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Explaining discrepancies between teacher beliefs and teacher interventions in a problem-based learning environment: A mixed methods study

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HIGHLIGHTS

- Tutor beliefs do not predict tutor interventions.
- Confidence in own facilitation skills explain tutor behavior.
- Students' capabilities clarify tutor interventions.
- Tutor behavior depends on the curriculum design.
- The developed observation instrument distinguishes tutor behavior.

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ABSTRACT

The purpose of this study was to explore the discrepancy between teacher beliefs and behavior in a Problem-Based Learning (PBL) environment. Using a survey and observations, this study demonstrated that tutors prefer learner-oriented beliefs, but in their teacher behavior they showed a more traditional approach to teaching. Analysis of semi-structured interviews indicated that this inconsistency could be attributed to the way in which problem-based learning is embedded in the curriculum, the confidence teachers have in the self-directed capabilities of students, and the self-confidence of teachers regarding their own facilitation skills.

1. Introduction

An increasing number of universities have developed curricula with a learner-oriented approach to teaching (Bolhuis & Voeten, 2001; Moust, Van Berkel, & Schmidt, 2005). Problem-based learning (PBL) is an example of a learner-oriented approach to teaching (Chng, Yew, & Schmidt, 2011; Hmelo-Silver & Barrows, 2006; Savery, 2006) that emphasizes self-directed, constructive, contextual and collaborative learning (Dolmans, De Grave, Wolfhagen, & Van der Vleuten, 2005; Hung, 2011). PBL has its origins in medical education and is introduced in many different countries, for instance Canada, United States, Australia and Singapore. Moreover, PBL is also adopted in other disciplines than medical education only, for instance economics and business, psychology, biology and law (Schmidt, Van der Molen, Te Winkel, & Wijnen, 2009).

The teacher in PBL, known as a 'tutor', plays a pivotal role as a facilitator, activator, and monitor (Hattie, 2009; Hmelo-Silver & Barrows, 2006). The tutor role differs from the teacher role in a teacher-oriented environment. In a teacher-oriented environment, the teacher has a directive role and aims to achieve knowledge transmission by giving examples, explaining the relationships and

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making distinctions between main and secondary issues. Moreover, a directive teacher structures the learning process and helps students to stay focused. In a learner-oriented environment a tutor instead takes a supportive role (Dahlgren, Castensson, & Dahlgren, 1998; Meirink, Meijer, Verloop, & Bergen, 2009). The tutor facilitates the students' learning process, encourages students to take responsibility for their own learning (Hmelo-Silver & Barrows, 2006), activates knowledge building, observes the students' thinking and learning strategies, and stimulates students to evaluate their learning process (Chng et al., 2011; Lee, Lin, & Lin, 2013). A learner-oriented approach to teaching may improve the quality of PBL (Zwaal & Otting, 2010; Moust et al., 2005) and leads to a higher quality of student learning (Trigwell & Prosser, 2004). Learner-oriented interventions are vital to the learning process and more effective in facilitating students' learning outcomes (Barrett & Moore, 2011). To enable learner-oriented interventions, cognitive apprenticeship strategies should play a role both in the curriculum development and in the tutors' guidance strategies (Collins, Brown, & Newman, 1989). Tutors should be able to apply different cognitive apprenticeship strategies such as modeling, coaching, scaffolding, articulation, reflection and exploration to support the students' learning process (Goh, 2014; Hmelo-Silver & Barrows, 2006). Tutors often find it difficult to guide students in a learner-oriented environment (Dolmans et al., 2002; Donche, 2005; Oolbekkink-Marchand, Van Driel & Verloop, 2006) and experience the use of different strategies as a very complex task (Goh, 2014; Hendry, 2009; Hmelo-Silver & Barrows, 2006). Even experienced tutors seem to struggle with their tutor role (Hung, 2011; Windschitl, 2002).

According to Ertmer (1999, 2005) two sets of barriers influence tutor behavior: extrinsic barriers and intrinsic barriers. Extrinsic barriers refer to limitations in the teachers' environment (e.g., inadequate equipment, no training possibilities). More important however, are intrinsic barriers, which refer to the ways tutors think about teaching and learning (Kim, Kim, Lee, Spector, & DeMeester, 2013).

1.1. Tutor beliefs

One way to investigate intrinsic barriers is to focus on tutor beliefs. In the present study tutor beliefs are defined as 'suppositions and commitments of tutors based on their own evaluations and judgments' (Meirink et al., 2009, p. 90). Tutor beliefs and conceptions are frequently used to describe the way teachers think about teaching and learning and are often used in the same context (Hoekstra, Brekelmans, Beijaard, & Korthagen, 2009; Jacobs, Muijtjens, Van Luijk, Van der Vleuten, Croiset, & Scheele, 2014a; Meirink et al., 2009). Beliefs are more deeply rooted and have more impact on tutor behavior than conceptions (Jacobs et al., 2014a; Pajares, 1992). Tutor beliefs influence the type of interventions tutors choose in their teaching practice (Oolbekkink-Marchand et al., 2006; Pajares, 1992).

A distinction is made between teacher-oriented beliefs and learner-oriented beliefs (Hoekstra et al. 2009; Lindblom-Ylänne, Trigwell, Nevgi, & Ashwin, 2006; Meirink et al., 2009; Trigwell & Prosser, 2004). Teachers with teacher-oriented beliefs prefer externally-directed, reproductive and individual learning. Teachers with learner-oriented beliefs prefer self-directed, constructive and collaborative learning. According to Vermunt and Verloop (1999) not all teaching activities lead to the same learning outcomes. Therefore, Meirink et al. (2009) divide learning activities into cognitive and affective learning activities. Cognitive learning activities are focused on knowledge-based learning outcomes and affective learning activities on emotions that influence students' learning progress (Vermunt & Verloop, 1999).

1.2. Tutor behavior

Tutor beliefs do not always predict actual tutor behavior. Hung (2011), and Windschitl (2002) demonstrated that most teachers have a preference for learner-oriented beliefs, but not always apply learner-oriented interventions in the classroom. Teachers with explicit learner-oriented beliefs still tend to fall back on teacher-oriented behavior (Donche, 2005; Meirink et al., 2009). These studies demonstrated a difference between the 'espoused theory'; the ideas that teachers believe guide their behavior and their 'theory in use'; the ideas that actually guide teachers' behavior (Argyris & Schön, 1996).

The literature gives various explanations for the discrepancy between tutor beliefs and behavior in a PBL context. Previous studies have reported that tutor interventions depend on the tutors' content expertise (Dolmans et al., 2002; Schmidt, Van der Arend, Moust, Kokx, & Boon, 1993). Content-expert tutors seem to find it difficult to limit themselves to the supportive role of facilitator (Kaufman & Holmes, 1998) and are likely to play a more directive role (Silver & Wilkerson, 1991). A non-expert tutor is focused on the facilitation and evaluation of the learning process (Dolmans et al., 2002) and enables students to use self-directing skills (Hung, 2011).

Tutor interventions depend as well on the way PBL is integrated into the curriculum (Hung, 2011; Lindblom-Ylänne et al., 2006). Savin-Baden (2000) suggests that many curricula use problem-solving learning instead of problem-based learning. Problem-solving learning is a more teacher-oriented approach, in which problem scenarios are developed based on subjects and disciplinary areas. Teachers determine what knowledge and skills are needed in order to achieve a 'good' solution for the problem. The solution for the problem is determined by the content. PBL is a learner-oriented approach where real-life problems are at the core of learning and students, with the support of a tutor, determine what knowledge and skills they might need to solve the problem. School subjects or disciplines do not determine the solution of the problem; there is no predetermined 'right' solution for the problem. Students are allowed and encouraged to take the responsibility to solve the problem in a variety of completely different ways (Hung, 2011).

Lastly, the capability of students plays a role. For instance, students may have difficulties with self-directed and constructive learning (Yew & Schmidt, 2009) and first year students may even have more difficulties with self-directed learning. Tutors need to adjust their guidance strategies to inexperienced students and need to support them to develop self-directed learning (Schmidt et al., 1993).

1.3. Present study

Previous studies showed contradictory findings about the impact of teacher beliefs on teacher behavior. For instance, various studies emphasized that teacher beliefs play a key role in teaching behavior (Hoekstra et al., 2009; Kim et al., 2013; Mälkki & Lindblom-Ylänne, 2011) although other studies demonstrated that teacher beliefs do not always predict teaching behavior (Bolhuis & Voeten, 2007; Donche, 2005; Postareff, Lindblom-Ylänne, & Nevgi, 2007; Windschitl, 2002). The present study is conducted in a PBL environment in which it is required that tutors not only have a learner-oriented way of thinking about teaching and learning but also demonstrate learner-oriented behavior. However, prior studies have not dealt with how tutors think about learner-oriented principles and how tutors apply learner-oriented interventions in PBL (Dolmans et al., 2002). Therefore, the first aim of this study was to identify and compare tutor beliefs and