The Transfer of Learning

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ABSTRACT

The transfer of learning holds a unique place of importance in instructional design. Bridging the relationship between the individual and the learning environment, the transfer of learning is both an internal process for the learner and an educational goal. Long troubled by disagreement among researchers, the transfer of learning is nonetheless still a crucial topic of consideration for instructional designers.

Keywords: learning transfer, instructional design

What is Transfer of Learning?

As educators, we hope that our students are able to take what they've learned in class and apply that knowledge in new ways. With this as an aim, a consideration of the transfer of learning is important to instructional design on the level of the individual and as a goal of instruction. The transfer of learning has been defined as "when learning in one context or with one set of materials impacts on performance in another context or with other related materials" (Perkins & Salomon, 1992, page number unavailable). Emphasizing the importance of transfer, Lobato (2006) argues that a "central and enduring goal of education is to provide learning experiences that are useful beyond the specific conditions of initial learning" (p. 431), which is achieved through the design of instructional materials and educational approaches that help students develop deep understanding. Additionally, the measurement of transfer is important in judging the quality of learning experiences (Bransford, 2000).

This paper will review concepts in the transfer of learning, implications for instructional design, critiques of the transfer of learning, and directions for research.

Concepts in the Transfer of Learning

Bransford (2000) noted the following key characteristics of learning and transfer as critical for education: Initial learning is necessary for the later transfer of knowledge; excessively contextualized knowledge impedes transfer where abstractions promote transfer; transfer is an active process; and all new learning happens on the basis of prior learning. From these general concepts, more specific facets of transfer may be examined.

Positive Transfer versus Negative Transfer

Positive transfer is defined as when learning in one context serves to better learning in another (Perkins & Salomon, 1992). Conversely, negative transfer is said to happen when

learning in one context impedes performance in other contexts. One example provided by Perkins and Salomon (1992) is the learning of a second language. When a native speaker is able to easily learn a related second language, positive transfer has occurred. However, prior knowledge of the elements of a language such as syntax, vocabulary, and grammar can interfere with new learning and is an example of negative transfer. Perkins and Salomon (1992) make the case that positive transfer is more important to education than negative transfer. They note that negative transfer is typically a problem only in the early stages of learning new material, and with experience, learners can self-correct for negative transfer.

Near Transfer versus Far Transfer

Near transfer occurs when learning in one context affects learning in a closely related or similar context, such as when math problems on an exam are the same kind featured in class homework. Conversely, far transfer is transfer from one context to another when the contexts seem unrelated, such as applying chess strategies to politics (Perkins & Salomon, 1992). We are cautioned by Perkins and Salomon that near and far transfer are useful concepts for describing transfer, but they are not metrics in and of themselves.

Low Road or Reflexive Transfer versus High Road or Mindful Transfer

Low road or reflexive transfer occurs when aspects of the learning context are similar enough to prior learning contexts to trigger semi-automatic responses and is present most often in near transfer (Perkins & Salomon, 1992). Similar to the relationship between near and far transfer, reflexive transfer is countered by high road or mindful transfer. Unlike low road transfer, high road transfer is characterized by a purposeful abstraction from the context in which something is learned, where connections between the contexts are consciously sought out. Bransford (2000) has argued that transfer is promoted when the learner actively questions their

own learning and understanding. It is believed that through mindful transfer the core principles of a situation are learned, and successfully grasping deep connections during initial learning is necessary for the later application of the principles to novel situations (Billing, 2007; Bransford, 2000; Perkins & Salomon, 1992). Furthermore, reflexive and mindful transfer may also work together in a given situation or context, but we are reminded by Perkins and Salomon (1992) that these are distinct processes.

Sameness and Differences

Another line of thinking in transfer research argues that while the similarities in the learning context are important to the transfer of learning, differences in those contexts are equally, if not more important (Marton, 2006). Although Marton makes no distinction between near and far transfer, he theorizes that differences and variations in learning contexts are required for transfer to take place, and multiple contexts must be used. In this view, transfer is a function of the perceived sameness and differences in learning contexts.

Marton's (2006) argument complements that of Perkins and Salomon's (1992) in that the discernment of differences between contexts may be an instance of mindful transfer. It would seem that a deeper level of processing would be necessary to detect differences in contexts, as compared to detecting sameness, which may be a reflexive response. The argument for differences is also supported by Bransford (2000), who argued that the use of "contrasting cases" (p. 60) may help learners understand when, where, and why to apply knowledge. According to Bransford, contrasting cases allow students to learn what is relevant or irrelevant to a concept.

Generative Learning and Framing

Generative learning has been defined as "learning that results in the flexible use of what has been learned in a wide range of relevant future situations" (Engle, 2006, p. 452).

Acknowledging the similarity between generative learning and transfer of learning research, Engle (2006) delineates possible mechanisms through which one can build a situative theory of transfer. Like other theorists, Engle (2006) accepts the idea that students' initial learning must be successful for knowledge to transfer to novel contexts, but builds upon it by adding that learning and the transfer of what is learned is enhanced by the social framing of the learning context as part of larger ongoing activity, and one in which the learners are active participants in the construction of the body of knowledge. In recent research aimed at testing the mechanisms posited in her earlier work (2006), Engle and her colleagues (Engle, Nguyen, & Mendelson, 2011) have begun studying ongoing activities as examples of what they now term expansive framing, a more conceptually accurate description of the phenomenon. The results of this initial research provide support for the hypothesis that expansive framing leads to more transfer than the opposite limited (or bounded) condition.

To return to the concepts of near versus far transfer and reflexive versus mindful transfer presented earlier, the expansive framing model (Engle, 2006; Engle, et al., 2011) may be argued to incorporate all of these. Earlier activities may promote near and reflexive transfer. Later parts of the ongoing activities or expansive framing that require high degrees of student participation may provide the learners with opportunities for far and mindful transfer.

Implications for Learning Design

From the research discussed above, it may be possible to derive some general best practices for learning design and also the assessment of learning. It can be argued that effective instruction would take these best practices into account and use them to create learning activities for students. A key facet of transfer is the success of initial learning, which is highly dependent on learning for understanding (Bransford, 2000). Research cited by Perkins and Salomon (1992)

and Engle et al. (Engle, 2006; Engle, et al., 2011) suggests that engagement with instructional material via thorough and diverse practice promotes the transfer of learning. Learning situations, they argue, require this sufficient practice and a broad variety of examples to encourage automaticity and in turn, reflexive transfer. This approach is also supported by Marton's (2006) differences model. Additionally, when learners have been able to abstract crucial principles of a problem, they are better able to apply those in similar situations. Thus, learning situations need to support active abstraction (Bransford, 2000; Goldstone & Wilensky, 2008; Perkins & Salomon, 1992). Also, as noted earlier, Engle and her colleagues (Engle, 2006; Engle, et al., 2011) propose that learning activities need to interactively engage students as contributors in the learning process, and be framed in large, broad contexts. Lastly, Marton (2006) argues for a focus not only on what is similar between learning contexts, but what is different. Any or all of these may be brought to bear in the learning activities we design and develop. The ideas underlying these concepts are not linked to one specific instructional model or another and may be applied rather flexibly.

Moreover, among researchers in the field, there is an increasing concern regarding teaching to the test as an outgrowth of the demand for school accountability (Mestre, 2003). This gives rise to a need to create assessments that measure broad transfer and deep conceptual change so that accountability does not encourage teaching methods that do not promote transfer. Assessments such as these would examine the ability to solve problems in novel situations and in turn may actually better demonstrate transfer than assessments measuring problem solving in isolated domains.

Critiques of the Transfer of Learning

The transfer of learning has been an issue of debate since the earliest days of educational research and this debate continues into the modern age. Based on widely differing and inconsistent research results, this lack of agreement within the scientific community extends to the nature of transfer, the degree to which transfer occurs, and includes the nature of the mechanisms which may underlie transfer (Barnett & Ceci, 2002). Some researchers have gone as far as to suggest abandoning the transfer of learning as a research construct because of the association of transfer as a passive "carrying over" (p. 19) of knowledge from one similar situation to another (Carraher & Schliemann, 2002), and as such, a dilemma arises in which one cannot adequately separate conceptual or operational definitions of transfer from those of knowledge. Lobato (2006) notes that other researchers avoid this conundrum by assuming that learning and transfer are "conceptually indistinguishable" (p. 432) and specifically Campione, Shapiro and Brown have argued that there is no need to dedicate special consideration to transfer (as cited in Lobato, 2006).

However, some of these criticisms may be countered. Many of the concepts discussed so far feature an active rather than passive search for information. For example, Perkins and Salomon's (1992) mindful transfer is purposeful process and Marton's (2006) suggestion of the importance of differences in contexts implies a dynamic relationship between learner and context. Additionally, in the model Engle and her colleagues (Engle, 2006; Engle, et al., 2011) are investigating, students are not passive consumers of education, but instead are active producers of it through participation. Through an examination of the processes students engage in during these activities, it may be possible to demonstrate how transfer differs from knowledge conceptually and operationally. These demonstrations may illuminate the mechanisms of transfer as well.

Directions for Research

The importance of the transfer of learning led the National Science Foundation to convene workshops focused on identifying directions for research (Mestre, 2003). Organized around three themes (context dependence of transfer, conditions for transfer, and metacognitive issues for transfer), the workshop proposed a research agenda that converged on common threads: whether current assessments are capable of measuring examples of far transfer and how instruction can be structured to promote far transfer instead of simply encouraging test achievement.

Whether or not current assessments can measure far transfer can be examined by asking how far transfer is represented in those assessments. In an effort to organize previous research and in turn better understand the phenomenon, Barnett and Ceci (2002) developed a taxonomy for far transfer. Breaking down far transfer along the dual factors of content (what is transferred) and context (when and where transferred from and to), nine dimensions of transfer were identified. The content factor represents a continuum of specificity to generality and includes learned skill, performance change, and memory demands. Context, presented along as a continuum of near to far, is comprised of knowledge domain, physical context, temporal context, functional context, social context, and modality. Given this framework, it may be possible to apply the taxonomy to individual assessments as well. Instructional assessments may mirror research studies in that they also may be more or less successful at including elements of far transfer.

The call for research to examine whether instruction can be structured to promote far transfer may utilize the differences model proposed by Marton (2006). It may be possible to investigate the degree to which learning contexts must diverge in order for them to be perceived

as different, as a function of far transfer. Additionally, it may be possible to operationalize the degree of divergence as a measure of abstraction or as a contrasting case, as called for by Perkins and Salomon (1992) and Bransford (2000), respectively. Lastly, through the expansive framing model, Engle et al. (Engle, 2006; Engle, et al., 2011) have demonstrated that it may be possible to empirically examine the influence of instructor-created social learning contexts and level of student involvement in transfer.

Conclusions

The transfer of learning is a key concept not only in the research literature but also in the practice of instructional design. It is important for us as instructional designers to be informed by the research literature and to take the transfer of learning into account as we design learning materials and activities. We must include activities that promote near transfer as a means of preparing learners for opportunities of far transfer. Far transfer must be a fostered though activities which encourage the learner to reach genuine and deep understandings of what they are learning, so that they may apply that knowledge in new contexts. It is only when the individual has achieved this that the goal of education has been met.

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