Addressing the persistent disconnect between learning and work: Using a Logic Model to support negotiations of diverse actors during the design of digital learning systems

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Digital Technologies open opportunities to work and learn in new ways as work environments and practices are transformed. However, digital learning systems often are designed without due consideration of the workplace. This disconnection of learning from work can make it difficult for professionals to apply knowledge learned to their work. Connecting work and learning through the design of digital learning systems requires technical experts, domain specialists and education researchers. We argue that when working in diverse design teams, at times team members face tensions which leave them feeling helpless, voice-less or in paralysis. This paper addresses this problem by placing attention on how to support design processes for digital professional learning by incorporating the knowledge of these diverse actors. The paper begins with a discussion of participatory 'critical encounters' to resolve tensions during the design process using a Logic Model as a stimulus tool to support negotiations. This is followed by a case example. The paper concludes with a novel methodology, drawing on the idea of 'double stimulation', using a Logic Model as a tool to anticipate and resolve tensions. This methodology helps design digital learning systems in ways that respond to workplace problems, acknowledging that the social context matters.

Keywords: design, digital education, double stimulation, professional learning, workplace learning

Research problem: The disconnection between digital professional learning systems and the workplace context

Digital technologies open opportunities to work and learn in new ways as work environments and practices are transformed. However, digital learning systems often are designed without due consideration of the workplace (Littlejohn & Pammer-Schindler, 2022). Not taking into consideration the context of work has important repercussions in contemporary workplaces: knowledge learned online has to be abstracted and reapplied in the workplace and this transfer of knowledge requires extra effort (Markauskaite & Goodyear, 2017, p. 153). This disconnection

of learning from work can make it difficult for professionals to apply the knowledge learned to their work (Billett, 2004). Furthermore, designing digital professional learning systems that take into account the context of work is a significant challenge, particularly when the designed activity targets professionals who work and learn in dynamic, networked and distributed work settings and in domains that constantly evolve.

The study seeks to address this problem by placing attention on how to support processes of design for digital professional learning by incorporating the knowledge of diverse actors. We argue that when working in diverse teams designing digital learning systems, at times team members can feel helpless, voiceless or in paralysis. The paper begins with a discussion of participatory approaches, "critical encounters" to resolve these (Engeström et al., 2015) during the design process, and a stimulus tool to support negotiations. This is followed by a case example. The paper concludes with a summary of a new proposed method based on "double stimulation" as a way to anticipate and resolve conflicts in ways that are responsive to workplace problems and acknowledge that the work context matters.

Critical encounters during the design of digital learning systems

An approach often used to design digital learning systems is participatory design, where different actors (practitioners, system designers, researchers, users, etc.) collaborate closely during the design process, through communication, negotiation, and participation (see e.g., Allain et al., 2018). Despite the reported benefits of this approach, there is evidence that participatory design can be difficult to orchestrate, and participation can miss opportunities to incorporate useful indigenous knowledge (Iniesto et al., 2022). It can be difficult for domain professionals to work alongside digital learning system designers in ways that build on knowledge created in collaboration, thereby prioritising the intertwined relationship between learning and the context of work.

It has been known for some time that participatory design is further complicated by the politics of design and the motivation for design efforts (Kensing & Blomberg, 1998). Systems designers may focus on characteristics of the technology, while domain professionals aim to strengthen control over their work lives and work environments (Kensing & Blomberg, 1998). Bringing together the diverse perspectives of actors with differing motives during a design activity can lead to tensions, problems and frictions (Engeström et al., 2015). These tensions lead to "critical encounters" (Engeström et al., 2015) where actors participating in a common activity to deal with a shared problem oscillate between resisting new ideas and embracing fresh possibilities. In these situations, the object of the activity is used as a stimulus for action. When tensions arise during action, a second object is used as a second stimulus to help anticipate and resolve conflicts arising from the first stimulus in a productive way.

This idea of double stimulation builds on Vygotsky (1978) and has more recently been conceptualised within the tradition of Cultural Historical Activity Theory (CHAT) (Engeström et al., 2015). The first stimulus takes forward the object of activity (e.g., design of a system) while the second stimulus supports the development of "everyday practices used by people in everyday life to undertake difficult actions" (Hopwood & Gottschalk, 2017, p. 23) and helps, for example, to bring together different knowledge from diverse actors needed for the system design. Productive outcomes are shaped around the uses of stimuli and the negotiations around these during critical encounters (Engeström et al., 2015).

An important question is what object can be used as a second stimulus to expand the participation of each actor during the design of professional digital learning systems? In this paper we propose the Logic Model (LM) as one possible second stimulus: an object used for programme planning and evaluation (see e.g., Suchman, 1977). The LM is used to plan the actions and activities needed to achieve intended outcomes, highlighting methods to evaluate whether the outcomes have been achieved. The LM illustrates a "theory of action" to support the planning, implementation and evaluation of the programme of work by illuminating relationships between perceived problems and intended outcomes (McLaughlin & Jordan, 1999). Although the LM is a well-established method and tool, it has not been conceptualised and used as a mediating object and second stimulus in team work to guide critical encounters and support negotiations around these. This idea is explained in the next section.

The Logic Model as a second stimulus in the design of digital professional learning

Taking the problems of participatory design into consideration, we propose using a double stimulus as a way to anticipate tensions and address the persistent challenge with the design of digital professional learning systems. We propose that when designing a digital professional learning system, a *first stimulus* is identification of the needs of the professionals (at all levels) through ethnographic methods. Problems and tensions in the workplace context are then identified through analysis (e.g., using CHAT). This analysis provides the basis for an action plan. Planning is by a group of actors (professionals working in diverse roles and at different levels based in a workplace; learning system designers, researchers, funders, etc.) who create a Logic Model (LM) to guide the design process. When creating the LM they consider problems in the context of work. These problems are identified in the first stage of the process. They then propose actions to address these problems, taking into consideration the socio-material environment of the workplace and technological possibilities. The LM is then ready to be used as a *second stimulus* to support these actors as they negotiate and modify proposed design actions. The group of actors meet at regular intervals to review, negotiate and agree actions iteratively, taking into account their diverse experience and knowledges. These actors review each action, then modify, reset, and re-evaluate the action. Thus, the LM becomes a mediating object or "object in-the-making" (Tronsmo & Nerland, 2018) with distinct versions at different points in time. The temporal constructions of the object in-the-making are "influenced by expressed concerns, propositions and interests of various stakeholders and [it] is shaped by the material and social configurations of the context" (Charitonos & Littlejohn, 2019). The next section provides a case example to illustrate how this method can stimulate diverse actors in diverse design teams to combine their knowledge to identify work problems and negotiate decisions about the design of professional learning.

Case example: Transforming work by identifying problems and negotiating actions

This case example is based on a UK Government funded (Fleming Fund) project focused on workplace transformation in health sectors in low- and-middle-income countries (LMICs) through digital workplace learning on the escalating problem of Antimicrobial Resistance (AMR). AMR, the ability of microbes to acquire resistance to antimicrobial medicines, is a major global threat responsible for 1.27 million deaths globally (Murray et al., 2022). An important aspect of reducing AMR involves health professionals learning continuously about the impact of microbial resistance and how data related to AMR can be generated, shared and used in ways that inform treatment,

policy and practice. They then apply this knowledge to adapt how they work in ways that reduce the impact of AMR. The objective was to design digital professional learning in ways that consider the mutual relationship between the workplace and the learning that takes place, and could lead to improvements in work practices among professionals.

First, a set of workplace problems associated with AMR surveillance work were identified through multi-sited and cross-country fieldwork (1 in South Asia and 2 in Africa), including site-visits (n=12) and interviews with in-country stakeholders (n=60; e.g., practitioners, managers, policy makers) and people with expertise in the field of AMR globally (n=23). Data were analysed by researchers using CHAT by examining contradictions that inhibit the object of work (i.e., improving AMR surveillance). This analysis provided a set of eight problems-in-context which formed the *first stimulus*.

These *first stimulus* problems were included in an LM which was then introduced to a group of diverse actors tasked with the design of digital learning to respond to those problems. This LM acted as a *second stimulus* to support negotiations. For brevity, only three of the eight problems-in-context are illustrated (Table 1).

Table 1: Example of a Logic Model

Workplace problem-in-context	Proposed action	Negotiated activities	Outcome evaluation
Problem 1: Professionals across sectors and roles lack knowledge in specific areas of AMR.	An open, online course that covers identified gaps in knowledge about AMR.	The open, online course encourages professionals to reflect on their own role and apply knowledge they learn to their practice.	*Tackling AMR* Global Curriculum designed and evaluated with end users.
Problem 2: Professionals have limited appreciation of their role as part of the global AMR network.	An online guidance tool to support people in leadership positions to help their teams reflect on their position within the AMR global network.	Guidance tool supports people in leadership positions to work with their teams locally to understand how their role contributes to the AMR global network system.	*Your role in the AMR network* tool evaluated with managers and teams within in-country sites.
Problem 3: Work environment not set up to support new forms of work.	An online guidance tool to support people in leadership positions to help their teams modify the work environment.	Guidance tool supports people in leadership positions to work with their teams locally to identify changes needed in the workplace.	*Reflecting on your work and changing your workplace* tool evaluated with managers and teams within in-country sites.

The eight problems identified through fieldwork (the *first stimulus*) were discussed during regular (bi-monthly) team meetings during which actions were proposed and negotiated by key actors including the project funders (UK Department of Health and Social Care), technical experts from the organisation managing the work (Mott Macdonald), the researchers who gathered the fieldwork data, and the learning system designers. More actors were brought in, depending on the problem in focus in specific situations (e.g., in-country experts and people in leadership positions in Problem 2; domain experts across various international institutions developing course content in Problem 1). These diverse agents negotiated how the proposed action could address

each problem and each had different ideas based on their distinct knowledge. The LM was used as a *second stimulus* to support this negotiation process, during critical enounters amongst these actors by making visible conflicting motivations around the proposed actions and agreeing a way forward.

For example, one problem identified was that health professionals lacked specific knowledge about AMR (Table 1). The action proposed by the funders to address this problem was the design of an open, online course to support professionals to learn at scale in a cost-effective way. However, the education researchers were concerned that, even though this action provided cost-effective learning at scale, health professionals might not be able to apply the knowledge they learned in an online course to their work. Instead, they proposed professionals began the online course by reflecting on their current work role and context, an idea which at first was received with resistance. Through a process of negotiation and by bringing in domain experts and learning designers focused around the LM, the education researchers reasoned why reflecting on the workplace and role would help professionals understand the relevance of what they learned through the course. This example of identifying conflicts, sketching possibilities, putting forward suggestions and agreeing ways forward illustrates what Engeström and colleagues (2015, p. 50) term "conceptualization efforts".

Another example is illustrated in the second problem in Table 1. Health professionals in LMICs, most of whom had not previously worked as part of a networked system, had limited appreciation of how their role related to the global AMR network, where data is exchanged locally, nationally and globally. An action proposed was the development of an online tool to guide health leaders to encourage their teams to think about ways the workplace could be reconfigured to facilitate new ways of networked working. Activities to develop different guidance tools for health leaders were proposed by professionals brought in from the participating public health sites who reflected the end-users. With the education researchers, they proposed and designed a guidance tool that could be used by health leaders to support their teams to reflect on their role and consider how their work impacted (directly or indirectly) on others in the global AMR network. This created a novel form of digital professional learning.

The third problem identified (Table 1) was that in LMICs, health sites were not always set up in ways that support new ways of working. This meant professionals were not able to apply the knowledge they learned on the online course to improve their practice. Managers needed to talk with their teams to understand how the work environment needed to be modified, but work hierarchy structures thwarted negotiations between health workers and managers. An online guidance tool to support managers to work with their teams to modify the work environment was developed and evaluated, providing a novel form of professional learning.

These examples illustrate how critical encounters of actors with diverse knowledge can lead to creative outcomes. The LM was used as a stimulus to support the negotiations of diverse actors. In the examples presented, the use of the LM helped these actors "gain control and drive action in situations where this control [was] lacking" (Hopwood & Gottschalk, 2017, p. 24). It also expanded responsibilities amongst teams involved in the design of digital systems and extended resources for local workplace use. This method supported the design of novel forms of professional learning that address workplace needs.

Conclusion: Using the Logic Model as a double stimulus

As professional learning requirements become ever more complex, professional learning has to be connected to workplace problems. To help bridge this gap we propose the Logic Model as a tool that helps deploy the principle of double stimulation.

The starting point for this method is the identification of professionals' needs and workplace problems which acts as *first stimulus*. The second stage is to design professional digital learning opportunities utilising systems and tools to address these problems. This needs the input of diverse actors, which may lead to tensions and critical encounters. These critical encounters are mediated by *second stimulus* – the Logic Model. The LM enables actors at specific periods in time to juggle different concerns, consider possibilities of action, and navigate difficult discussions by illustrating possible implications of proposed actions. Engeström and colleagues (2015, p. 50) note that "as the actors invest the second stimulus with actionable meaning, the artifact becomes a sign that the actors can use to guide and empower their actions". While the concept of a Logic Model is not new, its use as a second stimulus in teamwork and design activity is a novel contribution to the ways digital professional learning systems may be designed in future.

The development of this method is at an early stage and there is a need for further testing. Nonetheless, this paper offers a method that allows actors to break out of paralysing, conflicting situations during a collaborative design activity and plan actions that may transform the design of digital professional learning, addressing the persistent disconnect between learning and work.

Disclosure statement

The authors report no potential conflict of interest.

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