

## Design and Use of Learning Styles in Flexible Environments

- an empirical grounded research proposal -

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### Abstract

*Based on interesting results from a certification course, we have begun to formulate a research proposal within the design and use of learning styles in e-learning environments. In the course each participant's preferred learning style is uncovered and an individual curriculum is developed. Simultaneously a high degree of mutual learning takes place due to innovative ways of collaboration; among others between mature adult employees and younger college students. We have applied an HCI perspective in our analysis of this preliminary or preparation phase case study, focusing on users of a flexible e-learning course and on future design issues*

**Keywords:** design, research proposal, collaboration, learning style, community interaction, e-learning.

### RESEARCH AREA AND THE FIRST RESULTS

Odense Technical College, a Vocational College, are using learning styles at their e-learning centre, FlexLearn. The learning styles being: divergent, assimilative, convergent, and accommodative (Kolb 1984). The four different ways of being engaged in learning, can be more or less dominating within a person's learning preference. This inevitable puts a focus on the individual in the learning process, as well as creates the basis for organising learning processes based on these four learning styles. It is the design and use of flexible environments in blended learning situations, which uses learning styles as initiator for individual learning, through group and community interaction, which have caught our interest. We understand flexible environments as including both the learning platform and the organisation (planning, facilitating and evaluating) of learning.

### The Case Study

One course at the FlexLearn centre is the Comtia A+ certification. Here students acquire basic technical computer competences. The students are paying adults from companies, unemployed people paid by the local municipality / union, as well as the college's traditional apprentice students. At an average it takes 6 weeks to acquire this certificate.

Currently there is growing awareness about the use of different forms of typologies and learning styles within e-learning environments. Microsoft have for example in a large investment, developed Learning Gateway (Microsoft 2004) which was developed with the purpose of supporting different pedagogical streams, for example Howard Gardner and his taxonomy of type of intelligence (Gardner 1993). Flexlearn have similarly, in their platform incorporated the use of Kolb's learning styles, by marking all material (learning objects) with one of the four learning style, whether it is text documents explaining the theory, exercises for lab, technical drawings etc. This enables the teacher and participant, in collaboration, to prepare an individual curriculum, which lies within or even challenges the students learning style.

During a visitation conversation between the participant and the teacher the first day at the centre, the concept of learning styles are introduced and a questionnaire test inspired by Honey & Mumford (1989) is carried out. Honey & Mumford's (1989) questionnaire is based on Kolb's (1984) four learning styles. In a dialog the participant's preferred learning style is uncovered, where the test results is merely used as guidance in the

conversation, not as a result to be taken for face value. Based on the person's competences and learning style, a strategy for the participation in the course is made, constituting an individual curriculum with learning objectives. This individual curriculum enables the participant to be aware and focused on their own learning path. The expected course-duration for this particular participant is also considered.

The knowledge about the participant's individual and preferred mode of learning is also used to guide the participant to others with similar learning styles. However, though this format is used for the constitution of groups, the pedagogy adapted lies closely in line with the thinking of Kolb, who states that though we have a preferred learning style, we have to be challenged within other styles of learning to really progress (Kolb 1984). In the FlexLearn centre interesting results have been made from this set-up. But can we be sure this is due to introduction of learning styles or is it merely a product of the Hawthorne effect?

The environment in which the students learn is very flexible. The centre uses e-learning facilities, but students can also meet face to face. The keyword is can, as it is the students who determine and take responsibility for what should happen, when and where. E.g. the students who feel at ease with a teacher explaining the text in a lecture style format, in supplement to working in groups (off- and online) can ask the teacher to do so. However, very few do that. Instead they seem to work very independently in their groups. Groups that consists of people with different backgrounds, because the centre has chosen to mix the adult mature employees and unemployed with the much younger college apprentices. This happens as the main motivator for constitution is the learning style, not the vocational or occupational background of the participants. This mix seems to bring forward new perspectives to the learning process.

The adult participants have experience from practice, particular with defining problems and finding solutions, but they haven't been "to school" for many years. They are unaccustomed to this way of learning, of making decisions about what to learn and when to do it. It takes some taking use to that it is possible for the participants to request the teacher to explain or have a dialog about topics. "We are by now learning it [to request a teacher] and to express our needs. We must say, that the teachers also do what we ask for." Says one of the participants in an article for the local college newspaper and another adds: "But it is both unusual for us to go to school and to work after principles in FlexLearn". (Nielsen 2003, p. 2). The adult participants are here to further qualify themselves, and the motivation is large - to keep or get a job. The young participants are in the beginning of their lives and may not have the same motivation or pressure to finish the course. They have little problem solving experience from practice, however they are used to the concept of "being students", and know what that requires.

## **POSSIBLE RESEARCH QUESTIONS AND RESEARCH DESIGN**

The collaborative and self-directed learning using learning styles is in itself interesting, what really comes through as worth while investigating further is how the community of practice emerge, being based on groups formed by very different participants. Particularly, considering used within an engineering subject of relatively short length, as a Comtia A+ certificate is, compared to university educations in for example the social sciences.

The certification course is based on, what the centre has chosen to call: flex checkpoints. The idea being that the participants, when making the individual curriculum settle upon subject area goals within a determined time-horizon. As the participants progress through the course, they achieve points. When the goals have been reached the process and workmethods are evaluated and reflections on the next period and new goals begin. The Comtia A+ course includes two tests, and so even though students work in groups, the pedagogic (with the individual curriculum and assessment criteria) is based on a very individual perspective. It is interesting however, that even though the pedagogic is based on individual perspectives, collaboration in the groups not only seem to work, but support motivation and learning.

Though participants often work in the smaller groups, it also happens more than often, that people in for example the face-to-face lab exercises work together with other people, simply because they are around at the same time. This sometimes challenges the individual on his / hers learning style, and perhaps this is also what enables him/her to advance in the course, performing a more accommodative type of learning than assimilative (e.g. Hermansen 1998 – when describing Piaget) because they are forced to contemplate each others differences and end up learning from them.

These diverse and dynamic groups create a community acting jointly on the basis of very different relations. It turns out that the participants' benefits from and thrive in the diversity among the participants backgrounds. It has become a way of collaboration, which the technical college now uses explicitly to enhance motivation and learning. The question is, is the creation of groups based on primarily learning styles and learning preferences, in any way related to the success of the courses (based both on assessment results and speed of termination as well as the participants attitude towards the course) or is it merely the novelty of the approach? To let participants form groups based on learning style and from very different backgrounds as in this case study, is seldom seen, but could also turn out to be more than just an innovative alternative.

A recent study found that some online collaborative e-learning activities takes point of departure in a description of a persons background, containing previous educations, occupational information as well as other relevant information about for example technical skills and private issues (Levinsen and Orngreen 2003). Orngreen and Levinsen (2003) found that locating students competencies is a pre-requisite for collaboration, but that enabling teacher to match such competencies and facilitate collaboration, are not merely a matter of occupational and technical skills, but is very much related to if the participants have previous experiences with on-line learning, and the way they communicate in general. Could the initiating visitation conversation between the course participant and the teacher and the resulting learning style and learning strategy (containing individual learning goals and plan for this particular course) be a viable step towards uncovering students competencies? And based on these learning competencies, could the somewhat bold creation process of groups, be a feasible initiator for collaborative learning? This needs further investigation.

Designing a platform for e-learning using learning styles, which supports the organisation, as well as course participants are a research project in itself. However, prior to being able to say anything remotely valid about factors that should influence the design, further knowledge about the current set-up is needed. Therefore we have emphasised the issues above, which could be researched in an ante- and post format, thus giving an array of information stemming from many different perspectives and users, to ground design decisions in. And it is due to the vast number of users and use situations, that we think that after the analysis, we might use scenarios of use situations and prototyping of different environments as a possible way forward. Thus using a client and user centred design approach (e.g. Bødker et al 2000, Beyer & Holtzblatt 1997, Dix et al 2004). By client, we refer to the organisation offering the e-learning activity, its teachers, planners and administrators. By users we both contemplate end-users, the participants in the course, but also the organisation sending them to the certificate courses, as the already mentioned companies and agencies for unemployed etc.

It is interesting to contemplate the influence such a platform have on all actors, not just users in relation to learning. The teachers are for example highly affected with the transformation from traditional face-2-face education to an online organisation of learning processes, which much literature has dealt with, also in collaborative learning settings (e.g. Tesone et al 2003): However, what do the introduction of learning styles and this form of group constitution as well as the involvement of the company to a much higher degree (se later) mean to the teachers and their work? And which kind of organisational structure, responsibilities and teacher competencies, are necessary for the learning process to take place?

The design of the individual learning strategy may not only support mutual collaboration in the learning communities, but could also be used on a more long term basis within the specific organisation, where the participants work or educate themselves. The Danish ministry for education are for example contemplating that school children should have a learning style evaluation and sort of portfolio, which follows them throughout their school years. The plan is to let it work both as a medium for reflection, as they are used in this case study, but also as an administrative tool, when children changes schools or have to be evaluated prior to a college education etc. (Juul 2001). This led us to contemplate, how could we design a tool that both supported the individual, group and organisational level? So that the learning style, perhaps could be transformed into a sought of learning portfolio, stating not only the employees competencies and learning goals within the specific course, but also something about learning styles and possible future challenges, for the continuing education / life long learning perspectives of the individual and the company in which they work. For example, there is no question in the participants and their companies' mind that the competencies needed to carry out their work is changing. "When I look at my self at work in 10 years, then the content of my working day is different than it is today. Already now I am thinking about sales, when I am out at the customers... Today I already have customer visits, where I leave my bag in the car. It happens when I among others, shall instruct the customer in how they should operate the new equipment" says one of the service technicians at the course (Nielsen 2003, p.3). Service is becoming much more of a people oriented and communicative thing, than adjusting and maintenance of equipment. Is it possible for us to design the learning environment, so that the companies may in collaboration with the college settle their learning strategy for the organisation, group and individual level?

The nature of these research questions call for experimental and complementarity perspectives of research (Nielsen et al 2004). At first we plan to investigate, observe, and have a dialogue with the involved parties, and one of the authors of this paper, as initiator of FlexLearn, are already in close dialogue with not only end-users and teachers, but also with a company, which are interested in future collaboration on the learning portfolio, for design suggestions pointing at more long term based company strategies. As mentioned the analysis in general has the purpose to acquire further insight into the context and needs of all users at all levels, prior to turning to design suggestions.

## CONCLUSIONS

The main results of our preliminary study provide the basis for formulation of a research proposal, where the main questions are: What is the role of learning styles, and how can we be sure that it is their use in flexible environments that produce successful results? What are the most adequate pedagogies, use of teacher resources and design of e-learning according to the subject matter, when using learning styles? Can the identification of learning styles, create awareness about learning processes, and thus be used to initiate community interaction and motivate collaboration between participants? Is there an interesting learning style set-up, which could be considered on a more long term basis, considering the use of learning portfolios in collaboration between the organisation providing the courses, the participants and their occupational organisation or education? And how can we involve the actors in the analysis and design phase?

These are just some of the questions, which our preliminary empirical study gave us reason to raise.

In conclusion this e-learning project has led to the investigation of the learning processes and exploration of how to design environments that support such processes. This paper describes the preliminary empirical study including a few theoretical considerations based in an HCI perspective on e-learning, leading to the creation of a research proposal within design and use of learning styles in flexible environments.

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