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# Measuring process-oriented teaching

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**Abstract**

Process-oriented teaching is generally recognized as a way to promote lifelong learning, which in turn is tied to a demand of modern society. The purpose of this study is to examine psychometric properties and construct validity of Process-Oriented Teaching Questionnaire. A multi-group confirmatory factor analysis (MCFA) is performed to test the scale theoretical structure and the metric invariance across teachers' length of service. Results of MCFA are consistent with the hypothesized scale structure and show measurement invariance across different lengths of teaching service. The reliability of the scales in terms of internal consistency ranged from .81 to .87.



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## 1. Introduction

Process-oriented teaching is generally recognized as a way to promote lifelong learning, which in turn is tied to a demand of modern society. According to Bolhuis (2003) there are four main principles in process-oriented instruction: 1) proceed in the direction of student regulation of the learning process; 2) focus on knowledge building in the domain; 3) pay attention to emotional and motivational aspects of learning; and 4) take into consideration social nature of the learning process. Key strategies in process-oriented teaching are the activation of students' prior knowledge (Bolhuis & Simons, 1999), the support of students' self-regulated motivation (Deci & Ryan, 2002), the clarification and the discussion of learning goals (Zimmerman, 1989), and the promotion of students' self-evaluation skills (Arter, Spandel, Culham, Pollard, 1994). Activation of students' prior knowledge is related to mobilizing prior information and concepts, which are connected to a specific topic. If prior knowledge is not activated, there is a risk of inert learning (Brown & Paliscar, 1989) and of a lack of transferability to other contexts (McKeough, Lupart, Marini, 1995). Additionally in process-oriented teaching one should also take into consideration that teachers vary in the interpersonal styles they rely on to teach and motivate students (Deci, Schwarz, Sheinman, Ryan, 1981; Rigby, Deci, Patrick, Ryan, 1992; Ryan & Grolnick, 1986). Promoting students' self-regulated motivation implies allowing students the opportunity to choose, listening to students, asking students for their points of view (e.g., Reeve, Bolt, Cai, 1999). Process-oriented teaching also profits from making goals explicit through reflection and

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discussion with the students (Bolhuis, 2003). Learning goals and their relation with student's goals are often not clear to students and this is harmful for self-regulated learning. Another key strategy in process-oriented teaching is the promotion of students self-evaluation and self-monitoring, since it fosters student's self-concepts as active agents who have control of their learning (Barry, Zimmerman, Dale, Schunk, 2001).

Although key strategies in process-oriented teaching are well-defined concepts, there is still a lack of instruments for the assessment of teaching behaviors in this area.

### *1.1. Purpose of the study*

The aim of the present study is to examine the factor structure, the measurement invariance and the reliability of the scales of the Process-Oriented Teaching Questionnaire (POTQ).

## 2. Methods

### *2.1. Participants and procedures*

Subjects were 412 Italian teachers who worked in 8 primary schools in Rome. In each school, all the teachers participated in the study. The teachers completed the questionnaire individually.

### *2.2. Instrumentation*

The Process-Oriented Teaching Questionnaire was composed of three different teaching situations: explaining a new important topic to students, taking a typical lesson in the classroom, giving a feedback to students after a classroom test. Each situation was followed by scales assessing different teaching strategies for dealing with the specific situation. Each scale was composed of four items and teachers rated the frequency with which they used the behavior described in each item using a seven point Likert scale (where 1 corresponded to *"never"* and 7 corresponded to *"very often"*).

In the first teaching situation (explanation of a new important topic) two scales assessed two different process-oriented teaching strategies: discussion of learning goals (e.g., *I spent a lot of time in discussing with students which were their learning goals for the new topic*) and activation of prior knowledge (e.g., *I spent a lot time in understanding what students already knew about the topic*). Furthermore, one scale assessed traditional teaching strategies in terms of using frontal lessons (e.g., *I spent most of the time explaining the new topic fully*). In the second teaching situation (taking a typical lesson in the classroom) one scale assessed process-oriented teaching strategies in terms of support of students' self-regulated motivation (e.g., *I spent a lot time in listening to the students' opinions*) and one scale assessed instead traditional teaching strategies in terms of controlling students' behavior (e.g., *I spent a lot of time in telling the students what they had to do*). Finally, in the third situation (teacher feedback after a classroom test) process-oriented teaching strategies were assessed using a scale about the promotion of students' self-evaluation (e.g., *I spent a lot of time asking the students to think about what was their evaluation of their own work*), and traditional teaching strategies were assessed using a scale about the conjoint use of unidirectional speech and verbal rewards (e.g., *I spent a lot of time in communicating to the students the results they got, praising whoever did well*). The Process-Oriented Teaching Questionnaire was thus composed of seven scales (four about process-oriented teaching strategies and three about traditional teaching strategies) and of a total of 28 items.

### *2.3. Data analysis*

A multi-group confirmatory factor analysis (MCFA) was performed using SPSS AMOS 18. In accordance with the theoretical structure of the scale, the tested model consisted of 7 correlated factors. Measurement invariance was tested across three categories of length of teaching service (1-19 years; 20-30 years; 31-42 years), in terms of metric invariance, constraining factor loadings to be equal across different lengths of service. In accordance with recommendation by Chen (2007) for comparing two nested models, cut-off values of $\Delta$RMSEA < 0.015 were used for testing metric invariance.

## 3. Results

The tested measurement model had the goodness-of-fit indexes as follows: $\chi 2 = 931.67$ (df = 329) $p < .001$; $\chi 2/df = 2.8$; CFI = .91; RMSEA = .06. The reliability of the scales in terms of internal consistency was: .85 for Discussion of learning goals; .81 for Activation of prior knowledge; .81 for Using frontal lessons; .82 for Support of students' self-regulated motivation; .81 for Controlling students' behavior; .86 for Promotion of students' self-evaluation; and .87 for Using unidirectional speech and verbal rewards. The chi-square difference between the baseline model and the measurement invariance model was not statistically significant ($\Delta\chi 2 = 42.08$; df = 43, p = .47), and the difference in RMSEA was smaller than the cutoff criterion of .015 suggested by Chen (2007). According to these criteria, the scales can be considered as invariant across lengths of teaching service. Table 1 shows the results of these analyses.

Table 1. Equivalence of the factor structure of the POTQ scales across teachers' length of service

| Subgroup Comparison | Configural invariance models (Baseline models) | Measurement invariance models |
|---|---|---|
| $\chi^2$ (df) | 1888.52 (987) | 1930.61 (1029) |
| RMSEA | .047 | .046 |

## 4. Discussion

The main goal of process-oriented teaching is to encourage the development of self-regulated learning in order to promote lifelong learning. In traditional teaching the focus is on the content (knowledge and/or skills), while in process oriented teaching the process of acquiring this content (Bolhuis, 2003) is crucial. In process oriented teaching the teacher has to pay attention to the learning process activating students' prior knowledge, discussing learning goals and giving to the students the possibility of choice and of self-monitoring.

The aim of this study was to examine the factor structure, the measurement invariance and the reliability of a questionnaire assessing specific behaviors of process-oriented teaching as opposed to traditional teaching behaviors. The behaviors taken into consideration for process-oriented teaching were: the discussion of learning goals and the activation of prior knowledge in the explanation of a new important topic, the promotion of students' self-evaluation after a classroom assessment and the support of students' self-regulated motivation during a typical lesson. On the other hand three styles of traditional teaching were assessed: the use of frontal lesson based on unidirectional speech and on presentation in the explanation of a new important topic, the conjoint use of unidirectional speech and verbal rewards in the feedback after a classroom assessment and the use of a controlling style (Reeve, 2002) during a typical lesson.

The results showed that the seven-factor structure that was hypothesized in accordance with the theoretical structure of the scale fitted the data reasonably well. Furthermore, the scales showed reliability in terms of internal

consistency: the lowest Cronbach's alpha for the scales was .81. Finally, the test of metric invariance revealed the presence of measurement invariance across the three categories of length of teaching service.

The Process-Oriented Teaching Questionnaire provides a means by which researchers can examine the teaching strategies adopted by teachers. More specifically, with this questionnaire it is possible to investigate whether teachers tend to adopt a process oriented versus a traditionally oriented teaching strategy with their students. This could be useful in studies that aim at exploring the effects of the teaching behaviors on students' motivation, emotion, and performance.

In conclusion however, some limitations in the present study should be pointed out. First of all, the composition of the participating sample (i.e. Italian primary school teachers) might limit the generalizability of the results: future studies should include teachers from other school grades and from other countries. Secondly, we did not include in the study an observational measure of teachers' strategies: it would be useful to take into consideration in future validation studies also an external criterion based on teacher behavior in the classrooms.

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