The Use of Strategies in Motor Learning: Validation of a New Questionnaire

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Analyzing cognitive learning strategies are an important topic of psychological research since many years. On the majority, studies are focused on the relationship between the use of learning strategies and academic achievement (e.g., Artert, 2006; Streblow & Schiefele, 2006) and the development or evaluation of strategy trainings (e.g., Schmitz the, 2006). Numerous assessment methods are available, primarily in the form of self-report questionnaires (for a current review: Sporer & Brunstein, 2006).

By contrast, researchers in the field of motor learning has ignored so far this crucial aspect of motor learning. Thus, a questionnaire was developed to measure motor learning strategies. Based on psychological measures, five groups of learning strategies are differentiated:

1. Cognitive strategies [COG]
2. Metacognitive strategies [MET]
3. Management of external resources [IRE]
4. Management of personal resources [PER]
5. Motor strategies [MOT]

Each group of strategies is measured by one subscale. Altogether, the instrument, named “StraBL” (abbreviation of “Strategies of motor learning” in German), contains of 35 items.

Using hypothetical learning situations, the German version of the StraBL-questionnaire was evaluated in two studies.

STUDY 1
The exploratory factor analysis confirms the hypothesized 5-factor structure (see figure 2). The factor loadings are meaningful and relatively high (≥ .50 for 35 items). This factor solution explains 54% of total item variance.

The part-whole-correlations range from r = .37 to .69 and correspond to the factor analysis results. The reliability coefficients of the subscales range from α = .78 to .84 (see table 1).

STUDY 2
The results of this study reveal that most of the strategies (23 of 35, 65.7%) measured by the StraBL-questionnaire were used differently depending on the sport skill which was (hypothetically) learned. For example, the strategy “I practice the parts of the motor skill separately” (item 30) was frequently used to learn high jump, but very rarely to learn golf or swimming, αMHL = 4.92, p > .001.

Method

Participants: 170 students (92 men, 78 women; M = 24.2 years).

Procedure: Learning strategies should be measured within a specific learning situation (e.g., Leopold & Leutner, 2002). Thus, participants were instructed to visualize how to learn skis and then complete the StraBL-questionnaire.

Data analysis: Exploratory factor analysis (principal components with varimax rotation); part-whole correlations; internal consistency (Cronbach’s alpha).

STUDY 1

Table 1: Means, standard deviations, part-whole-corrrelations, and internal consistency of the StraBL subscales

<table>
<thead>
<tr>
<th>Subscale</th>
<th>M</th>
<th>SD</th>
<th>Part-whole correlations</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>COG</td>
<td>3.57</td>
<td>.72</td>
<td>.42 - .67</td>
<td>.832</td>
</tr>
<tr>
<td>MET</td>
<td>3.32</td>
<td>.68</td>
<td>.42 - .66</td>
<td>.845</td>
</tr>
<tr>
<td>IRE</td>
<td>3.25</td>
<td>.68</td>
<td>.36 - .78</td>
<td>.782</td>
</tr>
<tr>
<td>ERE</td>
<td>3.32</td>
<td>.68</td>
<td>.37 - .74</td>
<td>.799</td>
</tr>
<tr>
<td>MOT</td>
<td>3.41</td>
<td>.69</td>
<td>.43 - .63</td>
<td>.825</td>
</tr>
</tbody>
</table>

Results

The results of this study reveal that most of the strategies (23 of 35, 65.7%) measured by the StraBL-questionnaire were used differently depending on the sport skill which was (hypothetically) learned. For example, the strategy “I practice the parts of the motor skill separately” (item 30) was frequently used to learn high jump, but very rarely to learn golf or swimming, αMHL = 4.92, p > .001.

Discussion

Overall, the data suggest that the StraBL-questionnaire is a valid and reliable measure of learning strategies in sport and is worthy of further development and use. (1) The factor analysis provides support for the differentiation of five groups of strategies, (2) the alpha coefficients are at good level, (3) in line with results in the field of cognitive learning, strategies in motor learning are task-specific.

However, it is important to note some restrictions of the present study: (1) The German version of the StraBL-questionnaire was evaluated, not the English version presented in figure 2! The validity and reliability of this version is to examine in a further study. (2) Only hypothetical learning situations were used! In future studies, the StraBL-questionnaire should be applied on real learning processes in order to validate our findings.

In study 2 evidence was found that the use of learning strategies depends on gender, that is, men and women used different strategies in motor learning skill (see Bund, in press). Future research on learning strategies should address this and other learner-related aspects (e.g., age, skill level, goal orientation, self-efficacy). Furthermore, different learning tasks should be used (e.g., simple vs. complex tasks).

Another promising option is the interdisciplinary cooperation with cognitive psychologists in order to examine the behavioral differences between cognitive, or academic, learning and motor learning.

References


Figure 1: Motor skills used in Study 2

Figure 2: Results of an exploratory factor analysis

Method

Participants: 240 students (120 men, 120 women; M = 24.4 years).

Procedure: Participants were instructed to visualize how to learn motor skills of six different sports (e.g., athletics, golf; see figure 1) and then respond to the StraBL-questionnaire.

Data analysis: Exploratory factor analysis (principal components with varimax rotation); part-whole correlations; internal consistency (Cronbach’s alpha).

The results of this study reveal that most of the strategies (23 of 35, 65.7%) measured by the StraBL-questionnaire were used differently depending on the sport skill which was (hypothetically) learned. For example, the strategy “I practice the parts of the motor skill separately” (item 30) was frequently used to learn high jump, but very rarely to learn golf or swimming, αMHL = 4.92, p > .001.