Profiles of effective tutors in problem-based learning: scaffolding student learning

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Objectives Research on tutoring in problem-based learning has not focused so far on the variation in tutoring and how this variation can be interpreted by conceptions about effective tutoring.

Design This study focuses on the profiles of tutors generated by means of an instrument, the so-called Tutor Intervention Profile (TIP), and tries to determine which profiles are more or less effective. The TIP contains four dimensions of tutor behaviour: (1) elaboration; (2) directing the learning process; (3) integration of knowledge; and (4) stimulating interaction and individual accountability.

Setting The medical school of the University of Maastricht, The Netherlands.

Subjects Sixty-seven tutors who run 67 tutorial groups across three units (courses) in the academic year 1996–97.

Results It appeared that high, average and low performing tutors differ in their performance on each of the four dimensions of the TIP. Several different profiles of tutor performance could be distinguished, which were more or less effective. One group of tutors demonstrated a tutor intervention profile that was characterized as relying more on the use of expert knowledge, whereas another group of tutors was characterized as relying more on their abilities to stimulate the learning process in the tutorial group. The tutor intervention profile that was perceived by students as most effective showed high scores on each of the four dimensions, as expected. Notably, a tutor stressing the learning process in the tutorial group was perceived as more effective than a tutor stressing content (expert tutor). This is especially true for a relatively poor scoring tutor.

Conclusions The results of this study are consistent with research on human tutoring and research on tutoring in problem-based learning.

Medical Education 1999;33:901–906

Introduction

The role of a tutor in problem-based learning (PBL) is to scaffold student learning. This metaphor implies that the tutor provides support so that students think for themselves. A scaffold is a support, like the temporary framework that supports workers during the construction of a building. One assumption underlying scaffolding is that a cognitive distance exists between what learners know and can do on their own and what they know and can do with the assistance of a more knowledgeable person. Another assumption of scaffolding is that interaction and dialogue between the teacher and the learner or between peers plays a central role. The metaphor of scaffolding can be translated into a model of learning through incremental assistance by a more knowledgeable person, with the prototypical interaction being one-to-one tutoring.1

Individual (human) tutoring is regarded as the gold standard of education against which the value and effectiveness of other instructional methods can be measured profitably.2,3 Intelligent tutoring also uses individual human tutoring as a standard.4 However, although tutoring is regarded as a gold standard, there is little knowledge about the dynamics of the tutoring process. There is some research on scaffolding in the context of individual human tutoring (for a review of research see Hogan & Pressley1). This (descriptive) research has provided us with some information about the dimensions of scaffolding the learning process of students by expert tutors.1,3,5 Lepper et al.,3 for instance, found that human tutors give roughly equal attention to cognitive, motivational and social factors of
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The researchers emphasize the interplay between these factors. Furthermore, they summarize the characteristics of expert human tutoring as:

1. Expert tutors need to have subject matter knowledge but also subject-specific pedagogical knowledge to deal with difficulties students experience with learning subject matter, and expert tutors need more general pedagogical knowledge;
2. Expert tutors display a high level of affective support and nurturance in their interactions with students;
3. Expert tutors use a Socratic style of tutoring, that is they seek to draw as much as possible out of their students and to make learning an active and constructive process;
4. Expert tutors are committed to making increasing demands on the student in each tutoring session;
5. Expert tutors convey these high expectations in a very indirect and unprepossessing manner;
6. Expert tutors are more likely to articulate and especially to encourage and help the student to articulate the reasoning and meaning underlying their thinking, for example by stimulating self-generated explanations; and
7. Expert tutors devote substantial effort to encouraging and motivating students.

Hogan and Pressley\(^1\) conclude, however, that relatively little research has been done on scaffolding in, e.g. higher education, when it is indeed important to explore how scaffolding applies to this educational setting.

The way tutoring in PBL is realized might be influenced by the conceptions tutors have about effective teaching and learning. Tutors are not tabula rasa, since over the years they have developed conceptions of teaching and learning which might differ. How important these beliefs are for what they actually do is documented in research on teaching. According to Rando and Menges,\(^7\) these personal theories about teaching and learning are often implicit and likely to be inaccurate. Research on teaching in higher education\(^8\) reveals two teaching orientations or conceptions which have been labelled ‘learning facilitation’ and ‘knowledge transmission’. The learning facilitation orientation characterizes lecturers who conceive teaching as a facilitative process. On the other hand, lecturers whose conception of teaching is as knowledge transmission focus more on the subject than on learning. The knowledge transmission concept of teaching is also characteristic for beginning teachers.\(^6\) These different teaching conceptions, although related to lecturing, might explain different profiles of more or less effective tutors in PBL. Kaufmann and Holmes,\(^9\) for example, found that tutors who rated themselves as content experts find it difficult to maintain the ‘facilitator’ role and tended to present and explain case material more frequently than tutors who had less content expertise.

Research on tutoring in PBL in tutorial groups in the context of higher education has been limited. There are only a few studies identifying important dimensions of tutor performance in PBL which stimulate student learning.\(^10\)–\(^12\) Schmidt and Moust\(^11\) found that the dimensions of tutoring ‘social congruence’ and ‘cognitive congruence’ are important factors stimulating student learning. Cognitive congruence assumes sensitivity of the tutor concerning the difficulties experienced by students with a problem or the subject matter covered by the problem. It is theorized that both subject-matter expertise and interpersonal qualities (social congruence) are necessary conditions for cognitive congruence to occur. Wilkerson\(^12\) identified two factors: maintaining positive interactions within the group and providing assistance in getting the work of the group accomplished. Dolmans et al.\(^10\) found three factors: guiding students through the learning process, content knowledge input and commitment to the group’s learning. The studies mentioned so far have provided us with some insight into tutoring in PBL. There is, however, a lack of more detailed information about the interventions of the tutor during the process of PBL. The concept of cognitive congruence,\(^11\) for instance, is a rather global attribute. The variables in these studies, moreover, have also not been used to differentiate between more or less effective tutoring styles or profiles. Differences in styles of tutoring might be expected on the grounds of a number of factors, including the different beliefs of tutors about effective teaching and learning. There is, therefore, a need for more information about the specific profiles of more or less effective tutors. An instrument that focuses more in detail on the scaffolding by the tutor of student learning in tutorial groups is the Tutor Intervention Profile (TIP).\(^13\) This instrument is based on theory and research about PBL\(^14\) and co-operative learning.\(^15\),\(^16\)

This study reports on empirically found profiles of effective tutors in the perception of students. The TIP is used to assess these profiles by making use of its four dimensions. Two dimensions deal with tutor interventions in the tutorial group before students start studying. These dimensions are: (1) stimulating elaboration and knowledge transmission focus more on the subject than on learning. The knowledge transmission concept of teaching is also characteristic for beginning teachers.\(^6\) These different teaching conceptions, although related to lecturing, might explain different profiles of more or less effective tutors in PBL. Kaufmann and Holmes,\(^9\) for example,
ered as an operationalization of scaffolding the learning process. The questionnaire provides an instrument to assess the effectiveness of different profiles of tutor interventions.

The main purpose of this study is to provide more information about effective tutoring in PBL. As a criterion for effectiveness, the overall rating of the tutor by students is used. The questions addressed in this study are: (1) does the TIP differentiate between different (more or less effective) styles of tutoring in problembased learning? (2) How can these different profiles be interpreted in line with conceptions about effective tutoring?

**Method**

**Subjects**

The study participants consisted of 67 tutors who ran 67 tutorial groups across three units (courses) in the academic year 1996–97 at the medical school of the University of Maastricht; one first-year and two second-year units. The number of students involved in each tutorial group varied between eight and 10.

**Instruments**

The TIP was used to explore different profiles of tutor interventions. The TIP contains 33 statements describing tutor interventions that are rated by students at the end of their tutorial group sessions on a five-point Likert scale ranging from 1, ‘strongly disagree’ to 5, ‘strongly agree’. Table 1 contains some examples of items included in the TIP for each of the four dimensions.

A validity and generalizability study was conducted. A confirmatory factor analysis revealed adequate construct validity. In addition, it was found that in order to infer a reliable profile of a tutor’s performance for the four dimensions included in the TIP, the responses of at least five students are required.

To assess tutor effectiveness, an overall student judgement on tutor performance was used. At the end of the tutorial group sessions, students routinely fill out a programme-evaluation questionnaire. One of the items included in this questionnaire was to give an overall judgement about the performance of their tutor (ranging from 1 to 10, 6 being sufficient). This overall judgement was used as an indicator of a tutor’s effectiveness.

**Analysis**

In order to distinguish between different profiles of tutor interventions, a tutor’s score on each of the four dimensions of the TIP was classified as low, average or high. A score in the lowest tertile received score 1, a score in the middle tertile received score 2 and a score in the highest tertile received score 3. As a consequence, the number of tutors involved in each category for each dimension were equally distributed across the three scores (1, 2 and 3). Subsequently, for each tutor a total score was calculated varying between 4 (the tutor received score 1 for each dimension) and 12 (the tutor received score 3 for each dimension). The tutors were ranked on the basis of this total score. Recurring profiles of tutor interventions were counted. Two educational researchers with expertise in problem-based learning analysed the different tutor intervention profiles.

**Table 1 Examples of items included in the TIP and the four dimensions**

<table>
<thead>
<tr>
<th>Dimension 1: Stimulating elaboration</th>
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<tbody>
<tr>
<td>Stimulates a more in-depth brainstorm by, for example, asking questions, asking for clarification and stimulating relations</td>
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<tr>
<td>Stimulates identification of gaps in student’s prior knowledge</td>
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<th>Dimension 2: Directing the learning process</th>
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<tr>
<td>Stimulates generation of learning issues with sufficient depth and width</td>
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<tr>
<td>Draws attention to students’ gaps in prior knowledge while generating learning issues</td>
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<th>Dimension 3: Stimulating integration of knowledge</th>
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<tr>
<td>Stimulates students integration of new acquired knowledge with knowledge acquired with previous cases within the same unit</td>
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<tr>
<td>Stimulates students to apply the knowledge gained during self-study to explain the phenomena described in the case</td>
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<th>Dimension 4: Stimulating interaction and individual accountability</th>
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<tr>
<td>Stimulates students to make an inventory of the learning resources consulted during self-study</td>
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<tr>
<td>Stimulates students to report in their own words rather than reading from notes or photocopies</td>
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profiles and tried to characterize them into recurrent educationally meaningful tutor profiles. Finally, for each profile of tutor interventions the average overall judgment of the performance of the tutors was calculated to detect whether particular tutor intervention profiles were judged as more or less effective by students.

Results

Table 2 contains eight recurrent profiles of tutor interventions \((N = 67)\). Tutors scoring in the lowest tertile of each dimension (elaboration, directing, integration and interaction/accountability) of the TIP scored ‘low’, in the middle tertile scored ‘average’ and in the highest tertile scored ‘high’. The number of tutors classified in each of the profiles is given.

<table>
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<th>Dimensions</th>
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<tr>
<td>Description of tutor profile</td>
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<tr>
<td>1 Poor tutor*</td>
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<tr>
<td>2 Poor expert/content tutor</td>
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<tr>
<td>3 Poor process tutor</td>
</tr>
<tr>
<td>4 Average tutor</td>
</tr>
<tr>
<td>5 Interactive tutor</td>
</tr>
<tr>
<td>6 Good expert/content tutor</td>
</tr>
<tr>
<td>7 Good process tutor</td>
</tr>
<tr>
<td>8 Excellent tutor**</td>
</tr>
<tr>
<td>9 All other tutors</td>
</tr>
</tbody>
</table>

* Tutors with a score of 2 for one of the four dimensions were also categorized as poor \((n = 3)\).

** Tutors with a score of 2 for one of the four dimensions were also categorized as excellent \((n = 10)\).

Profiles 3 and 7 represent tutors (8%) who score relatively better on dimensions 1 (elaboration) and 3 (integration). These tutors seem to be better able to stimulate the group’s learning process than direct the discussion or stimulate interaction and accountability. As a consequence, these tutors were characterized as poor process tutors and good process tutors.

Finally, 8% of the tutors scored relatively high on dimension 4 (interaction/accountability). These tutors were characterized as interactive tutors. A further group of tutors (18%) showed profiles of tutor interventions that occurred only once or twice and could not be classified.

For each group of tutors with a specific tutor intervention profile, the average overall judgement of the tutors’ effectiveness was calculated (scale 1–10, 6 being sufficient). The results are shown in Table 3. As can be seen in this table, poor tutors scored on average 6.8 and excellent tutors scored on average 8.2. Average tutors scored 7.5. The average scores across the nine profiles differ significantly \((F_{8,66} = 7.8, \ P = 0.000)\). The Scheffé test revealed, however, that only the average tutor performance score of the poor tutors (profile 1) differs significantly from the average tutor performance score of the excellent tutors (profile 8) and all other tutors (profile 9). The results in Table 3 are in line with the expectations, i.e. the profiles of tutor interventions strongly correspond with students’ perceptions about tutor’s effectiveness. Although not all types of tutor performance differ significantly, it is remarkable that poor expert tutors as compared to poor process tutors score lower (6.9 and 7.7, respectively). The same holds...
for good expert and good process tutors (7.8 and 8.1, respectively).

Discussion

The aim of this study was to determine the profiles of effective and less effective tutors. The results show that there are different styles of tutoring. One group of tutors demonstrated a TIP that was characterized as relying more on the use of expert knowledge, whereas another group of tutors was characterized as relying more on their abilities to stimulate the learning process in the tutorial group. The different emphasis displayed by tutors in PBL on the four factors of tutoring reflect the two different conceptions teachers may have about effective learning and teaching.8

The TIP that was perceived by students as most effective showed high scores on each of the four dimensions, as expected. These results are in line with research on human tutoring and confirm the model of effective tutoring in PBL developed by Schmidt and Moust.11 This model emphasizes the need for cognitive congruence, which presupposes both content expertise and a focus on the learning process of students (e.g. the learning difficulties experienced by students). What was striking was the finding that a tutor stressing the learning process in the tutorial group is perceived as more effective than a tutor stressing content (expert tutor), although the differences are not statistically significant. This is especially true for a relatively poor scoring tutor.

Although this study yields more insight into the different teacher profiles, which can be interpreted from the results of research on teaching conceptions, it has several limitations. In this study the outcome measure is students' satisfaction with their tutor. It would be interesting to look at student achievement measures to determine their effectiveness. Furthermore, the number of tutors in this study is small. More tutors are needed to ensure the generalizability of the different profiles of tutors. Another limitation has to do with the retrospective nature of the student ratings. Student ratings reconstruct reality and therefore might give rise to bias. An interesting follow-up would be to use observation in tutorial groups. A last consideration, which limits the significance of the findings, is the stability of the profiles for individual teachers. There is no knowledge of how stable these profiles are and what the influence is of situational or group variables. Profiles might develop from less effective to more effective profiles with growing tutoring expertise.

The findings presented here have implications for faculty development. The results of this study on more and less effective tutor profiles suggest which faculty development activities should be undertaken. More specific topics for training tutors are given on item-level. In particular, the profile with a low score on all dimensions needs attention. Kaufmann and Holmes,9 for instance, mentioned in their study that inexperienced tutors who were content experts find it difficult to maintain the facilitator role. These tutors really need training in the four dimensions of the TIP. Because the profiles could be interpreted by research on conceptions teachers have about effective learning and teaching, this suggests that more attention should be paid to those conceptions to improve tutor functioning. In this regard Rando and Mengers7 emphasize that there should be a blending of personal and formal theories to influence the practice of tutoring in PBL, because personal theories are often inaccurate.

References


Received 24 February 1999; accepted for publication 1 March 1999