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Gin-Hong Lee, Chaou-Shune Lin & Yu-Hua Lin

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WEB PAPER

How experienced tutors facilitate tutorial dynamics in PBL groups

GIN-HONG LEE, CHAOU-SHUNE LIN & YU-HUA LIN Fu Jen Catholic University, Taiwan

Abstract

Background: Problem-based learning (PBL) tutorial are conducted in small groups, and successful learning in such groups requires good group facilitating skills. There is a lack of research on actual skills employed by tutors in facilitating the group dynamics.

Aim: To explore the process of PBL tutorial small groups, focusing on the tutors' actual behavior in facilitating group dynamics. **Methods:** Eight experienced tutors from various departments in medical colleges participated in this research. Forty tutorial group sessions were videotaped. Among the 636 tutorial intervention episodes, 142 of them were associated with facilitating group dynamics. Tutors interventions as well as their recalls were transcribed verbatim. Qualitative research methods were utilized to analyze the data.

Results: There were 10 tutorial group dynamic situations and 48 tutorial skills. Analysis of the tutors' intentions employing these skills in the 10 situations showed that tutors were trying to achieve the following aims: (1) iteration of PBL principles, (2) delegation of responsibility to the students, (3) creation of a good discussion forum, and (4) the generation of a good learning atmosphere. **Conclusion:** Results from this study provide PBL tutors with a practical frame of reference on group dynamic facilitating skills and stimulate further research on this topic.

Introduction

One of the advantages of problem-based learning (PBL) is its ability to bring out certain valuable psychological and behavioral characteristics of the students (Townsend 2011). These approaches to learning, which are not limited to the transmission of knowledge only, are best carried out in a small group learning environment. Most teachers and students agree that a tutor's ability to facilitate such a group is more important than the possession of specialized knowledge (Barrows 1998). This is confirmed by studies which showed that students considered a tutor as being more effective when he or she focused more on the group dynamics, and not on the knowledge itself (Dolmans et al. 2001).

Tutorial skills can be grouped into two categories: group dynamic and tutorial discussion content. Group dynamic is related to the flow of the tutorial discussion and interpersonal interaction, whereas discussion content involves the accuracy of the tutorial discussion, critical thinking training, and hypothesis generation ability (Azer 2005). In spite of the importance of the group dynamic skills in the PBL tutorial learning environment, these skills are not easily learned. Tutors are often unsure of when and how to intervene when problems occur. This is especially true for new tutors who need more training on group facilitation skills, on how to ask appropriate questions, and on how to handle difficult situations (Holmes 1996). Even experienced tutors find it difficult to handle some group situations such as silence in the group, students with unusual behavior, or the group

Practice points

- The experienced tutors used a rich repertoire of techniques and there were carefully considered reasons for the execution of these techniques to facilitate tutorial dynamics.
- The 48 tutorial skills concerning the tutorial dynamics can be used as teaching materials in faculty training.
- The intentions behind tutor interventions were grouped under four themes: iterate the principles of PBL, delegation of the learning responsibility to the students, construct a good discussion forum, and construct a good learning atmosphere.
- It is worth further exploring what factors affected the tutors' behavior and under which conditions a tutor's behavior could achieve the best educational results.

process is grinding to a standstill (Tipping et al. 1995). Tipping (1995) suggested that tutors needed to reflect on what the aims of the group were, and how these could be achieved. He also suggested that Medical College provide tutors with systematic training on facilitating skills on group dynamics.

Previous studies on tutors' dynamic skills largely overlooked how the theory was actually applied in real-life tutorials, and how the learning process was conducted, focusing instead on describing the theoretical principles (Dolmans et al. 2005). In a few cases, these studies were limited to the analysis of the interactive process in individual

Correspondence: G.-H. Lee, Clinical Psychology, Fu Jen Catholic University, 510, Chung Cheng Rd, Hsin-Chuang District, New Taipei City, 24205, Taiwan, R.O.C. Tel: 886-2-29053446; fax: 886-2-29052094; email: 016100@mail.fju.edu.tw

Table 1. Demographic characteristics for the eight experienced tutors.						
Tutor	Department	Unit of video recording	Male/female	Years of PBL teaching experience		
1	Clinical psychology	Psychopathology	Female	2		
2	Clinical psychology	Psychoanalysis	Female	2		
3	Nursing	Nursing theory	Female	2		
4	Nursing	Community nursing	Female	2		
5	Medicine	Central nervous system unit	Male	2		
6	Medicine	Peripheral neuro-muscular system unit	Male	2		
7	Medicine	Respiratory unit	Female	3		
8	Medicine	Cardiovascular unit	Female	3		

segments, losing sight of the whole picture (Visschers-Pleijers et al. 2006). Hak and Maguire (2000) suggested that for future studies a series of recordings should be made showing the entire PBL process. Furthermore, most of the studies on tutorial skills had focused on tutors in Medicine. At the current age when we encourage a collaborative approach in Medicine, it is desirable that tutorial problems in Medicine should include topics on psychology, nursing, law, and ethics. Therefore knowing how tutors in other disciplines apply their tutorial skills will be helpful to the tutors in Medicine.

Lee et al. (2009) found that in tutorials involving students from Medicine, Nursing, and Clinical Psychology, there were 10 categories of situations in which tutors intervened to facilitate group dynamics, but that study did not mention what the tutors actually did during such interventions. This study is a continuation of the 2009 study. Here, we analyzed 10 group dynamic situations, and identified the skills and intentions employed by these experienced tutors in their roles as facilitators.

Methods

Study subjects

In order to examine how tutors with different training background applied their tutorial skills, we studied tutors in three disciplines in a Medical College: fourth year Medical class, and first year students in the Master Program of Clinical Psychology and Nursing, respectively. The study looked at 11 tutorial groups: four from Medical, three from Nursing, and four from Clinical Psychology. There were six to eight students in each tutorial group. With the exception of Nursing where most of the students were female (there was one male student), men and women were equally represented in the other groups. Students in Medicine already had one year of PBL experience while students from the other two disciplines did not have prior PBL experience. Ground rules were established for all these tutorial groups by their respective school/department, including rules on attendance, time management, and tutorial process. Each tutorial lasted three hours. Students took turn at different tutorials to act as the Group Leader to facilitate discussion while one student would record the materials discussed by the group on a white board, and this student is termed the Recorder.

From fall 2005 through 2008, we used a purposive sampling technique in our study in order to yield a sample that would most likely contribute significant information on the tutorial skills of facilitating group dynamics (Lee et al. 2009). The selection criteria for the participants were: tutors must have taken PBL faculty training program and with more than two years of tutoring experience. Sampling continued until novel information was no longer being gathered. The basic characteristics of the tutors are given in Table 1. All the tutors had given their written consents. This study received the approval of the institutional review board of the Fu-Jen University to conduct a study involving human subjects.

Data gathering

Data collection consisted of the following steps: (1) research assistant arranged the video recording schedule after getting consent from the tutors and students. Each recording was centered around one Health Care Problem, to include the initial problem exploration and final reporting stage, so that recording of each tutorial group took one to two weeks to complete. (2) During the recording session, the research assistant would take notes on when a tutor intervened for future reference. (3) One week after the completion of the recording together and the tutor was asked to explain his/her intervention method and the reason for such intervention. Tutors interventions as well as their explanations were transcribed verbatim (Lee et al. 2009).

Data analysis

We used episode as our basic unit for analysis, defining one episode as an intervention when a tutor spoke up during a tutorial session. From the 40 video recordings of the 11 tutorial groups, including problems exploration and final reporting stage lasting almost 240 hours, 636 episodes of tutor intervention were identified. One hundred and forty-two of the 636 episodes fell under the 10 categories of tutorial group dynamics. We therefore analyzed each of these 142 episodes in relation to: (1) what a tutor had said, (2) behavior or skill exhibited by the tutor as noted by the observer of the video tape, (3) the tutor's explanation of his/her intention, and (4) the observer's analysis of this intention (Table 2).

Table 2. Example of data analysis from one tutorial episode.						
Situation when a tutor intervened	Tutor's behavior	Researchers' description of the skill showed by the tutor	Tutor's explanation of his/her intention	Researchers' summary of tutor's intention		
Non-verbal nega- tive response	Have you decided to move on to the next page? Some of you are becoming impatient	To confirm if the students really wanted to move on to the next chapter/page	As tutors, we have to ask them to reconsider the rush to move on to the next chapter/page	Wanted the students to focus on one learning issue		
		Pointing out the impatient behavior of students	I asked them not to jump to the next chapter so quickly. They should consider the materials at hand more closely.	Wanted to encourage them to attempt more discus- sion of the current materials		

Grounded theory and constant comparative method were used to analyze the data (Pope et al. 2000). Two authors of the study, G.H. Lee and Y.H. Lin, and a research assistant with a Master's degree, independently went through a line-by-line coding and compared each new piece of data with data previously analyzed. These three researchers then discussed the codes they had generated and how these codes were developed at regular intervals. Any difference in opinion on either the classification or the meaning of the code was resolved by discussion among the three researchers to reach a group consensus. Once all relevant codes were identified, they were grouped together into meaningful categories. These categories were then grouped under appropriate themes, which were used to generate a theory. In order to maintain consistency in the generation of categories, we kept record of the decision rule so that whenever a new code emerged, the same rule was used to classify them into their respective category (Lee et al. 2009).

Results

There were 48 skills exhibited by the tutors when they intervened (Table 3). Analysis of the intentions behind tutor interventions yielded 15 categories and four themes, as shown in Table 4. In the following 10 group dynamic situations, the frequency and percentage of tutor interventions are given in parentheses. A description of the situation, verbatim transcript of tutors' statements and their intention (in parentheses) are also given with each group dynamic situation.

(1) Discussion of procedural errors (32/142; 22.5%)

At the beginning of a PBL curriculum, students were unfamiliar with PBL tutorial process. Therefore, tutors who have just joined a new PBL group may need to intervene a little more during the first 3–4 tutorials.

Brainstorming itself is guessing. Just guess. It does not matter if you are right or wrong. (to establish the consensual discussion)

Can someone tell me what the main problem is? (to establish the correct PBL learning process)

(2) Influence of the traditional passive learning method (8/142; 5.6%)

During tutorials, students would initially look to their tutors expecting the tutors to provide them with the answers.

The solution to this was for the tutor to put the questions back onto the students, answering them with more questions and encouraging them to look for the answers themselves.

Are you still asking me? Can someone else answer this? (to let the students uncover their innate problem-solving ability)

The main problem we are facing now is no one in the group has the courage to challenge authority. Why? (to remove the image of tutor as an authoritative figure)

(3) Ineffectual leadership (29/142; 20.4%)

When a Group Leader proved to be incompetent, or was not carrying out his/her responsibilities adequately, tutors would intervene, explaining the correct way to proceed or demonstrate by example.

We have discussed several points here and there which may be related to the case. Would the Group Leader like to summarize for us? (to train the student the ability to become a Group Leader)

Your behavior today as Group Leader is different from last time in that...(to take the role of Group Leader when necessary so that the group can progress effectively)

(4) Recorder was not effective (5/142; 3.5%)

Tutors intervened when they thought the Recorder was writing either too much or too little, or when the Recorder seemed to have misheard what was being said or had written what had been said out of context. Sometimes a Recorder was too busy writing one learning issue while other group members had moved on to discussing other issues, so that the process became disjointed. Tutors would then invite the Recorder to join in to break this impasse.

Recorder *needs to be very focused. Forget about yourself for the moment and record what others students have said.* (to teach the Recorder how to perform the task of recording the spoken materials effectively)

Would you like to help the Recorder by repeating the fact one more time? (to bring the Recorder into group discussion)

Table 3. The 48 tutors' skills for the group dynamics.

- 1. Discussion of procedural errors
 - 1. Remind and iterate the principles of PBL to students, correct the wrong process, and provide example of implementation
 - 2. Let the students understand the relationship between the current discussion and the entire curriculum before the opening of a new problem
 - 3. Encourage the students to slow down to think deeper during brainstorming and hypothesis generation
 - 4. Teach them how to allocate time
 - 5. Understand when the students are facing problems6. Regroup a disorderly discussion group
- 2. Influence of the traditional passive learning method
 - 1. Using PBL principles, encourage students to challenge authority, to freely express their opinion and to accept others' opinion
 - 2. Throw the question directed at the tutor back to the group to let the group think
 - 3. Deflect the question back to the student, or ask the student to go back to find out the information
 - 4. Tell the students in advance to avoid mini-lectures by students, and point this out appropriately during tutorial
- 3. Ineffectual leadership
 - 1. Affirmative praise for group leader to reduce his/her anxiety
 - 2. To indicate or hint to the group leader that he/she should play his/her role to allocate time, adjust the direction of discussion, and to summarize
 - 3. Take over the role of group leader temporarily to assist the group leader to synthesize the information, or to direct evaluation
 - 4. Tutor provided several suggestions and let the group leader have the authority to decide
 - 5. Directly correct mistakes spoken by the group leader
- 4. Recorder was not effective
 - 1. Propose a method on record keeping
 - 2. Point out the error when the recorder has misinterpreted the statement of the speaker
 - 3. Bring to the group's attention the isolated situation of the recorder, so that the group can help the recorder participate effectively
- 5. Tutorial group got stuck or no response
 - 1. Point out the silence, explore the thinking and feeling of the group members to find a consensus
 - 2. Let the group confront the issue of not studying and discuss the underlying reason
 - 3. Summarize and extend the discussed materials and present back to them
 - 4. Encourage students who understood the issue to come out and elaborate
 - 5. Ask the group leader to provide leadership
 - 6. Provide emotional support to alleviate group anxiety
 - 7. Agreeing with the students not to move the discussion on if they get stuck at a certain point, in order to create an atmosphere conducive to free discussion
 - 8. Leave behind a difficult problem and start again from the beginning with simple ideas
- 6. Students speaking too much or too little
 - 1. Remind the students about time management
 - 2. Interrupt students who are speaking too much, and invite other students to speak
 - 3. Directly inquire why a student was silent, attempt to find out the underlying reason, and suggest ways on how to share information
 - 4. Create an atmosphere so that quiet students can have a chance to speak, or provide support and encouragement when they do speak
 - 5. Stop the group from rushing to conclude the discussion of a main learning objective
- 7. Non-verbal negative response
 - 1. Point out non-verbal cues, bring the group's attention to them and clarify their meanings
 - 2. Encourage students to express their opinion verbally in a non-judgmental manner to facilitate communication
 - 3. Facilitate communication between two students or group discussion
 - 4. Acknowledge positive interaction and appreciation among students, to create a positive environment

8. Unhelpful interpersonal interaction

- 1. Affirm the value of having conflicts in a group
- 2. Pointing out the conflict among the students, allowing them a chance to speak
- 3. Inviting student who was taking a free ride to speak
- 4. Inviting the student who was interrupted to speak
- 9. Students with unusual behaviors
 - 1. Direct teaching, explaining the principle of PBL
 - 2. Affirm the value of criticism
 - 3. Explore with the group why a student was not catching up
 - 4. Asking student who is making good progress to help student who is lagging behind
 - 5. During feedback, ask the students to express their opinion about the student with unusual behavior and to provide positive feedback
 - 6. Asking student unable to express themselves adequately to address the issue

10. Positive experiences

- 1. Pointing out the progress the group is making and providing encouragement
- 2. Use positive language to stimulate students
- 3. Extending knowledge from basic science to clinical application, letting the students appreciate the value of their learning
- (5) Tutorial group got stuck or no response (31/142; 21.8%)

When a group got stuck on an issue or nobody in the group was making any contribution, tutors would use this opportunity to inquire as to what the students were thinking or feeling, in order to bring out the main issues that were disturbing them. Are you all baving difficulty understanding? If you do not understand the problem, then this is a problem in itself. (to analyze the reason the group has become silent or got stuck)

Looks rather confusing to me, ha ha. Where is the Group Leader taking us? (to avoid the traditional role

	Table 4. Tutors' intentions in promoting tutorial group dynamics.
Themes	Categories
Iterate the principles of PBL	 To establish a correct PBL format so that students understand there are specific process and methods to follow Let the students learn to be receptive of mistakes made by themselves and by others Emphasize the importance of pausing to reconsider the issues
Delegation of the learning responsibility to the students	 Allow the students to be the driving force to direct group direction and process To uncover students' innate problem-solving ability To remove the image of tutor as authoritative figure
Construct a good discussion forum	 Use time management to make sure every student got an equal chance to speak and discuss main issues To assist the group to generate appropriate learning objectives To help the Group Leader, note-taker, and group members improve the performance of their roles
Construct a good learning atmosphere	 Generate a relaxed atmosphere, so that the group feels comfortable and trusted Stimulate active and balanced interaction among group members Look after group members who are ignored or disliked by other group members Pay attention to the emotional state of every group member Assist students when they faced setback, and try to alleviate their negative emotion Pay attention to group silence and on how to handle it

of a teacher and delegate the responsibility for leadership to the students)

Just because nobody answered shows that no one has looked at the answer in the book. The answer is in the book. (to encourage silence which is constructive because it allows the students a chance to think, and handle unproductive silence)

Why is she infertile? Try to guess. Go on. (using the initiatives of students, to stimulate in a light-hearted way interaction among students and encourage their thought process)

(6) Students speaking too much or too little (5/142; 4%)

There was no objective measure on whether a student was speaking too much or too little. Tutors usually made subjective decision on this issue based on the nature of the discussion content and reactions from the students. When a student was taking up too much discussion time, tutors would either remind the student to be succinct and manage time effectively, or interrupt the student and ask other students to contribute. Conversely, when some students were not participating in the discussion, tutors would direct questions at them to give them the opportunity to speak.

XXX has brought out a lot of issues. YYY, what do you think? Looks like you were ready to speak. (to ensure that each group member got an equal chance to speak)

Why have XXX and YYY not spoken yef? (to remind the group not to ignore silent members, and to create an inclusive atmosphere where they include the silent member)

Wait a minute. Are we finished with this topic? Is XXX the only one who has studied this issue? What about other students? (to let the group explore the main learning issue more, instead of letting one or two students to speak about the issue)

(7) Non-verbal negative response (8/142; 6%)

Tutors usually observed students' facial expressions and other non-verbal cues to gauge the group dynamics and interpersonal relationships. When students were frowning, or smiling and nodding, or were nervous, angry, or showed impatience, tutors would use these cues to inquire about the reasons for such responses, and to clarify the meaning of their emotional reaction.

I see that you are frowning. Did you not understand, or did you disagree (using non-verbal cues to understand students' emotions and how their studies are proceeding)

You are nodding vigorously. Are you agreeing with his/ber statement strongly? (to use non-verbal cues to regroup and probe deeper the content of the discussion)

(8) Unhelpful interpersonal interaction (8/142; 6%)

When conflicts arose within a group, or dominant students were holding other students back, or students were taking a free ride or sponging off other students, thereby creating an unhealthy or non-constructive atmosphere, some tutors would point this out, open up the space for the expression of opinion, and to seek a solution through communication within the group.

XXX and YYY have just disagreed on this issue. This is good, because the purpose of PBL is to nurture our critical appraisal ability (to channel the conflict within a group in a constructive direction)

Looks like XXX was just about to speak. What he had mentioned before was.... (to invite the student who was interrupted to speak; to look after students who were ignored by the group) (9) Students with unusual behaviors (8/142; 6%)

Tutors sometimes needed to intervene when a certain student behaved in such a way that disturbed or disrupted the dynamic of the tutorial. Examples included sardonic remarks, pretense, disingenuousness, and being unconstructive or passive aggressive.

XXX looks like you do not care. That does not matter. Creativity comes from dissatisfaction. (to try to explore the reasons behind the peculiar behavior of students)

Why is it that XXX has not spoken a word today? What were you thinking? (to give students with peculiar behavior the opportunity to speak or to explain)

What did XXX just say? Do you think everything that was said was correct? (to use the strength and resources of the group to help less able students)

(10) Positive experiences (8/142; 6%)

Tutors would also make a point of acknowledging positive aspects of the group's performance. When students agreed with other students and expressed positive feelings to other students, tutors also made a note of these and pointed them to the group, praising their progress, therefore creating a positive and productive atmosphere.

Looks like you have clarified many issues.... I think your confidence about the materials you have learned is just as good as the theory behind it. (Trying to bring out good behavior from the students to let them have a positive experience)

Discussion

How should a tutor intervene in a small group PBL environment is an important topic in faculty development. In a study to examine the relationship between verbal and non-verbal expressions, and tutors' threshold to intervene, it was found that tutors tended to intervene when the expressions of the students were related to exploratory questioning or reasoning (Gukas et al. 2010), thus providing information on situations when tutors would intervene, but not information on how a tutor should intervene. Some studies had focused on interaction within the PBL groups, to teach tutors symptoms associated with groups which were successful or unsuccessful, so that tutors can learn to intervene in a timely manner to help the students to learn (Azer 2009). However, tutor intervention is not entirely influenced by group interaction because tutor's intension is also an important factor (Maudsley 2002). Our study revealed that when experienced tutors intervened to facilitate the group dynamic, they did it for the following reasons: (1) to develop and maintain an orderly and effective discussion forum so that every student can take up individual and group responsibility to do their best in a tutorial. Tutors emphasized the principles of PBL to the students to elevate their understanding and application of PBL, so that students' behavior could be transformed from the traditional passive learning to an active learning mode. (2) To create a healthy and stable learning environment for the students. To achieve this goal, tutors stimulated the group dynamic, found solutions to deal with negative interpersonal situations while strengthening and promoting positive interpersonal interactions. Yalom (1975) regarded a group as a microcosm of society. The interpersonal behavior of students outside the group is often reflected within the group. Therefore the behavior of a group member within a group, while a reflection of his/her learning behavior, is also a reflection of his/her manners and ability to interact with others. Observation on student behavior can provide tutors with good reference points to determine if interpersonal communication skill is being applied effectively within a tutorial group. Therefore tutors were often sensitive to the interaction among the group members in order to remove barriers among the members, so that the group could advance to become more productive.

Different tutors intervened differently to the same situation, due to the difference in their intentions. One example would be when students were confused about the subject under discussion. If the intention of the tutor were to promote selfdirected learning and to generate a safe receptive environment for a student, he/she would reassure the student by saying that it was alright to find it confusing, so that the student would feel more at ease in the group. If the focus was on the group dynamic, the tutor would use this opportunity to unite the group by bringing this issue out for group discussion, while pointing out that it was alright for students to help each other, so that they could build a co-operative learning relationship among themselves. Obviously these strategies need not be applied in any particular sequence, and they can just as easily be applied simultaneously.

Of course, each tutor might have his/her own individual style. Despite having the same or similar views and intentions, then, tutors would go about it in their own way. When interrupting students, some tutors used a soft and relaxed approach by providing hints and encouragement, while others were more directive in providing suggestions. However, a tutor's style of response was often varied, with different approaches used by the same tutor depending on the situation and the students present (Dolmans et al. 1999). We have noticed the following contrasting approaches when tutors intervened: (1) providing direct verbal instruction versus demonstrating PBL spirit; (2) direct intervention versus opening the issue for group discussion; (3) giving a gentle hint versus firm suggestion; (4) emphasis on problem-solving versus focus on the group dynamic; (5) building an environment which encourages acceptance versus an environment focused on finding the correct answer; (6) pointing out the situation so that the group can act on it versus tutors taking it upon themselves to resolve problems; and (7) responding to the actions of one or several students versus to the group.

Hendry et al. (2003) reviewed the literature and found that the most common problems observed in PBL groups were: quiet student, lateness or absenteeism, dominant student, student disparaged psychological aspect of a case, tutorial process was disorganized, students expressed frustration with tutor's lack of content-expertise, student not relating well to another student, group engaged in superficial study of the problem, group "shortcuts" the tutorial process by combining session, group rushed through tutorials to get the diagnosis in order to finish early, and student(s) teasing or "picking on" others. In contrast, our study showed three areas which were hardly mentioned in studies involving medical schools from Western culture. These are ineffectual leadership by the Group Leader, Recorder was not effective, and influence of the traditional passive learning method on the students. There are two possible reasons for the different results in our study as compared with previous studies. Firstly, some of our students did not have experience in PBL tutorial group learning. Secondly, students in Taiwan were trained in a lecture format since an early age so that they were not sure of their role in a group learning environment. Even though we had established ground rules for all the tutorial groups, we could not avoid problems related to students not familiar with the process and their roles in a group, which echoed the previous findings that for an effective PBL group learning, tutors need training on facilitative skills and students also need training on PBL learning method (Azer 2009).

From the complexities mentioned above, it appears that situations that prompted tutors to intervene and their intervention manner were influenced by the following factors: students' PBL experience, group dynamic situation, and tutor's intention. Based on adult learning theory, in order to change tutors' intervention behavior, one should start with the intention mentioned above by providing tutors with the correct understanding and attitude so that they can lead a tutorial effectively (Hatem et al. 2011). Our results can be used for training tutors on PBL tutorial. Specifically, in Table 3, we have listed scenarios when tutors can intervene. Faculty trainer can choose appropriate scenarios to discuss with their faculty trainees on how they would react under such circumstances. The 48 skills we have listed in Table 3 are those used by experienced tutors. These will provide the base for the faculty trainees to reflect on when and how they would apply these skills, or whether they would apply these skills at all. In addition, our results provide the foundation for future studies on: (1) what factors affected the tutors' behavior and (2) under which conditions a tutor's behavior could achieve the best educational results. Future studies can also explore how tutors' internal cognitive process affects their behavior, including their perceptual judgment, educational beliefs, and their expectation of the students. If we can capture the internal cognitive process of tutors, we can analyze the interactions among these factors that lead to tutor intervention.

Our study has three limitations. Firstly, our study involved 40 tutorial sessions led by eight tutors from Medicine, Nursing and Clinical Psychology. Even though we had employed a purposive sampling strategy in selecting participants and sample size control is not the intent of a qualitative study such as this, but the inclusion of other disciplines such as Dentistry and Pharmacy in future studies may generate additional useful information. In addition, whether the results from this study are also applicable to other disciplines remains to be determined. This is especially relevant because more and more disciplines are now using PBL. Secondly, we have studied the skills exhibited by tutors when they intervened concerning group dynamics under 10 different situations. But we did not collect information on whether tutors had waited before they intervened, and if they had waited, for how long. This is an important skill because periods of silence in a tutorial group did not indicate that the students were not learning effectively (Remedios et al. 2008). Thirdly, it was noted that problems associated with group learning were resolved better when tutors intervened using methods preferred by the students (Kindler et al. 2009). We do not know if the intervention method listed in Table 3 were welcomed or expected by the students.

In conclusion, we have analyzed the skills displayed by eight experienced tutors when they facilitated group dynamics, and found that there were 48 skills exhibited by the tutors when they intervened and these skills were intended to resolve 10 major situations. The intentions behind tutor interventions were grouped under four themes: iterate the principles of PBL, delegation of the learning responsibility to the students, construct a good discussion forum, and construct a good learning atmosphere. Our results can be used in faculty development in the training of tutors. Furthermore, the method used by tutors to intervene is a complex set of behavior. Future studies can use our results as the base to examine the influence of tutor's intention, students' PBL experience, and group situation on tutor's intervention method, in order to find the most appropriate facilitative model in a group learning environment.

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Notes on contributors

GIN-HONG LEE, PhD, is an Assistant Professor of Clinical Psychology, Fu Jen Catholic University, Taiwan.

CHAOU-SHUNE LIN, MD, is an instructor of Medicine, Fu Jen Catholic University, and Department Chair of Emergency Medicine, Catholic Mercy Hospital, Taiwan.

YU-HUA LIN, PhD, is an Associate Professor of Clinical Psychology, Fu Jen Catholic University, Taiwan.

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