Technological Forecasting & Social Change xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Technological Forecasting & Social Change

journal homepage: www.elsevier.com/locate/techfore

Theorising about barriers to open e-learning systems in public administrations

Julia Stoffregen[a,b,*], Jan M. Pawlowski[b,1]

[a] University of Jyväskylä, Finland
[b] University of Applied Sciences Ruhr West, Germany

ARTICLE INFO

Keywords:
Information systems and organisational change
Event studies
Collaborative e-learning
Public administration
Open educational resources
Socio-technical systems

ABSTRACT

Barriers to the general use of e-learning technology are known across various contexts. Despite increasing efforts to clarify the range of these barriers, few efforts have been made to advance the theorising about them and, thus, to answer why and how they unfold. This study is motivated to overcome this unaddressed problem and develops a process model based on adaptive structuration theory (AST) and the punctuated socio-technical change model (PSIC). It represents how barriers unfold between actors, technology, and organisational properties in public administrations. The PaSIC model provides a new perspective on how critical incidents drive the emergence and progress of barriers to the general use of e-learning technology. Implications of the study clarify why particular organisational actors, properties and technology should be considered in future research in order to realise change in open e-learning systems.

1. Why theorise about barriers of open e-learning systems

The use of open educational resources (OER) and e-learning technology have gained increasing importance in educational, private and public sectors (Bere et al., 2013; Lane, 2010). The exchange of knowledge through forums and OER promises to advance the shift to the knowledge society (Bere et al., 2013; Sannia et al., 2009). Given the increasing access to the web, open e-learning has furthermore potential to reach a global community and equalise access to knowledge as a public good (Colazzo et al., 2009; D'Antoni, 2009).

The development and use of open e-learning technology, however, hardly succeeds in realising these promises. Numerous barriers challenge the success of e-learning and have been elaborated from pedagogical (Sannia et al., 2009; Yunus and Salim, 2008), resource-based (Chen, 2014) and other conceptual perspectives (Pereira et al., 2015; Stoffregen et al., 2015). The studies show that similar challenges such as lack of knowledge about OER are reproduced across various projects. Yet, how and why these barriers emerge is not elaborated so far.

To address this issue, recent studies encourage focusing more on processes of learning and knowledge exchange; most salient challenges appear to be associated with them (cf. Barette et al., 2012; Gustavsson, 2009; Stefanick and LeSage, 2005). Thus far, however, very few studies have responded to this call. Despite a shift to elaborate on *how* difficulties unfold (cf. Gustavsson, 2009; Moynihan and Landuyt, 2009), studies do not head for developing theoretical models (e.g., Conci and Bramati, 2007). Exceptions are studies by Chen (2014) and Eidson (2009), which however, do not extend the stage of *categorising* barriers. Hence, how and why barriers evolve is a knowledge gap in the domain.

It is time to close this knowledge gap and answer how and why barriers unfold in the process of open e-learning. Beyond previous studies we theorise on barrier change by delimiting when and why difficulties emerge, are punctuated and are overcome (e.g. Bacharach, 1989; Sutton and Staw, 1995). Such a process theory perspective is unique both for the topic and the domain. Implications for research and practice will be discussed in this respect at the end of the paper. The paper is organized as follows: In the first part, we present related work in the domain and the theoretical background of this study. Subsequently, we outline the methodological approach. Finally, we report our results and draw conclusions about the most important points.

2. Related work in the domain of public administrations

"Open e-learning systems are assemblages of learners, artefacts like OER and e-learning technology interacting in a given time and space. OER are digital open knowledge resources carrying a license that enables learners to re-use, adapt, and share information and knowledge without fees" (Stoffregen and Pawlowski, 2016). *Open* puts the emphasis on technical (interoperability), social (trust) and legal principles

* Corresponding author at: University of Applied Sciences Ruhr West; Campus Bottrop, Lützowstr. 5, 46236 Bottrop, Germany.
E-mail addresses: julia.stoffregen@hs-ruhwest.de (J. Stoffregen), jan.pawlowski@hs-ruhrwest.de (J.M. Pawlowski).
[1] University of Applied Sciences Ruhr West; Campus Bottrop, Lützowstr. 5, 46236 Bottrop, Germany.

https://doi.org/10.1016/j.techfore.2018.01.010
Received 10 November 2016; Received in revised form 14 November 2017; Accepted 12 January 2018

such as open licenses (e.g. Creative Commons[2]) (Hilton III et al., 2010; OECD, 2007). Unlike the focus on learning management systems or particular technical functions (Abdullateef et al., 2016; Conde-González et al., 2014; García-Peñalvo and Alier, 2014), open e-learning promotes the use of diverse social media including new ways of independent learning by self-generated and peer-reviewed contents (cf. Stoffregen and Pawlowski, 2016). Exemplary platforms are Dokeus (Bere et al., 2014) or EAGLE[3] dedicated to the use of local public administrations.

In the context of public administrations, open e-learning is a new phenomenon. Unlike traditional learning in the classroom abroad, public employees engage with digital contents and tools at the workplace to acquire and exchange knowledge with peers. The “e” promises to increase efficiency and flexibility as costs of travelling and seminars are saved (Colazzo et al., 2009; Langford and Seaborne, 2003; Remtulla, 2007). A crucial new element of open e-learning, then is neither the use of open source software for training means (like in Brazil and several EU countries, e.g., Bere et al., 2014). Nor it is the fact of *online* learning per se which is conducted in several administrations (e.g., China, Brazil, Italy, Germany; Bere et al., 2013; Bere et al., 2014; Stoffregen et al., 2016). Open e-learning does not provide tutored, traditional learning contents. Neither performance monitoring tools nor certificates are integrated (cf. García-Peñalvo et al., 2010). Open e-learning bases on small knowledge chunks inherent in digital formats which are aimed at tackling the brain drain in times of demographic shifts and retirement. They are generated by public employees who develop their own knowledge resources, organise their expertise and share it with others.

For local public administrations suffering limited budgets, and lack of support from higher administrations to address specific learning needs of employees (e.g., Stoffregen et al., 2015), open e-learning appears as an attractive way to innovate the management of knowledge and learning. Involving public employees in technical change appears to gain increasing importance; yet, research has focused rather focused on technical aspects of learning technology such as the role of open source (Abdullateef et al., 2016), or adoption issues (cf. Conci and Bramati, 2007; Stefanick and LeSage, 2005).

When open e-learning technology in public administrations is introduced, it may serve as a mandatory and self-standing training approach (Chen, 2014), or complement established training programs (Hârţescu, 2012). While the range of courses such as enhancing digital competencies (Langford and Seaborne, 2003) among others (Bere et al., 2013; Conci and Bramati, 2007), suggests that digital learning is a successful approach, studies emphasize that several barriers need to be overcome in the public sector.

At the beginning of implementing open e-learning, public managers appear to miscalculate needed investments as e-learning is understood as a cheap fix for missing training programs (cf. Langford and Seaborne, 2003). **Further in the launch** of e-learning technology, it appears that public employees are seldom familiar with online activities (Hârţescu, 2012). Learning and exchanging knowledge online appears to be impersonal and raises concerns about norms for disclosing information (Stefanick and LeSage, 2005). **Later on**, the high workload of public employees leads to reject e-learning activities. Facilities are not explored, and public employees criticise the lack of interactive facilities (Eidson, 2009).

Apart from these particular challenges, systematic categorisations of barriers were developed. Barette et al. (2012) categorise barriers into knowledge acquisition and transformation, organisational learning support, organisational learning culture, leadership of learning, and strategic management. Pereira et al. (2015) derive categories based on a synthesis of a technology readiness index and expectancy disconfirmation theory. Furthermore, a synthesis of existing barriers was made, categorizing barriers into organisational, technical and social dimensions (Stoffregen et al., 2015).

While the label of barriers varies, it is the sheer range that raises concerns about the success of open e-learning in the public sector. Even though the models are complex, important explanatory variables seem to be missing (cf. Barette et al., 2012; Pereira et al., 2015). Hence, some initial steps have been made to ask *how* learning and knowledge exchange unfold. Yet, results reside on a descriptive level (Gustavsson, 2009), or results in factor models (cf. Barette et al., 2012; Moynihan and Landuyt, 2009).

Going beyond the focus on barriers, studies have not attempted to *clarify how* and *why* barriers emerge, and thus do not address the root of the challenges. This state of research can be found in the related domains such as learning and knowledge management in the public sector (Moynihan and Landuyt, 2009:1097) as well as barrier models in the private sector or educational domains. Mechanisms and entities behind OER-barriers are not yet fully explored (Pawlowski and Richter, 2010).

To follow a process perspective, which answers *how and why barriers unfold*, will thus offer a new and explanatory insight on the mechanisms of barriers in the domain. Process theories are known to provide invaluable insight into how barriers unfold in-between (public) organisations, employees and technology (cf. Lyytinen and Newman, 2008). Yet, no model has been advanced for the study of barriers in the public sector. This study will take the first step in this new direction. The following section will begin to outline the nature of process theories. Subsequently, the theoretical framework for the literature synthesis will be crafted.

3. Theoretical framework

3.1. Nature of process theories and models

Process models are narrative explanations of how relevant human actors, technologies and events evolve over time (Pentland, 1999). Core elements are a sequence of time, focal actors and roles, antecedents and consequences of change as well as instances of deep structure that generate change (Pentland, 1999). Causality in process models is event-based, which can be distinguished from factor or variance models (cf. Van de Ven, 2007). Variance models quantify *what* factors have influence; for example, whether and how strong the influence of the factor *gender* explains the perceived effectiveness of e-learning among public employees (cf. Chen, 2014). Process models qualify what factors are important in a process as well. However, they go beyond answering *what* makes a difference by clarifying *why* and *how* certain events lead to consequences and change over time (Van de Ven, 2007).

Process models evolve from data of the phenomenon, so it is not recommended to predefine an analytical lens. Yet, it is worth to elaborate a general framework that sensitises the research perspective (Bostrom and Gupta, 2009; Van de Ven, 2007; Weick, 1989; Weick, 1995). Criteria to craft a suitable framework are: (1) that an appropriate number of entities and mode of change are covered (Van de Ven, 2007); and (2) that it facilitates a disciplined imaginary of the phenomenon (Bostrom and Gupta, 2009; Weick, 1989).

One potential process model as a point of orientation is the punctuated socio-technical change model (PSIC). PSIC enjoys ongoing use and refinement in technology development projects (e.g. Newman and Zhu, 2007; Newman and Zhu, 2009). It is acknowledged in the information systems (IS) domain for opening the black box of change processes in technology development (cf. Ahmad et al., 2011). The analytical categories address a wide but focused range of entities. The mode of change is comprehensive and includes both social and technical incidents of change (Lyytinen and Newman, 2008). Another process approach is adaptive structuration theory (AST), which builds upon structuration theory (Giddens, 1984; Meneklis and Douligeris, 2010; Orlikowski and Robey, 1991). AST is invaluable to refine analytical perspectives from general socio-technical systems (as in PSIC) to

[2] https://creativecommons.org/licenses/.
[3] https://eagle-irl.dhbw-heidenheim.de/.