multimedia platform, the Learning Wiki², is introduced which has been developed for apprentices in the fields of paper production and mechatronics by a research team from the Alpen-Adria-University Klagenfurt in cooperation with a paper manufacturer and a vocational school. The training in these professional fields lasts three to four years and consists of face to face lectures in the vocational school, which are held as block release courses several times a year, and training on the job with a supervisor. With the development of a digital learning platform in the presented project, apprentices are provided with additional learning possibilities for which the multimedia potential of digital media is used. These media learning offers are seen as an addition and not as a replacement for face to face lectures. Before developing the learning platform, the research team² that I supervised first concentrated on the social situation of youths in the employment market as well as on vocational learning and the ways of learning which are favored by youths. This approach aimed at adjusting the technical product to the demands and learning requirements of youths. Taking into account the social context of youths in the development of the digital learning medium can be regarded as a context-oriented media development in contrast to developing media independent of their addressees.

Index Terms—context-oriented media development, learning wiki, playful learning, self-organized learning.

I. METHODS OF THE DEVELOPMENT AND EVALUATION OF THE LEARNING PLATFORM

The selection of qualitative and quantitative methods, used in the different phases of developing the learning platform, was informed by a context-oriented media development approach. Before devising the concept of the digital learning platform, thematically structured interviews were conducted with ten apprentices (six apprentices in the field of paper production and four apprentices in the field of mechatronics). Since this kind of interviews is explorative in its character, it lends itself to the exploration of a new research field. In the interviews, the apprentices were asked about their motivation, their self-perception as learners and about their previously used studying methods. Moreover, they voiced their expectations regarding a digital learning platform. In the field of mechatronics, four teachers were interviewed as well and asked about forms of knowledge acquisition among apprentices, thematic priorities in the training of mechatronicsians, and their expectations in relation to digital learning. First, the interviews were analyzed individually, before comparing the results to each other. The analysis was based on the principles of the Grounded Theory. In this sense, the results were induced from the empirical material gathered [1].

Due to the context-oriented media development approach, the addressees of the learning platform were likewise involved in devising the concept and the content of the platform. Thus, two workshops took place in the paper factory in which both apprentices and experienced skilled workers participated. In the vocational school, the teachers contributed to the development of the platform by providing specific learning contents, which were translated into a language that youths would understand by a researcher in cooperation with an apprentice. The transformation of the language was seen as necessary since the results from the thematically structured interviews showed that apprentices found the texts in text books difficult to understand.

For choosing the contents of the learning unit “soft skills” on the learning platform for mechatronicsians, a participative method was used as well. The apprentices in one of the classes at vocational school identified conflict situations they had experienced in their companies during an activating lesson. They wrote the script and enacted the scenes of the conflict situations they had experienced. These scenes were taped and integrated into the learning unit. Another participative method of devising content was employed in the learning unit “Stories by Apprentices”. The apprentices were encouraged to talk about their experiences on their first day at work as well as about their plans for the future. These accounts were integrated in the learning wiki in the form of sound files.

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¹¹ Research team: Univ.-Prof. DDr. Christina Schachtner, Mag. Angelika Höber, Mag. Gabriele Frankl, Dr. Caroline Roth-Ebner, Eva Elisabeth Schwarz, Cornelia Timko, Mag. Elisabeth Augustin

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For the evaluation of the learning platform developed, qualitative and quantitative methods were used. In the field of paper production, a workshop and a group discussion took place, which were dedicated to the evaluation of the platform. In the field of mechatronics, standardized questionnaires, which were answered by 67 apprentices from three classes, were used for the evaluation.

II. THE SITUATION OF YOUTHS IN THE EMPLOYMENT MARKET AND THE ROLE OF EDUCATION

To adjust the digital learning platform to the needs of today’s youths and especially to the needs of the specific addressee group of this project, their social situation has to be taken into consideration. How can the current situation of youths in the employment market be defined? To answer this question, I rely on a representative youth study from Germany [2], which, however, also illuminates the situation of youths in other European industrial nations due to their comparable economic structures.

According to the Shell Study from 2006, the percentage of youths who is worried about the future has increased. While 55% of the youths between the age of twelve and twenty-five were skeptical about their future in 2002, the percentage in this age group had increased to 69% in 2006 [2]. This fear is not unwarranted. The perspectives in the employment market are bleak and the chances of entering this market have – objectively seen – become unfavorable [3]. This concern can especially be found among apprentices.

Along with digital information and communication technologies new learning media have developed which so far have especially been employed at universities and in adult education but hardly in vocational training. The initial euphoria which had accompanied the introduction of computer aided learning in the 1990s was soon followed by a phase of disillusionment since the learning platforms were most of the time not so widely accepted by the potential users as had been expected. In my opinion, this lack of acceptance can be ascribed to focusing on technical considerations when constructing learning media instead of concentrating on the learning subject.

A new orientation of digitally aided learning requires an examination of the way knowledge has so far been acquired in the respective areas of application and determining as to how these findings can be transferred to digital learning possibilities. Based on surveying apprentices, teachers, and experienced skilled workers as well as of learning theoretical approaches, the following principles of learning have been defined as a basis for the construction of the digital learning offering in this project.

A. The principle of self-organized learning

On the one hand, this principle is linked to the apprentices’ wish for self-realization and self-development in their job. On the other hand, it ties in with a constructivist understanding of learning. According to constructivism, learning is a self-directed, biographically determined, viable, cognitive, and emotional activity which can be inspired but not determined from outside [4]. “We can only know what we compile ourselves,” explained Ernst von Glasersfeld, one of the founders of constructivism. I would like to add: we only compile what we find viable [4]. Therefore, new learning settings should not concentrate on conveying knowledge but on enabling the compilation thereof. The new learning settings should enable learners to place their own emphasis on their learning rhythm, their learning contents, and on individual or collaborative learning. A flexible learning structure which allows for individual learning processes enhances the joy of learning and it also reduces the unequal educational levels which can especially be found among apprentices.
B. The principle of playful learning

The principle of playful learning especially highlights the moment of freedom in the acquisition of knowledge. “All playing is first and foremost free acting,” wrote the game theorist Johan Huizinga [5]. Free acting promotes experimenting and discovering, which highly appeal to the youths of the survey. Playing and working have often been seen as incompatible actions and they are still seen in that way. The American pedagogue John Dewey contradicts such a perception when he says, “Playing and working together form the first step towards knowledge,” which means to playfully “do things and, in doing so, to get familiar with certain things” [6]. Additionally, playing enhances the creativity and productivity of the learner, which both promote the desire and the courage to face new challenges [6]. Digital learning spaces can be designed as playing spaces, not by prescribing learning paths, but by letting the learners choose the order in which they want to learn. Choices support free acting in the sense of Huizinga [5]. Moreover, the multimedia design of the virtual learning space is playful in its characteristics, making the stay in this space a captivating experience, which is also part of playing for Huizinga [5].

C. The principle of collaborative learning

For apprentices, learning with each other and from each other is not only more interesting than learning alone; other apprentices are also a valued source of knowledge, which corresponds to a high readiness to share knowledge with others. Digital media can particularly encourage the mutual exchange of knowledge by providing discussion forums and archiving discourses [7]. Communities of Practice, as Etienne Wenger calls them, can develop [8]. Communities of Practice are connected by a common interest or topic. Their members are practitioners who possess a reservoir of experiences, competences, and stories and who want to learn from each other. The youths participating in this project are also part of this group, as they have practical experiences and appreciate each other as sources of knowledge.

D. The principle of reflexive learning

The ability to act reflexively is the ultimate goal of vocational training and is based on the professional competence [9]. It is the ability to think “about work structures and environments as well as about oneself in relation to preparing, fulfilling, and controlling different tasks at the work place” [9]. Therefore, this ability refers to work assignments and responsibilities, to one’s own person, and to the social surroundings. This kind of learning aims at a critical and responsible appreciation and evaluation of actions on the basis of reflecting and reasoning powers. Concerning the reduction of hierarchies in modern companies, this ability gets increasingly important in the modern world of work. Digital learning platforms should stimulate the reflexive capability to act. A possible stimulation would be a digital journal in which apprentices note down their learnings of a day or a week. Writing down incidents and experiences means becoming aware of processes and procedures, thinking about the quality of one’s performance, considering alternative solutions, and acknowledging successes and failures.

IV. The Learning Wiki as a Learning Medium for Youths

The Learning Wiki (http://www.lern-wiki.uni-klu.ac.at) which is now to be introduced is based on these learning principles. I will concentrate on the learning area which is dedicated to apprentice mechanotricians. As the name of the learning platform already suggests, wiki technology has been used since it is easy to handle, easily accessible and changeable and since it is offered as an open source product [10]. Another advantage of a learning wiki is that it is accessible anytime and anywhere. Thus, learning does not have to be restricted to the school but can be continued in one’s free time.

How is the Learning Wiki structured? It comprises learning contents from mechatronics and paper production. The learning offering for the first year of apprenticeship of mechanotricians consists of specialized knowledge metal, specialized knowledge electronics, soft skills, games, and narratives by apprentices.
A. Specialized knowledge metal and electro

The contents have been selected by technical instructors and translated into a youth-appropriate language by the researchers together with an apprentice. The knowledge offered is presented in the form of texts, pictures, video clips, and flash animations. The knowledge offering can be successively differentiated by clicking on the marked terms. Moreover, it has been taken into account that apprentices have to acquire interrelated knowledge. Corresponding links connect related topics.

In the area on specialized knowledge, users have the possibility to check what they have learned by means of digital tests. At the request of the apprentices, the possibility of testing their learning successes has been integrated in the learning system. From this application, the apprentices expect to be able to determine their knowledge, and they would like to discuss the test results with persons of trust such as one of their teachers.

B. Soft skills

This learning area contains video clips which show conflict situations at the work place, first with a negative outcome and then with a positive one. The situations presented have been selected and performed by youths. The film sequences are embedded in a methodical-didactical concept which explains what soft skills are and which by posing questions inspires to reflect the conflicts presented.

Two questions are for instance: “What went wrong and why?” and “How did the boss feel in the end?” Furthermore, the methodical-didactical concept comprises guidelines which are to promote the social climate and the personal well-being at the work place. Two of these guidelines are for example: “You have to take responsibility and own up to mistakes!” or “Everyone makes mistakes! Next time, you will do better!”

In every learning area, discussion forums are available which provide the apprentices with the opportunity to exchange experiences and knowledge and to ask their teachers questions.

The content of each learning unit can be changed and extended. Learning units which are obligatory in the curriculum of the vocational training of mechatronics should be devised in a cooperation between teachers and pupils. However, it is also possible to initiate collaborative writing processes in which pupils write and medially design individual learning units. In doing so, the learners would no longer be recipients but take over the role of authors.

The learning contents provided on the platform are not conceived as a completed course. Rather teachers can integrate individual learning sequences into face to face lessons and pupils can access the content after class. When developing the Learning Wiki, the idea of blended learning was of central interest.

V. HOW FAR HAVE THE LEARNING PRINCIPLES BEEN TAKEN INTO CONSIDERATION WHEN DEVELOPING THE LEARNING WIKI?

The principle of self-organized learning has been taken into account in such a way that the learners can create their own learning processes in the hypertext structure. According to their individual questions, interests, and gaps in their knowledge, they can compile their own learning modules from texts, pictures, and video clips. No matter where or when, pupils can decide for themselves when they want to study and how long and how often they want to engage in the different learning units. Moreover, learners have the possibility to construct new knowledge together with others in the discussion forums. Self-organized learning processes allow for individual learning rhythms. However, such processes require a lot of self-discipline.
**Playful learning** is not restricted to individual elements in the Learning Wiki but permeates the entire multimedia learning platform [11]. Learners can try out which ways of learning are most suitable and effective for them and which of them they find most delightful. The structure of the Learning Wiki encourages experimenting and discovering; it is an expression of enabling didactics which triggers learning processes without prescribing them [12]. Also wrong paths may be taken. Mistakes and errors are part of playing and offer the possibility to learn how to cope with failures. As a reward for finding the right solution or as a means to relax, music can be listened to via a “mouse click”. Since listening to music is one of the favorite leisure activities of youths, it can be assumed that music as a playful element of the Learning Wiki makes it even more attractive as a learning space. Furthermore, the Learning Wiki offers apprentice mechanotricians games which have been especially developed for them.

**Collaborative learning** started when devising the learning units. As already mentioned in the section on methods, the learning contents in the area of “Soft Skills” were developed in workgroups and translated into scenes. Since the apprentices came from different companies, they were able to benefit from the others’ experiences and had to select certain situations which were to be integrated into the Learning Wiki. Collaborative learning can likewise take place in the discussion forums, which are available for all learning areas. The apprentices declared that they like to interact with other apprentices and that they would like to continue this interaction in their free time. Apart from that, collaborative learning is possible when participating in writing processes to extend the learning contents, which requires agreements concerning the content and the organization. Collaborative learning processes contribute to communication, moderation, and conflict competences. However, the Wiki technology also limits collaborative learning since no simultaneous learning meetings are possible, which would be desired by today’s youths who is peer-oriented.

**Reflective learning** is for instance encouraged in the area of soft skills which, as already mentioned, incite to think about the psychodynamics of conflict situations or encourage to emotionally put oneself in the position of others. The stories in the category “Stories by Apprentices,” which can be downloaded as sound files or video clips, offer special incentives for reflection. In these stories, apprentices talk about their first day at work and their plans for the future which encourages others to recall their own experiences and to think about how they did or did not master difficult situations and what they could have done better.

**VI. EVALUATION RESULTS**

The Learning Wiki was evaluated by three classes of the vocational school Berufsschule Villach 2 in July and August 2008. Among the three classes were a class with emphasis on electronic engineering and mechatronics (Class A) and a class which consisted of mechatronics apprentices (Class B), whose pupils evaluated the learning area “Basics Metal”. The third class was attended by agricultural machine technology apprentices who evaluated the interdisciplinary area of “Soft Skills”.

The apprentices of Class A and B had no or very little experiences with e-learning. They preferred the representation of the contents in the area “Basics Metal” in the form of pictures and text and they would also rely on contents represented by pictures and texts, if they had not understood certain contents during the lesson. The texts were seen as very understandable, which suggests that the transfer of the learning content into a youth-appropriate language was successful.

The discussion pages concerning the topic of metal were primarily used to read about what other apprentices said, to ask questions, and to talk about their daily routine at work. This suggests that the interest in others, which had been voiced in the interviews, is also present in practice. Moreover, it is not surprising that 76 % and 80 % of the apprentices respectively declare that it was fun to discuss with others. Almost as many apprentices would like to discuss with others after class.

The wish for tests, which was also stated in the interviews, was likewise confirmed in practice, since all apprentices participated in the tests. When asked about their motivation to do so, the apprentices explained that they primarily wanted to test their knowledge and secondarily used the tests to prepare for exams.

The apprentices are very satisfied with the learning unit “Basics Metal”. 90 % and 100 % respectively were satisfied and very satisfied, since they found that all important topics were covered and because the learning content was repeated and explicated once again. Most of the apprentices would like to use the Learning Wiki at home as well.

The apprentices who evaluated the areas “Soft Skills” and “Stories by Apprentices” especially liked the films they could find there and to a lesser extent they also liked the texts. The behavioral guidelines offered were seen as helpful and very helpful by 57 % of the apprentices. As for this learning unit, most of the apprentices appreciated the understandability of the texts. Other similarities to the answers given by the apprentices in Class A and B could be found in the motivation of using the discussion pages. Most of them wanted to find out what other apprentices had to say. Most of the apprentices found it enjoyable to discuss about soft skills, especially in terms of sharing their experiences. However, the percentage of apprentices who would like to discuss about soft skills after class as well was lower than the percentage of the apprentices who also wanted to discuss “Basics Metal” at home. Yet, they are still the majority. The area that especially appealed to the apprentices was the learning unit “Stories by Apprentices,” which features accounts of apprentices about their first
days at work, their plans for the future and about being a woman in a professional area dominated by men. All in all, the majority of the apprentices who took part in the evaluation of the learning units “Soft Skills” and “Stories by Apprentices” were satisfied and very satisfied with these units. The reasons for this degree of satisfaction are especially the additional possibilities, offered by the Learning Wiki, to learn about the experiences of other apprentices. The interest in the situation of other apprentices, which was apparent among the apprentices of all three classes, can be interpreted as an indication for the education phase posing a major challenge which can be more easily mastered together with others. The apprentices want to know what others have to deal with in this phase, which problems they are faced with, and how they come to terms with them. This interest is related to the wish to learn from and with each other. This interest and this wish have to be seen in relation to the awareness of today’s youth that the phase of entering the working world is a decisive phase in which chances are opened up, but in which opportunities can also be missed.

VII. PLEA FOR A PARTICIPATIVE DEVELOPMENT OF TECHNOLOGY IN THE AREA OF DIGITAL LEARNING

Each learning platform, among them the Learning Wiki, opens up a learning space which, due to its structure and contents, codetermines what is being learned, which competences are advanced and which are not, whether learning is fun or is seen as a burden. Technology determines the conditions for the cognitive, emotional, and social development of people who learn with the help of technology. When expecting that people accept digital information systems and integrate them in their everyday life, they have to be able to participate in the planning and, as far as possible, in the construction and evaluation of learning media.

As a conclusion, I would like to advocate a participative development of technology which has been realized in this project from the conception phase onwards. Teachers have been questioned about their teaching methods and their wishes for a digital learning program, while pupils have been asked about their self-perception as learners, their previous learning and knowledge acquisition experiences as well as about their expectations in terms of a learning program. They have participated in the determination of the structures of the learning program and in the development of the contents and they will go on co-creating the Learning Wiki by their interactive usage thereof.

The introduction of a multimedia learning platform just like the Learning Wiki presented in this paper confronts the learning subjects with certain challenges, as it demands the ability of organizing oneself, bearing responsibility, being ready to make decisions, acting in a structured way, creativity, and cooperative competence. These are all abilities which go beyond professional competence and which are elements of general education. Therefore, using digital learning media to improve the vocational training of apprentices and young employees does not replace general education (Allgemeinbildung). On the contrary, the acquisition of personal and social competences, which is for instance possible in subjects like political education, religious education, and German, are a prerequisite for successfully working with digital learning media. The demand for education that goes beyond mere professional competence will even increase in the future, since the modern working world generally relies on this kind of abilities, especially in the areas of customer communication, team work, public relations, project organization, and conflict management.

REFERENCES


AUTHOR

Christina Schachtner is with the Alpen-Adria-University Klagenfurt/Institute for Media and Communication Sciences, Klagenfurt, Austria (e-mail: christina.schachtner@uni-klu.ac.at).

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