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Original article

EFFECTIVENESS USE GENERATIVE LEARNING MODEL ONSTRATEGIC THINKING SKILLSAND LEARNING LEVEL OF BASICS OFFENSIVE FENCING

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Abstract

Aim. Wittrock an American educational psychologist introduced the Generative Learning Theory in 1974. The Generative Learning Theory is based on the idea that learners can actively integrate new ideas into their memory to enhance their educational experience. The purpose of the present investigation was to describe the effects of eight weeks of generative learning model (G.L.M.) on strategic thinking skills and learning level of offensive fencing basics.

Methods. 48 female students from faculty of physical education for girls (age 17.8 +/- 1.9 years) participated in this study. The sample was distributed equally into two groups, the experimental group contains (24 female students) and the control group contains (24 female students), the experimental group participated in the (generative learning model (G.L.M.)) program for eight weeks and the control group participated in the traditional program that used in the faculty. All participants completed the strategic thinking skills test and offensive skill tests before and after the 8-week programs.

Results. The data revealed that significant improvement in strategic thinking skills and learning level of fencing basics (offensive).

Conclusions. The findings indicated that the (generative learning model) program for 8 weeks could an increase in strategic thinking skills and the performance level of the offensive fencing basics (simple two skills and complex three skills). These results have to be taken into account by teachers in order to better understand and implicated of these concepts in educational lessons.

Key words: generative learning model, strategic thinking skills, fencing.

Introduction

Fencing is an open-skilled combat sport that was admitted to the first modern Olympic Games in Athens (1896). It is art of managing the sword, floret and sabre for attack and defense. It is a combat sport, which is performed with two opponents, in confrontation of ability, reflex, skill and technique, aiming to touch the opponent.

Lukovich (1997) defines the objectives of fencing as the tip touch using the floret and the sword, or that of cut and sabre tip, seeing that the valid surface specified according to the particular rule of each weapon. This way, sabre and floret are weapons of convention, by virtue of the controlled use of rules. The sword, in turn, maintains the sports framing based on its origin – the essence of the duels.

Its practice is regulated by the Fédération Internationale D'Escrime (FIE), founded in 1913 and headquartered in Paris, in France. However, despite its sports regularmentation being not so old, its practice is directly linked to the evolution of the races itself, once the history of management of weapons derives simultaneously to the humankind itself, aimed for one of the most primary aspects of the innermost of an animal – the instinct for survival.

Fencers are usually subjected to hard practice to improve their performances. To minimize errors during movements, they have to follow personalized training programs and the final outcomes depend on the knowledge of the movements. (Bernd & Emil 2007)

Wittrock an American educational psychologist introduced the Generative Learning Theory in 1974. The Generative Learning Theory is based on the idea that learners can actively integrate new ideas into their memory to enhance their educational experience Wittrock theorized that these learners processed information actively, by generating relationships between what they already knew and what they were encountering anew. He provided insight into how students who were successful at mastering new material made sense of new information they encountered and built up their working knowledge of a subject.

Wittrock's theory of generative learning had a simple premise. He theorized that individuals

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generate their own meanings of new material they encounter by building relationships between the new material and their prior knowledge. The fundamental premise of Wittrock's theory was that people enhanced their learning through this act of generating their own personal knowledge of information they received. The greater the generative activity engaged in by a participant while the new material is received, the greater is the learning that occurs. The learner may see relationships between incoming information and something already known. The learner may perceive a new relationship between one element of the new information and other elements within it. Whether a learner sees relationships between incoming information and prior knowledge, or within different segments of incoming ideas, what was common to both these activities was generatively. The act of generating ideas about the information and forming relationships between incoming information and a growing body of knowledge was the key to improved learning.

According to generative learning theory, to comprehend a complex topic, learners need to "electively attend to events and generate meaning for events by constructing relations between new or incoming information and previously acquired information, conceptions, and background knowledge" (Wittrock, 1992). In this theory, comprehension and understanding result from the generation of relations both among concepts and between experience or prior learning and information. In other words, learners need to make their own meaning by integrating new information with current existing knowledge, rather than just transferring the presented information into memory (Grabowski, 2004).

Wittrock and many other researchers explored generative learning theory in elementary and secondary school classrooms. The goal of their research was to address the criticism that in schools, there was very little transfer of learning from the abstract to the real. Wittrock's criticism of teaching practices of the time was that teachers often decontextualized learning and did not draw on the generative way in which successful students comprehended incoming information by generating relationships between incoming information and existing knowledge (Wittrock, 1992). Although much of the early research on generative learning was in the retention of reading in classroom environments in elementary schools. This later expanded to other learning environments and populations, such as multimedia learning in adults, strategic management training simulations for managers, and learning from interactive museum exhibits (Denner, Rickards, & Albanese, 2003; Duensing, 2000; Mayer, 2010; Wittrock, 1989; Wittrock, et al. 1975; Zantow, et al., 2005).

In order to design instructional supports in computer-based learning environments, two key aspects of generative learning theory should be addressed. First, learners' control over their learning process is necessary. Thus, learners' self-regulation is a critical aspect of the theory and should be considered when designing instructional supports (Barab, et al. 1999; Wittrock, 1991).

Second, when learners generate their own knowledge, they need to create relationships between new information and their prior knowledge. Therefore, prior knowledge is another key aspect of the theory that should be considered.

Current theoretical and empirical advances about self-regulation can further inform the mechanism of generative learning theory, because learners' cognitive and metacognitive regulation is a critical process in knowledge generation (Barab, et al. 1999; Wittrock, 1991). In other words, by its very nature, learners must be accountable and responsible for their knowledge generation processes. Accordingly, the central aspects of self-regulation for knowledge generation are learner's cognitive and metacognitive control. Cognitive control regulates the use of cognitive strategies to accomplish learning goals and metacognitive control monitors and modifies their cognitive strategies in order to make any adaptive changes while they are learning (Schunk, 1996; Zimmerman, 2000).

Early research performed by Wittrock, even before he proposed his theory, resonated with the findings of my study. Bull and Wittrock's (1973) research explored the use of imagery in generative learning. Bull and Wittrock based their assumptions on data from the 1969 research by Bobo and Bower, the 1971 research by Paivo, and the1966 research by Wittrock. The experimental research that Bull and Wittrock conducted in 1973 studied the use of imagery on the retention of learning. The generative learning of my study's participants bears further interpretation through Bull and Wittrock's research. These researchers hypothesized that the use of imagery increased the retention of learning (Bull & Wittrock, 1973). They hypothesized that there would be greater retention of learning in activities that involved the use of imagery than learning that only involved the use of verbal definitions. Bull and Wittrock's research highlighted the distinct difference between learning associations that are imaginal, or concrete-spatial, and those that are verbal in nature. Bull and Wittrock's (1973) study found that when children engaged their concrete-spatial (or imaginable) mode of processing information, this facilitated an improved retention of their learning.

Second, prompting learners to use generative learning strategy tools may increase the frequency of using those strategies and may improve the quality of using those strategies. Asking learners to highlight important sentences, summarize their understandings, and interact with given adjunct questions may facilitate and increase learners' use of given generative learning strategies. Simple prompting may be enough to get learners to use the generative learning strategy, but may not be enough to help them monitor, be aware of, or adjust their learning processes according to how well they are learning (Azevedo & Cromley, 2004; Kramarski & Mevarech, 2003).

Thus, one hypothesized strategy would be to provide feedback about their metacognitive processes such as decisions about which cognitive strategies to use and how to use them (Butler & Winne, 1995; Winne, 1997; Wittrock, 1992). Metacognitive feedback can remind learners to assess the suitability of cognitive strategies employed and correcting strategy use (Jacobs & Dempsey, 1993; Narciss, 2008). In sum, support for learners' knowledge generation processes should be present in computer-based learning environments, and this support should help the learners' cognitive and metacognitive control.

Learners' prior domain knowledge also plays a critical role in their knowledge generation and self-regulation. According to existing research, prior domain knowledge is a significant predictor of learning outcomes (Alexander, 2003; Alexander, et al., 1995; Shapiro, 2004). It represents the basic building blocks of human information processing, key units of comprehension, and a determining factor in learning (Ausubel, et al., 1978). Furthermore, prior domain knowledge can influence cognitive processes during learning.

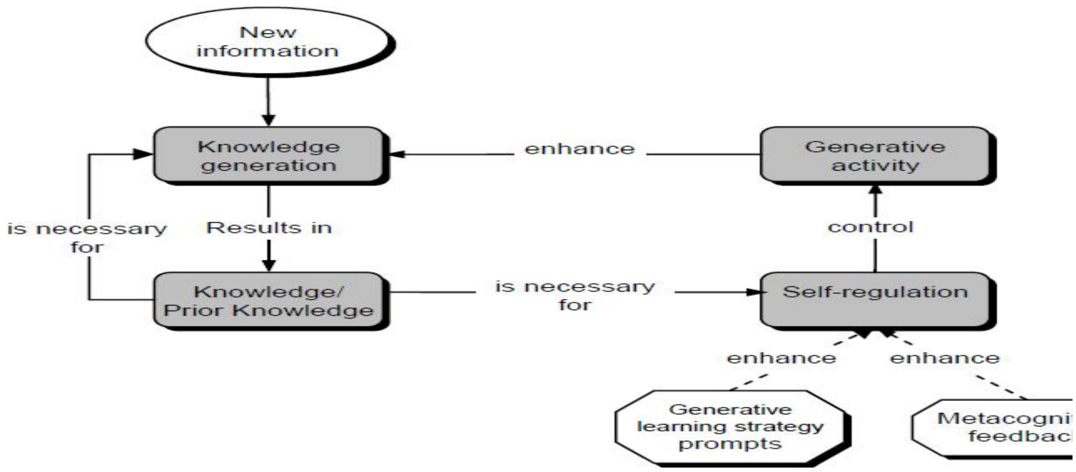
Considering the essence of this theory of generative learning, learning strategies should involve the actual creation of relationships and meaning (Wittrock, 1990, 1991).

Through these learning strategies, learners meaningfully, combine ideas from what they read with what they already know, thereby creating personally meaningful understanding.

Novice learners are not typically familiar with the procedures associated with constructive self-regulative learning" (Tergan, 1997). Some research indicates that low-prior domain knowledge students are not successful in regulating their learning by using key self-regulatory processes, such as planning their learning, activating their prior domain knowledge, monitoring their emerging understanding of the topic, or deploying effective strategies (Azevedo & Cromley, 2004; Shapiro, 2004). Thus, learners' prior domain knowledge should be considered as an individual factor affecting self-regulation, generative learning strategy use, and learning.

The purpose of the present investigation was to describe the effects of eight weeks of generative learning model (G.L.M.) on strategic thinking skills and learning level of offensive fencing basics.

Figure 1. This framework explains the essence of generative learning theory and describes the predicted cognitive mechanism of related psychological constructs.



Methods.

48 female students from faculty of physical education for girls (age 17.8 +/- 1.9 years) participated in this study. The sample was distributed equally into two groups, the experimental group contains (24 female students) and the control group contains (24 female students), the experimental group participated in the (generative learning model (G.L.M.)) program for eight weeks and the control group participated in the traditional program that used in the faculty. All participants completed the STQv3 and offensive skill tests before and after the 8-week programs.

The instrument

The STQv3(6 pages, 53 items) asked respondents to rate how often they used these skills when confronted with problems, dilemmas, and/or opportunities on a Likert type scale, where 1 = rarely or almost never, 2= once in a while, 3 = sometimes, 4 = often, and 5 = frequently or almost always. A higher value represents greater use of a cognitive skill. Average to above average scores on the STQ suggest that the respondent is effective in using the strategic thinking skills; meaning that he or she is most likely to possess the skills to be a strategic thinker. An inability to be an effective strategic thinker is suggested by low scores. The STQ takes approximately fifteen minutes to complete and is capable of being either self or electronically scored. The STQtmcontains two indicators: (a) Omission Rate (number of omitted responses), and (b) an Inconsistency Index (degree of response inconsistency) to overcome validity issues with self-report instruments. If scores on the paired items deviated, more than one point the case was eliminated from the analyses. It also contains seven reverse scored items to reduce the danger of patterned answers.

Results.

Table 1. Age, Anthropometric Characteristics and physical variables of the Groups (Mean ± SD)

Variables	Mean	Standard Deviation	Coefficient of skewness
Age (years)	19.55	1.65	0.34
Height (cm)	166.76	2.54	0.45
Weight (kg)	72.44	3.28	1.11

Table 1 shows the age, anthropometric characteristics and physical variables of the subjects. There were no significant differences were observed in the anthropometric characteristics and for the subjects in the groups.

Table 2. Mean ± SD and "T" sign. Between two Groups (experimental and control) in Systems Thinking, Reframing, Reflecting, Strategic Thinking and Performance Level of basics offensive fencing

Variables	Experimental group		Control group		T sign.
	Before	After	Before	After	
SystemsThinking	3.12 ±0.44	3.22 ±0.28	3.25±0.26	4.74 ±0.38	**Sign.**
Reframing	3.51±0.26	3.22±0.41	3.05±0.37	4.31±0.28	**Sign.**
Reflecting	3.15±0.65	3.38 ±0.39	3.10±0.32	4.66 ±0.54	**Sign.**
StrategicThinking	3.32±0.43	3.66±0.22	3.18±0.42	4.53±0.75	**Sign.**
Performance Level (Degree)	4.61 ±0.08	6.50 ±0.05	4.62 ±0.08	5.59 ±0.06	**Sign.**

The t-test showed statistically significant differences between the post measurements for the experimental and control groups in all variables of and Performance Level of basics offensive fencing for the experimental group.

Discussion

Findings supported the hypothesis that when students generated self-discovered images about material they needed to learn, their retention of the material improved.

However, researchers found that there was significant difference in retention either when images were experimenter-given, or when children worked with only verbal definitions (i.e., when no imagery was used). This idea, that learner-generated images facilitated greater learning than experimenter-given images, was in keeping with findings from research in general on generative learning. As did other research on generative learning performed in the years to follow, this early research found that learning was greater if the mediators of learning (i.e., the imagery) were self-discovered rather than experimenter-given. As. Bull and Wittrock's study found.

However, several studies have shown that learners do not regulate their own learning or they often make inappropriate metacognitive decisions, especially in a computer-based learning environment (Azevedo & Cromley, 2004). As a result, providing support and guidance may be necessary to help learners regulate their learning more appropriately. Two questions arise regarding support and guidance: What to support? And, how to support learners? First, considering the generative learning processes, support and guidance should help learners selectively attend to events, meaningfully generate their own knowledge, and monitor the knowledge they have generated. Specifically, underlining or highlighting is a strategy that learners use to select relevant information and integrate the information with their own preconceptions (Rickards, 1979). Learners, also, can create headings, organizations, or summaries with note-taking tools. Adjunct questions can provide learners with an opportunity to review their learning and create personally meaningful learning. Therefore, providing those types of learning tools help learners selectively attend to events and create meaningful understanding from the events.

The learning strategies employed in the name of generative learning are simple coding strategies such as underlining, note taking, and adjunct questions; complex coding strategies such as creating hierarchies and headings, summarizing and concept mapping; and elaborative integration strategies such as imaging and creating examples, interpretation, or analogies (Doctorow, Wittrock, & Marks, 1978; Rickards, 1979; Rickards & August, 1975; Wittrock, 1990; Wittrock & Carter, 1975). Many studies have supported the effectiveness of those generative learning strategies (Barnett, et al, 1981; Davis & Hult, 1997; King, 1992; Rickards, 1979; Shrager & Mayer, 1989). Even though theoretically potential learning benefits should arise from generative learning strategies, the effects are not always consistent in every learning environment.

Conclusions

The findings indicated that the (generative learning model) program for 8 weeks could an increase in strategic thinking skills and the performance level of the offensive fencing basics (simple two skills and complex three skills). These results have to be taken into account by teachers in order to better understand and implicated of these concepts in educational lessons.

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