

PROBLEM-BASED LEARNING

Gender-Related Differences in Learning in Student-Led PBL Tutorials

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ABSTRACT *Context:* Male and female students behave differently in problem-based learning (PBL) tutorials. However, these differences could be partly attributed to faculty tutor behavior in male and female tutorials.

Objectives: This study aims to examine the gender differences in learning outcomes between medical students when peer tutors facilitate PBL tutorials.

Methods: A questionnaire-based study conducted in single-gender student-led (SLT) and faculty-led (FLT) tutorials. The study involved third year medical students ($n=91$) divided into ten groups (five groups each). The SLT groups consisted of 16 male and 28 female students, while the FLT group consisted of 20 male and 27 female students. Students evaluated their individual and group performance in tutorials and also skills of tutors. Student performance in end-unit examinations and their perceptions about peer tutoring were also analyzed.

Results: A total of 290 questionnaires (response rate = 63.7%) were collected over the five-week period of the study. Although individual performance in tutorials and achievement in examinations were comparable in both groups, there was significantly higher group performance in female compared with male student-led tutorials ($p < 0.01$). This difference between male and female groups was not attributed to improvement in the performance of female groups, but rather to a decline in performance of the male SLT groups. In addition, both male and female students expressed facing difficulties in discussion and analysis of the problem in the first tutorial session.

Conclusions: Understanding the gender differences in the group behavior in student-led tutorials is important for PBL programs adopting this approach.

KEYWORDS *Problem-based learning, student tutors, gender, medical education, group dynamics.*

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Introduction

Problem-based learning (PBL) facilitates not only the acquisition and organization of knowledge but also the development of several other desirable attributes, such as communication skills, team work, problem-solving skills, self-directed learning, sharing information and identification of personal strengths and weaknesses (Neville, 1999). Many of these skills are related to the small group tutorial process and group dynamics.

Although gender differences in learning have been previously reported in medical education (Wright, 1996; Abu-Hijleh *et al.*, 1997; Nilsonne *et al.*, 2000), very little attention has been given to these differences in small group PBL tutorials. In an early study by Aries 1976, he concluded that student discussion groups composed entirely of women tend to have a turn-taking style of participation, while all-male groups developed a hierarchical pattern of discussion, with extremely uneven amounts of talk per man. In a later stage, some researchers indicated that women were more sensitive to interpersonal dynamics in the classroom and that their motivation and performance depended mainly on feeling a positive connection with others (Fletcher *et al.*, 2000). A recent study showed that group dynamics in faculty-led PBL tutorials were perceived more effective in female compared with male student groups (Das *et al.*, 2003). However, these results could be partly attributed to the differences in faculty tutor behavior in female compared with male tutorial groups. Therefore, tutorials led by peers are expected to unmask any possible gender-related differences in student learning, which were concealed by the presence of a faculty tutor.

The College of Medicine and Medical Sciences (CMMS), Arabian Gulf University (AGU) in Bahrain adopted a total PBL curriculum with its inception in 1982. The undergraduate medical curriculum is divided into a pre-medical phase (one year), a pre-clerkship phase (three years) and a clerkship phase (two years). The pre-clerkship phase is organized around integrated organ system units, in which ninety-three integrated health problems are studied over a period of three years. We have previously described the details of the PBL program at AGU (Abu-Hijleh *et al.*, 2004). Problem-based tutorial groups at AGU are made up of either all male or all female students according to university regulations. In this study, we aimed to address the following questions:

- (1) Do female peer-tutored groups function as effectively as their peer-tutored counterparts? Are there differences in individual performance between female and male students tutored by peers?
- (2) Do male and female students, acting as tutors in PBL tutorials, acquire similar tutoring skills?

Methods

Study Sample

Ninety-one third-year students were divided into ten groups during their five-week study of the hematology unit in the academic year 2002–2003. Five groups (44 students) were randomly allocated to the student-led tutorials (SLT) and the other five groups (47 students) to the faculty-led tutorials (FLT). The SLT groups consisted of 16 male and 28 female students, while the FLT group consisted of 20 male and 27 female students. The number of students per group varied between eight to ten students. This gender difference in percent representation is a true reflection of the male/female ratio of students admitted to the CMMS. All faculty tutors in the study were males. The students involved in this study had all been exposed to a two-week orientation program on the principles of PBL in the second year and participated in more than 100 tutorial sessions with different faculty tutors. Students in the SLT group were given a special one-day workshop on tutoring skills, which focused mainly on the roles of students and tutors in PBL tutorials, acquainted them with the basic facilitation skills and the methods of student assessment in tutorials.

SLT groups selected a peer tutor from the group every week for each problem. FLT groups were assigned a faculty tutor as scheduled by the regular College Program. Student and faculty tutors attended the weekly “tutor-briefing” sessions one week prior to the start of the problem. During these briefing sessions, the problem coordinator reviewed the problem with the tutors and explained important issues to be considered during discussion of the problem in the tutorials. The student and faculty tutors were provided with a tutor guide to help them in guiding the group to generate key learning needs/objectives. Student tutors were advised not to discuss the content of the tutor guide with their colleagues prior to the tutorial session.

Outcome Measures

Evaluation of Tutoring Skills

Students evaluated the tutors (peers and faculty) using the Tutor Intervention Profile (De Grave *et al.*, 1998). The evaluation form contained five dimensions of tutor intervention: two dealing with tutor intervention during the first session, i.e. stimulating elaboration and directing the learning process; and three dimensions during the second session, i.e. stimulating integration of knowledge, stimulating interactions, and providing feedback (see Table 1). Students rated the tutor at the end of second session on a five point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Table 1. Items in the questionnaire used for students' evaluation of tutoring skills. Students were asked to evaluate tutors on each item on a Likert-type scale of 1–5

A. Stimulating elaboration:

Stimulates brainstorming: e.g. by asking questions, asking for clarification and stimulating discussion of the problem
Interrupts only when needed

B. Directing the learning process:

Stimulates generation of relevant learning needs
Provides leadership
Listens carefully with understanding
Clarifies difficult issues

C. Stimulating integration:

Stimulates students integration of newly acquired with previous knowledge
Stimulates students to apply the knowledge gained during self study to explain phenomena described in the problem
Helps in balancing basic and clinical application in discussion of the problem

D. Stimulating interaction:

Stimulates students to make a summary of the learning needs
Stimulates students to report in their own words rather than reading from notes
Fosters the feeling of cooperation between the group members

E. Feedback:

Provides feedback about the performance of the group.

Self-assessment of Student Performance in Tutorials

At the end of the second tutorial session, students were asked to evaluate their individual performance in the two tutorial sessions. Each student in the group completed a self-assessment checklist anonymously and independently. This checklist was modified from Rangachari and Crankshaw (1992). It consisted of 13 items representing 5 categories: responsibility, information processing, communication, critical appraisal and self-awareness (see Table 2). Ratings were distributed on a Likert-type scale of 1–5 ranging from “strongly disagree” to “strongly agree” with the given statements.

Evaluation of Group Dynamics in Tutorials

Students completed another form, which reported each student's evaluation of the function of the tutorial group. This form was modified from Engel (1993). Items included tutorial atmosphere, listening/information sharing, group performance, decision making in the group and reaction to leadership (see Table 3).

Table 2. Items in the questionnaire used for student's self-assessment of tutorial performance. Students were asked to evaluate their performance on each item on a Likert-type scale of 1–5

A. Responsibility

I participated actively in the tutorial
My behavior did not impede the tutorial process
I was punctual for each session
My behavior facilitated the learning of others

B. Information Processing

I brought in new information
The information I brought was relevant to the discussions
I used a variety of sources to obtain my information

C. Communication

I was able to communicate ideas clearly
My comments did not confuse other students

D. Critical Analysis

My comments promoted understanding of the group
I am interested in the problem based approach

E. Self Awareness

I assessed my own strengths and weaknesses
I am able to accept and respond to criticism constructively

Student Achievement in Examinations

Academic achievement in the end of unit examination was assessed using a written examination including A-type multiple-choice questions (MCQs), short essay questions (SEQs) and an Objective Structured Practical Examination (OSPE).

Student Perception

Student perceptions about peer tutoring were collected using an open-ended questionnaire completed by students in the SLT groups only during a meeting with the first author. The students were asked to reflect on their experience about the strengths of peer tutoring, weaknesses of peer tutoring and suggestions for improvement.

Statistical Analysis

Data were analyzed using the *SPSS version 11.5* and presented as means \pm SD of each parameter. Items in the self-evaluation and tutoring skills evaluation questionnaires were averaged and grouped into categories. Gender differences

Table 3. Items in the questionnaire used for evaluation of group function. Students were asked to evaluate their group function on each item on a scale of 1–4

Items	1	2	3	4
Tutorial atmosphere	Cautious	Hostile	Encouraging	Supportive
Listening/ Information sharing	Poor	Reasonable	Good	Intense
Decision making	Dominated by active members	Dominated by loudest	Based on experience	By consensus
Reaction to leadership	Hesitant	Power struggles	General support	Supportive but free to disagree
Overall Group Productivity	Poor	Fair	Good	Excellent

within each group in each category of the questionnaires were analyzed using the independent samples *t*-test. A *p*-value < 0.05 was considered statistically significant.

Results

Response Rate

The ten groups of students completed a total of 290 questionnaires (response rate = 63.7%) during the five-week period of the study. The number of forms collected from the SLT group was 155 (70.4%), and from the FLT group was 135 (57.1%). Male groups filled 105 forms (58.0%) and female groups filled 185 forms (67.3%).

Evaluation of Tutoring Skills

Female tutors in SLT groups were rated better in providing feedback to their groups compared with male students ($p = 0.013$) (Table 4). Compared with faculty tutors, student tutors (male and female) tended to have lower scores in skills related to the first tutorial session (stimulating elaboration, directing the learning process) and better facilitation skills in items related to the second tutorial session (stimulating interaction, integration, providing feedback). However, none of the differences between student and faculty tutors in all items related to tutoring skills were statistically significant.

Table 4. Comparison of students' evaluations of the skills of tutors in male and female student-led (SLT) and faculty-led (FLT) groups. Data represent a mean \pm SD of 155 forms in the SLT group and 135 forms in the FLT group. Items are rated based on a Likert-type scale of 1–5

	Males	Females
	<i>Stimulating elaboration</i>	
SLT	3.98 \pm 0.73	4.16 \pm 0.87
FLT	4.18 \pm 1.26	4.35 \pm 0.88
	<i>Directing the learning process</i>	
SLT	4.16 \pm 0.59	4.29 \pm 0.66
FLT	4.45 \pm 0.79	4.49 \pm 0.81
	<i>Stimulating integration</i>	
SLT	4.38 \pm 0.75	4.51 \pm 0.69
FLT	4.18 \pm 0.88	4.38 \pm 0.56
	<i>Stimulating interaction</i>	
SLT	4.39 \pm 0.82	4.45 \pm 0.81
FLT	4.22 \pm 0.58	4.19 \pm 0.63
	<i>Providing feedback</i>	
SLT	4.21 \pm 0.99	4.63 \pm 0.74*
FLT	4.07 \pm 0.76	4.04 \pm 1.06

* = Significant difference between male and female groups ($p < 0.05$).

Self-assessment of Student Performance in Tutorials

No significant differences in self-evaluation of tutorial performance were found between male and female students in SLT or FLT groups regarding all categories in the questionnaire.

Evaluation of Group Dynamics in Tutorials

Regarding group functions, overall group productivity was significantly greater in female compared with male SLT groups ($p = 0.000$) (Table 5). In addition, there was significantly more listening and information sharing in female compared with male SLT groups. FLT female groups had better support for the leadership by the faculty tutor ($p = 0.000$), while SLT male groups had better support for leadership of their peer tutor ($p = 0.000$).

Student Achievement in Examinations

There was no difference in scores of written or practical (OSPE) examinations between female and male students in either student-led or faculty-led tutorial groups.

Table 5. Student evaluations of group function in male and female student-led (SLT) and faculty-led (FLT) tutorial groups. Data represent a mean \pm SD of 155 forms in the SLT group and 135 forms in the FLT group. Items are rated based on a Likert-type scale of 1–4

	Males	Females
	<i>Tutorial atmosphere</i>	
SLT	3.31 \pm 0.54 [‡]	3.51 \pm 0.55 [‡]
FLT	3.19 \pm 0.66	3.29 \pm 0.58
	<i>Listening and sharing information</i>	
SLT	3.00 \pm 0.76 [‡]	3.35 \pm 0.62 ^{**}
FLT	3.20 \pm 0.71	3.18 \pm 0.83
	<i>Decision making</i>	
SLT	3.75 \pm 0.67	3.82 \pm 0.55
FLT	3.35 \pm 0.95	3.57 \pm 0.94
	<i>Reaction to leadership</i>	
SLT	3.60 \pm 0.56 ^{‡‡}	3.61 \pm 0.67
FLT	2.95 \pm 0.95	3.60 \pm 0.65 ^{**}
	<i>Overall group productivity</i>	
SLT	2.87 \pm 0.87 [‡]	3.57 \pm 0.61 ^{**}
FLT	3.16 \pm 0.78	3.48 \pm 0.64 [*]

* = Significant difference between male and female groups ($p < 0.05$).

‡ = Significant difference between SLT and FLT for each gender ($p < 0.05$).

** , ‡‡ = $p < 0.01$.

Student Perception

Female groups were more relaxed in tutorials, but they indicated that peer tutoring reduces the contact between faculty and students and should better be done in advanced medical years. On the other hand, male groups perceived peer tutors better in assessment of their tutorial performance. Both male and female students in the SLT group indicated that they encountered difficulties in problem discussion and analysis during the first tutorial session. Both genders also indicated the need for special “tutor briefing” sessions for guiding student tutors.

Discussion

Peer tutoring is becoming part of the PBL program in many medical schools. Peer tutoring is expected to give students a first hand experience to important attributes, such as leadership, listening, questioning and feedback

skills. This study examined the differences in the small-group learning between male and female students when a peer-facilitator led the tutorials. Replacing the faculty tutor with one of the students was expected to make the tutorial group think about reforming and then determining what dynamics best serve its interests.

The results of this study indicate that students' overall productivity as a group was significantly more effective in female compared with male student-led tutorial groups. This gender difference was mainly attributed to the decline in group function of the male groups. However, the performance of female groups was somewhat consistent either in the presence of a peer tutor or a faculty tutor. Therefore, when female students were challenged with the experience of peer tutoring, they were more serious and more committed when the role changed from a faculty tutor to a student tutor. There was significantly more listening and sharing information in female compared with male tutorial groups. These data are in line with previous findings that women try to confirm and support each other and achieve consensus in their interactions, whereas men more often strive as individuals to achieve and maintain dominance (Tannen, 1994). These findings are more consistent with the recent theories of women's developmental psychology, which suggest that empathic connections are vital for the women's self-esteem, energy and motivation (Fletcher *et al.*, 2000). A recent study indicated that female faculty-led tutorial groups have less sponging (some students letting others do the work for them) and withdrawal compared with male groups (Das *et al.*, 2003). Since in our study, all faculty tutors were males, it will be interesting to examine the differences between male and female students in relation to the gender of the faculty tutor.

Whilst our study indicates the presence of gender differences in student-led tutorials, several confounding variables, which may affect the tutorial process, should be considered. These variables include the type of PBL program, degree of student maturity, complexity of the study problems, structure of the curriculum, the characteristics of the course, degree of familiarity of tutors with the problem and the student's level of prior knowledge (Dolmans *et al.*, 2002). The interactions between these variables and their impact on tutorial performance in student-led tutorials are still to be investigated.

The performance of both male and female student tutors in most of the tutoring skills was comparable. However, both male and female student tutors showed less effective tutoring skills in the first tutorial session during discussion and analysis of the problem compared with faculty tutors. On the other hand in the second tutorial session, both male and female student tutors were rated better in tutoring skills, such as integration and providing feedback compared with faculty tutors. A recent study reported that peer tutors struggled with basic facilitation skills, such as their ability to ask questions that would lead to further understanding of the tutorial problem, and had difficulty in separating their role as a student from their role as a tutor

(Solomon & Crowe, 2001). In our study, students expressed concern about the impact of peer tutoring on problem understanding and analysis in tutorials. Therefore, both male and female students have comparable skills in leading small groups. However, they show deficiencies in skills that require content expertise. These data indicate that facilitation skills training and preparation of student tutors appears to be crucial before embarking students on tutoring.

Conclusions

Although drawing conclusions from studies based on self-reporting from students could be a limitation, this study demonstrates that there are differences between female and male students behavior in student-led PBL tutorial groups. The results of this study may be valuable for programs using student tutors as part of their educational activities. In addition, faculty development programs should address the gender differences in PBL tutorials as part of their tutor training workshops. Finally, special training on facilitation skills should be provided to students before starting peer-tutoring.

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