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ORIGINAL PAPER

Understanding the experience of being taught by peers: the value of social and cognitive congruence

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Abstract
Background Medical schools use supplemental peer-teaching programs even though there is little research on students' actual experiences with this form of instruction. *Purpose* To understand the student experience of being taught by peers instead of by faculty. *Methods* We conducted focus groups with first- and second-year medical students participating in a supplemental peer-teaching program at one institution. From the learner focus group themes, we developed a questionnaire and surveyed all first-year students. *Results* Focus groups revealed four learner themes: learning from near-peers, exposure to second-year students, need for review and synthesis, teaching modalities and for the peer-teachers, the theme of benefits for the teacher. Factor analysis of the survey responses resulted in three factors: second-year students as teachers, the benefit of peer-teachers instead of faculty, and the peer-teaching process. Scores on these factors correlated with attendance in the peer-teaching program ($P < .05$). *Conclusions* Students valued learning from near-peers because of their recent experience with the materials and their ability to understand the students' struggles in medical school. Students with the highest participation in the program valued the unique aspects of this kind of teaching most. Areas for improvement for this program were identified.

Keywords Peer-teaching · Undergraduate medical education · Tutoring · Preclinical education · Curriculum · Medical student teachers

Background

Using students as teachers is common among medical schools as one type of supplemental instruction. In a survey of US medical schools, Moore-West,

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Hennessy, Meilman, and O'Donnell, found that 75.8% of medical schools had peer tutoring programs (1990) Although the definition of ''peer'' is broad, encompassing both actual peers (i.e. in the same medical school class) and near-peers (i.e. students one or more classes ahead of the students they are teaching), most medical school programs use near-peers.

Known variously as peer instruction, peer teaching, peer tutoring, and near-peer instruction, the premise of peer-assisted learning is that students can help other students learn, while hopefully learning something themselves in the process (Topping, 1996). Advocates of peer-assisted learning suggest it is successful because the peer-teacher and students share a similar knowledge base, or a ''cognitive congruence,'' which allows the peer-teachers to use language that their learners understand and to explain concepts at an appropriate level (Cornwall, 1980). Peer-teachers and students also share a ''social congruence'' because of their similar social roles (Schmidt & Moust, 1995). Bruffee argues that this kind of teaching serves as a transitional knowledge community that enables medical students to bridge the gap between being a college student and being a doctor (1999).

Although the majority of medical school supplemental peer-assisted learning programs use one-on-one peer tutoring, some schools employ supplemental peer instruction in a large group setting (Ebbert, Morgan, & Harris, 1999; Hurley, MacKay, Scott, & James, 2003; Sawyer, Sylvestre, Girard, & Snow, 1996; Wadoodi & Crosby, 2002). Most of these programs are based on the ''Supplemental Instruction'' model that targets high-risk classes instead of high-risk students in an attempt to reduce drop out rates and improve academic performance (Blanc & Martin, 1994). Studies have demonstrated that these programs can result in better test scores, improved academic performance in the first year of medical school, and decreased drop-out rates (Hurley et al., 2003; Sawyer et al., 1996). Ashwin (2003) found that more attendance in peer-assisted learning sessions related to better performance even when controlling for previous performance. However, this researcher noted that students participating in peer groups often learned approaches to succeed on assessments, but perhaps not deeper learning. In a recent review of the literature, Santee and Garavalia (2006) noted that studies comparing receiving peer tutoring to no tutoring nearly uniformly favored the peer approach.

Several studies have compared the efficacy of peer-assisted learning to a more traditional faculty led approach. Santee and Garavalia (2006) found that in half of the 10 studies reviewed, students in peer-assisted groups performed no differently than students in faculty led groups. In four studies, the results were mixed and in one study the peer-led group out-performed the faculty-led group. Not included in the Santee review was a study by Nnodim (1997) who found that students in a peer-taught gross-anatomy section performed better on a knowledge-assessment than those taught dissection in a traditional manner.

Research also indicates that students value peer-assisted learning. In a letter to the editor, Field, Burke, Lloyd, and McAllister (2004) reported that peer-assisted learning was favorably received by students to learn clinical examination skills. The students found the peer tutors gave useful feedback and clear explanations and they would recommend this kind of learning to friends. Houwink and colleagues (2004) reported that having third-year medical students working with first-year medical students during the first day of anatomy dissection decreased physical and emotional reactions compared to historic controls. In a qualitative study of peer-assisted

learning, Glynn, MacFarlane, Kelly, Cantillon, and Murphy (2006) found a positive learning environment where learners were confident in their ability to progress.

While program outcomes have been documented in the literature, there has been little investigation of the experience of peer-teaching from the perspectives of the learners and peer-teachers themselves. The purpose of this study was to identify and describe the views of participants in a supplemental peer-teaching program.

Methods

This study employed a two-phase research design. First, focus groups were conducted with first- and second-year students participating in the Medical Scholars Program (MSP), described below, as learners and teachers. As a tool for qualitative research, the focus group method uses group discussion to explore the perceptions and perspectives of its participants (Morgan, 1988). Based on the results of the focus groups, a questionnaire was developed and administered to all first-year medical students. The participants in this study were peer-teachers (second-year medical students) and learners (first-year medical students) who participated in a supplemental peer-assisted teaching program in 2004–2005. This study received approval from the University of California, San Francisco Committee for Human Research Protection.

Program description

MSP is a supplemental peer-teaching program at the University of California, San Francisco (UCSF) School of Medicine that has served as a model for at least two other supplemental medical school peer-teaching programs (Hurley et al., 2003; Sawyer et al., 1996). At its inception in 1986, MSP was a model of collaborative learning in which second-year medical students facilitated first-year students working together through problems on a worksheet. The goal was not for the second-year students to teach, but rather for the first-year students to learn from each other. Over time MSP has adapted its format in response to changing curricular and student needs. In 2001, UCSF introduced a new preclinical curriculum consisting of eight integrated multidisciplinary blocks. The current focus of MSP is to review anatomy in the first block (Prologue), and physiology, pathology, medicine and pharmacology in the second block (Major Organ Systems). MSP now consists of weekly review sessions that are taught, rather than facilitated, by second-year medical students. These sessions are open to all first-year students during the first 6 months of medical school.

To accommodate all students and maintain small group sizes, the same MSP session is repeated four times each week with different second-year MSP peer-teachers, with groups of 5–10 first-year students. Students can enroll in MSP as an elective and receive one unit of credit three times during their first year in September, November and January but are encouraged to attend even if they do not enroll. In recent years, close to 100% of first-year students have attended some or all of the MSP sessions in the first few months of medical school.

Focus groups

In the spring of 2005, students were recruited to participate in one of four focus groups, three for MSP learners and one for MSP teachers. We randomly selected

students using a table of random numbers from the first-year class and contacted them by email to request their participation for the first two learner focus groups. For the third learner focus group, we sent an email request to the 16 first-year students who had been selected to serve as MSP teachers for the following year. Requests to participate in the fourth focus group, specifically designed for MSP teachers, were sent to all second-year students who had served as MSP teachers during that year.

All focus groups were facilitated by one of the authors (TML). Lunch was served to all focus group participants. Immediately prior to all focus groups, students filled out a brief questionnaire about their participation in MSP. Then, the facilitator asked semi-structured questions about participants' perceptions of the overall efficacy of MSP, differences in student experiences over the 6-month course of MSP, and the experience of being taught by second-year students as compared to faculty members (for the learners) or the experience of teaching first-year students (for the teachers). Each focus group lasted approximately 60 min and was audio-recorded.

After each discussion was transcribed verbatim, the primary author (TML) read through the transcripts and identified more than 25 initial codes. Two other authors then independently analyzed the same transcripts. During subsequent discussions, the codes were clustered into a set of emerging themes. Through an iterative process, agreement was reached among the coding researchers regarding the definition of the coding categories and themes, and their application to the data under consideration.

Survey

We used the results from the learner focus groups, including statements and codes, to design a questionnaire that was administered to all first-year medical students during a required session at the end of the year. Completion was both voluntary and anonymous. The survey included the same questions about the student's participation in MSP that were asked of focus group participants. Fourteen items were derived from the major themes identified in the focus groups. Students indicated their level of agreement with each item using a 5-point Likert scale from 1 = strongly disagree to 5 = strongly agree. The survey was piloted with 10 third- and fourth-year medical students.

Analyses

To ensure that the focus group and survey participants were representative of the entire class, chi-square tests were used to compare enrollment characteristics. Descriptive statistics were calculated for the 14 survey items. We conducted a principal components factor analysis of these items followed by a varimax rotation. Factors with eigen values greater than 1 were retained. Items with factor loadings of 0.4 were considered significant for this sample size (Stevens, 1996). Cronbach's α was calculated for each factor. We correlated the factor scores with the average percentage of sessions attended. We used SPSS for Windows Version 13.0 for calculations.

Results

Focus group results

Of the first-year students asked to participate in the learner focus groups, 8 of the 23 (35%) and 9 of the 24 (38%) randomly selected students, and 9 of the 16 future MSP teachers (56%) participated. For the teacher focus group, 10 of the 16 (63%) second-year MSP leaders participated. We over-sampled to ensure sufficient number of participants rather than focusing on a high response rate. From the data reported in the demographics survey, the participants in the focus groups were representative of the entire first-year class based on their enrollment in MSP (data not shown). Generally these students enrolled in MSP at the beginning of the year with declining enrollment as the year progressed.

Learner focus groups

Four major themes were identified in analysis of the learner focus group data and are discussed below.

Learning from near-peers

In discussing their experience of learning from near-peers as compared to faculty, the first-year students mentioned the importance of near-peers being good cognitive matches. The second-year MSP peer-teachers had recently learned the material themselves and could teach at an appropriate level, focusing on a basic understanding of concepts. In comparison to faculty teaching, one student remarked, ''The thing with peer teaching is that because they're not experts, they have a better understanding of what the basics are. When you're an expert like the faculty what you think is basic is no longer basic.''

Because the second-year teachers had recently struggled to learn the material they were teaching, they were able to explain why a concept had been difficult for them and how they had learned it. One student commented, ''Some of the most helpful times were when people said, 'This confused me because of this. And this is how I figured it out.' I was totally confused and I didn't even realize that was why.'' Another student remarked, ''They have the perspective of having just learned it as opposed to innately knowing it and ... they remember recently having gone through the learning process.''

Exposure to second-year students

Students commented on the social importance of interacting with students from the second-year class. Particularly at the beginning of the year, the second-year MSP teachers helped alleviate fears and anxiety about medical school. In thinking back, one student remarked, ''For the first few sessions, there were a lot of the MSP teachers just saying, 'We know this material is tough. It's the first month of med school, relax, it's gonna be okay, it's not as bad as it really seems.''' In addition, it was reassuring to the students that MSP was not remedial, but rather attended by the majority of the class. One student stated, ''I think it was helpful to look at MSP not as a help session in the way that if you're struggling you get help, but kind of a

complementary way of learning. That way, students felt okay getting help before it was too late.''

Interacting with the second-year students and seeing that they had made it through the first year normalized the experience of being a first-year medical student and provided the first-years with a portrayal of what to expect in the upcoming year. One student commented, ''Just the confidence of knowing that the second-years made it, they're still alive, they know this, I can do it too.'' In describing her experience interacting with the MSP teachers while they were teaching anatomy, another student remarked, ''I felt like watching the second-years and the way they handled just the tools and how they handled the bodies in general really gave me an idea of how to handle the body myself... the ease with which they were using things and not afraid of everything—that was kind of comforting.''

Simply interacting with and getting to know the second-year students were also valuable components of MSP. One student summarized this by saying that meeting the second-years in MSP made him feel that ''the class above us is on our team too.'' Another student commented, ''[the second-year teachers] would always help you out or talk to you about different things, and it just gave that exposure—I don't know how else I would have really gotten that second-year exposure.''

Although the students spoke mostly about the support they received from interacting with second-year students, they also discussed the benefits of MSP in promoting collaboration and camaraderie among the first-year class. One student remarked, ''I think in a way MSP fostered group studying within our class. People would pick up review sheets for you, and you would just kind of sit in a group together. If you weren't sure about something, you'd lean over and ask somebody a question. That really reinforced being able to work in groups and camaraderie among the first-years.''

Need for review and synthesis

When the students were learning anatomy, they felt an immense need for supplemental review. ''It just seemed like there was no way that I'd actually remember all that stuff without having an additional teaching session.'' As the year progressed, the MSP review became less essential, and students had a better understanding of how to study. One student commented, ''[MSP] isn't as important right now 'cause I know everybody kinda figured out their study style, and I guess we are more comfortable with what we have to do.''

The MSP sessions connected the various concepts taught in a course together and provided an explicit means of organizing the information that the students were learning. One student stated, ''When we were doing endocarditis and myocarditis and all that, I had no idea how they all related to each other. And MSP did a really good job of connecting all the different lectures done by different people.''

Teaching modalities

The second-year MSP peer-teachers used different teaching styles than the faculty. The first-year students found the use of mnemonics helpful. ''I think [the MSP peer-teachers] were more comfortable with kind of dumbing things down and just teaching it in a simpler way, and making silly mnemonics and things that I don't think the faculty would do.'' In addition, MSP was more visual and interactive than

many of the lectures. ''I'm an interactive learner, I remember things when people quiz me on them... MSP does that, lectures don't.''

Students felt that the current format of MSP was more useful than the original format of working together on problems. They maintained that the current UCSF curriculum had enough opportunities for students to work together on problems in small groups and problem-based learning and that MSP's niche is to provide a concise organized review of the material. ''I liked the lecturing. I think if it was a small group learning exercise I wouldn't go... I feel like we have a lot of it already... and it tends to be very specific, like you learn breast cancer really well but you don't really learn about other things, and it's just hard to organize what you're supposed to be getting out of it, so I like the lectures.''

Teacher focus group

For the single focus group of MSP teachers there was one unique theme that emerged, ''*Benefits for the teachers.*'' The second-year peer-teachers spoke about the value of the relationships they developed with first-year students and stated that their commitment to service was a motivating factor in their decision to teach. One peer-teacher remarked, ''I got a sense of fulfillment from teaching MSP. It was great to be able to help others with things that were not easy for me in first-year but that I finally understood.'' Another student commented that she wanted to teach MSP because of the opportunity ''to connect with the first-years in ways the faculty may not be able to.''

Teaching MSP also provided the teachers with the opportunity to learn. One teacher stated, ''I was motivated to learn at a deeper level because I was more motivated to learn for them than I was for myself.'' Another succinctly said, ''Teaching MSP has been helpful for my preparation for the boards.''

Survey results

Of the 141 students in the first-year class 139 attended the required teaching session, and 111 completed the questionnaire (80%). The mean age of the survey responders was 24.9 years (SD = 2.8). About 54% of the responders were female and 19% identified themselves as an underrepresented minority. Comparison of the survey responders to the entire first year class revealed that those completing the survey enrolled in MSP at the same rate as the whole class at two of the enrollment times (September – 91% vs. 96%; January – 23% vs. 21%). Those completing the survey were less likely to have enrolled in MSP than the entire first-year class (57% vs. 76%; $P < .01$) during the second enrollment time in November.

Table 1 shows the responses to the 14 items on the survey. Factor analysis indicated that there were three factors accounting for 58% of the variance. The factors related to the role of the second-year student teachers (34%, $\alpha = 0.81$), the MSP learning process (14%, $\alpha = 0.76$), and the role of students as teachers instead of faculty (10%, $\alpha = 0.67$). The data in table one is organized by these factors. The mean for the three factors was 3.80, 3.81, and 3.55, respectively. We found significant correlations between attendance and the three factors. The correlations were 0.23 ($P = .008$) for the role of second-year student teachers, 0.45 ($P < .001$) for the MSP learning process and 0.25 ($P = .005$) for the role of students as teachers instead of faculty.

Table 1 Descriptive statistics and factor analytical results for questionnaire items

Factors/items (n = 110)	Mean	SD
Second-year student teachers		
The second-year MSP leaders gave me helpful general advice about medical school	3.56	0.81
It was reassuring to see that the MSP leaders had made it through first year	3.69	0.87
MSP allowed me to meet second-year students	3.84	0.63
It was useful when the second-year MSP leaders shared how they approached particular topics	4.12	0.67
MSP was the most significant way that I interacted with students from the classes above me	3.32	1.13
It was useful when the second-year MSP leaders shared their own learning experiences with material	4.05	0.72
The second-year MSP leaders provided alternate explanations of concepts	4.04	0.67
Factor mean	*3.80*	*0.54*
MSP learning process		
MSP helped me figure out what to study	3.77	0.86
MSP was essential to my learning in first year	3.67	1.00
MSP reviewed and reinforced the material taught in the Essential Core	4.16	0.73
MSP helped me put individual concepts in a particular course together	3.87	0.78
MSP would have been more useful if we worked together on cases or problems instead of listening to lectures given by the second-years (reverse coded)	3.47	0.87
Factor mean	*3.81*	*0.60*
Role of students as teachers instead of faculty		
MSP was useful because it was taught by students rather than faculty	3.46	0.84
MSP would have been more useful if it was taught by faculty instead of students (reverse coded)	3.63	1.00
Factor mean	*3.55*	*0.80*

Note: Scale was from strongly disagree (1) to strongly agree (5)

Conclusions

Using both qualitative and quantitative methods, this study examined the experience of peer teaching from the perspectives of both the learner and the peer-teacher. In the focus groups we found that the first-year students identified advantages to being taught by second-year students for both their learning and social interactions. The second-year students who served as teachers also identified advantages for their own learning as well as the personal rewards that come from helping others. These findings confirm previous research that suggests that social and cognitive congruence between teacher and learner can result in a powerful peer-assisted learning experience (Cornwall, 1980; Moust & Schmidt, 1995; Schmidt & Moust, 1995).

The four major themes that emerged from the learner focus groups (learning from near-peers, exposure to second-year students, need for review and synthesis, and teaching modalities) merged into three factors in the quantitative study. In the analysis of the focus groups, the discussions of the cognitive and social benefits of

learning from near-peers were separated into two separate themes, whereas in the survey, these items resulted in a single factor. Similarly, in the focus groups, the students' desire for review and synthesis was separated from the current teaching modality of MSP, whereas in the survey the two were combined into one factor. Finally, a separate factor was found in the survey that related specifically to the fact that MSP is taught by students rather than faculty. Overall, our factor analysis results suggest a framework for thinking about peer-assisted instruction which has three components—the benefits of the peer-teachers, the learning process for peer-assisted programs, and the peer-teacher/faculty role perceptions.

These results fit nicely with Shulman's description of signature pedagogies in the professions (Shulman, 2005). Signature pedagogies are the forms of instruction characteristic of the profession. Medicine traditionally has relied on the near-peer form of teaching, in which as little as one year of training may separate the teacher from the student. Clinical teams are organized around the belief that the near-peer is often the best teacher. MSP provides students with early exposure to a model of learning from or teaching individuals that are only one year ahead or behind them in training. Shulman argues that signature pedagogy has a surface structure which is concrete and includes showing and demonstrating, a deep structure which focuses on how to impart knowledge, and an implicit structure that provides the beliefs about professional attitudes, values and dispositions (Shulman, 2005). The results of our study highlighted the presence of all of these messages in MSP.

Although the focus groups revealed largely positive experiences with MSP, the survey ratings averaged between ''neutral'' to ''agree.'' We note that students with the highest participation in MSP rated the program most positively. It may be that MSP appeals to certain groups of students more than to others. This finding should be explored further, but is consistent with the expectations of designing an alternative learning opportunity.

In the focus groups, students had many recommendations for the program including announcing session topics ahead of time and moving sessions to the daytime. The latter issue is difficult to address given student course schedules. Despite selecting for teaching ability, the second-year MSP peer-teachers in their focus group requested more instruction about how to teach before assuming their teaching roles. Currently there are at least twice as many applicants as positions for MSP leaders and therefore the leaders are chosen based on an interview and a demonstration of their teaching skills to a group of upper level students. Even though most MSP leaders are experienced and capable teachers prior to the beginning of the program, they were particularly interested in learning more skills for effective management of student questions. We have begun to address this issue by offering a student derived and delivered ''Teaching to Teach'' workshop.

Based on our research, we believe we can make several recommendations to other schools. First, the role of a supplemental peer-teaching program must be considered in light of the curriculum that the school offers. The shift at UCSF from a predominantly lecture-based curriculum to a more active and self-directed one with ample small group sessions resulted in a meaningful concomitant shift in MSP. The curricular change did not eliminate the need for a supplemental peer-teaching program.

Second, peer-teaching is likely to be most effective in the beginning of medical school and may greatly alleviate some of the transitional difficulties students encounter. Initially, the large volume of material to learn may be overwhelming,

leading students to seek additional guidance and reassurance until they become comfortable guiding their own study. Peer-assisted learning provides support in the crucial first few months when students are particularly overwhelmed or nervous. Yet, for certain students, prolonged peer-assisted learning may be very valuable.

Third, schools should recognize the unique contribution of near-peers who can empathize with their students, teach at the appropriate level, and anticipate and reframe learning. Near-peer-teaching might be effective in a variety of approaches other than that illustrated by MSP in this study. Even though the second-year MSP teachers do not have the same content expertise as the faculty, they compensated for this with their cognitive congruence. The cognitive congruence literature focuses on the ability to teach at the right level (Moust & Schmidt, 1995; Schmidt & Moust, 1995). However, the literature is not explicit about how one recognizes this ''right level.'' This study revealed that the ability of the second-year MSP teachers to anticipate problems that the first-year students might have in understanding particular concepts was a key component in creating cognitive congruence. Because they recently learned the material themselves, peer-teachers are able to share their own struggles and learning experiences and describe the approaches they used in overcoming their challenges. The two items referring to this concept were two of the highest rated items on the survey (see ''Second-year student teachers'' factor, Table 1).

Fourth, because of the collaboration it promotes both between and within medical school classes, schools should consider near-peer-teaching as a way of enhancing team orientation. MSP helped foster informal support and advising of the first-year class by the second-year class as well as collaboration and camaraderie among the first-year students.

Fifth, peer-teachers must be prepared as teachers. It is a disservice not to spend the time enhancing their skills as educators. Although not a unique finding, this study provided further evidence that peer-assisted learning benefits the peer-teachers as well as the students (Annis, 1983; Boud, Cohen, & Sampson, 2001; Hurley et al., 2003; Ocel, Palmer, Wittich, Carmichael, & Pawlina, 2003; Sobral, 2002; Tang, Hernadez, & Adams, 2004; Topping, 1996; Whitman, 1988). While the second-year MSP teachers valued the opportunity to review and relearn material from first year, they also appreciated the opportunity to give back to the medical school community. However, they recognized that the role of teacher was one for which they needed further preparation. Other researchers support this need to prepare the students who teach (Escovitz, 1990; Kassab, Abu-Hijleh, Al-Shboul, & Hamdy, 2005; Nestel & Kidd, 2003, 2005).

Although this study clarified the experience of being taught by peers as opposed to faculty, there are several limitations. First, the study was an examination of a single group of students at one university. Second, not all students who were asked were able to participate in the focus groups. However, the size of the actual focus groups was appropriate for the methodology. Third, the focus group leader was an investigator which may have affected participants' perceptions of their ability to speak freely. This bias may be outweighed by the fact that she was a peer to whom they could speak freely. Although the study may have been subject to the Hawthorne effect, this was minimized by the fact that the focus group participants were reporting their perceptions to a peer. Finally, some of the findings of the study may be unique to MSP in the 2004–2005 academic year.

From this work, a direction for future research has become apparent. We would next like to examine the role of supplemental peer-teaching programs in other curricula. What would peer-teaching look like in a more structured curriculum with fewer small group opportunities? What opportunities would there be for supplemental peer-teaching in curricula that are completely based on small group learning, such as a pure problem-based learning curriculum?

In conclusion, this study provided a deeper understanding of students' experiences in one medical school supplemental peer-teaching program. Although the value of the review and synthesis that these sessions provided was emphasized, there were other strengths of learning from near-peers as opposed to faculty. In particular, the value and importance of cognitive and social congruence was highlighted. As medical schools continue to include more opportunities to learn from near-peers, an improved understanding of this experience will be crucial in helping to assure the success of near-peer teaching both within the medical school curriculum and as a supplemental means of instruction.

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