

Self-Directed Workplace Learning in Transfer from Education and Training to Workplace

Jaanika Hirv-Biene

Tallinn University, Narva Rd 25, Tallinn, 10120, Estonia

Abstract

Applying what is learnt in one context in another context, i.e., the transfer of learning, is often taken for granted and little support is provided to this process across different settings, such as formal education, training, and workplace. Technology-enhanced learning research in formal education abounds, and workplace learning receives growing attention, but what is missing is a comprehensive perspective tracing transfer of learning across settings. Self-directed learning can be seen as a binding agent which supports and propels the transfer of learning. Thus, in this paper, a design-based research is presented, which focuses on self-directed learning at the workplace as a mechanism to support transfer of learning across settings. The potential outcome of the proposed research would be a framework of learning design principles and scaffolding technologies to support self-directed learning and thereby transfer.

Keywords

Self-directed learning, transfer of learning, transfer of training, technology-enhanced learning

1. Promoting transfer via self-directed learning and technology-enhanced learning

As the shelf-life of knowledge and skills decreases, and forms and settings of learning diversify, the need to transfer knowledge and skills between different contexts is expected to increase. Frequent job changes as well as transformation of tasks in a job are increasingly common, making the ability to adapt and learn new skills sometimes even more important than having specific skills [1].

However, ample research into *transfer of learning and training* has established that applying knowledge gained in one context (such as education or training) in another context (such as workplace) is not as easy as often assumed [2],[3]. Moreover, time and effort needed for this process is often underestimated and little support is provided for it [14]. This can result in situations where learners discard the knowledge and skills acquired in education or training as useless. That, in turn, is likely to contribute to issues such as the difficult transition from education to work [1].

Technology provides flexibility, portability and different modalities which allow to bring otherwise distant contexts closer to each other. Thus, digital technologies provide many opportunities for facilitating transfer [4]. However, technology-enhanced learning (TEL) research relevant to transfer


is scattered between different concepts and approaches and is skewed towards research in educational settings.

This research aims to address this gap by focusing on self-directed learning (SDL) as a binding agent: SDL plays an important role in the transfer process [5] and at the same time, via the theme of self-regulated learning, has ample pool of TEL research to build on. The main contribution is envisaged as a framework of learning design principles and scaffolding technologies to support SDL and thereby transfer. As different contexts are essential in the phenomenon of transfer, these principles and technological scaffolding will be developed and tested in three different learning settings: continuing education, workplace, and training.

1.1. Transfer of learning

In this research, transfer is understood broadly as applying something that is learnt in one context to another context [4],[6]. The term *transfer of learning* is used more often by researchers in (adult) education and *transfer of training* in organizational psychology and human resources development. As in this research, both educational and workplace settings will be investigated, then literature from both fields will be drawn upon. However, for the sake of brevity, the term “transfer of learning” will be used to refer to transfer in general.

Proceedings of the Doctoral Consortium of the 18th European conference on Technology-enhanced Learning, 4th September 2023, Aveiro, Portugal.

 hirvja@tlu.ee (Jaanika Hirv-Biene)



0009-0002-2093-5850 (Jaanika Hirv-Biene)



© 2023 Copyright for this paper by its authors. The use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).



CEUR Workshop Proceedings (CEUR-WS.org)

Some researchers have found either the notion of transfer, or some of its definitions, problematic for various reasons [6]. Several sociocultural theorists, for example, have argued that the idea of transfer tends to consider knowledge too much as a tool, carried from one situation to another without any change [7]. They claim that in doing so, transfer research discards the relations among people, activities and context, which are always involved in any activity.

A more comprehensive view of transfer is presented by Dohn and Markauskaite [4], who emphasize that as with any other field, transfer research has evolved in time, and different conceptions of transfer are not mutually exclusive, but simply focus on different aspects of knowledge. They outline five major conceptions of transfer, from behavioristic to developmental. Behaviorist notion of transfer indeed considers transfer as a retention of knowledge across different settings and focuses on declarative (“know-that”) and procedural knowledge (“know-how”). Developmental practices approach, however, considers transfer more as a transformation in social practices as a response to a specific problem, and focuses on procedural and relational knowledge (“know-of”: experiential, contextual knowledge) [4].

Therefore, as long as it is assumed that people apply some of their previous experience in new settings, there is also a point in talking about transfer. The broad definition of transfer—applying something that is learnt in one context in another context—allows the researcher to consider different kinds of knowledge traversing different situations, both the simpler as well as the more complex ones. Salomon and Perkins [8] use the terms “low-road transfer” to mark the transfer between relatively similar situations, where a well-practiced behavior transfers almost automatically (e.g., driving a truck instead of a car). The “high-road transfer,” however, involves quite a different context and requires a mindful abstraction of principles to be generalized into another context (e.g., using chess principles in military tactics)[8].

Several models have been developed to describe the transfer process and the factors involved. In the transfer of training field, research has been strongly shaped by Baldwin and Ford’s [9] seminal work, which divided the factors influencing transfer into three broad categories: trainee characteristics (e.g., ability, motivation), training design (e.g., principles of learning) and work environment (support, opportunity to use). More recent views of transfer emphasize that it is a dynamic and cyclical process, repeating through phases of forming transfer intentions, setting goals, attempting transfer, and evaluating the transfer attempts [10]. In this way, it is also tightly interconnected with the general self-regulatory cycle [10] of self-monitoring, self-judgment, and self-reaction [11] which lies at the heart of self-regulated (SRL) as well as self-directed learning (SDL). The relationship between these concepts and their role in transfer will be discussed in more detail in the following section.

1.2. Supporting transfer and SDL in TEL

SDL is commonly defined as a process in which learners take an active role in determining their learning needs and goals, finding resources, choosing strategies, and evaluating outcomes [12]. Although definitions may be similar, the scope of SDL has been broader than that of SRL research. Traditionally, SRL research has primarily focused on cognitive processes, but SDL research emphasized also pedagogical and social processes [13], [14]. The focus of SRL is more on the micro level—the task—whereas SDL focuses more on the macro level—the learning journey. That also means that SDL encompasses SRL [15].

In recent decades, research in the fields of SDL and SRL have moved closer to each other. Garrison [16] proposed a model that incorporates SRL into SDL theory, recognizing the importance of both cognitive and social aspects of learning. He proposed an SDL framework consisting of three broad areas: self-management, self-monitoring and motivation. Self-management covers task control and external activities during the learning process (learning methods, support, resources etc.), whereas self-monitoring covers the domain of self-regulation: cognitive and metacognitive processes, such as monitoring one’s learning strategies or thinking about one’s thinking. Garrison emphasizes that self-management and self-monitoring are tightly connected, e.g., perceived control over learning and external feedback play an important role in self-monitoring process. This integration acknowledges the interplay between learners’ self-directedness and their ability to regulate their learning processes effectively.

The role of self-directed learning in transfer is manifold. Firstly, as noted above, SDL and transfer are intertwined via the reliance on same self-regulatory processes, as learners form intentions and set goals of what they want to apply, attempt to apply it, and based on the internal and external feedback decide the future course of action (e.g., whether to continue to transfer, modify or discard what was learnt in training) [10]. Secondly, the need for engaging in SDL is implicit in the transfer process: transfer between educational and workplace settings often involves a considerable amount of additional learning [2], which happens largely at the workplace. Workplace learning however, tends to be more informal, without an instructor and tightly intertwined with work and interactions with colleagues, clients, superiors etc. [15]. In this way, most of the responsibility for learning effectively lies with the learner. Furthermore, as organizations increasingly use technology-based training formats and seek to leverage informal learning, the employers expect the employees to engage in self-directed learning more and more [18]. Thirdly, the learner control central to SDL process has been found to activate metacognition, which in turn is required for adaptive transfer [5].

However, this larger autonomy over one’s learning is not always used effectively [18]. Thus, the potential of harnessing SDL to support transfer will go unused when this process is not supported across different

major settings of learning—such as continuing education, training, and workplace.

1.3. Supporting transfer and SDL in TEL

Transfer of learning has not received much explicit attention in TEL research. However, a similar theme of learning across contexts has emerged in TEL now and again in relation to several interconnected concepts, such as seamless learning, ubiquitous learning, or personal learning environments.

Wong [19] describes seamless learning, or ‘mobile-assisted seamless learning’ as a broad field that emphasizes the role of technological innovation in creating personalized learning across different settings. Research around the concept has focused on creating a continuity of learning experiences along several dimensions, such as formal and informal learning, personalized and social learning, learning across time or across different locations, learning across different devices etc. [19].

Ubiquitous learning is sometimes used synonymously with seamless learning, but it is more technology-oriented, focusing on how technology can provide timely and appropriate support to learners based on the demands of real world contexts [19]. Cárdenas-Robledo and Peña-Ayala [20] characterize ubiquitous learning as leveraging digital content, physical setting, mobile devices, pervasive components, and wireless communication to provide teaching–learning experiences to users whenever and wherever.

Dabbagh and Castaneda [21] describe personal learning environment (PLE) in the narrow sense as “a self-driven digital learning space”, composed of different digital artifacts, platforms, and tools; but more broadly, as an approach that assumes a person-centered view of lifelong learning in technology-infused era. They find that PLE provides not so much an explanatory theory but rather a framework for analyzing learning conditions, resources, and opportunities in the digital realm from the ecological point of view. Similarly to seamless learning, the PLE framework emphasizes the integration of formal and informal learning experiences [21].

In all these three areas, SDL (including SRL) have been used as learning paradigms [19],[20],[21]. Supporting self-directed/regulated learning with technology is a well-investigated topic in TEL on its own as well. However, most of the tools and learning technologies for supporting SDL have been developed for formal education and based on the SRL framework [22].

According to Ley [23], technology-enhanced learning research has traditionally focused on formal education, though research into workplace learning has been increasing in the recent decades. Cattaneo and Barabasch [24] report an example of a learning technology solution aimed at facilitating transfer of learning across settings. They describe an online environment, mobile apps, and a learning scenario for helping the apprentices relate what they were learning at school with their experiences at the workplace. Here as well, SDL processes, especially reflection, were

chosen as a mechanism to help to bridge the different settings, but the setting was limited to vocational school-workplace configuration.

Siadaty, Gašević and Hatala [25] present another comprehensive application for supporting SDL, but focusing solely on workplace context. They describe Learn-B, an online environment providing technological scaffolding (e.g., usage information or recommendations) to micro-level processes of SDL (e.g., task analysis, strategy change, reflection). Trace data on users’ actions in Learn-B environment was analyzed to evaluate which technological scaffolding interventions were most effective in supporting users’ SDL.

To conclude, there is ample research in TEL research on supporting (self-directed) learning across settings, but this research tends to be more focused on formal education and little explicit attention is paid on transfer.

2. Research problem, goal and research questions

The problem this PhD research aims to address is the limited understanding regarding the effective support of self-directed workplace learning with technology. Specifically, the focus is on exploring how SDL can be facilitated across continuing education, training, and workplace context in a manner that promotes successful transfer of learning across these settings. Thus, this research aims to explore the ways in which learning technologies can shape learning practices and facilitate SDL in the workplace, and thereby facilitate transfer of learning across various contexts. To achieve that aim, we will seek to find answers to following questions:

- **RQ1:** Which processes of self-directed learning at the workplace play the key role in transfer of learning from training and education to work?
- **RQ2:** What is the role of continuing education institutions, employers, training companies in supporting professional learners’ self-directed learning?
- **RQ3:** How do different learning technologies shape self-directed learning practices?
- **RQ4:** What kind of effect the proposed interventions have on professional self-directed learning at work and transfer of learning from training or education to workplace?

3. Methodology

The methodology of the proposed research is design-based research. McKenney and Reeves [26] describe design-based research as a type of research where scientific inquiry is embedded into iterative development of solutions to practical and complex problems. DBR focuses on both theory and practice and seeks to advance the design knowledge on the one hand and theoretical understanding on the other.

Several DBR cycles will be run in each of the planned research settings: a continuing education

institution, a workplace, and a training company. In each setting, we will build on the relevant results and insights from previous settings. The DBR cycles in each setting will have some iterations running simultaneously, as depicted in Figure 1.

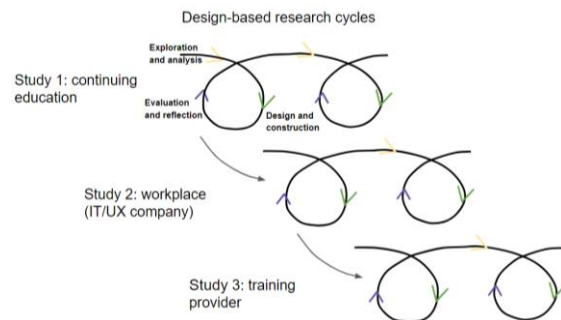


Figure 1: Research scheme

The continuous education setting will be represented by the University for Continuing Education Krems, Austria, where the first iteration has been already carried out. The learners investigated in this setting are enrolled in the MA curriculum of “e-Education”. They are professional learners, who hold a full-time job while studying and usually, expect their studies to be directly or indirectly relevant to their everyday jobs.

The workplace setting will be represented by an UX/IT company in Estonia. The company has a strong learning culture and they value employees’ autonomy and initiative, but they have difficulties transferring knowledge accumulated in numerous projects among the employees.

The training setting will be represented by a training company in Estonia, which provides digital skills training to organizations who want to train their employees. Their offering includes both online as well as face-to-face training. To date, the company has paid little attention to supporting the transfer process, especially after the training, and they feel the need to improve their service in this respect.

The first DBR cycle has already been conducted in the continuing education setting and will be described in the section 4. In the following, a summary of each DBR summary phase and the way how it will be conducted in this research is presented.

Design-based research models usually describe it as consisting of three, iterative and flexible phases. Here, the DBR framework by McKenney and Reeves[26] is used.

In the phase of *exploration and analysis*, the problem to be addressed is identified and investigated, and the existing situation is explored in the light of what is known [26]. In this research, exploration and analysis will include site visits, semi-structured interviews with the stakeholders/participants depending on the site (e.g., employees and managers at the workplace), analysis of the existing course and training designs and technological scaffolding provided. Literature review on transfer-related issues in similar contexts is conducted for each setting. The aim in this phase is to identify transfer-related challenges in each setting as well as to clarify initial design requirements and propositions for a transfer-

supporting learning design and corresponding technological scaffolding. This part of the DBR cycle in each setting contributes mostly to answering RQ1 and RQ2.

In the *design and development* phase of interventions, possible solutions to the problem are considered and documented, theoretical grounding of these solutions is established and the actual solution is iteratively developed [26].

In this research, this phase includes documenting design requirements and design propositions for transfer-supportive learning design for a given setting, based on the insights from the exploration and analysis. The learning design principles and technological scaffolding validated in previous settings are considered against the requirements of the setting and adapted or transformed as needed, setting-specific requirements are documented and accommodated. Initial learning design is described and feedback sought from stakeholders, adjustments made as needed. Based on the learning design, a course or training with appropriate technological scaffolding is created. This part of the DBR cycle in each setting contributes mostly to answering RQ2 and RQ3.

In the phase of *evaluation and reflection*, the created solution is tested empirically and evaluated in the light of the project’s goals. Theoretical as well as practical insights from the project are considered, conclusions formed and redesign ideas formed [26].

In this research, the evaluation and reflection phase includes implementing the learning design created with the target group of the particular setting (students in continuing education, employees at an IT-company, trainees in the training company). Data from assignments submitted by learners, learners’ replies to various free-text prompts, applications used during learning (e.g., LMS) and interviews with learners and other stakeholders (e.g., managers in a company) are used to evaluate the effect of the intervention on learners’ self-directed learning behavior and transfer. The results are analyzed and conclusions are drawn for each iteration and each setting separately, but also common patterns sought across settings both in terms of learning design principles as well as technological scaffolding.

4. Initial results: first DBR cycle

The first iteration of the DBR cycle in the first setting, continuing education, was carried out roughly in the fall semester 2022/2023 and is reported in detail in [27].

In the first cycle, we aimed to find out which learning design elements and learning technologies support continuing education students in transferring learning to their work context.

We devised and implemented a learning design with appropriate learning technologies in two courses with continuing education students (N=11) in the MA curriculum of e-Education. The design aimed to guide the learners through several stages of forming transfer intentions, planning, attempting transfer and evaluating/reflecting on their attempt.

The technologies used in this first iteration were simple: for example, free text forms in Google Forms

were used to guide students in forming transfer intentions and reflecting on transfer attempts.

The students participating in the research were professional learners who worked full-time in fields related to their studies (e.g., teachers in formal education, trainers or learning content creators in the private sector, human resources specialists).

Throughout the course, the students worked on their transfer projects, where they proposed a solution for a course-relevant problem in their own context (e.g., implementing VR for onboarding; equipping classrooms for hybrid learning). Students' transfer projects and submissions of free text forms were analyzed to investigate if there is evidence for transfer, what learning design elements supported transfer, and what barriers to transfer the students experienced, and how these could be addressed in learning design.

The results suggested that the proposed learning design was conducive to transfer and the activities and technologies helped to guide the students through the phases of transfer. However, several points of improvement and redesign were also identified. For example, students' reflection on the transfer attempts remained superficial – a possible solution to address this might be redesigning reflection tasks into more interactive format (e.g., guided by a conversational agent).

5. Contribution

The expected outcome of this research is a framework of learning design principles and potential technological scaffolding for realizing these principles. The framework could be adapted in different settings to support learners' self-directed learning in the transfer process. Such a framework would be useful both for designing future research interventions as well as for practitioners to create transfer-supportive training and education programs with technological scaffolding.

The framework itself, and learning designs and design principles described in the framework would serve as a design contribution of design-based research. The grounding of these design principles in the insights about self-directed learning practices in the transfer process, supported by technological scaffolding, would make up the theoretical contribution of this research. In addition, implementation strategies would be provided on how to use the proposed learning designs, practices and tools continuing education, training, and workplace settings to facilitate transfer across these settings.

References

- [1] European Commission, European Political Strategy Centre. 10 trends shaping the future of work, 2019. URL: <https://data.europa.eu/doi/10.2872/69813>
- [2] M. Eraut, Transfer of Knowledge between Education and Workplace Settings. in: H. Daniels, H. Lauder, and J. Porter (Eds.) Knowledge, values and educational policy. Routledge, London, 2009, pp. 75–94.
- [3] T.T. Baldwin, J.K. Ford, Transfer of Training: A Review and Directions for Future Research, *Personnel Psychology*, 41 (1988) 63–105. <https://doi.org/10.1111/j.1744-6570.1988.tb00632.x>
- [4] N.B. Dohn, L. Markauskaite, R. Hachmann, Enhancing Knowledge Transfer, in: M.L. Bishop, E. Boling, J. Elen, and V. Svihla (Eds.), *Handbook of Research in Educational Communications and Technology*. Springer International Publishing, Cham, 2020, pp. 73–96.
- [5] B.S. Bell, S.W.J. Kozlowski, Active learning: Effects of core training design elements on self-regulatory processes, learning, and adaptability, *Journal of Applied Psychology*, 93 (2008) 296–316. <https://doi.org/10.1037/0021-9010.93.2.296>
- [6] T. Tennant, Is Learning Transferable?, in: D. Boud, J. Garrick (Eds.), *Understanding Learning at Work*, Routledge, London and New York, 1999, pp.165–179.
- [7] M. Packer, The Problem of Transfer, and the Sociocultural Critique of Schooling, *The Journal of the Learning Sciences*. 10 (2001) 493–514.
- [8] G. Salomon, D.N. Perkins, Transfer of cognitive skills from programming: When and how?, *Journal of educational computing research*, 3 (1987) 149–169.
- [9] T.T. Baldwin, J.K. Ford, Transfer of Training: A Review and Directions for Future Research, *Personnel Psychology*, 41 (1988) 63–105. <https://doi.org/10.1111/j.1744-6570.1988.tb00632.x>
- [10] B.D. Blume, J.K. Kevin Ford, E. A. Surface, J. Olenick, A dynamic model of training transfer, *Human Resource Management Review*. 29 (2019) 270–283. <https://doi.org/10.1016/j.hrmr.2017.11.004>
- [11] A. Bandura, Social cognitive theory of self-regulation, *Organizational Behavior and Human Decision Processes*, 50 (1991) 248–287. [https://doi.org/10.1016/0749-5978\(91\)90022-L](https://doi.org/10.1016/0749-5978(91)90022-L)
- [12] M.S. Knowles, *Self-directed learning: A guide for learners and teachers*, Association Press, New York, 1975.
- [13] K. Saks, Ä. Leijen, Distinguishing Self-Directed and Self-Regulated Learning and Measuring them in the E-learning Context, *Procedia - Social and Behavioral Sciences* 112 (2014) 190–198.
- [14] J. Pilling-Cormick, D.R. Garrison, Self-Directed and Self-Regulated Learning: Conceptual Links, *Canadian Journal of University Continuing Education*, 33 (2007) 13–33.
- [15] H. Jossberger, S. Brand-Gruwel, H. Boshuizen, M. van de Wiel, The challenge of self-directed and self-regulated learning in vocational education: a theoretical analysis and synthesis of requirements, *Journal of Vocational Education & Training*, 62 (2010) 415–440. <https://doi.org/10.1080/13636820.2010.523479>
- [16] D. R. Garrison, Self-Directed Learning: Toward a Comprehensive Model, *Adult Education Quarterly*, 48 (1997) 18–33. <https://doi.org/10.1177/074171369704800103>
- [17] M. Eraut, Informal learning in the workplace: evidence on the real value of work-based learning (WBL). *Development and Learning in*

- Organisations, 25 (2011) 8–12.
<https://doi.org/10.1108/1477281111159375>
- [18] B.S. Bell, Strategies for Supporting Self-Regulation during Self-Directed Learning in the Workplace, in: J.E. Ellingson, R.A. Noe, (Eds.), *Autonomous Learning in the Workplace*, Routledge, New York, NY, 2017, pp. 117–134.
- [19] L.-H. Wong, A Brief History of Mobile Seamless Learning, in: L.-H. Wong, M. Milrad, M. Specht (Eds.), *Seamless Learning in the Age of Mobile Connectivity*, Springer Singapore, Singapore, 2015, pp. 3–40.
- [20] L. A. Cárdenas-Robledo, A. Peña-Ayala, Ubiquitous learning: A systematic review, *Telematics and Informatics*, 35.5 (2018): 1097–1132. <https://doi.org/10.1016/j.tele.2018.01.009>
- [21] N. Dabbagh, L. Castaneda, The PLE as a framework for developing agency in lifelong learning, *Educational Technology Research and Development*. 68 (2020): 3041–3055. <https://doi.org/10.1007/s11423-020-09831-z>
- [22] R. Perez-Alvarez, I. Jivet, M. Perez-Sanagustin, M. Scheffel, K. Verbert, Tools Designed to Support Self-Regulated Learning in Online Learning Environments: A Systematic Review, *IEEE Transactions on Learning Technologies*, 15.4 (2022): 508 – 522.
- [23] T. Ley, Knowledge structures for integrating working and learning: A reflection on a decade of learning technology research for workplace learning, *British Journal of Educational Technology*, 51.2 (2020): 331–346. <https://doi.org/10.1111/bjet.12835>
- [24] A. Cattaneo, A. Barabasch, Technologies in VET: Bridging learning between school and workplace – the “Erfahrraum Model”, *Berufs- und Wirtschaftspädagogik*, 33 (2017) 1–17.
- [25] M. Siadaty, D. Gašević, M. Hatala, Measuring the impact of technological scaffolding interventions on micro-level processes of self-regulated workplace learning, *Computers in Human Behavior*, 59 (2016) 469–482.
- [26] S. McKenney, T.C. Reeves, *Conducting Educational Design Research*, 2nd ed., Routledge, New York, 2019.
- [27] J. Hirv-Biene, G. Pishtari, M. Wagner, E. M. Sarmiento-Márquez, T. Ley, A Learning Design to Support Transfer of Training in Continuing Education, in: O. Viberg, I. Jivet, P.J. Muñoz-Merino, M. Perifanou, T. Papatoma (Eds.), *Responsive and Sustainable Educational Futures*, 18th European Conference on Technology Enhanced Learning, EC-TEL 2023, Aveiro, Portugal, September 4-8, 2023, Proceedings. Springer, 2023, pp. 89–103.