Facilitating Transfer of Skills and Strategies in Occupational Therapy Practice: Practical Application of Transfer Principles

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Abstract: In Occupational Therapy (OT) practice, practitioners assume that the skills and strategies taught to clients during rehabilitation will transfer to performance and participation in everyday life. Despite transfer serving as a practice foundation, outcome studies conclude that this assumption of transfer is not occurring and it often results in decreased efficacy of rehabilitation. This paper investigated key aspects of transfer and found concepts in the psychology literature that can support transfer of skills and strategies in OT. Six key principles proposed from educational psychology can serve as a guide for practitioners to better train for transfer. In this paper, we discuss the six principles and apply concepts from psychology. Each principle is supported with examples of how they may be incorporated into OT practice. If occupational therapists understand these principles and implement them in treatment, the efficacy of treatment may improve for many populations.

Keywords: Clinical reasoning, Occupational Therapy practice, Rehabilitation services

Occupational therapy (OT) practice may be conceptualized as a learning process, where therapists serve as teachers, facilitating the learning process for clients working towards becoming more independent in everyday life activities. Learning is defined as a relatively permanent change in behavior as a result of experience or having the capacity for skill or knowledge acquisition (Berkeland & Flinn, 2005). As facilitators of learning, occupational therapists assist clients in a variety of learning processes including, helping clients learn or relearn skills, developing strategies to perform activities, and teaching caregivers skills that will help them care for or support clients with disabilities (Glogoski, Milligan & Wheatley, 2006). As a result, transfer seems to be a critical component in the domain of teaching and learning.

The purpose of teaching clients skills and strategies during occupational therapy is to support performance and participation in the broader contexts of everyday lives. It is not feasible to teach a client all the skills or strategies for every situation he or she might encounter when returning to home and community. Moreover, as many clients resume daily activities, is it unlikely that continuous support or a structured setting will be available to assist in using newly learned skills and strategies. Therefore, the skills and strategies must be acquired during therapy in a way that permits them to be independently applied by clients across a variety of situations that may differ from the initial learning event (Toglia & Kirk, 2000). This phenomenon, the use or application of prior learning in new contexts, is often termed “transfer” or “generalization” of learning (Flavel, 1979; Woodworth & Thorndike, 1901). For this paper, we treat transfer and generalization as overlapping constructs and use the following definition. Transfer is the degree that a skill learned in one context can be performed in another context, and transfer of training refers to the potential that learning one skill will influence the ability of the learning of another skill (Geusgens et al., 2007). Context refers to internal (emotion/mood state) or external (physical/social environment) circumstances associated with the learning or performance event (Roediger, Dudai & Fitzpatrick, 2007). These two defi-
nitions are replete in the psychology literature (Guthrie, 1935; Hull, 1943; Perkins & Saloman, 1989; Thorndike, 1932). Transfer that is defined in this article is not to be confused with the term transfer used in OT to define how a person physically moves from one surface to another. Further, transfer can occur across environmental contexts, such as techniques to complete a modified cooking task learned in inpatient setting to use in the home. Transfer can also occur across tasks, for example when an individual who has learned to eliminate distraction (e.g., turn off the television) while paying bills, also does this while cooking a new recipe (Haskell, 2001; McKeough, Lupart & Marini, 1995).

According to Hammel and colleagues, social participation is increasingly becoming a core goal for rehabilitation as a whole (2008). Transfer of skills is one means to achieving this goal; however evidence is limited to support the occurrence of transfer in rehabilitation (Geusgens, Winkens, van Heugten, Jolles & van den Heuvel, 2007). In educational psychology, the concept of transfer has been rigorously studied. Transferring of learned skills is not expected to occur automatically, except in rare conditions when the transfer distance (the similarity between a learned skill and the new skill) is very near (or skills are very similar) (Perkins & Salomon, 1988). Transfer seems to be inconsistent in rehabilitation practice and research (Geusgens et al., 2007). One common assumption among researchers and practitioners is that skills and strategies taught to clients during therapy will be seamlessly and automatically implemented in various contexts of everyday lives (Geusgens et al., 2007). For example, in stroke populations, efforts primarily target remediation of functional impairment (e.g., upper extremity movement and strengthening/endurance) with the assumption that this will result in gains in everyday life activities (e.g., dressing, working) (Teasell, Foley, Salter & Jutai, 2008). Numerous follow-up studies with individuals with stroke demonstrate that this transfer is not occurring and functional outcomes remain poor, once individuals with stroke return to their premorbid activities (Murray & Lopez, 1997; Teasell et al., 2008). This limitation may stem from the failure to explicitly “teach for transfer” (Butterfield & Nelson, 1989; Perkins & Salomon, 1988) during the process of intervention.

Purpose

In a recent review of educational psychology literature, Geusgens and colleagues (2007) offered a list of “prerequisites for the occurrence of transfer” (p. 426). They argue that the adoption of these principles (see Table 1) during the therapeutic process may enhance the likelihood that skills learned would be retained and appropriately implemented by the clients across activities and environments upon discharge. However, discussion is lacking on how the principles may be understood and adopted by rehabilitation, specifically OT. The purpose of this paper is to provide a descriptive summary on the six principles proposed by psychology (Geusgens et al., 2007) and discuss their potential application to OT. We apply concepts from educational psychology to support each principle and provide examples of how each may be operationalized in the context of occupational therapy practice.

Transfer in OT Practice

The educational psychology literature has determined a number of specific, evidence-based principles related to teaching for transfer. As a caveat, these principles are discussed in general terms, as they would relate to clients who are capable of cognitive, goal-directed learning. For clients with neurological injury (i.e., TBI, CVA), practice guidelines for OT stress the importance of generalization and present it as a central tenet of cognitive rehabilitation (Cicerone et al., 2000). However, the research and outcomes on how transfer applies to clients with cognitive deficits (i.e. executive function) is limited but emerging (Geusgens et al., 2007). Therefore, we emphasize that application of these principles in populations with neurological injury may be different when compared to clients without cognitive deficits.

Six principles to support transfer of skills in occupational therapy

Principle I. A person should know what transfer is and how it works (Geusgens et al., 2007, p. 464).

While the definition of this concept is somewhat self-evident, it is often not addressed in OT. In essence, this principle states that therapists should explain to clients what transfer is and the process of how transfer works. For example, when working with a client on a light meal preparation, the occupational therapist should point out that the goal of the treatment is to transfer the strategies and processes they are learning in completing this exercise to meal preparation in their home. This should facilitate a discussion about the similarities and differences between the two contexts and a discussion about the application of the activity to their home. The underlying educational psychology principle associated with this principle is the concept of “teaching for transfer” (Butterfield & Nelson, 1989; McKeough, Lupart & Marini, 1995; Perkins & Salomon, 1988). Teaching for transfer is simply structuring the learning environment.
Table 1. Prerequisite principles to promote occurrence of transfer

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<td>1</td>
<td>A person should know what transfer is and how it works</td>
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<td>A person should be aware of one’s own functioning before he or she will acknowledge</td>
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<td>A person should be able to judge when and where transfer can be applied</td>
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<td>General knowledge should be taught, as this type of knowledge is easier to transfer</td>
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<td>The connection between what is learned and the situation in which it is learned should</td>
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and the activity to promote transfer. This concept of teaching for transfer is the foundation for the remaining principles.

Principle II. A person should be aware of one’s own functioning before he or she will acknowledge that a strategy is needed to improve it (Geusgens et al., 2007, p. 464).

Clients must understand they have a problem before they may be willing and able to adapt existing or new behaviors to address it. Intuitively, this principle is also supported by studies that show that impaired self-awareness is associated with poor outcomes (Fleming, Strong & Ashton, 1998; Prigatano & Wong, 1999; Sherer et al., 1998). Cognitive psychology and therapeutic models (e.g., Barco et al., 1991; Toglia & Kirk, 2000) describe two main aspects of awareness: (1) pre-existing knowledge or beliefs regarding one’s abilities, task demands and how to compensate for limitations (termed “metacognitive knowledge” [e.g., Toglia, 1991] or “intellectual awareness” [Barco et al., 1991]) and (2) knowledge of performance acquired during task execution via self-monitoring processes (termed “on-line awareness” [Toglia, 1991] or “emergent awareness” [Barco et al., 1991]). In the context of learning and transfer, reduced self-awareness of deficits may result in decreased motivation to engage in the initial learning of skills or strategies; if the client does not understand that a problem exists, he or she might view strategies as unnecessary (Toglia, 1991). Reduced self-awareness may also result in the inability to appropriately recognize situations in which learned skills or strategies should be used (Toglia & Kirk, 2000).

The importance of awareness in the therapeutic process and to functional outcomes seems to be recognized by OT’s, particularly in populations with brain injuries (Radomski & Latham, 2008). As such, there are a number of suggested ways to improve clients’ self-awareness during the course of OT, and randomized controlled trials are emerging to support them (Goverover et al., 2007; Schmidt, Fleming, Ownsworth, Lannin & Khan, 2012). The general perspective is that awareness interventions, rather than focusing on improving awareness in isolation, should occur in the context of improving a functional ability and should use real-life and familiar activities and settings (Fleming & Ownsworth, 2006; Toglia & Kirk, 2000). This “occupation-based” awareness training is thought to best facilitate the emergence of awareness because it allows clients to compare their stored knowledge and expectations of performance with their current performance, thereby permitting error-recognition and the eventual restructuring of knowledge and beliefs about their abilities. This is accomplished via direct feedback regarding task performance and structured self-evaluation. For example, a therapist working with a client on community reintegration could set up a structured shopping experience that incorporates awareness-training techniques. In a practical approach, the therapist would provide an introduction to the task and its goals, after which the client would predict his or her task performance, estimate the level of difficulty or how much time or effort it will take, and pre-plan for any problems. Actual task performance should be videotaped so that the client can evaluate his or her performance and compare it with his or her initial predictions. Following this, the therapist and client would compare and discuss their observations and perceptions of task performance, including how consistent the client’s performance was with his or her predictions and expectations. The video would be used to support this discussion as well as to review errors, positive aspects of task performance, and potential opportunities for compensatory strategy use. Such experiences would continue in the service of improving pre-task metacognitive knowledge, while techniques to improve online-awareness, such as periodic self-checking during task performance, would be introduced gradually. The therapist may begin by participating in or verbally guiding the client through the process, and would reduce the verbal guidance as it becomes habitual for the client.

Occupation-based approaches recognize the importance of providing opportunities for clients to implement the same learned awareness strategies in varied tasks and environments (Toglia & Kirk, 2000; Tsauoudes & Gordon, 2009). For example, the client could start by applying the evaluation process in a simulated grocery store in the clinic, and then move to a small neighborhood grocery, to a larger grocery store or a clothing store.
in the mall and then to other non-shopping activities (e.g., meal preparation, laundry). Many features of occupation-based awareness interventions are consistent with the teaching strategies thought to enhance the likelihood of transfer including reducing the transfer distance by embedding learning in contexts in which it will later be required, teaching general skills and strategies which can be applied in a range of contexts, and varying the practice/learning situation (Toglia & Kirk, 2000; Tsaousides & Gordon, 2009).

Principle III. A person should be able to judge when and where transfer can be applied (Geusgens et al., 2007, p. 464).

Once a client acknowledges performance deficits and learns skills or strategies to address them, he or she needs to be able to realize the occurrence of situations in which the skills or strategies should be used. Research in healthy adults show that individuals do not spontaneously recognize everyday situations to which learned material can be applied (Gick & Holyoak, 1983; Perkins & Salomon, 1988; Roediger, Duddai & Fitzpatrick, 2007), therefore it is unrealistic to expect that clients with disabilities can do this automatically. Instead, therapists should assume that spontaneous transfer is not the norm and incorporate methods into treatment that will facilitate a client’s ability to recognize and anticipate situations which might prove difficult and thus require learned skill or strategy use. This is particularly relevant in situations that require “high-road transfer,” which depends on deliberate mindful abstraction of skill or knowledge from one context for application in another context (Salomon & Perkins, 1989). When contexts (environments) are very different and fail to trigger automatic associations, then cognitive effort is required to discover or extract generic qualities that two contexts possess to make connections based upon common elements. For example, driving a car vs. driving farm tractor are different contexts but contain similar elements for abstraction (e.g. functional operation).

Salomon and Perkins (1989) describe two modes of high-road transfer, “forward reaching” and “backward reaching.” Therapists can incorporate teaching methods into their interventions to facilitate both of these modes. Steps to promote forward reaching high-road transfer occur during the learning process and involve abstracting learned skills (acquired ability) or strategies (plans) in preparation for application elsewhere in the future. An example of forward reaching transfer is where the therapist simply tells the client how to apply cooking skills for meal preparation learned in the clinic to meal preparation in his or her home. Once the client understands the general idea of transfer, the therapist may ask, “How might you apply these skills in a friend’s kitchen? Or camping?” This would exercise and strengthen the client’s own forward reaching capability. In addition, after learning a particular skill or strategy, the client could be asked to brainstorm different daily life situations to which it could be applied.

In contrast, backward reaching high-road transfer is required when one experiences, or anticipates experiencing, a performance problem. He or she must identify the key problematic characteristics of the situation and draw upon (“reach backward into”) past experience for knowledge, skills or strategies that could be applied to solve the problem. To strengthen this type of problem solving ability, therapists can place their clients in novel situations that require the application of previously learned strategies. If a client wants to be independent in shopping, the therapist could take the client to an unstructured context (e.g. mall) and, if the client becomes overwhelmed by distractions, the therapist would cue the client to think about what he or she has been practicing in therapy and implement some strategy to help him or her feel more in control of the situation. Therapy sessions could also involve homework assignments that guide clients to become more aware of everyday situations which may be problematic or to which strategies can be applied.

In essence, high-road transfer requires the client to develop the skills to perform basic “task analysis” to identify, summarize and organize common elements or demands of various situations and then map them onto their strengths, limitations, and the skills or strategies learned during OT. Clients will need a high level of support from their therapist to initially perform these abstractions, but the process may become habitual with repeated practice (Siegler, 2004).

Principle IV. General knowledge should be taught, as this type of knowledge is easier to transfer than specific knowledge (Geusgens et al., 2007, p. 464).

In OT, there is a tendency to be task-oriented or focused on a specific activity—therapists work with clients to address a specific skill or provide them with specific strategies for improving their performance of a task (Toglia, 2005). According to this principle, however, a different approach may be required when trying to promote transfer (Geusgens et al., 2007). Task specific knowledge does not transfer as well as general knowledge. The educational psychology principle underpinning this principle is the concept of “transfer distance”. Transfer distance refers to how similar the learning environment and activities are to the transfer environment and activities (Butterfield & Nelson, 1989). General knowledge has greater similarity to multiple
activities and contexts than task specific knowledge and is therefore easier to transfer. For example, instead of discussing specific strategies to reduce fatigue while cooking a meal, the occupational therapist should focus on teaching the concepts that support conservation of energy and general strategies such as pacing and planning. Transfer distance also involves the concept of “high and low road transfer” (Salomon & Perkins, 1989). Low road transfer is transfer that occurs between two very similar activities (e.g., driving a car vs. driving a truck) whereas high road transfer is the general abstraction and application of a strategy between two different contexts (e.g., energy conservation techniques to dressing) (Salomon & Perkins, 1989). Low road transfer can occur fairly automatically and relies on long-term memory [Salomon & Perkins, 1989] whereas high road transfer involves multiple cognitive processes, but has a far broader range of applicability in the real world. Teaching general knowledge or strategies will promote high road transfer. In OT for example, teaching general metacognitive strategies to help clients identify goals, create a plan, implement a plan, and evaluate their work can have broad application across multiple performance areas (Toglia & Kirk, 2000). While high road transfer may ultimately be the goal, this principle is dependent on the ability of the client (e.g. clients with severe brain damage have more limitations).

Principle V. The connection between what is learned and the situation in which it is learned should be broken by practicing a strategy or skill while varying the practice situation as much as possible (Geusgens et al., 2007, p. 464).

As mentioned earlier, a context is defined as a situation where an event occurs; it can be an internal state (feeling a particular way, e.g. being happy when seeing friends) or an external state (physical environment where something occurs) (Roediger, Dudai & Fitzpatrick, 2007). This principle links a specific task or strategy and the context in which it is learned; this link is influenced by how much the task or strategy is practiced and the various situations in which it is practiced (Schneider & Shiffrin, 1977). Further, this link is supported by consistent mapping (initial practice in one context) and varied practice (practice in different contexts). Consistent mapping involves sustained task performance in a static context across time—there will be differences in performance in the beginning, but automaticity will develop across hundreds to thousands of trials (Schneider & Shiffrin, 1977). For example, reading is not an automatic skill but requires time and practice to recognize and comprehend letters, words and sentences, and to understand how the words may be rearranged to form sentences, paragraphs and stories. In time, recognition of words becomes automatic with constant exposure and practice; however, comprehension of the material read always requires effort to process each new piece of information (Logan, 1997). In OT, a therapist working with pediatric clients on reading may encounter fluctuations in their performance due to internal contexts (feeling sad), external contexts (noisy therapy gym) or both. Consistency in performance is required before practice may be varied.

Similarly, varied practice refers to allowing practice to occur in a variety of similar contexts. This permits retaining and adapting certain pieces of information from one context to the next, which is thought to increase the chances that the task or strategy will transfer from the initial context of practice into the application of novel contexts (Salomon & Perkins, 1989). An example of varied practice in OT might include assessing and ‘fitting’ a new vehicle for a client. In the new car, the controls for operation may be similar but may vary in location and shape. These slight variations in context require re-adaptation of prior knowledge and strategies to reorient in order to use skills to operate the new vehicle. Repeated exposure will eventually foster transfer of skill. By practicing in varying contexts, the client increases the likelihood of successful performance in future novel contexts.

This principle of transfer is critical for OT. The continuum of consistent mapping and varied practice presents how therapy should structure a context to facilitate transfer. A client should first gain mastery over a strategy or skill in one context and demonstrate consistent performance before moving to different contexts and transferring that strategy/skill over.

Principle VI. Transfer should be addressed during learning, as it cannot be expected to occur automatically (Geusgens et al., 2007, p. 464).

If the intention of teaching a skill/strategy is for use in daily performance, then this intention should be explicitly stated and concentrated on throughout the process. Assuming a skill or strategy taught to a client will automatically transfer and be used is a misconception. For example, in the context of education, the objectives of a teacher’s lesson plan are typically stated before a lecture, instantiated through the lecture and revisited at the end to ensure the content was covered (Salomon & Perkins, 1989). While this example is pertinent to education, it would be efficacious to apply this basic approach to OT.

Transfer appropriate processing and bridging are two concepts that support transfer in learning. Transfer appropriate processing is categorized as a type of
memory dependent learning where the memory of an event is typically best retrieved under similar or original circumstances in which it was encoded. Additionally, the amount of information recorded and the initial context of encoding directly impacts performance based on degree of similarity or dissimilarity of the context of retrieval (Morris, Bransford & Franks, 1977). Practitioners can utilize this concept to improve the performance of a client on a specific task. For example, therapists working on dressing with a client who has hemiplegia may want to evaluate how the client performs in their home since it is the most appropriate and relevant context for completing the activity. Bridging is another concept that highlights teaching a specific condition or resembling condition in order for specific transfer (high or low road) to occur in the context of OT. If a client with a knee replacement wants to dress and sequence through a morning routine, it would be recommended to use the client’s own clothes and practice dressing where the clients typically completes activity (e.g. at bedside instead of bathroom). Both TAP and bridging are requisites for transfer in order to maximize the probability of the skills and strategies being used in various contexts.

The advantage of using transfer appropriate process, bridging and this final principle in OT may seem intuitive, and it is often glossed over. However, transfer has far reaching implications for therapists and clients. For example, a client with a right below knee amputation is being taught to use a new prosthesis for a meal-prepping task. The therapist should first work with the client to state goals and expectations for OT. The overall goals might include having the client don the prosthesis independently and ambulate with a cane in the kitchen without any loss of balance. Before, during and after a cooking task, there should be discussion of overall goals, specific strategies for movements, task priorities and safety. More importantly, there should be a discussion of the differences and similarities between the practice environment in therapy and home environment in relation to the cooking task. This might include an evaluation of the client’s home environment, having the client complete the same cooking task, discussing the client’s performance and what needs to be altered to improve transfer. It is important for therapists to limit our assumptions about transfer occurring automatically and instead, clearly address it in the context of OT.

**Conclusion**

One expected outcome of OT and rehabilitation is that skills or strategies acquired by clients will be readily accessible for use in their daily activities and environments. In other words, what is learned in a clinical setting will transfer or generalize to everyday life for each individual client. Evidence for the occurrence of transfer in practice is lacking as suggested by a recent review of transfer in cognitive rehabilitation (Geusgens et al., 2007). We propose that this may stem from a fundamental disconnect on how to promote transfer in OT. The six principles and their supporting concepts previously described are borne from educational psychology; yet, they bear significant implications for OT practice. These six principles apply to existing OT practice models and support the work of therapists as they teach skills and strategies to clients in order to support and maintain performance and participation. To our knowledge, these principles have not been formally tested in structured experimental research studies; however, the concepts supporting them have been extensively studied in psychology. We recommend practitioners and researchers to begin to use these principles and assess the impact on the functioning of their clients. Research on transfer is a new field of inquiry that may bear great significance on evaluating the efficacy of OT interventions. Once occupational therapy begins to view practice as a type of learning and the benefits of training for transfer, we may augment our interventions and practice frameworks to include principles of transfer.

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