

## Instructional Guidance in Reciprocal Peer Tutoring With Task Cards

Peter Iserbyt, Jan Elen, and Daniël Behets

Katholieke Universiteit Leuven

This article addresses the issue of instructional guidance in reciprocal peer tutoring with task cards as learning tools. Eighty-six Kinesiology students (age 17–19 years) were randomized across four reciprocal peer tutoring settings, differing in quality and quantity of guidance, to learn Basic Life Support (BLS) with task cards. The separate and combined effect of two instructional guidance variables, role switching and role definition, was investigated on learning outcomes. In all settings student pairs were given 20 min to learn BLS. Individual student performance was measured before (baseline), immediately after (intervention) and two weeks later (retention). Repeated ANOVA showed strong learning gains but no significant differences between groups for total BLS scores. However, at retention significantly more students from the most guided condition remembered and consequently performed all BLS skills. It is concluded that guidance comprising role switching and role definition enhances skill retention in reciprocal peer tutoring with task cards.

**Keywords:** peer learning, Basic Life Support, cooperative learning, instructional models

The contemporary pedagogical concept of social constructivism, introduced by Vygotsky (1978), assumes that human development is based on classic biological development as well as on cultural mediation. Learning is triggered by creating a zone of proximal development, defined as the distance between the actual development level determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in cooperation with more capable peers. Creating this zone is an essential feature of learning because it stimulates a variety of internal processes that are able to operate only when the learner is interacting with the environment and cooperating with other people (Vygotsky, 1978). Although Vygotsky emphasized asymmetrical relationships in which one interactant is more expert than the other, neo-Vygotskian researchers such as King (2002) claimed that also peers can contribute to individual learning.

Iserbyt and Behets are with Katholieke Universiteit Leuven—Human Kinesiology, Movement Education and Sport Pedagogy, Leuven, Belgium. Elen is with Katholieke Universiteit Leuven—Research Centre for Instructional Psychology and Technology.

Although social constructivism offers a theoretical perspective on learning, it does not provide simple rules for pedagogical practice (Rovegno & Dolly, 2006). However, many educational researchers have developed and investigated teaching approaches from this perspective (for a review of social constructivism in the field of physical education, see Rovegno & Dolly, 2006). In some of these approaches, settings in which students work together in groups with no or minimal guidance are encouraged. It has been argued that students learn best in a non- or minimally guided environment where they have to discover or construct knowledge for themselves (Jonassen, 1991; Schmidt, 2000). Advocates of this non- or minimal guidance approach argue that instructional guidance might interfere with the natural learning processes and learning styles of learners and consequently negatively affect learning outcomes. In addition, they consider learning to be idiosyncratic and therefore a common instructional format or strategy might be ineffective to enhance individual learning (Steffe & Gale, 1995). On the other hand, an increasing amount of research reveals learning settings with no or minimal guidance to be inferior to guided methods of instruction in helping students learn and transfer (for reviews, see Kirschner, Sweller, & Clark, 2006; Mayer, 2004). This has been explained by arguing that learning environments with no or minimal guidance do not consider human cognitive architecture although it is of prime importance (Kirschner et al., 2006). Research on human cognitive architecture describes long-term memory as the dominant structure in human cognition. It contains a large amount of information that is central to all our cognitive activities. Learning implies the alteration of this long-term memory which requires interaction with working memory. Working memory is the cognitive structure in which conscious processing occurs. It is severely limited in capacity and duration as explained by cognitive information processing theories (Chandler & Sweller, 1991). Instructional procedures with no or minimal guidance, then, are argued to overload the working memory. By using working memory to search for problem solutions, less capacity is available for information-processing and learning activities (Kirschner et al., 2006). Therefore, it has been stated that providing direct instructional guidance on concepts and procedures to learners with limited prior knowledge in any subject matter is more effective than asking these learners to discover these procedures on their own (Mayer, 2004).

Previously conducted controlled experiments indicate that learners perform better when they are told what to do when dealing with novel information (Kirschner et al., 2006). However, the research mentioned above should be looked at with caution. Results obtained from research on the implementation of instructional guidance (or no guidance) are limited to the specific learning setting and the specific target group addressed in those studies. Therefore, it is difficult to generalize these findings to all learning settings and target groups (Webb & Farivar, 1994). Especially important is that hardly any study in this respect has been completed for learning psychomotor tasks. In addition, it is not yet clearly defined which instructional guidance variables are responsible for enhancing learning outcomes under specific conditions.

In this study the authors examined the effect of two instructional guidance variables within the context of reciprocal peer tutoring for acquiring a psychomotor task with task cards as learning tools. The target group consisted of freshmen university students in Kinesiology without prior knowledge on the task to be learned.

It was investigated whether these students would benefit from instructional guidance when working in pairs with task cards.

Peer tutoring, also known as peer teaching, is the system of instruction in which students work in pairs to support each other's learning (Byra, 2006; Ernst & Byra, 1998). This format has been extensively studied in general education (for review see Fuchs, Fuchs, Bentz, Phillips, & Hamlett, 1994) and was found to enhance students' cognitive and social learning (Olson, 1990). Findings from research in peer tutoring suggest that increases in learner achievement are related to the increase of individualized instruction, opportunity to respond and the provision of specific feedback (Maheady, 1998). In addition, the enhancement of self-concept (Fantuzzo, King, & Heller, 1992) and the fact that learning becomes more fun and exciting (Maheady, 1998) are important factors in explaining increased learning gains in peer tutoring.

In physical education, peer teaching structures have been investigated in different aged target groups (for reviews, see Byra, 2006; Ward & Lee, 2005). In general, these studies have shown increased student responses (Ward, 1993) and increased percentages of correct student performances (Johnson & Ward, 2001). It has been demonstrated that low-skilled students as well as higher-skilled students benefit from peer tutoring (Johnson & Ward, 2001). A substantial body of evidence supports the use of peer teaching structures with students having motor and cognitive delays. In one group of studies, normally developing students were paired with developmentally disabled students (Houston-Wilson, Dunn, van der Mars, & McCubbin, 1997). DePaepe (1985) found that students with moderate developmental disabilities who were paired with fifth-grade peer tutors from the regular student population spent more time in the subject-matter content (ALT-PE), regardless of whether the peer tutors were trained or not. Investigating students' opinions however, it was found that peer teaching strategies were not higher ranked than direct instruction or inquiry teaching with regard to the best way to teach physical education (Cothran & Kulinna, 2006). According to Metzler and colleagues (2008), peer teaching is one of the instructional models that can be considered as an innovation in the way physical education subject matter is taught and learned in P-12 and other educational settings. Other instructional models that were defined are direct instruction, personalized systems for instruction, cooperative learning, sport education, inquiry teaching, tactical games and teaching for personal and social responsibility (Metzler, Lund, & Gurvitch, 2008). Metzler (2005) also points out that each model is designed to promote a well defined set of learning outcomes, and that it is consequently not valid to make comparisons across these models. From all peer teaching strategies, reciprocal peer tutoring is one of the most commonly employed in physical education settings (Mosston & Ashworth, 2002). In this format, learners are paired and exchange roles of doer and observer. While one learner (doer) performs the task, the other learner (observer) observes and gives feedback based on information provided by the teacher orally or in the form of task cards.

The extent of peer teaching in the reciprocal style of teaching is specifically the provision of feedback from one learner to another (Byra, 2006). This format is very similar to the class-wide peer tutoring model (Delquadri, Greenwood, Whorton, Carta, & Hall, 1986). The only difference is that in class-wide peer tutoring, post-performance awards are given for appropriate social and skill behavior (Byra, 2006).

This is not the case in reciprocal peer tutoring. A number of studies compared the effects of Mosston's (1981) reciprocal peer teaching style to his command style of teaching (Ernst & Byra, 1998; Goldberger & Gerney, 1986). In general, reciprocal peer teaching has showed to improve skill performance in different-aged learners across various physical activities (Ernst & Byra, 1998; Goldberger & Gerney, 1986). In addition, the number of exchanges between pairs is much greater and more positive than the interactions between learners in the command and practice styles of teaching (Cox, 1986). These findings were supported by subsequent research indicating that interactions between students in reciprocal peer tutoring are high in number and positive in nature (Byra & Marks, 1993; Ernst & Byra, 1998). In addition, these students expressed more empathy and offered more praise and encouragement to each other (Goldberger, Gerney & Chamberlain, 1982). Subsequently, Mosston and Ashworth (2002) observed that feedback is provided at a much higher rate when the teaching style requires learners to provide immediate task-related information to a partner, and that partners will interact more when they are self selected (i.e., friends). Byra and Marks (1993) reported that learners gave more specific feedback to partners they identified as friends. Learners felt more comfortable receiving feedback from friends than from nonacquaintances. Furthermore, literature suggests that pairing by gender has little effect on learner processes and outcomes in reciprocal peer tutoring (Ernst & Byra, 1998).

The reciprocal peer tutoring format seems to have many benefits. Next to improved motor skill performance, students also learn to analyze movements by observing the doer and comparing this performance against the criteria defined by the teacher orally or by means of task cards, and to give and receive feedback (Ernst & Byra, 1998; Mosston & Ashworth, 2002). These academic gains occur for both doers and observers (Simmons, Fuchs, Fuchs, Mathes, & Hodge, 1995). While the learner is learning by doing, the observer is intended to be learning by observing, analyzing performance and giving performance-related feedback (Topping, 2005). Despite these positive research findings, peer tutoring effects are not incidental. Therefore, merely placing students in pairs is insufficient to ensure that learning will occur. In a reciprocal peer tutoring setting, learners depend upon each other not only for what they learn—the content to be learned—but also for how they learn—the process of learning (King, 1998). Moreover, learners are rarely experts in the process of learning. Research in cooperative learning suggests that only when structure (i.e., guidance) is implemented so that students understand how they should work together, cooperation and learning get maximized (Johnson & Johnson, 1994). If we extend this argument to the context of reciprocal peer tutoring, we can identify two main guidance variables affecting the structure of this setting, namely role definition and role switching. At present, their separate and combined impact on student learning has not yet been clearly investigated. In this study role switching and role definition are implemented separately and combined in a reciprocal peer tutoring setting with university students in Kinesiology, learning a psychomotor task with task cards. By implementing those variables separately, it was possible to investigate their contribution to student performance.

According to Cohen (1994) role switching fosters a reciprocal exchange in which the output of the observer becomes input of the doer. Student partners can work in their roles for a specific amount of time or a set number of turns depending on the skill to be learned (Block, Oberweiser, & Bain, 1995; Mosston & Ashworth,

2002). This role switching is considered to be an important factor in explaining learning gains in general education settings. Previous research argued that reciprocal roles are intended to promote mutuality in the tutoring process and provide equivalent opportunities for partners to engage in various cognitive and metacognitive activities (King, 1998; Mosston & Ashworth, 2002). Furthermore, it is believed that role switching engages students in greater questioning, explaining, monitoring and regulation of learning (King, Staffieri, & Adalgais, 1998). Although it makes sense that role switching would be beneficial for learning, its isolated contribution to student in physical education has not yet been investigated.

Clearly defining roles of observer and doer creates a positive interdependence between partners, which means that partners rely on each other to complete the task (Cohen, 1994). This positive interdependence is considered to be an essential element of cooperative learning outcomes (Putnam, 1998). It helps to prevent social loafing (Johnson & Johnson, 1999), encourages interaction between the observer and doer (Ernst & Byra, 1998), increases student participation and responsibility and leads to conceptual gains (Cohen, 1994). In addition, role taking helps to distribute the cognitive load between the two partners by allowing each partner to focus on one particular type of cognitive process to be used (King, 1998). Block et al. (1995) stated that roles of doer and observer should be clearly defined. The doer knows exactly what he/she should be working on while the observer knows exactly what components of a skill to look at and what kind of feedback that should be given. Also Dyson (2002) found that roles should be taught explicitly to enhance social and motor learning. In his cooperative learning study, he implemented the role of coach (i.e., observer) and held this student responsible for providing the doer with feedback. In doing so, a sense of respect was developed between learners.

In peer learning studies, task cards are often used as tools for providing feedback and to facilitate peer tutoring roles (Barrett, 2005; Block et al., 1995; Dyson, 2002; Johnson & Ward, 2001). Dyson (2002) argued that task cards help to hold students accountable for learning the motor skills, a key element of cooperative learning that is often missing. In his cooperative learning study, Barrett (2005) used task cards during practice time and to facilitate peer assessment. Johnson and Ward (2001) implemented task cards during a 20-lesson striking unit. In this study, task cards were used by students in Kinesiology to learn Basic Life Support in reciprocal learning settings. It is put that assigning the use of task cards to the observer could create a zone of proximal development. The student (observer) who is using the task cards to guide and assist the doer's learning could be the more capable peer showing the way to better performance.

Basic Life Support (BLS) was the psychomotor task to be learned in this study. BLS consists of nine lifesaving actions to be performed in a specific order. Based on Romiszowski's (1999) skills scheme, BLS can be classified as a reproductive skill due to the application of a standard procedure (algorithm). Because the majority of cardiac arrests are witnessed, bystander BLS has been shown to be an important predictor of increased survival to hospital discharge (Soar & McKay, 1998). Furthermore, research indicated that when bystander BLS is initiated, survival rate is doubled (Herlitz et al., 2005). Because of this importance, BLS has now become widely implemented in hospitals, lifeguard training and school curricula in several countries. However, BLS courses are often classroom-based and teacher intensive. Consequently, researchers in the field of BLS emphasized the need for instructional

methods which can raise the level of BLS performance or reduce instructional time while preserving performance level over time (Todd, Heron, & Thompson, 1999). From this point of view, this study contributes to the research in BLS in trying to find time-effective ways to teach BLS.

## Purpose of the Study

In this study four different reciprocal peer tutoring settings were implemented to learn BLS. Settings differed in the amount and quality of explicit instructional support that was given. Two instructional guidance variables were implemented separately and combined: role switching and role definition. This research contributes to the literature by investigating the isolated and combined impact of role switching and role definition on student performance in reciprocal peer tutoring. In all settings, instructions were provided by means of task cards combining a picture of the skill with specific instruction about how to perform the skill. The following research questions were addressed in this study: (a) What is the effect of instructional guidance when university students in Kinesiology learn BLS in pairs with task cards? and (b) what is the contribution of role switching and role definition to learning outcomes?

## Methods

### Sample and Student Grouping

The sample was made up of a total of 86 Kinesiology students (aged 17–19 years), 33 men and 53 women from a Belgian university. The study was embedded in a curricular life saving course. All participants had given their informed consent for participation in this study. In addition, the research was approved by the local Institutional Review Board. Students reported no previous training in BLS skills. Based on previous research indicating that the most appropriate pairing technique for peer learning is self-selection (Byra & Marks, 1993; Ernst & Byra, 1998; Mosston & Ashworth, 2002), students were allowed to choose a partner they preferred to work with and marked their relationship individually with 1 (unknown person), 2 (acquaintance), 3 (friend), or 4 (bosom friend). Student pairs were randomly divided into four groups of 18 students: role switching group (7 men and 13 women), role definition group (8 men and 14 women), combined group (10 men and 12 women) and control (8 men and 14 women). Analysis of variance (ANOVA) indicated no significant differences in relationship between partners across the four groups,  $F(3, 82) = 1.53, p = .21$ . In all four conditions partners had similar relationships, with means ranging between 3.4 and 3.8.

### Research Procedure and Experimental Groups

Baseline BLS performance was measured individually before intervention. Students received standardized instructions and the following scenario on a laptop computer: *"You are asked to help a man who has just collapsed in this room. The manikin in this room represents that man. You have two minutes to help the man to the best of your abilities. I will answer questions concerning the victim's condition, but I will*

not tell you what to do." A mobile phone was present next to the victim. Student's actions were assessed as baseline BLS performance. After baseline assessment students joined their preferred partner for intervention and were given 20 min to learn a BLS sequence by means of task cards. Pilot studies and recent literature in learning BLS (Isbye, Meyhoff, Lippert, & Rasmussen, 2007) indicate this is a suitable amount of time. Task cards were continuously available during intervention. In addition, task cards were the only source of information for learning BLS.

Student pairs were randomly assigned to one of four peer learning settings and received standardized instructions on a laptop computer according to their experimental group. In the *role switching* group students were asked to work in a doer-observer relationship. The function of the doer and observer was not defined. Every five minutes students had to switch roles when prompted by the researcher. Switching roles earlier or later was not allowed. Roles were not defined so students could choose for themselves what to do when being a doer or observer. In the *role definition* group students were also asked to work in a doer-observer relationship. The function of the observer was defined as *with the task cards in one's hands instructing the doer what to do, checking the doer's actions and give continuous feedback concerning the correctness of his/her actions*. The function of the doer was defined as *following the instructions and taking into account the feedback given by the observer*. No specific instructions concerning the switching of roles were given. Students could switch roles as they wished. It was not allowed to simultaneously enact the same role (e.g., both students performing BLS on the manikin). Students could choose themselves who started as a doer or observer and for how long. In the *combined* group students worked in a defined doer-observer relationship and they switched roles every five minutes when prompted by the researcher. In the *control* group students received no instructional guidance on how to structure the learning setting. Students decided themselves how to organize the learning setting with the task cards. They were free to practice on the manikin, read the task cards or not, switch practice turns, and so forth whenever they wished. In all groups, task cards were available as the only source to learn BLS.

To achieve intervention fidelity, all interventions were continuously supervised by a researcher to verify if the interventions were delivered as designed. This researcher was a professor in sports pedagogy, experienced in the reciprocal style of teaching. Before the experiment, this researcher received two training sessions of 30 min to get familiar with the specific procedures and protocol for each experimental group as described above and set up by the study investigators. In addition, all interventions were filmed and analyzed to identify inconsistencies in the experimental treatments. None were identified.

During intervention all student pairs were videotaped to collect BLS data and allow adequate analysis afterward. After 20 min intervention time the researcher stopped the students to start individual intervention assessment of BLS. Retention testing of BLS performance occurred two weeks following intervention. Participants were asked not to engage in BLS activities meanwhile.

### Basic Life Support Task Cards

Eleven task cards were developed to learn BLS. Their content was developed according to the European Resuscitation Council 2005 guidelines and comprised

the instruction of nine BLS items (Handley et al., 2005), namely safe approach, check responsiveness by shaking gently and shouting loudly, shout for help, open airway, check for breathing, call 112, perform 30 chest compressions, perform two ventilations, and finally continue the 30 compressions-2 ventilations sequence until you become exhausted, professional rescuers take over or the victim starts breathing normally. Instructions for performing chest compressions and ventilations were provided on two task cards due to the complexity of these skills. All task cards were orientated in landscape and had an A4 format, which fits the size of a page in regular text processing programs. They combined a picture of the BLS skill with instruction on how to perform the skill. The development and design of the task cards were based on multimedia learning research (Mayer, 2005). This research provides research-based principles to take into account when developing multimedia learning tools to promote learning. The following principles were taken into account for the development of the BLS task cards:

#### Learners learn better

- from words and corresponding pictures than from words alone (multimedia principle);
- when words and corresponding pictures are presented near rather than far from each other on the page or screen (spatial contiguity principle);
- when extraneous material is eliminated rather than included (coherence principle);
- when instruction is personalized (personalization principle).

In addition, a theory-grounded and research-based technique for coping with complexity in multimedia learning was taken into account, namely signaling. Signaling means that important techniques on the pictures are cued by means of arrows (Mayer, 2005).

### Assessment of Basic Life Support Performance

All BLS assessments were individually completed on a Laerdal AED ResusciAnne manikin connected to a laptop computer running the PC-Skill Reporting system version 2.0 (Laerdal Medical, Belgium). This software recorded the following cardiopulmonary resuscitation variables: total number of compressions, average compression depth, average compression frequency, hand position, total number of ventilations, average ventilation volume, and ventilation-compression ratio. In addition, qualitative assessments were made by two researchers, naïve to the purpose of this study and certified BLS instructors. These qualified observers evaluated the following variables from BLS videotape recordings at baseline, intervention, and retention: safe approach, check responsiveness by shaking gently and shouting loudly, shout for help, open airway, check for breathing, call for help or 112, continue 30-2 sequence, performs all BLS skills and performs all BLS skills in correct order.

Intra- and interobserver reliability was measured using Cohen's Kappa. Intraobserver reliability was 0.97 for researcher A and 0.95 for researcher B. Interobserver reliability was 0.92, based on 40% of all BLS video tapings. To calculate the over-

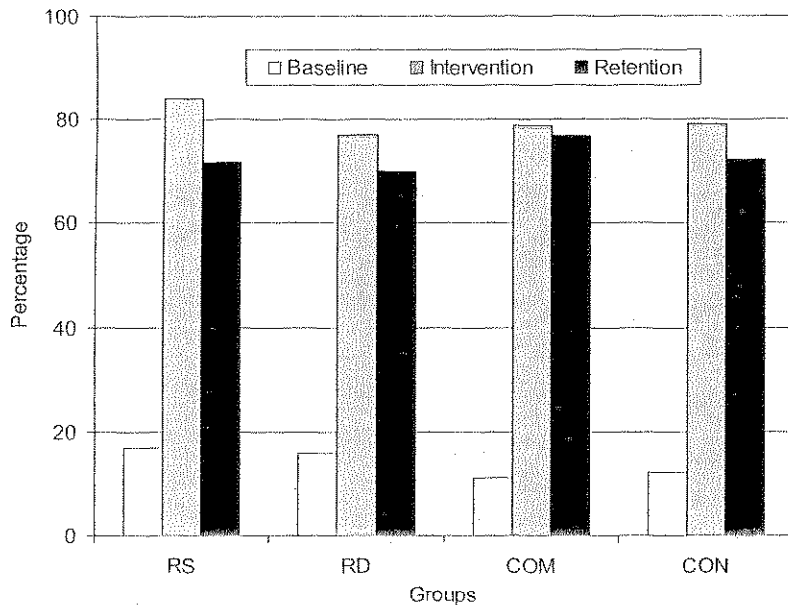
all BLS performance, data from the research manikin and assessments made by observers were entered in a scoring system based on the Cardiff Test (Whitfield, Newcombe & Woollard, 2003). A complete description of the scoring system used to assess doer performance is presented in Appendix A. Total BLS scores could range between 18 and 73 points. Individual BLS variables were analyzed as well.

## Data Analysis

For BLS, dichotomous variables (performed—not performed) were analyzed using Pearson's chi squared analysis. Variables with multiple response and continuous cardiopulmonary variables from the manikin were analyzed using one way analysis of variance (ANOVA) to detect significant differences between groups. A repeated-measures ANOVA was conducted for total BLS scores at baseline, intervention and retention to analyze learning gains. Scheffé's test was conducted for post hoc analysis to discriminate significantly different groups. An alpha level of .05 was used for all statistical tests.

## Results

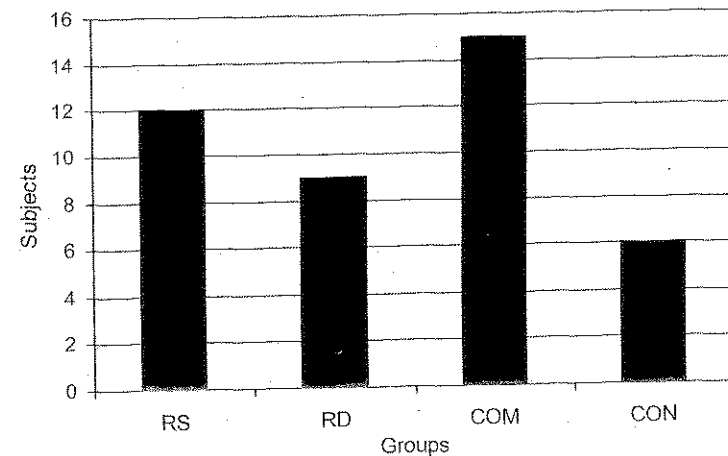
Repeated-measures ANOVA for average total BLS scores at baseline, intervention and retention revealed no significant differences between groups,  $F(3, 82) = 0.70$ ,  $p = .56$ . However, a main effect for time was found,  $F(2, 164) = 1035.40$ ,  $p < .001$  (see Figure 1). Post hoc Scheffé analysis indicated significant differences for aver-



**Figure 1** — Average Basic Life Support performance at baseline, intervention and retention testing in the role switching (RS), role definition (RD), combined (COM) and control (CON) group.

age total BLS scores between baseline and intervention ( $p < .001$ ), baseline and retention ( $p < .001$ ) and between intervention and retention ( $p = .01$ ). For individual BLS skills, no significant differences were found between groups.

At retention, significantly more students from the combined group remembered and consequently performed all nine BLS skills compared with their counterparts in the control group ( $p = 0.03$ ; see Figure 2). This difference in skill retention was not significant between all other groups.



**Figure 2** — Number of subjects performing all Basic Life Support skills at retention in the role switching (RS), role definition (RD), combined (COM) and control (CON) group.

## Discussion

The first research question in this study addressed the effect of implementing instructional guidance variables on learning outcomes. The target group consisted of university students in Kinesiology, working in pairs with task cards. Repeated-measures ANOVA for total BLS performance demonstrated strong learning gains in all groups between baseline and intervention, and between baseline and retention. From intervention to retention testing, there was a significant drop in student performance in all groups. No significant differences between groups were found. Concerning the retention of all nine BLS skills, a significant difference was found between the combined group and the control. At retention, significantly more students from the combined group remembered and consequently performed all BLS skills compared with their counterparts in the control group. In this study, it is striking that skill retention was only enhanced in the condition where role switching as well as role definition were implemented. The isolated implementation of those variables (i.e., role switching and role definition) does not seem to affect skill retention. It is only when both are implemented, skill retention is enhanced.

In general, the enhancement of skill retention in the most guided condition supports previous research where settings with no or minimal guidance were found to be inferior to guided methods of instruction (Kirschner et al., 2006; Mayer, 2004).

Early research on reciprocal teaching (Palincsar & Brown, 1984) demonstrated that structure is needed to keep students focused on learning the given task, which in turn is beneficial for learning. In addition, it supports the statement that learners with limited prior knowledge in any subject matter should be provided with direct instructional guidance on concepts and procedures and should not be left to discover these procedures by themselves. Advocates of no or minimal guidance however state that any form of guidance interferes with the natural learning processes and learning styles of learners and consequently negatively affect learning. In this study, the control group could be considered as a non-guided setting, where partners were free to organize the learning environment themselves. This implies that they had to agree on a large amount of decisions like how to use the task cards (e.g., read silently or aloud; use as instructional and/or feedback tool; etc.), how to practice, when to switch practice turns, and what to do when not practicing. Maybe this mutual decision making to organize a peer tutoring setting poses a higher cognitive load on the learners' working memory compared with receiving explicit guidance. Next to this self-organization of the learning environment partners also had to focus on learning the skill. From this point of view then it could be suggested that receiving explicit guidance on how to organize a peer tutoring setting with task cards reduces cognitive load and allows learners to focus more on the content to be learned. As a consequence, more space in working memory could be available for learning through interaction with the long term memory. This reasoning is in line with previous research where it was argued that peer tutoring settings can be effective on condition that the organization is adequate (Topping & Ehly, 2001). In this study instructional guidance seems to affect only skill retention. Maybe the target group addressed in this study (university students in Kinesiology) is more capable of processing a higher cognitive load than other learners. Or, maybe the cognitive load for learning BLS is just not high enough for these students, which could explain why a reduction of cognitive load by instructional guidance does not affect BLS performance and consequently does not discriminate between groups at intervention. It was only on the level of skill retention that instructional guidance affected BLS performance.

The second research question in this study addressed the contribution of role switching and role definition in students learning BLS in pairs with task cards. From a social constructivist perspective on learning, teaching and learning are highly social activities. Interactions with teachers, peers and learning materials like task cards could influence the cognitive and affective development of learners (King, 1998). It is stated that when learners perform intellectual activities, they dynamically interact with the learning environment which could support improved performance. In the current study, individual learners were able to interact with their peer and the task cards. Hence, improved interaction with this learning context by implementing role definition and role switching should enhance performance. Role definition could have affected interactions between learners and the task cards because it defined the roles of being a doer and observer. Being an observer was defined as "*with the task cards in one's hands instructing the doer what to do, checking the doer's actions and giving continuous feedback concerning the correctness of his/her actions*". The role of the doer was defined as "*following the instructions given by the observer*". These role definitions contain guidance on how to use the learning tools and how to interact with the partner, which might be advantageous

to enhance learning outcomes. The importance of instructing students how to use learning tools has previously been stressed for learning cardiopulmonary resuscitation performance in a class-wide peer tutoring setting (Ward & Ward, 1996). Previous research also indicated that clearly defining roles is beneficial for student learning (Block et al., 1995; Dyson, 2002). By assigning the use of task cards to the observer a zone of proximal development could be created. The observer, using the task cards to guide and assist the doer, could be seen as the more capable peer showing the way to better performance. However, in the current study, the isolated implementation of role definition as an instructional guidance variable was not beneficial for learning outcomes. It seems that role switching, as additional variable next to role definition to assure equal times for being a doer and observer, is crucial for student skill retention.

The implementation of role switching (reciprocal style of teaching) guarantees equal practice times as a doer and observer, implicating equal opportunities for giving feedback and practicing (Mosston & Ashworth, 2002). In contrast, when role switching is not implemented in a reciprocal peer tutoring setting, peers have to decide themselves when to switch roles. This might be a problem for peers who are not able to distribute the given practice time according to their individual learning needs and learning pace. Therefore, implementing role switching could be beneficial to ensure mutual learning. Previous research on peer tutoring did not address the contribution of role switching to student learning (e.g., Barrett, 2005; Johnson & Ward, 2001). From this study it can be concluded that the isolated implementation of role switching did not enhance student learning. Only when role switching as well as role definition were implemented, learning outcomes were enhanced.

This study has some limitations. Firstly, the nature of the BLS skill as a restriction to the generalization of findings in this study should be acknowledged. Different results could have been obtained when the task involved a more motor-, cognitive- or non-algorithmic skill. Secondly, the sample group in this study consisted of university students in Kinesiology. These students are perhaps more acquainted with learning psychomotor tasks such as BLS and consequently achieve higher learning outcomes. In other words, the question arises whether the impact of instructional guidance on student performance in this target group is more restricted in comparison with other groups. In addition, it could be stated that for the present target group task cards as learning tools in itself promote effective cooperation between peers, explaining high learning outcomes but no significant differences for total BLS scores at intervention and retention. Finally, practice time in this setting was set at 20 min. Maybe this intervention time is too long for discriminating the impact of guidance and allowing initially weaker groups to achieve similar performance.

## Conclusions and Future Research

This study investigated the effect of explicit instructional guidance on learning BLS in four reciprocal peer tutoring settings with task cards. Participants in this study were freshmen university students in Kinesiology without prior knowledge in BLS. Experimental settings differed in the quality and quantity of instructional guidance. Two variables were implemented separately and in combination in three groups: role switching and role definition. In a fourth group (control) no guidance was given. From this study it can be concluded that the combined implementation

of role switching and role definition in a reciprocal peer tutoring setting with task cards enhances skill retention.

Future research could focus on the generalization of findings in this study. The present study could be replicated with other target groups (e.g., secondary school students, or students with special needs or disabilities). In addition, researchers could investigate the effect of additional variables that could be able to enhance learning outcomes in peer learning with task cards, like peer and self-assessment. As scholars recommend that students become key participants in the assessment process by tracking their own progress (Marzano, 2006), future research could investigate the effect of peer and self-assessment on learning outcomes in reciprocal peer tutoring with task cards.

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## Appendix: Assessment of Basic Life Support Performance

- 1. Safe approach**
    2. Performed
    1. Not performed
  - 2. Check consciousness**
    - A. *By shaking gently at shoulders*
      3. Performed
      2. Not performed
      1. Performed potentially dangerous
    - B. *By shouting aloud*
      2. Performed
      1. Not performed
  - 3. Shout for help**
    2. Performed
    1. Not performed
  - 4. Check breathing**
    - A. *Opening airway*
      4. As instructed on task cards
      3. Other and effective
      2. Visibly attempted
      1. Not performed
    - B. *Look, listen, feel*
      - B1. *Actions*
        4. Correct
        3. Not correct
        2. Not effective
        1. Not performed
      - B2. *Time*
        4. 8-12 s
        3. 1-8 s
        2. >12 s
        1. Not performed
  - 5. Call 112**
    3. Performed
    2. Called unspecified help
    1. Not performed
  - 6. Chest compressions**
    - A. *Total amount of compressions after three cycles*
      4. 85-95
      3. >95
      2. 1-84
      1. Not performed
    - B. *Average compression depth (mm)*
      6. 40-50
      5. 51-55
      4. 24-39
      3. >55
      2. 1-24
      1. Not performed
  - C. Compressions with correct hand position (%)*
    6. 100
    5. 85-99
    4. 70-85
    3. 55-70
    2. <55
    1. Not attempted
  - D. Average compression rate (rate/min)*
    6. 90-110
    5. 110-120
    4. 80-90
    3. >120
    2. <80
    1. Not performed
  - 7. Ventilation**
    - A. *Total amount of ventilations after three cycles*
      7. 6
      6. 4-5
      5. 7-8
      4. 1-3
      3. >8
      2. Attempted
      1. Not performed
    - B. *Average ventilation volume (ml)*
      7. 500-600
      6. 300-499
      5. 600-800
      4. 1-299
      3. >800
      2. Attempted
      1. Not performed
    - C. Ventilation: compression ratio*
      5. 2: 30 (2: 28-32)
      4. Other
      3. Compression only
      2. Ventilation only
      1. No ventilation nor compression
  - 8. Continue with resuscitation**
    4. 3 items correct
    3. 2 items correct
    2. 1 item correct
    1. No item correct
- Extra analysis:
- 9. Performed all BLS items**
    2. Yes
    1. No
  - 10. Performed all items in the correct sequence**
    2. Yes
    1. No

Total Basic Life Support score (1-10): range 18-73 points