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The Influence of Task Card Guidance on Student Learning in Tennis: Introducing Multi Media Principles in Physical Education

Bob Madou, Peter Iserbyt & Daniel Behets
Katholieke Universiteit Leuven, Belgium

Introduction
In Physical Education, studies on peer mediated learning environments have revealed social benefits (Dyson & Rubin, 2003; Mc Phail, Kirk, & Kinchin, 2004) and gains on motor skill development in different age and ability groups, sports and environments (Greenwood, Carta, & Maheady, 1991; Barrett, 2005). As there are tools that can serve as resources to guide thinking and collaborating activities (Pea, 1994), several intervention studies have mentioned the use of task cards to mediate student – centered learning.

In different roles of management, instruction or feedback, task cards can enhance task execution and stimulate task oriented behaviour. Considering task execution quality, they deliver simple instructions on a learning task by means of text, illustrations or pictures. Considering task execution quantity, they can explain the number of exercises or trials to perform. In enhancing task oriented behaviour they can be used as checklists to assess each other’s performance or as cognition support in organizing, supporting and augmenting thinking (Salomon, Perkins, & Globerson, 1991; Pea, 1994). Besides beneficial reports of task card implementation in enhancing peer tutored learning (Byra, 1993), there remains little evidence of the specific role of task cards on student learning.

To study the contents and design of PE task sheets, the domain of Multi Media Learning (MML) was implemented as a frame of reference. The premise of MML is that students learn more deeply from multi media messages consisting of words and pictures than from more traditional modes of communication involving words alone (Mayer, 2003). As cue guidance is one of the basic implementation forms of task sheets in PE and has been used in intervention studies in the past (Barrett, 2005), this pilot study focused on task sheets providing cues in words and pictures on a forehand groundstroke in tennis.

A first goal of this pilot study was to apply MML knowledge to construct task cards guiding a forehand groundstroke in tennis. As the time necessary for students to read and use task cards is an important issue for the implementation in student – centered teaching (Slavin, 1995; Barrett, 2005). A second goal was to investigate the impact of cue sequence on reading time. A third goal was to measure the influence of task card instruction and cue sequence on ball control and technical performance. It was believed that positive impact of task card guidance on motor skill acquisition could have strong implications for task card implementation in the PE field.

Methodology

Participants and materials
Eighty right-handed university students participated in this study (30 boys, 50 girls). Members from racquet sport clubs were excluded. Ball control was measured by scoring the landing spots of the forehand strokes hit by the subjects. The target area consisted of 5 concentric circles, measuring 40, 80, 120, 160 and 200 cm, corresponding to respectively 5,4,3,2 and 1 point. Stroke technique was videotaped and two test leaders executed real time laptop ball landing scores.

Design and Procedures
Participants received a 45 second standardized instruction on a laptop. After dropping a ball on a prescribed spot, the participant executed a forehand, thereby aiming for a target area, at the middle of the service line on the opposite side of the net. First, they performed 3 free trials, followed by a baseline sequence of 10. After baseline subjects performed 4 series of 10 trials. The 4 series alternated with 4 instruction sessions on a laptop. Participants could deliberately choose how long they studied the instructions. Reading time was recorded automatically.

Experimental conditions
Participants were divided ad random between 3 experimental conditions and a control group (N= 4x20). In the separate condition, the four technical cues were presented separately in the four instruction sessions. In the cumulative condition, a new cue was added for each instruction session. In the global condition all four cues were presented together during all four instructions. Task retention was measured after one week by scoring one 10 trial sequence from all subjects, preceded by 3 free trials.
Technical cues

In concordance with the principles of MML (Mayer, 2003) and a task card construction procedure for overhead throwing (Morrison & Reeve, 1993), four important forehand cues were constructed, based on leading works in tennis (Elliot, Reid & Crespo, 2004). They included pictures of a tennis player, combined with on screen text. Four (group) x six (series) analysis of variance (ANOVA) evaluated reading time, ball control and stroke technique.

Results

For reading time, a group effect F(1,2) = 20.31, p = 0.001 revealed different reading times between the global group and both other experimental groups p=0.001. A time by group interaction F(1,6) = 4.16 , p = 0.001, revealed more decrease in the reading times from the global group in comparison with both other experimental groups.

For ball control, no interactions were found. For the separate F(1,5) = 3.96 , p < 0.01 and the global group F(1,5) = 2.62 , p < 0.03 a learning effect over 6 measurements was found.

Considering stroke technique for the second cue, a learning effect for both the cumulative and the separate group was found F(1,1) = 4.51, p = 0.04 at the second intervention. For the fourth cue, an overall time by group interaction was found F(1,15) = 2.29, p = 0.001. Focusing on the fourth intervention, an interaction effect F(1,3) = 4,51, p=0,01 revealed higher learning gains for the separate and the cumulative group in comparison with both other groups. For the fourth cue in the first intervention, a significant interaction F(1,3) = 4.51, p < 0.001 revealed more increase in the global group, compared with both other experimental conditions (p < 0.01).

Discussion

Although no influence of multi media knowledge has been described in PE, it is believed that the experimental procedure for task card construction and design was easy to implement and provides a strong base for scientific task card construction. However, no recommendations for other types such as management or assessment cards should be made.

The time necessary for task card manipulation in PE classes is an important issue in the context of cooperative learning (Slavin, 1995, Dyson et al., 2003). Global task card presentation provoked more reading time in comparison with both other formats. Although this effect decreased over time, the implementation of global task cards in PE demands sufficient reading time for students.

Considering ball control, the cumulative group was the only group without learning over 6 measurements. This might be due to the fact that this sequencing failed to provide students with a strong learning scheme, neither offering them a global nor a specific focus.

Technical skill performance improved significantly over six measurements but did not exceed the results of the control group. However, stronger learning gains were found for the second and fourth cue immediately after their moment of initial exposure. This ‘First Exposure Effect’ (FEE) might indicate that a cue, presented for the first time, attracts students focusing on learning techniques immediately after. Students also tend to focus on the last presented cue, thereby taking their mind off the previous ones. This can be called the ‘Last Presentation Effect’ (LPE). Therefore, from a technical perspective, global cue sequence seems recommendable as it provides students with a general image on all four cues, making use of the FEE while not being liable to the LPE.

It is suggested that teachers would let the students deliberately chose their personal reading time, creating the opportunity for the task card to interact with the students characteristics such as prior knowledge, individual ability to learn, learning style, motivation and so on. Considering ball control, further investigation could explore different sequencing methods. Considering stroke technique, both the FEE and the LPE need further investigation to become reliable principles for cue sequencing in PE task cards.

References


