Editorial for special issue on cognitive ergonomics for work, education and everyday life

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1 Introduction to this special issue

This special issue presents five papers organized by the theme: “Cognitive Ergonomics for Work, Education and everyday life”. As a central theme of the 31st European Conference on Cognitive Ergonomics (2013), the theme is organized around important issues related to the evolution of work and education and to technical evolutions concerning health and mobility.

On the one hand, it is related to the evolution of work and education, such as learning at work and learning at school. Indeed, the twenty-first century has witnessed the increasing inter-penetration of the worlds of work and education in the society. New technologies at school, such as mobile technology, question the complex ecology of school, in particular the role of teachers. Education also infiltrates work—given needs for flexibility and lifelong learning—supported by training or by enabling work environments. Furthermore, learning and development cross the boundaries of established educational and work institutions as evidenced by online communities of practice. Such evolution questions the inter-relation between productive and constructive activities, as well as the potential of technical/social/organizational environments to enable cognitive development of individuals and teams,

and to support their motivation and engagement, autonomy, potential for action, and control of tasks and activities (Falzon 2014). Two papers are related to this concern, exploring the introduction of digital technology at school (Rubegni and Landoni 2016), and the role of online communities in a professional domain (Barcellini et al. 2016).

On the other hand, it is related to the societal evolutions of everyday life in two particular domains, health and mobility. Here again, the introduction of technologies aims at enhancing people’s capacity in self-monitoring and in decision making as well as at enabling people’s autonomy. In the health domain, home-based self-monitoring technology aims to enhance people’s capacity for self-care and promote preventive self-monitoring activities at home. One paper is related to this issue, exploring design and use of self-monitoring technologies (Verdezoto and Gronvall 2016) in the ‘quantified self’ movement. In the mobility domain, new tools and services are designed to support journey decision making. Two papers are related to this issue either for public transportation (Grison et al. 2016) or driving (Sharples et al. 2016).

2 Approaching socio-technical complexity

One main concern in ergonomics is design and evaluation of technology to be integrated in a system of work (Norros 2014; Wilson 2014). The five papers of this special issue adopt a broad approach to take into account the complex ecologies in which social and technological aspects are embedded, either at school, at work, at home or in mobility.

In order to investigate the way technology can be designed and introduced within the school, Rubegni and Landoni (2016) take a holistic perspective in order to understand the complex ecology of the school, made of a

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variety of actors. Indeed introducing a new technology will transform the roles of teachers, in order for them to transform the digital technology as a resource for developing skills, as well as to engage the students in using it.

Verdezoto and Grönvall (2016) explore socio-technical complexities that may occur when introducing preventive health-measurement technologies into older adults' daily routines and everyday lives. To do so, they conduct qualitative and quantitative studies using interviews, cultural probes, workshops and a survey. This variety of approaches allows them to question how self-monitoring technologies may be integrated in individual's everyday life.

Grisson et al. (2016) explore what can motivate route and modes changes towards alternative public transports in everyday life. Investigating users' experiences via the critical incident technique allow them to explore contextual as well as internal factors which lead to decision making in mobility. Sharples et al. (2016) combine two methods (scenario and simulation) to understand the role of information as well as contextual influences to decision making in the driving context.

A combination of methods is also used by Barcellini et al. (2016) in order to understand the role of online communities in a professional domain. The confrontation of the analyst's viewpoints and the participants' viewpoints enables them to discuss the conditions for the development of a virtual community of practice, in relation with the hybridization between the "real-world" community and the "online community".

3 Summary of papers

Rubegni and Landoni's contribution is on "The TRITS model: Teacher Roles in introducing digital Technology into a School curriculum". In this research, the authors investigated the role of teacher of elementary school in using digital technology for stimulating and prompting classroom activities—storytelling in particular—and propose a model to describe this role (TRITS). A first originality of the research is to focus on the use of ICT in the field of elementary school, whereas most of research deals with higher levels of education. A second originality is that the research combines an epistemic perspective—to propose a model of teacher role—with a pragmatic and constructive one as it aims at contributing to the development of the activities of teachers and pupils using technologies: from storytelling to digitally supported storytelling. To do so, the authors conduct a longitudinal research (4 years) which articulates: analysis of non-digitalized storytelling activities with a holistic perspective about the school context, participatory design of storytelling pedagogical supported by ICT and analysis of the "new" activities

developed. At each step, contextual inquiry and focus group were used to gather data in order to describe the activities performed and feed the development of the TRITS model. Finally, by combining their results with literature, the authors present their model which describes the level of engagement in class activity and students, from fully engaged to not engaged and the level of commitment in envisioning and planning the use of digital technology to support the curriculum objective achievement, from active to passive. In accordance with these dimensions, they conceived four different teachers' roles: Manager (MT), Proactive (PT), Facilitator (FT), and Follower (FoT). Finally, the TRITS model can be seen as a useful model to analyse and predict how the synergy between teacher and learners changes when technology is introduced.

Barcellini, Delgoulet and Nelson's contribution is entitled "Are Online Discussions enough to constitute Communities of Practice in professional domain?" Using a framework grounded in research on Virtual Communities of Practice, the goal of the study is to understand to which extent online discussions between members of a specific profession supports the building of a Virtual Community of Practice. By studying and thoroughly analysing (i.e., by content and lexical analysis), the online mailing list dedicated to ergonomics, the authors identify that the online discussion contains both informative and formative functions about situated and circumstantiated aspects of practices. In addition to studying the online form, the analysis of interviews conducted with participants reveal divergence in the perception of belonging to a "community". These results contribute to the development of the profession of ergonomics field and in general to online discussions between professionals within virtual communities of practices.

Verdezoto and Grönvall's paper is on "On Preventive Blood Pressure Self-Monitoring at Home". Self-monitoring activities are increasingly parts of people's everyday lives. Some of these measurements are performed voluntarily rather than being referred by a physician and are conducted because of either a preventive health interest, or to better understand the body and its functions (so-called 'Quantified Self'). However, the authors outline that the existing technologies supporting preventive self-monitoring are highly techno-centred and neglect medical perspective, lived experience in self-monitoring activities of persons, and skills and abilities to be developed. An originality of this research is that it aims at addressing these issues in order to contribute to the design of preventive tools supporting empowerment of individuals—and not only tools adapted to supposed "needs" of those individuals. To do so, the authors coupled qualitative studies with a target group about a specific health parameter (blood pressure) with a quantitative survey on preventive self-

monitoring activities in the Danish population. The results highlight several aspects that are important to consider when designing preventive self-monitoring technology (e.g., importance of interpretation, understanding and health awareness) in order to empower the user, seen as active and informed. The authors reflect on the findings to illustrate how these aspects may inform both people engaged in Quantified Self activities and designers alike, and the tools and approaches that have sprung from the so-called ‘Quantified Self’ movement.

Grison, Gyselinck and Burkhardt’s contribution is on “Exploring Factors Related to Users’ Experience of Public Transport Route Choice: Influence of Context and Users profiles”. A goal is to achieve a better understanding of the users-related factors that affect the choice of routes in public transport. A secondary goal is to understand characteristics that motivate alternative routes and transport types. The focus of this research is unique since earlier studies focused on factors explaining decision making between private and public transports modes. Grison, Gyselinck and Burkhardt focus is on the factors affecting user’s choice between several public transport route alternatives. Regular users of the public transport of Paris and suburbs took part in the study and were interviewed using a semi-structured interview (following the critical incident technique). During the interview, individuals were asked to report on positive and negative real events they experienced, with as much details as possible. The aim was to avoid the collection of general thoughts and stereotypes about a theme and to favour verbal reports on specific situations recognized by participants. Using the interviews, critical incidents were identified which lead to three principal results. Firstly, the user choice of public route is contextualized. Secondly, taking an alternative to the usual route, or using a multimodal route, is determined by the context and factors more related to the pleasantness of the travel. Third, the factors influencing the choice between different public transport routes depend on the users’ profiles and preferences. The result of this study is important since it differentiates from other studies that consider users of public transport as a uniform group rather than a heterogeneous group with profiles and preferences that affect public transport routes.

Sharples, Shalloe, Burnett, and Crundall’s contribution is on “Journey Decision Making: The influence on drivers of dynamic information presented on Variable Message Signs”. With the increasing prevalence of mobile technologies, drivers may receive a combination of formally provided information and other sources of information such as social media. Yet, as driving is a time-critical and safety-critical task that demands that information is presented in as succinct a manner as possible, reducing

potential for distraction. Moreover, this is a crucial safety issue for agencies who control and monitor traffic movement to understand the effect of information provided to drivers decision making (strategic choices—route selection—or tactical decisions—altering driving style). In this context, this research focuses on Variable Message Signs (VMS) used in highways environments to provide drivers with up-to-date dynamic information. This paper presents a series of studies that were conducted to explore the way in which drivers respond to, understand and make decisions during a journey when presented with different types of messages, with the aim of supporting selection of legends for display on VMS in the short term, and providing a foundation for implementation of dynamic information in-car and via smartphone devices. To do so, authors used two methods—a scenario approach and a medium-fidelity driving simulator. The paper highlights the role of familiarity with information wording and context, level of detail, interpreted meaning, previous experience and contextual cues on trust in information and consequently behaviour in response to the information presented. These results provide an insight into the role of information and other contextual influences in decision making in the driving context specifically. They also have useful implications for the way in which information should be designed in other decision making contexts, such as travel using public transport, or supporting real-time complex control operations.

References

- Barcellini F, Delgoulet C, Nelson J (2016) Are online discussions enough to constitute communities of practice in professional domain? A case study of ergonomics’ practice in France. *Cogn Technol Work*. doi:[10.1007/s10111-015-0361-z](https://doi.org/10.1007/s10111-015-0361-z)
- Falzon P (2014) *Constructive ergonomics*. Taylor & Francis, Boca Raton
- Grison E, Gyselinck V, Burkhardt JM (2016) Exploring factors related to users’ experience of public transport route choice: influence of context and users profiles. *Cogn Technol Work*. doi:[10.1007/s10111-015-0359-6](https://doi.org/10.1007/s10111-015-0359-6)
- Norros L (2014) Developing human factors/ergonomics as a design discipline. *Appl Ergon* 45:61–71
- Rubegni E, Landoni M (2016) The TRiTS model: Teacher roles in introducing digital technology into a school curriculum. *Cogn Technol Work*. doi:[10.1007/s10111-015-0360-0](https://doi.org/10.1007/s10111-015-0360-0)
- Sharples S, Shalloe S, Burnett G (2016) Journey decision making: the influence on drivers of dynamic information presented on variable message signs. *Cogn Technol Work*. doi:[10.1007/s10111-015-0362-y](https://doi.org/10.1007/s10111-015-0362-y)
- Verdezoto N, Gronvall E (2016) On preventive blood pressure self-monitoring at home. *Cogn Technol Work*. doi:[10.1007/s10111-015-0358-7](https://doi.org/10.1007/s10111-015-0358-7)
- Wilson J (2014) Fundamentals of systems ergonomics/human-factors. *Appl Ergon* 45:5–13