

Chapter 7

Games for Learning and Learning Transfer

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ABSTRACT

Research findings are at best mixed with regard to the effectiveness of computer and video games in promoting learning transfer or learning, but much of this research makes use of the same unsuccessful methods of classic transfer experiments which offered research subjects limited initial practice in the learning to be transferred. Learning transfer however, like expertise, may need to be based on extended practice, an idea supported by studies of habitual or expert game players and recent non-game related developments in transfer research. Practice however must be joined to a certain kind of game complexity and cognitive or experiential game fidelity before deep learning and instances of significant transfer can be facilitated. Implications of these transfer conditions for the design of games for transfer are discussed as well as the need for research with regard to the various learning processes underlying the game-play behaviour of expert and habitual gamers.

INTRODUCTION

Research into learning transfer, broadly, relates to the influence of prior learning on new contexts of learning or performance. In its classic conceptualisation transfer involves the use of learning gained in one context, or setting, in a second subsequent context or setting. Ever since the formal introduction of the concept of learning transfer in 1901 in

a series of papers by Edward E. Thorndike and Robert Sessions Woodworth, the concept has been controversial (1901a, 1901b, 1901c). Many studies and experiments have failed to facilitate transfer responses in subjects, even when, in many cases, the odds seemed to be very much stacked in favour of its occurrence (Detterman, 1996).

In this chapter the older tradition of transfer research is linked to more recent research into and development of games for learning. An argument is made that many of the concerns of researchers

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and other stakeholders in the emerging ‘serious games’ industry relate directly, if not explicitly, to the question of learning transfer. Games, it is argued towards the end of this piece, might also represent a useful environment within which to study some outstanding issues with regard to learning transfer. Games, for instance, offer affordances for empirical research simply not obtainable in more traditional learning environments—not least in the ability to use usability software and methods to closely monitor, capture and analyse a range of game-world and real-world actions and reactions.

Research findings, however, are at best mixed in their conclusions with regard to the pedagogical or transfer effectiveness of games, but, in another link between games for learning and learning transfer, many of these studies may be said to make use of the same unsuccessful methodologies of classic ‘in vitro’ transfer experiments in which research subjects, after only a limited exposure or practice, are prompted to demonstrate transfer into a new experimental setting. We suggest that one of the key reasons this approach has not tended to produce transfer is that transfer, like expertise, needs to be based on extended and perhaps considerable practice. Indeed, studies of habitual or expert computer and video game players do seem to provide encouraging results with regard to the ‘transfer power’ of games. Based on this and other evidence we propose three key necessary conditions for transfer: extended practice; game complexity; and cognitive or experiential fidelity. Together these key conditions provide the central structure and concerns of the chapter. First, however, some context is offered with regard to the history of research into transfer, its importance, and its relationship as both a phenomenon and concept to the use of computer and video games for learning.

BACKGROUND

Learning Transfer Research

In 1901, two well-known and influential academic psychologists Thorndike and Woodworth published a series of articles in *Psychological Review* entitled, ‘The influence of improvement in one mental function upon the efficiency of other functions’ (Thorndike & Woodworth, 1901a, 1901b, 1901c). In it they present the results of a series of experiments that suggest the influence of ‘improvement’ in one cognitive skill or ‘function’ does not necessarily imply an improvement in skills in what might be taken to be a closely related area, concluding, ‘that spread of practice occurs only where identical elements are concerned in the influencing and influenced function’ (Thorndike & Woodworth, 1901a, p. 250). But what are these ‘identical elements’? Why is it so difficult to find evidence of this spread of practice, this *transfer of learning*? What are the factors which govern its occurrence? How can we, as it were, control and predict transfer?

Since the publication of Thorndike and Woodworth’s articles these questions have been tackled by successive generations of researchers. Thorndike and his followers’ initial focus on more or less physically identical elements in the original and target transfer contexts eventually gave way to what might be described as a more cognitivist interest in ‘structural or conceptual similarities between contexts or tasks’ (Carragher & Schliemann, 2002, p. 2) which was again replaced more recently by a more constructivist/situationist approach, like that presented by Greeno, Smith, and Moore (1996) whereby transfer is seen as an active and constructive process.

Despite the efforts of these generations of researchers, examples of successful facilitation of transfer—beyond transfer of the largely reflexive kind between highly similar learning and target contexts—are a relative rarity in the research literature (see Bransford, Brown, & Cocking, 2003;

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