

CAN E-LEARNING CHANGE WORK PRACTICES?

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ABSTRACT

Stand-alone e-learning is unlikely to change work practices. This claim contrasts with a comprehensive body of research arguing that e-learning is at least as effective as face-to-face instruction in improving work performance. Such a comparison is, however, problematic. On the one hand, it relies on the premise that face-to-face instruction is effective in changing work behaviors. This article argues that instruction—whether e-learning, face-to-face, or a blend of both—cannot stand alone. Individualized on-the-job scaffolding of employees is needed for meaningful learning transfer and sustainable behavior change to occur. On the other hand, e-learning can be as important as face-to-face instruction in preparing the ground for advancing work practices, when e-learning is designed in acknowledgement of its strength and limitations. In outlining the above arguments, this article contributes a four-step model of intervention-based change. The model lists the key motivational drivers of employee persistence and commitment to change. The article illustrates e-learning as an assimilative learning catalyst and offers an overview of the scaffolding needed for advancing workplace practices. Ultimately, the article acknowledges organizational cost concerns regarding individualized scaffolding and discusses how a redefinition of e-learning can cost-effectively scaffold employees to sustainable change.

KEYWORDS

Professional Development, E-learning, Persistence, Motivation, Scaffolding, Sustainable Change

1. INTRODUCTION

The only constant is change. This statement has its roots in Heraclitus' ancient Greek philosophy. It does, however, also describe a premise of work that many employees experience today: a new business strategy, a new manager, a new It system, new standards, and new procedures. Change is exciting and change is stressful. When external or internal pressure deems organizational change necessary, employees need situated support to reduce potential anxiety and to navigate new paths to individual and organizational performance. If only we could accomplish this by sending our employees on a course.

The objective of professional development (PD) is to advance workplace practices. Professional development interventions (PDIs) are often formalized courses that are comparable with those of higher education; however, another layer of complexity is added to PD as the objective is reached *after* the PDI has been completed. Hence, the end objective is not to learn certain concepts, which can be applied and assessed in a test; it is after those tests that the real learning challenges lie.

E-learning for PD has become increasingly popular within organizations (Ho & Jones 2015). The prevailing e-learning intervention delivers a self-paced instructional learning path with programmed and/or recorded content that often includes learner–material interactions with programmed feedback and multiple-choice tests. Stand-alone means that there are no additional activities or processes added to the e-learning course; it is self-contained. The popularity of using this form of e-learning for workplace learning is related to an underlying assumption that e-learning is as effective as face-to-face interventions. A comprehensive body of research supports this assumption (fx. Maloney et al. 2011; Jackson & Lichtenstein 2011). As a consequence, the aim of e-learning becomes the digitalization of face-to-face training and the development of e-learning *instead* of face-to-face training. Formalized instruction may, however, not have been the answer in the first place—at least, not the complete answer. Hence, in PD, the comparison between e-learning and face-to-face instruction diffuses important discussions on the change needed, the possibility of change occurring, and whether instruction is the right means to achieve the objectives.

In light of the above concern, the purpose of this paper is to present a model for broadening the understanding of intervention-based change to individual employee behavior and to show how e-learning can contribute in the process. Specifically, the paper is structured around the following research questions:

- (i) What drives intervention-based change to work practices? (Section 2)
- (ii) What is needed to ensure change to work practices? (Section 3)
- (iii) Which roles can e-learning play in the change process? (Section 4)

2. WHAT DRIVES INTERVENTION-BASED CHANGE TO WORK PRACTICES?

The purpose of the model below is to 1) synthesize recent findings in social-psychological and educational research into an intervention-based change process with key motivational drivers for employee commitment to change and consequently 2) highlight the complexity in changing work behaviors through PDIs.

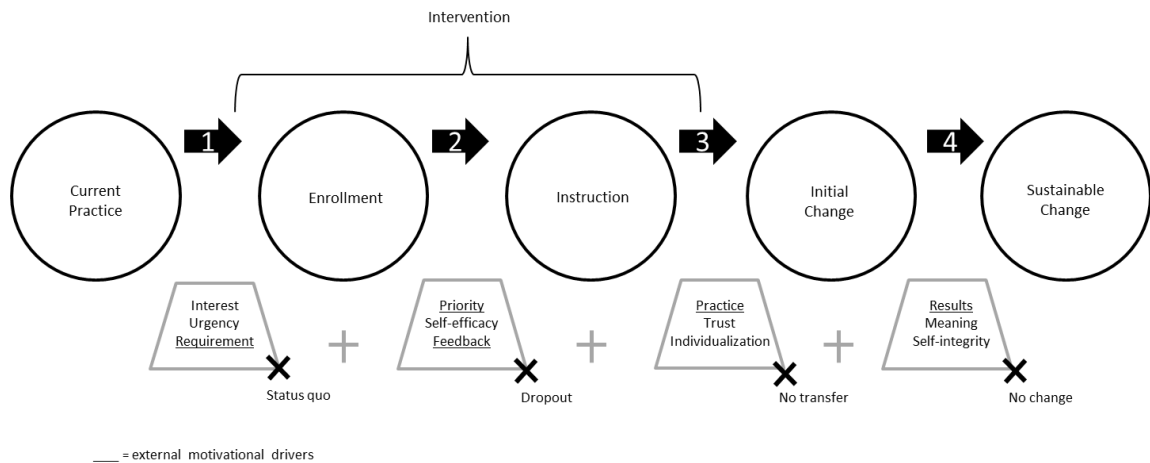


Figure 1. The four-step change process

The five circles in the above model (Figure 1) are components of the intervention-based change process. The arrows illustrate the critical steps in the process, while the trapeziums list the key motivational drivers that are critical to proceed to the next step. The X in each trapezium indicates the likely consequence of missing motivational drivers. Previous drivers should be added to each new list of drivers. As an example, an employee loses interest (step 1 driver) in the topic during the course (step 2) and drops out. Another employee experiencing the hardship of building new work habits (step 4) may terminate her efforts due to organizational changes at work, which no longer make the change a priority (step 2 driver). The intervention includes the enrolment in (circle 2), engagement with, and completion of formalized instruction (circle 3).

The drivers can be roughly divided into internal motivational drivers, fx interest and urgency, and external motivational drivers, fx priority and feedback (Halawa et al. 2014; Lee & Choi 2011). The external factors are underlined in the model. There is, however, a strong interrelatedness between external and internal drivers, and it can be challenging to decide whether a drop in commitment is caused by a drop in internal or external motivational drivers (Halawa et al. 2014).

The model is a simplification and generalization of extremely complex and heterogeneous human motivations, learning, and action; in many instances, the intervention and changes in work behaviors would be interwoven and the process possibly more circular or spiral-shaped than linear. The simplification aside, the model illustrates how changing work practice is a challenging and vulnerable process that requires more than formalized instruction. Each step will be explained below before returning to this argument.

2.1 Step 1: Motivation to Enroll

The first step in the model occurs when the employee decides to enroll in the PDI. The internal motivational drivers are the employee's **interest** in the content and sense of **urgency** to become competent in the field to sustain or increase work performance. As mentioned, the drivers uphold their importance throughout the change process. Thus, the employee's interest in the material must also be present during the intervention (step 2) because *"lack of interest can cause students to dedicate less time to the course, leading them to skip pieces of content, disengage from assessments, or simply proceed through the content at a slow pace"* (Halawa et al. 2014, p.2).

A key external motivational driver ensuring enrollment and persistence is the **requirement** from a manager or workplace to participate in the PDI. The use of compliance and mandatory PD varies greatly from industry to industry; most employees do, however, experience participation in mandatory PD during organizational changes (Miller et al. 2014). A requirement to enroll, complete, and change practice will have a positive impact on persistence throughout the change process, especially when the alternative has negative consequences for the employee's job tasks or employment. Employee engagement and general performance may, however, suffer along the way.

2.2 Step 2: Motivation to Engage and Complete

The second step is where the employee engages in and completes the intervention. In addition to previous drivers, persistence requires that the participation take **priority** over other job tasks. A temporary decrease in workload can also allow for engagement in PDIs. Once the workload increases, however, the PDI may be down-prioritized, resulting in dropout. Participants in PD are primarily working adults with many responsibilities and distractions (Kaiden 2002). Hence, even when PDI initially takes priority over other tasks, priorities easily change. The low exit barriers for e-learning means that the decision to leave can easily be provoked by any number of factors in the employee's life (Halawa et al. 2014).

Focusing on internal drivers, ability is an apparent predictor of persistence; low-performing participants tend to disengage more frequently than high-performing ones (Hoskins & Van Hooff 2005). However, the effects of ability on dropout are mediated by the employee's self-perceived **self-efficacy**—the degree to which the employee believes that she can achieve a particular goal. Self-reported self-efficacy has predictive value for persistence and performance (Zimmerman 2000). Though self-efficacy is widely accepted as a key driver of persistence, the timing of high self-efficacy in the change process could be important; high self-efficacy on PDI objectives *prior* to the intervention may undermine a sense of urgency to change, because the employee believes that she is already capable of and possibly already doing what is taught in the PDI. Hence, the employee must find the content sufficiently challenging to be worth the time investment, but not so challenging that content incomprehensibility and volume impede self-efficacy and knowledge gain. Individuals' self-efficacy is formed by their own interpretations of their performance and by social cues (Bandura 1982). Thus, **feedback** can be an important enhancer of self-efficacy. Effective task-related feedback generally contributes to performance improvement. To be effective, *"feedback needs to be clear, purposeful, meaningful, and compatible with (...) prior knowledge (...) It also needs to prompt active information processing on the part of learners, have low task complexity, relate to specific and clear goals, and provide little threat to the person at the self level"* (Hattie & Timperley 2007, p.104). Hence, effective feedback continues to be vital throughout the change process.

2.3 Step 3: Motivation to Transfer and Initiate Change

In step three, the motivated employee initiates changes to his work. For more than a century, researchers within the field of learning transfer have discussed this process: how knowledge and skills learned in one instructional context can be applied in another context, such as the workplace. There is, however, little agreement among researchers about the nature of learning transfer, the possibilities of its occurrence, and the mental or social mechanisms that may underlie the concept (Lobato 2006). That said, several researchers agree that employees should **practice** new skills both during and after the intervention and, thus, be able to immediately act on the new learning (Wahlgren & Aarkrog 2012). The employee must be motivated to practice, which requires actionable PDI instruction and a supportive work climate that prioritises the change

(Herrington et al. 2009; Noesgaard 2014). The initiation of change depends heavily on the level of **trust** the employee perceives to be present at her workplace. Experiences of incompetence occur when initiating change in behavior, and practitioners are reluctant to adopt new practices unless they feel certain they can make them work (Guskey 2002). If an organization punishes those who make mistakes and take risks, the employees will, thus, be reluctant to initiate change (Kousholt 2009). Trust has been overlooked in work situations but is a significant factor in PDI persistence and learning (Short 2014).

In step three, **individualization** of the learning objectives and content becomes critical for employee motivation. The employee needs to find a meaningful blend of the PDI proposed changes and the specificities of the individual work context to advance her work performance. Hence, it can be reasonable to allow employees to define their own goals and both challenge and support them when doing so (Blondy 2007). Employees do not transfer learning directly to their work practices (Noesgaard & Ørngreen 2015). Consequentially, insisting on transfer per specification may prove to be counterproductive for employee motivation to change.

2.4 Step 4: Motivation to Sustain Change

The fourth step turns initial change into sustainable change. This part of the change process is based on Thomas Guskey's model for teacher change (Guskey 2002), in which he shows that practitioners commit to PDIs and change practices sustainably only when they experience positive **results** from the initiated change. This runs counter to a general understanding that practitioners commit to changing work practices during PD (Guskey 2002). Instead, it is the unpredictable on-the-job reactions to the initial change, fx students' inactivity or a customer's increased engagement, that determine whether or not the employee finds **meaning** in the initiated change and consequently sustains it.

Numerous epistemologically diverse theories of learning underline how accommodating our habits and beliefs to new evidence not only makes creativity, learning, and change possible but can also be a very difficult, frustrating, and painful process (fx Engeström & Sannino 2010; Mezirow 1997; Cohen & Sherman 2014). Through the lens of frustration theory, employees become frustrated when they anticipate positive results in their practices after PDI but find none. Frustration left unmanaged easily obstructs initiated behavior change (Amsel 1992). It often entails an element of discomfort when an employee is led to question his practice as the most fruitful way to foster student learning or business results. Thus, employees may also become frustrated and disengage, because the initiated change conflicts with their beliefs and current practices; thus, posing an identity threat. Self-affirmation theory specifies how the individual needs to uphold his sense of **self-integrity**; to perceive oneself as morally and adaptively adequate: *"the self-integrity motive is so strong that even mundane events can threaten the self as well as instigate defensive responses to protect it"* (Cohen & Sherman 2014, p.335). Providing self-affirming interventions, which focus the individual's attention on his values and capabilities unrelated to the changing work tasks, may ensure the employee's self-integrity and openness to change.

2.5 Empirical Example of the Model: Advancing Science Teaching

The chart below (Figure 2) is a snippet of data from a study of an e-learning intervention intended to improve Danish K-6 science teaching. Ann, Lillian, and Julia (pseudonyms) are middle-school science teachers at the same school. They participated in a research study on the implications of an e-learning PDI, which was conducted at three schools from February 2014 to June 2015 with a follow-up survey six months later (more on this study in Noesgaard & Ørngreen, 2015).

Observation and survey data were gathered in identical ways and weight before (PRE) and after (POST) the teachers interacted with the e-learning (eL). In the chart (Figure 2), each value on the x-axis (PRE1-4, eL, POST1-4) represents the teachers' weekly 90-minute science teaching, in which the classroom observation took place. The curves show the teachers' performance on behavioral learning objectives based on observation protocols and video recordings. The control line represents the other teachers in the study, who did not complete the same course as Ann, Lillian, and Julia but were evaluated on the same objectives. The e-learning intervention included step 3 of the model (Figure 1) as the learning process alternated between a) instruction with theoretical knowledge, exercises, and practical tools; b) guided preparation for classes; and c) actual teaching, in which the change was initiated.

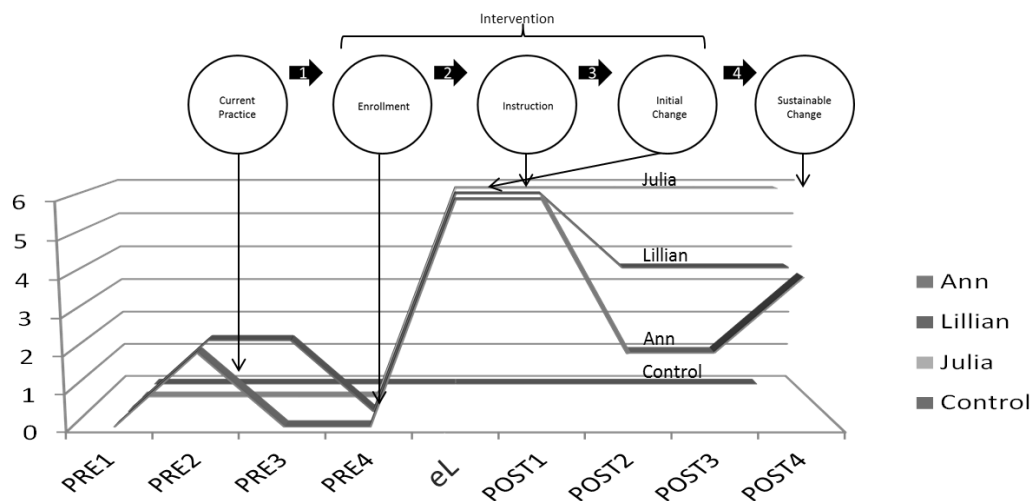


Figure 2. Exemplifying the model: e-learning for science teachers

In the PRE phase (Current Practice, Figure 2), Anna and Lillian performed on a few elements of the objectives, though the general picture shows little to no performance on the objectives. During the eL, the three teachers fully performed on the learning objectives in their teaching. In the POST phase, the e-learning had been completed, and there were no requirements for the teaching, but the classroom observation continued.

The differences in the POST phase were surprisingly apparent—also for the other teachers—despite high levels of similarity in teacher and contextual characteristics measured by self-efficacy, learning outcome, satisfaction, relationship with management, and approach to the PDI. Julia experienced a positive impact on the students during the in-class application and continued to use her new skills after completion, even applying her new questioning technique in her history classes. The follow-up survey indicated that Julia has sustained the change in her teaching. Lillian, conversely, became frustrated as her students reacted to the change in her teaching with inactivity. Both Lillian and Ann continued to apply only elements that were easy to assimilate to their current practice. The follow-up survey indicated that neither Lillian nor Ann is teaching as per the course objectives any longer. Hence, these seemingly similar teachers in very similar contexts, who completed an intervention based on transfer research, underwent very different levels (Figure 2) and kinds of change. This is an example that supports Guskey's argument that sustainable change and commitment only occur when the initial change yields positive results.

3. WHAT IS NEEDED TO ENSURE CHANGE TO WORK PRACTICES?

In PD, there is often a gradual attrition of participants from enrollment over completion to change in work practice (fx. in Marsh et al. 2001; Maloney et al. 2011). Attrition need not be negative; the content may prove irrelevant to the employee after enrollment (step 2), or he immediately finds the exact advice needed. In such instances, the continuation of the PDI could be a waste of time. Many employees who disengage somewhere along the change process could, however, have benefited from persisting. The gradual attrition calls for increasing support throughout the change process, because it becomes increasingly difficult to persist as more motivational drivers are required. Simultaneously, the level of support decreases; often, there is no PDI-related support after the instruction is completed. Thus, the need for motivational support increases the further the employee gets in the change process.

Employees need support that is highly individualized, because they vary greatly in terms of their ability to self-regulate: to control thoughts and actions despite the presence of disruptive impulses. An individual's level of self-regulation applies not only to current situations but may "*also influence the decision about whether to enter into various situations or not in the first place*" (Baumeister et al. 1993, p.141). Highly self-regulated employees may persist through formalized learning and, consequently, advance work practice without additional support. Many employees will, however, disengage when the PDI, for example, proves

more time-consuming than anticipated (priority–step 2 driver) or poses a threat to their professional identity (self-integrity–step 4 driver). In frustrating situations of feeling incompetent due to no or negative impact on practice, even highly self-regulated individuals find reason to return to the status quo.

The increased need for individualized support makes scaffolding an effective strategy. Scaffolding is providing support at the individual level of the employee’s current skill while she is carrying out the task, and then gradually fading out the support (Järvelä, 1995). “A scaffold is, by definition, a temporary entity that is used to reach one’s potential and then is removed when learners demonstrate their learning” (Lajoie 2005, p.542). Inspired by Vygotsky’s (1978) conception of the zone of proximal development, individuals are viewed as having learning potential that is immediately outside of their comfort zones and that can be reached through competent scaffolding by, for example, managers or coaches.

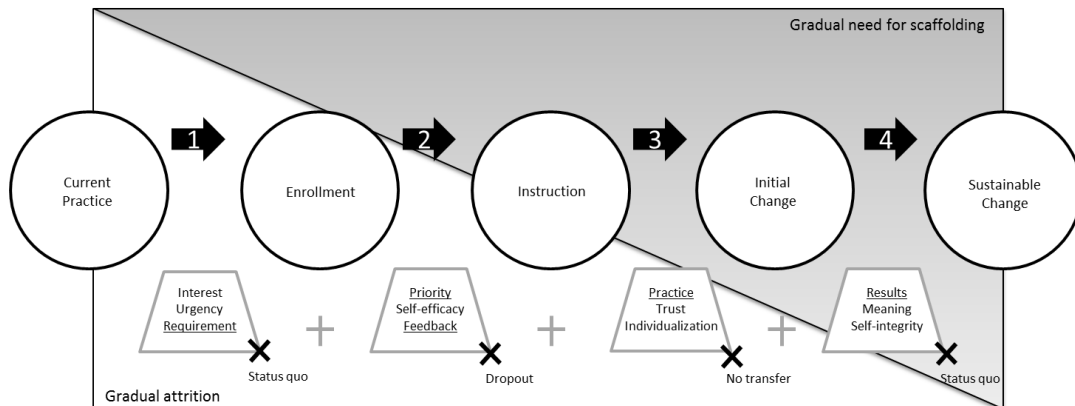


Figure 3. Gradual attrition vs. gradual need for scaffolding

In the above model (Figure 3), a rectangular background to the four-step change process has been added. It illustrates how resistance to gradual attrition requires increasing levels of scaffolding. This relationship is naturally simplified and is unlikely to be linear. In addition, attrition is relevant at the group level, while the change process highlights individual motivations. Nevertheless, scaffolding, which is competently directed at the drivers, is likely to have a positive impact on employee persistence because the extent, length, and technique of support can be tailored to levels of self-regulation and individual motivation (Lajoie 2005).

PDI aims to positively impact complex real-world settings and “isolating the effects of a single program or activity under such conditions is usually impossible” (Guskey 2002, p. 50). On-the-job scaffolding will, thus, not inevitably ensure advancements but may contribute positively to employees’ change efforts.

4. WHICH ROLES CAN E-LEARNING PLAY IN THE CHANGE PROCESS?

Compared to face-to-face interventions, e-learning persistence is extra challenging due to the need for self-regulation combined with low entry and exit barriers. Looking at learning potential, however, several studies find that self-paced e-learning can effectively convey material for lower-level learning, such as memorization and procedural knowledge (Hofmann 2006). Even in processing difficult material, e-learning can assist through worked examples that provide structure and sequence, thereby reducing employees’ cognitive load (Kachelmeier et al. 1992). Hence, stand-alone e-learning can offer inspiration, information, and standardized feedback, extending knowledge on subject matter, processes, and procedures. Therefore, e-learning can be an assimilative learning catalyst that effectively preps the ground for changes in practice.

This paper has argued that e-learning is unlikely to result in changes to work practices on its own, not because it is e-learning but because formal instruction in any modality cannot stand alone in change efforts. However, when organizational decision makers assume that well-designed instruction will advance work practices on its own, investments in scaffolding initiatives are logically considered an expensive noncritical add-on to training and, consequently, cut off the intervention chain. Ideally, the costs of scaffolding employees to sustainable change should, however, not be compared to the costs of stand-alone instructional

initiatives, which, in themselves, rarely advance work practices. Acknowledging this premise, some suggestions for lowering the direct and alternative cost of scaffolding may include 1) using the majority of PDI investments on on-the-job scaffolding instead of lengthy formal instruction; 2) using e-learning snippets for retention and assimilative learning purposes; and 3) investing in scaffolding of employees' change processes for business-critical or strategic change initiatives.

At face value, on-the-job scaffolding is not scalable. Despite breakthroughs in machine learning and artificial intelligence, the in-person commitment (supporting persistence) and individualization (supporting meaningful change) cannot be fully and meaningfully turned into algorithms. As such, only incremental cost cuts can be obtained. Scaffolding may, however, become simultaneously effective and cost-efficient through the use of technology. Online coaching and follow-up has been effective in completion of PD tasks and achieving work-related goals (Poepsel 2011). Mobile probes, which are personal text messages with questions or tasks, can provide a scaffolding experiences of “*gentle, but also disciplinary, reminders to act and reflect*” (Ørngreen et al. 2016, p.8). In addition, scaffolding and assessment are two sides of the same coin; employees are continuously assessed to determine what type or level of scaffold is sufficient to help them reach their potential (Lajoie 2005). Hence, formative digital assessment tools could advance both scaffolding and learning evaluation. These technological tools cannot ensure performance increases in isolation, but as elements in adaptive learning technologies, they may prove the value of less instruction and more just-in-time and just-for-me performance support.

Broadening its definition to include scaffolding technologies, e-learning can be the provider of critical content *and* scaffolding in a multitude of fashions. When we start thinking of e-learning in these ways, we are closing in on answers to employee growth and performance in both meaningful and scalable ways.

5. CONCLUSION

This paper investigated the assumption that e-learning is as effective as face-to-face interventions when stimulating change. A four-step change process was presented illustrating key challenges and vulnerabilities of intervention-based change. E-learning can play an important role in the change process, though it highlights that sustainable change requires more than the formal instruction of any modality. Instead of evaluating e-learning in the light or shadow of its instructional alternative—face-to-face-instruction—the paper suggests that educators, managers, and employees themselves focus on the change needed and the motivational means to accomplish it. This change in perspective can open up to potentially simple and financially feasible technologies that scaffold employees to continuously advance their work practices.

PDI's do not change practice; people do. Therefore, this paper has focused on individual motivations for change. A key argument has, however, been that change does not occur in a vacuum that we can control or design. Thus, an extension of the paper would benefit from elaborating on group dynamics and from adding theoretical models of organizational learning and change. In addition, further research and technological developments can investigate the extent to which in-person situated scaffolding can be digitalized to advance work practices, thus finding scalabilities in and around the seemingly non-scalable.

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REFERENCES

- Amsel, A., 1992. Frustration theory: Many years later. *Psychological Bulletin*, 112(3), pp.396–399.
- Bandura, A., 1982. Self-efficacy mechanism in human agency. *American Psychologist*, 37(2), pp.122–147.
- Baumeister, R.F., Heatherton, T.F. & Tice, D.M., 1993. When ego threats lead to self-regulation failure: Negative consequences of high self-esteem. *Journal of personality and social psychology*, 64(1), pp.141–156.
- Blondy, L.C., 2007. Evaluation and application of andragogical assumptions to the adult online learning environment. *Journal of Interactive Online Learning*, 6(2), pp.116–130.

- Cohen, G.L. & Sherman, D.K., 2014. The psychology of change: Self-affirmation and social psychological intervention. *Annual Review of Psychology*, 65(1), pp.333–371.
- Engeström, Y. & Sannino, A., 2010. Studies of expansive learning: Foundations, findings and future challenges. *Educational Research Review*, 5(1), pp.1–24.
- Guskey, T.R., 2002. Professional development and teacher change. *Teachers and Teaching*, 8(3/4), pp.381–391.
- Guskey, T.R., 2002. Does it make a difference? *Educational Leadership*, 59(6), pp.45–51.
- Halawa, S., Greene, D. & Mitchell, J., 2014. Dropout prediction in MOOCs using learner activity features. *eLearning Papers*, 37(March), pp.1–10.
- Hattie, J. & Timperley, H., 2007. The power of feedback. *Review of Educational Research*, 77(1), pp.16–7.
- Herrington, A. et al., 2009. Transfer of online professional learning to teachers' classroom practice. *Journal of Interactive Learning Research*, 20(2), pp.189–213.
- Ho, Maris; Jones, M., 2015. *2015 State of the industry*. Alexandria, USA: ASTD DBA Association for Talent Development (ATD).
- Hofmann, J., 2006. Why blended learning hasn't (yet) fulfilled its promise. In C. R. Bonk, C. J. Graham, ed. *Handbook of Blended Learning: Global Perspectives, Local Designs*. San Francisco, USA: Pfeiffer Publishing.
- Hoskins, S.L. & Van Hooff, J.C., 2005. Motivation and ability: Which students use online learning and what influence does it have on their achievement? *British Journal of Educational Technology*, 36(2), pp.177–192.
- Jackson, T.W. & Lichtenstein, S., 2011. Optimising e-mail communication: The impact of seminar- and computer-based training. *International Journal of Internet and Enterprise Management*, 7(2), pp.197–216.
- Kachelmeier, S.J., Jones, J.D. & Keller, J.A., 1992. Evaluating the effectiveness of a computer-intensive learning aid for teaching pension accounting. *Issues in Accounting Education*, 7(2), p.164.
- Kaiden, R., 2002. Lessons from the cyberspace classroom: The realities of online teaching. *The Internet and Higher Education*, 5(1), pp.71–74.
- Kousholt, B., 2009. *Forandringsledelse og forandringskommunikation*, Frederiksberg: Samfundslitteratur.
- Lajoie, S.P., 2005. Extending the scaffolding metaphor. *Instructional Science*, 33(5–6), pp.541–557.
- Lee, Y. & Choi, J., 2011. A review of online course dropout research: Implications for practice and future research. *Educational Technology Research and Development*, 59(5), pp.593–618.
- Lobato, J., 2006. Alternative perspectives on the transfer of learning : History, issues, and challenges for future research. *Journal of the Learning Sciences*, 15(4), pp.431–449.
- Maloney, S. et al., 2011. Effectiveness of web-based versus face-to-face delivery of education in prescription of falls-prevention exercise to health professionals: Randomized trial. *Journal of Medical Internet Research*, 13(4).
- Marsh, C.M. et al., 2001. Design and effectiveness of a computer-based continuing education program for orthodontists. *The Angle Orthodontist*, 71(1), pp.71–75.
- Mezirow, J., 1997. Transformative learning: theory to practice. *New Directions for Adult and Continuing Education*, 1997(74), pp.5–12.
- Miller, L. et al., 2014. *2014 State of the Industry*. Alexandria, USA: ASTD DBA Association for Talent Development (ATD).
- Noesgaard, S.S., 2014. Supporting transfer of learning: Practice-based considerations on the applicability of transfer literature in online design. In *Proceedings of Designs for Learning 2014*. Stockholm, pp. 1–5.
- Noesgaard, S.S. & Ørngreen, R., 2015. The effectiveness of e-learning: An explorative and integrative review of the definitions, methodologies and factors that promote e-learning effectiveness. *The Electronic Journal of e-Learning*, 13(4), pp.278–290.
- Ørngreen, R., Jørgensen, A.N. & Noesgaard, S.S., 2016. Mobile probes: A scaffold for peer and self-regulated learning. In *Proceedings of Designs for Learning 2016* (accepted). Copenhagen.
- Palloff, R.M. & Pratt, K., 2001. Learning lessons from the cyberspace classroom. *17th Annual Conference on Distance Teaching and Learning*, pp.1–5.
- Poepsel, M.A., 2011. *The Impact of an Online Evidence-Based Coaching Program on Goal Striving, Subjective Well-Being, and Level of Hope*. Capella University.
- Short, H., 2014. A critical evaluation of the contribution of trust to effective technology enhanced learning in the workplace: A literature review. *British Journal of Educational Technology*, 45(6), pp.1014–1022.
- Vygotsky, L.S., 1978. Interaction between learning and development. In *Mind in Society: The Development of Higher Psychological Processes*, pp.29–36.
- Wahlgren, B. & Aarkrog, V., 2012. *Transfer: Kompetence i en professionel sammenhæng*. Aarhus Universitetsforlag, Aarhus.
- Zimmerman, B.J., 2000. Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology*, 25(1), pp.82–91.