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Technology-mediated Boundary Objects and Boundary Crossings in Vocational Education and Training an instructional design model.

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Technology-mediated Boundary Objects and Boundary Crossings in Vocational Education and Training - an instructional design model.

Abstract

In this extended summary, we propose an instructional design model aimed at using technology-mediated boundary objects and boundary crossing processes in vocational education and training. The model is based on preliminary findings from a current research project (2015-2017) on vocational teachers' perceptions of transfer and boundary crossing and their use of information and communication technology (ICT) in relation to such processes. Theoretically the model is inspired by Akkerman & Bakker's (2011) proposal of four dialogical learning processes, which are attributed boundary crossing potential. Empirically the model has been field validated among Danish vocational teachers attending continuing professional development courses at The Metropolitan University College in Denmark. While the instructional design model has been positively received among the vocational teachers, we still consider it to be a work-in-progress, and further research on how to scaffold the use of the model is needed.

Extended summary

Background

In the Danish dual Vocational Education and Training (VET) system, students oscillate between school and workplace periods throughout their education. Making sense and use of learning in and from different contexts and experiencing continuity between school and work has long been considered a major instructional challenge in Danish VET research resulting in a continuous focus on the transfer phenomenon (Aarkrog, 2010). Based on a pre-study of vocational teachers' use of information and communication technology (ICT) conducted in 2014 (Riis, Bergstedt, Rasmussen, *unpublished*), we noticed how the teachers attributed a transfer and sometimes boundary crossing potential to the use of ICT in teaching and learning processes across different contexts, leading to our current research project (2015-2017). The main research question investigates why and how vocational teachers understand and design for boundary crossing through the use of ICT-based artefacts. The research project is designed as a multiple case study (Yin, 2009) with interviews, observations, and design experiments as primary methods to generate and collect data in different phases of the project. As part of our study, we propose an instructional design model for using technology-mediated boundary objects in boundary crossing processes.

Both in research (Lobato, 2006; Engle, 2012) and among practitioners transfer is a contested concept. In this study, we adopt the concepts of vertical and horizontal learning, polycontextuality, and boundary crossing (Engeström, Engeström & Kärkkäinen, 1995; Tuomi-Gröhn, Engeström & Young, 2003; Akkerman & Bakker, 2011; 2012), as a way of challenging the traditional notion of transfer understood mainly as a one-time and one-directional transition between a context of acquisition and that of application. As stated by Engeström et al. (1995), learning can be conceptualized as both a vertical and a horizontal process. In the former, focus is on learning in a single social system (e.g. in a school) often times based on a narrow, hierarchical view of knowledge and expertise. Conversely, in the latter perspective, learning is based on a broader, multidimensional view of knowledge and expertise and focus is on transitions or crossings in and between multiple social systems (e.g. in and between school and workplace). A horizontal view on learning and transfer understood as boundary crossing, seeks to find productive ways of relating intersecting dissimilar practices (Akkerman & Bakker, 2011), potentially accommodating the inherent contradictions of a dual education system.

Ortoleva and Bétrancourt (2015) state that although oscillation between school and apprenticeship potentially can be a great source of learning, vocational students often experience difficulties in integrating formal knowledge achieved in school and tacit knowledge accomplished in the workplace. Accordingly, Schwendimann et al. (2015) claim that students in dual vocational education systems often experience gaps between what is learned in school and the experiences achieved in the workplace. Correspondingly, Aarkrog (2005) states that many Danish vocational students perceive their educational programs as discontinuous and fragmented.

Boundary crossing and boundary objects

As mentioned above different conceptions exist in the literature about the difficulty in using knowledge from one context in another. Previously the concept of *transfer* has been dominating the research field (Billett, 1996; Illeris, 2009; Henningsen & Mogensen, 2013), whereas the concept *boundary crossing* is becoming increasingly used in the literature (Tangaard, 2007; Akkerman and Bakker, 2011; Hanh, 2012; Messmann and Mulder, 2015; Motta et al., 2013). Akkerman and Bakker (2011) acknowledge that the conceptions of boundary crossing and boundary objects may earlier have been reflected in theories of transfer.

According to Akkerman and Bakker (2011) boundaries can function as resources for understanding action and interaction between the socio-cultural differences and discontinuities in learning practices, which can support the comprehension and development of identities and practice. The intersection between two practices creates a third space of negotiation of meaning, which potentially results in the creation of new learning. Akkerman and Bakker (2011) state that socio-cultural systems such as school and work have different cultures, tools, subjects, rules etc., but they may still have a common interest in educating high quality future vocational workers. Further, Akkerman and Bakker (2011) emphasise that the intersecting socio-cultural practices do not per se lead to boundary crossing, as the concepts refer to differences between socio-cultural practices that lead to discontinuity. However, the boundary crossing learning processes can be facilitated through *boundary objects*, which are “artefacts doing the crossing by fulfilling a bridging function” (Akkerman & Bakker, 2011, p.133). Boundary objects can articulate meaning and point out different perspectives, as they can translate the meanings of actions and practices.

Akkerman and Bakker (2011) have identified four dialogical learning processes that can potentially occur at the boundaries between socio-cultural systems, namely *identification*, *coordination*, *reflection*, and *transformation*. *Identification* processes are concerned with the focus on differences and similarities, and thus boundaries between contexts, which results in new insights and consequently reconstruction of the nature and objectives of the practices and related identities. Identification may lead to negotiation of identities, and may involve the need for legitimating coexistence of identities or practices (Akkerman & Bakker, p. 142). *Coordination* processes allow different groups to cooperate effectively, by establishment of a communicative connection that may entail translation of meanings, which allows for smooth boundary crossing in a routinized manner (Akkerman & Bakker, p. 143). *Reflection* is the process of learning something new on the basis of realising and articulating differences of practices. This may lead to expanding insight about personal actions from another perspective, which will require perspective taking and perspective making, and thus a new enriched understanding of practices or roles (Akkerman & Bakker, p. 144). *Transformation* is learning mechanisms that occur as a result of confrontation between practices, which lead to profound changes. It is suggested that confrontation may happen as a consequence of disruption of the previous workflow. However, the confrontation can cause the recognition of a shared problem space, which allows for collaborative problem solving or the development of something new (Akkerman & Bakker, p. 146).

Boundary Crossing and ICT

Hahn (2012) states that oscillation between school and work is difficult, because there are tensions between the objectives, cultures, and roles of respectively schools and workplaces. Akkerman and Bakker (2012) claim that in order to reach the potentials of dual vocational education, boundary crossing between the two learning contexts must be facilitated. According to Heilesen, Mogensen and Gleerup (2012) ICT can extend formal learning into the workplace during apprenticeship periods. This will lead to empowerment of apprentices, and give the learners a more active and responsible role in their learning. Equally, Nortvig and Eriksen (2013) state that new and easy accessible technologies provide opportunities for construction of a third space of learning and integration of theory and practice. Nonetheless, Christensen et al. (2014) claim that only few Danish educational institutions actually express a pedagogical understanding in the implementation and use of ICT.

TBOC - An instructional design model

Based on our preliminary findings and inspired by Akkerman & Bakker's (2011) four dialogical learning processes, we propose an instructional design model, the TBOC-model (figure 1), and in our presentation, we report how vocational teachers in our study have perceived and used the model.

TBOC-model

Technology-mediated Boundary Objects and Crossings

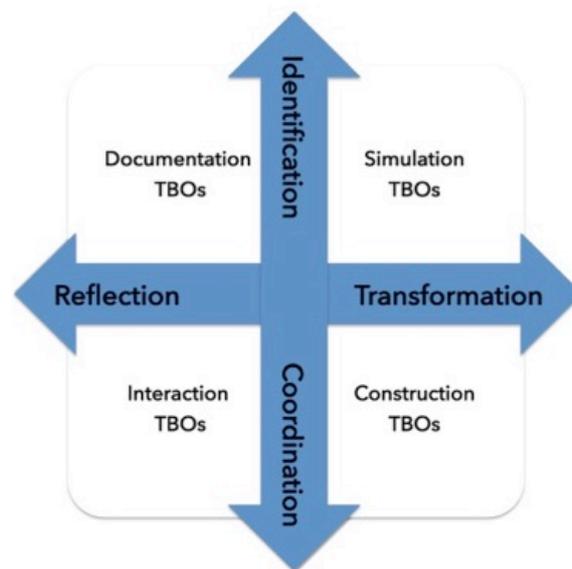


Figure 1. The TBOC-model.

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