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IN-TIME ON-PLACE LEARNING

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ABSTRACT

The aim of this short paper is to look at how mobile video recording devices could support learning related to physical practices or places and situations at work. This paper discusses particular kind of workplace learning, namely learning using short video clips that are related to physical environment and tasks preformed in situ. The paper presents challenges of supporting learning as part of work practices taking place in the workplace, because learning has different attributes during work than in formal educational contexts: e.g. it is informal, just in time and social. The theoretical framework of the design is the tradition of pragmatism. We start with the concepts of experience, change of practices / habits and reflection, claiming that living through experiences suggest changes for practices and these trigger reflective processing of the situations. We present an Android application 'Ach So!' for creating and annotating short videos as potential solution for informal learning for physical work practices. The paper ends in proposing future steps in the development of the application. The co-design process for the application is lean and iterative, where the design receives feedback from the project partners, skilled workers, apprentices and managers of SMEs targeted to be the main users of the application.

KEYWORDS

Workplace learning, learning through experience, video, Pragmatism, android, semantic video

1. INTRODUCTION

The aim of this short paper is to look at mobile video recording devices and apps and their potential to support learning that is related to physical places, practices and situations at work. Since it has already been shown that learning is different during work than in educational contexts, e.g. by being informal, just in time and social (Kooken et al., 2007, Kerosuo and Toiviainen, 2011), this paper is not focussing on the general aspects of informal workplace learning, but goes directly into the discussion of particular kind of workplace learning, namely learning using short video clips that are related to specific locations and physical environment. The paper starts with a brief theoretically oriented discussion about challenges related to workplace learning and pragmatism notions of experience. The frameworks have been selected to be the bases of the design research, because of their relevance in a process tackling multifaceted challenges like the one in hand. We continue with a presentation of an Android application named Ach So! that has been designed as part of the research. Ach So! is an app for creating, annotating and sharing short videos of situations in a workplace. We demonstrate the main functionality of the app and the first impressions of using it. The paper ends by proposing future steps for the design and development of the application. The work is supported by the European Commission 7th Framework Programme project Learning Layers (LL), which is developing a variety of tools and applications for supporting learning at workplaces. One of the pilot areas of the project is construction sector, in particular the sustained ecological construction sector. The development and co-design process for the application is lean and iterative, where the design can receive feedback from project partners, skilled workers, apprentices and managers of SMEs, who are the main beneficiaries of the project.

2. BACKGROUND AND CHALLENGES

The learning we are interested in is tied to the context, actions and practices or work and learning, where use of various tools and physical artefacts play an important role. Often this type of work is multi-episodic: problems arrive and take place in time and the need to learn and to know occurs within the work process. Learning at work is time and context situated (Kerosuo and Toiviainen, 2011). One of the possible solutions for the situated work learning, discussed in various forums of researchers and practitioners, are mobile and ubiquitous learning environments (see e.g. Hernández-Leo, Ley, Klamma and Harrer 2013).

Videos have been used in workplace learning since the beginning of video technology. Cennamo (1993) proposes three sets of qualities for educational videos: 1) content of the video 2) characteristics of users 3) characteristics of the task, namely why and for what purpose the video is used. Depending on the three qualities of the videos and their use, they may provide benefits for learning or make it more complicated.

When studying construction work, we observed that often learning is understood as growing of the repertoire of solutions and ‘tricks of trade’ that allow the worker to work efficiently. For educational construction work video content this means that the content should be practical, not theoretical or abstract. Since the users are both problem and solution oriented, good examples will be tested out right away and failed and successful attempts to do things could be used as content for others. Furthermore, the tasks in a construction work are in such scale and speed that the ways to execute actions, usage of tools or materials can be captured on video without special technology. These are aspects that support the idea of using video clips in informal learning in construction work.

In this study we focus on the construction sector for finding practices to support workplace learning. The main challenges in these working environments are: tight schedules – no time for dedicated learning or practising, short moments were the guidance or support for changing practices or learning new usages of tools and materials arise, and often harsh conditions where it is not easy to use devices that require fine motor control, e.g. touch-controlled smart phones.

One of our assumptions is that learning and reflection is more efficient when it occurs close (physically and temporally) to the practices itself (see also Mørch and Skaanes 2010). To meet the needs the mobile learning application has to be able to show contextual and situated practical skills and knowledge, and be easily available without breaking the execution of the work practices too gravely.

3. PRAGMATISM NOTIONS ON EXPERIENCE

In our design research we study how video capturing and usage of the video could be used without disturbing the primary work practices. Furthermore we do research on annotations, possibilities to enhance reflection that occurs afterwards or directly when using the videos. As part of the research we design prototypes to test our ideas.

To guide and scope the design, we started with three concepts (1) experience, (2) change of practices / habits and (3) reflection. The concept that ties all of these three parts together is meaning making: living through experiences that suggest changes for practices and trigger reflective processing of the situations. Habit (habituated practice) is related to the concept of belief and doubt (see e.g., (EP 2:19 [1895])). Beliefs can be such that we are necessary aware of them (EP 2:12 [1895]) or but they can also be something that can also go unnoticed – be unconscious (EP 2:336 [1905], CP 2.148 [c. 1902] and CP 2.711 [1883]).

Bergman (2009) clarifies that beliefs can be seen to be “intellectual habits” that “*might not be in the focus of our awareness but which can be easily brought up into reflection*”. This easier bringing them to awareness distinguishes them for instance from tacit knowledge, which is related to automated routines that are hard to explicate. The problems of learning tacit knowledge are widely studied and discussed for workplace learning (Nonaka and Takeuchi 1995 and Zhenhua 2003).

Physical practices are present for awareness and observation. Most of the physical aspects observed and of which one is being aware of are external. They provide common ground for meaning making. The process of going through what has been executed, what is right or wrong or felt in a different manner etc., is clearer when it is possible to refer to it physically. When it is possible to point to the indices that are common for the persons present and from which they may have similar kind of experiences. This is the core in tutoring processes, namely, showing the important points, practicing together, using a tools or materials. It is

experiencing together. It underlines the challenge of recording a real occurrence in such way that the material clues are visible. These clue-like characteristics in the surrounding artefacts emphasize the context, common ground, potential for sharing. We still need to ponder on the question: what invokes learning from the daily routine, from process or habit? We shall argue that it is changing practices through experiencing.

When observing construction work we recognized that while working people enjoyed moments of doubts and inspiration. Often this kind of feelings are described as irritating; feeling uncomfortable before realising from some clues what is different or needs different kind of actions. The emotional, bodily and routinized aspect of habit is tied to embodiment – being and acting in place, but it also provides a different view to the reasoning, reflection and learning itself. Dewey's concept for instinct is *qualitative immediacy* (see e.g. Alhanen 2013). The qualitative immediacy is the specialty in experiencing within time and place — it is the something that belongs to the particular experience. Often this is felt, as something being wrong, but it's not possible to tell what is wrong, although it is noticed. These experiences are seen to be the triggers where the *potential for learning occurs*, which can be enhanced by right kind of tools such as video capturing tools. (See Bauters et al. 2011).

Skilful performance of work practice, allows reflecting the practice while performing it (Schön, 1987). Reflection and self-controlled conduct characterises Peirce's concept of habit. These emphasise the rational aspect of habit. The instinctual or automated bodily aspect of habit as mentioned earlier relieves consciousness to the more demanding tasks (see also Kilpinen 2009:17). Schön's reflection-in-action (1983) and Boud et al. (1985) model of reflection are two modernisations of Dewey's concept of reflection that caused a reflection surface the discourse again in 80's. Schön's reflection-in-action provided a new way to describe the on-going learning of a skilled practitioner as a reflective practitioner, and the idea was applied to the goals of art, design and professional education (Schön, 1987).

Our observation during the design process point towards technology to capture the moments where experience tells that something interesting is on the way. Technology should support this kind of alertness towards experiences that suggest changes for practices. Technology should scaffold reflective processing of such situations in ways that are recognizable as beneficial, and worth the unavoidable pause or delay that the capturing of the moment may cause. Videos are good artefacts to share the concrete and emotional aspects of experiences, and they can be used as indices through which it's possible to perform joint meaning making. The possibility to leave a temporary or digital mark to artefacts supports the meaning making, which again provides more clues (indices) for referring back for further reflection or shared meaning-making.

4. SHORT VIDEO CLIP CAPTURING APP

Ach so! is designed to lower the barrier for using video to capture learning and to record events that others could use for learning. It aims to introduce these as useful practices at construction and training sites. Ach so! provides an app to introduce the process of using videos for learning. The tool is for recording and annotating video clips for learning in construction. It is implemented as an app for Android platform, to be used with tablet computers or smartphones in construction sites or training sites (see Figure 1). In 'Ach so!', the users record short example videos in four genres, 'Site overview', 'Problem', 'Good work' and 'Trick of trade'.



Figure 1. Screenshot from video clip captured by Ach So! showing annotation playback and editing interface.

Videos can be connected to real world objects by linking them to nearby QR-code or barcode, or by using the location coordinates. Ach so! videos in current implementation are sent to SeViAnno-platform (Renzel et al. 2010), where they are stored as MPEG-7 annotated videos. Stored videos include automatic metadata: location, date and author and optional QR-code, tags and annotations. The annotations are added by touching an area on a paused video and writing the annotation text (Figure 1.). The annotations appear in video timeline as jump points, and when playing back an annotated video, the video automatically pauses for three seconds for each annotated target. This pause is to encourage creation of short clips, where important aspects in moving scene are shortly explained. The purpose for storing video annotations and descriptions as MPEG-7 semantic data is to later support semantic recommendations for video metadata and for clips to watch.

5. FEEDBACK FROM THE FIELD

Feedback has been acquired through small incremental testing in the laboratory type of settings with design group's members and associates trying out the application, but also with two small field experiments in actual work settings. The feedback in both cases caused immediate redesigns of various features. Next we describe the feedback and directly after that discuss what kind of changes it caused.

The first field test after many user interface tests within the design groups was to visit an office building intended for the future site for the research group. The idea was to get to know the place, present it for the rest of the team and start planning the usage of the rooms, placements of the furniture, and people. First things that were noticed were that the four initial genres were not suitable for freeform experimenting with the app. To give an easy genre for playing around and starting the use of tool, especially in construction context, we replaced genre "Don't do this" with "site overview". Furthermore, the genres were indicated with symbols, but these were hard to memorise, so they were changed into wording/titles. We also found that the user varied often between landscape and portrait recording stance, though in that version only landscape was properly supported and there was an initial decision to support only landscape format. We decided to make the application to work also in portrait mode, and take care that the player interface has sensible layout when the screen is rotated.

The second field test was with an environmental engineer, who went to swamplands to build measurement and monitoring stations. This was testing in harsh environment during a typical, though challenging work task. Physical limitations with mobile phone recording were found. For example, if the worker is alone the recording is impossible in the harsh winter conditions: hands are too wet and air too cold to operate well the smartphone and most of all the work has to be stopped. However, many moments were recognized by the engineer doing the testing where capturing "how to do things" would have been very beneficial for later guiding of other workers. With two workers on same location, it was found that still there was not enough time to stop the work, and sometimes the spaces where the work occurred were too tight to fit the other person to capture what the other one was doing. Finally the engineer team succeeded in capturing a video of a part of work execution. This capturing was executed inside, where the work was easier to stop, where the items could be arranged for capturing. However, the engineers stressed that this kind of capturing and very light and easy adding of annotations onto the work done, seemed to be something they could use to guide inexperienced workers to pay attention to small details when pre-building stations elements for outside set up. The small details are such that can create a lot of extra work if not built properly.

The engineer recognized the need for easy to use "camera" or capturing tool, and also the need for explaining details through annotations, but the designs should support cameras that leave hands free. The next versions try to combine clip management and annotation through mobile device and recording through wearable cameras, on chest, in helmets or in glasses.

6. CONCLUSION

'Ach so!' supports the creation of short video clips that require minimal preparation, but deliver something that is useful for peers to learn in the work community. We have preliminary results to believe that there exists moments in work where people recognize that the moment would be useful to record and share. These moments are either directly related to learning, or they are recognitions of problems, which in turn are related

to learning. App like ‘Ach sol!’ allows to take action in these moments, and at least encourages to evaluate the moment from perspective of learning. Thus, the framework and idea is in the right direction. However, to have the video capturing and annotation application in a smartphone or tablet is not the most convenient solution for construction work executed in field in harsh conditions. It means that we have to move forward into the technology of smart glasses and helmet cameras but keep the application idea.

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