

Mobile-learning and Hypervideo: usability and feasibility

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Abstract

In the dual-track Vocational Education and Training (VET) system, apprentices gain experiences in different learning locations (mainly workplace and school) but the bridges between these experiences are difficult to construct. Mobile devices could help to promote connectivity across learning contexts, provided they are accepted by the various persons and institutions involved. Ease of use and usefulness, here interpreted as the main elements of *usability in the large*, are indicators of the acceptance of mobile devices. We involved apprentices from different professional fields, namely chefs and car mechanics. Both used headband cameras to capture visual material on professional situations lived at the workplace. Software applications were then used to allow such material to be brought to school and discussed with teachers and classmates or shared with supervisors at work. To evaluate the usability of the device, we used a five-section questionnaire mainly based on the TAM and UTAUT model, which had been adequately adapted to the peculiarity of the VET system. Results confirm the feasibility of the approach and the usability of the devices, and highlight the potential of mobile devices to foster connectivity between learning locations in VET.

Extended summary

Introduction. Our study contributes to reflections on the use of technologies as a means to connect and coordinate different learning locations, which is more and more required to foster a deep and grounded learning. Capturing visual materials through mobile devices on activities experienced at the workplace and using them at school to promote specific learning activities can constitute an effective way to give apprentices the chance to learn and reflect on their own professional background. Implementing mobile technology in learning contexts requires us to reflect on how to approach the evaluation for the stakeholders involved in the process. A first and brief analysis of the concept of usability already reveals a strong overlap with the concept of acceptance. Given the fact that usability emerges as a strong reference point, it is crucial to understand how it can be operationalised. With this respect, it can be very useful to look at Hartson, who suggests that one should evolve towards the concept of *usability in the large*, defined as “ease of use plus usefulness” (Hartson, 1998, p. 103). *Ease of use* is an important aspect to consider because a tool or an application “perceived to be easier to use than another is more likely to be accepted by user” (Davis, 1989, p. 320). It includes such measurable attributes – some of which are already implicitly present in the previously cited definition – as learnability, speed of user task performance, user error rates, and subjective user satisfaction, as Hix and Hartson (1993) or Shneiderman (1992) propose. But, according to Hartson, ease of use is not enough because it does not take into account the functionality that supports users’ needs. In this respect, *usefulness* plays a crucial role: it is “perhaps the primary usability factor, the factor that provides immediate access and affordance to the functionality without getting in the way” (Hartson, 1998, p. 103). This is why, as already mentioned, in the present study we will focus both on the ease of use and the usefulness, which can be also approached as indicators of acceptance

Methods and measures. Considering usability of mobile devices to be the first, preliminary and inescapable learning process step, the present study deals with the following two research questions: a) Are mobile technologies easy to use at the workplace? b) Are mobile technologies perceived to be useful as tools to aid reflection at school on workplace experiences and to foster the learning of professional knowledge? We involved apprentices from three different professional fields in using headband cameras: 19 apprentice car mechanics (in their second year of training) and 8 chefs (in their first year) from two different Vocational Schools (respectively Biasca and Trevano); they were given a headband camera to be used for 1 to 4 weeks each, in turn. Software application was used to allow such material to be brought to school and discussed with teachers and classmates or shared with supervisors at work. To evaluate the usability of such tool we used a five-section questionnaire mainly based on the TAM and UTAUT model, which had been adequately adapted to the peculiarity of the VET system.

Results. Results underline the potential of mobile devices to foster connectivity between learning locations in VET. Among those who used the headband cameras, the apprentice car mechanics collected a total of 110 raw videos concerning 34 different professional procedures (from September 2009 to July 2011) for a

total of 17 hours and 42 minutes. The chefs collected 146 raw sequences related to 18 different professional procedures (from January to July 2011) for a total of 23 hours and 53 minutes.

In order to answer our research questions, we submitted to all the participants a five-section questionnaire, aiming at exploring: (1) the overall perceived ease of use, (2) the learnability, (3) the detailed perceived ease of use, (4) the usefulness of the devices, and finally (5) the usefulness of the tools.

Most apprentices found the tools easy to use (59.3%) or at least easily usable with somebody's support (37.0%). Only one apprentice (within the chefs' group) considered the headband device difficult to use.

Almost half of the car mechanics mentioned having experienced no difficulty at all (47.4%) but none of the chefs shared this impression. Both professions faced some trouble in framing the camera (50.0% of chefs and 42.1% of car mechanics), a task which requests accuracy and precision at the beginning of the recording, and to a lesser extent, in charging the system (18.5% and 25.0% chefs apprentices).

Data collected through the selection of UTAUT items show significant differences among the headband users (chefs=8; car mechanics=19) concerning two main dimensions, where the chefs had more positive perceptions than the car mechanics: *performance expectancy* (T test: $t(25)=-3.60$, $p<.05$, $r=0.58$) and *attitude towards technology* (T test: $t(25)=-3.26$, $p<0.05$, $r=.55$). No significant differences appeared on any of the remaining five dimensions considered by the model. At a more descriptive level, we can notice that the means concerning the apprentice chefs are always slightly higher than those of the car mechanics.

We also submitted a set of items to the headband users in order to analyze how they judge the hypervideos elaborated by the teacher on the basis of videos recorded by apprentices at the workplace. A Mann-Whitney test indicated that overall the chefs perception of the usefulness of the hypervideos was higher than that of the car mechanics ($U=7.000$, $p=0.000$, $r=-.71$). In other words, we could say that apprentice chefs see the potentiality of sharing experiences lived at the workplace with peers and teachers. We provide more details concerning each item for both professions during the presentation.

Conclusion and perspective. The use of headband cameras appeared a little bit more challenging; note that the device we used was a little bit complicated, and that in the meantime, a lot of new models of wearable cameras have been produced, especially for sports and leisure time, which should partly improve the result. Indeed, the most often encountered problem concerned framing, which is an operation not directly linked to the interaction with the software of the device but more with aligning the camera viewpoint with the wearer's line of vision. Car mechanics' procedures are certainly less suitable to video-recordings because they can be quite long with few visible changes, whereas chefs' procedures are often shorter, faster evolving and easier to follow. Additionally, car mechanics often use intrusive tools in the garages, make physical effort and change locations more often, which is not so much the case for chefs.

References

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