Problem-Based Learning Readiness: Evaluation of Physician Assistant Applicant Readiness for Group Learning

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Abstract

Research on student readiness for self-directed learning has often utilized the Self-Directed Learning Readiness Scale for Nursing Education (SDLRSNE), which focuses on self-evaluation. Many health professions programs use small groups as a vehicle for self-directed learning. The purposes of this study were to examine impact of a PBL experience on PA applicant responses to the SDLRSNE and to examine impact of the same PBL experience on internally developed pilot questions regarding PA applicant expectations of group member and faculty roles. A total of 249 applicants to a graduate physician assistant program completed the 40-item SDLRSNE plus 10 author-devised pilot items before and after a PBL experience. Results indicated no significant differences from pre- to post-PBL experience on SDLRSNE, but there were significant differences on six of the ten pilot items, all of which related either to expectations of the facilitator or of group-related performance. In order to measure readiness for self-directed learning, as well as to measure impact of a PBL experience on that readiness, items need to focus on expectations of self as related to facilitator and other group members. A PBL experience appears to positively impact PA applicant expectations.

Keywords: Problem-based learning; Self-directed learning; SDLRSNE; Medical education; Physician Assistant education

1.Introduction

Self-directed education creates unique demands on students accustomed to information presented by faculty. The addition of small group work to the self-directed format is a source of stress for students who have developed and relied on skills for individual learning. To varying degrees, physician assistant (PA) education, has adopted the androgogical (related to adult learning) model of problem-based learning (PBL) that combines self-directed learning with small group experiences. Skills associated with success in a PBL curriculum include teamwork, communication, independent research, ability to develop questions, and skill in formulating connections between various knowledge items (Barrows, 1996). Students entering a PA program where a portion of the curriculum emphasizes self-directed learning in small groups and/or PBL andrology may be unaware of the expectations and tools necessary for success. These strategies may differ from those used in a largely lecture-based curriculum (Barrows, 1994).

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Students who have no prior experience with self-directed learning may initially express feelings of confusion and frustration with the lack of direction, information, and affirmation from an authority figure (Lewis et al., 2009). Although there has been research on methodology to improve the facilitator’s ability to become proficient in the PBL process through training and experience, other than Barrows’ guide for new PBL students, there is limited information and research about strategies to enhance students’ transition to PBL (Azer, 2011; Barrows, 1996; Hitchcock & Mylona, 2000). Students’ perceptions of the PBL process change with time and experience in PBL. An analysis of PBL students from the beginning to the end of their experience during the second year at Michigan State University College of Human Medicine examined the importance of four factors (facilitator effectiveness, small-group process, learning materials, and academic support) to their learning. Results revealed that students initially rated facilitator (tutor) effectiveness as the most important of four factors, but by the end of the year, they rated facilitator effectiveness third (behind learning materials and the small-group process, respectively; Kalaian & Mullan, 1996).

Some PA programs, as well as other healthcare professions programs, especially those at the undergraduate level, have developed varying strategies to facilitate the transition of students to a PBL curriculum. Instructors at the Mara University of Technology in Malaysia introduced a 12-hour training workshop for students, “Becoming an Effective Learner,” to improve student skills in critical thinking, researching strategies, and knowledge construction. At the end of the workshop, more than 85% of students understood their roles in PBL and felt confident about the process, and 75% had begun to practice the skills learned in the workshop (Azer, 2011). First year dental students at the University of Adelaide, Australia, received a one week course, “Communication and Learning,” that introduced the process of problem-based learning and related assessment methods. The authors described parameters for an effective PBL group, including interpersonal conflict resolution. A pre- and post-questionnaire completed by the students evaluated effectiveness of the course and found a significant increase in knowledge about PBL (Greenwood, Townsend, Joseph, & Wetherell, 1999). Trained facilitators at the Peninsula Medical School in Exeter, UK incorporated a voluntary teamwork exercise into the admissions process on a trial basis to assess whether it could identify applicants with positive PBL attributes better than the interview process. They measured both desirable attributes (ability to summarize, reflect, adhere to group rules, and tolerate differences) and undesirable attributes (prejudice, and domineering, non-participatory, or rude behaviors) during the teamwork exercise. They found no correlation between scores on the teamwork exercise and structured interview scores, and they proposed this was due to a difference between an applicant’s verbalized self-perception and their actual performance (Chamberlain & Searle, 2005). Similarly, applicants may profess knowledge of PBL but revise their understanding when they participate in a PBL experience.

Some researchers have begun to extend this work to PA education. For example, interviews of faculty in two PA programs that use PBL revealed that they use a mock PBL session during the interview process, encourage applicants to observe an actual PBL session, and provide information about PBL on their website as ways of introducing prospective students to the PBL process (Midla & Coryell, 2010).

PBL relies heavily on self-directed learning skills. There has been considerable research in development of a scale to measure readiness for self-directed learning as a means to identify students who are most likely to be successful in this type of curriculum. Guglielmino (1978) created a widely used 58-item self-directed learning readiness scale, but it appears to measure a single construct of enthusiasm or positive attitude for learning rather than discriminating between being ready or not for self-directed learning (Bonham, 1991; Field, 1989; Guglielmino, 1978). Taking these criticisms into consideration, Fisher, King, and Theue (2001) developed a new 40-item Self-directed Learning Readiness Scale for Nursing Education (SDLRSNE) containing three factors (self-management, desire for learning, and self-control). This scale has undergone confirmatory factor analysis with first-year undergraduate nursing students (Fisher & King, 2010).
Hendry and Ginns (2009) administered the SDLRSNE to medical students in a hybrid PBL curriculum at the University of Sydney and identified four factors (critical self-evaluation, learning self-efficacy, self-determination, and effective organization for learning), rather than the original three. Researchers across a wide variety of disciplines, venues, and cultures have used the SDLRSNE to measure traits associated with self-directed learning in the following groups: first year undergraduate medical students in Australia, Nepal, and India; baccalaureate nursing students in Australia, China, and Turkey; and first-year Pharm. D. students in the U.S. (Abraham et al., 2011; Deyo, Huynh, Rochester, Sturpe, & Kiser, 2011; Fisher & King, 2010; Hendry & Ginns, 2009; Kocaman, Dicle, & Uger, 2009; Shankar et al., 2011; Yuan, Williams, Fang, & Pang, 2012).

An observation of previous research is that the SDLRSNE measures individual behaviors, attitudes, and expectations, whereas small group PBL requires teamwork skills and the ability to provide feedback to others. As Barrows (1994) noted, small group learning for health care students is important because it provides training for being medical team members in their professional lives. Therefore, the SDLRSNE may not adequately assess a student’s readiness for learning in a group setting. To address this perceived limitation, items that addressed expectations towards learning in a group setting were piloted, using a pre-test/post-test analysis of participants in a PBL experience during an interview for a PA studies program. Expectations about behaviors valued in a small-group self-directed learning curriculum changed significantly in a positive direction after a PBL experience (Hawkins, Hertweck, Goreczny, & Laird, 2013). This highlights the need for development of items that can predict success in a small group/PBL curriculum. The intent of this study was to measure changes in applicant’s perceptions of attributes valuable to the PBL process after participating in a small group PBL experience.

Despite available opportunities for program applicants to learn about PBL, including observing classes, videos on the University web page, and demonstrations at “open house” events, some matriculated students report being surprised to learn that the central component of the curriculum is PBL. They may be resistant to some aspects of the PBL process, such as the requirement of self-directed learning and reliance on classmates during small group work, possibly interfering with their learning. To increase applicant awareness of the nature of the PBL curriculum, the program provided applicants with the opportunity to participate in a PBL experience. The PBL experience was not part of the admissions criteria for the PA program and did not affect applicant acceptance into the program. One purpose of this study was to examine impact of a PBL experience on PA applicant responses to the SDLRSNE. A second purpose was to examine impact of the same PBL experience on internally developed pilot questions regarding PA applicant expectations of group member and faculty roles.

2. Methods

2.1 Subjects

Subjects were applicants to a PA program in 2012 who attended one of two interview sessions. We collected data from 249 applicants, all of whom took part in a voluntary one-hour PBL experience led by a trained student facilitator. There were no exclusion criteria.

2.2 Instruments

2.2.1. Self-Directed Learning Readiness Scale for Nursing Education (SDLRSNE)

The first questionnaire administered was the 40-item SDLRSNE, which uses a 5-point Likert scale with endpoints of “strongly agree” and “strongly disagree.” Three subscales for self-directed learning readiness (self-management (13 items), desire for learning (12 items), and self-control (15 items)) were used, rather than the four subscales of Hendry and Ginns (2009) because researchers have utilized the three subscales most frequently (Fisher & King, 2010).
2.2.2. Additional group-oriented items

We devised ten additional group-oriented pilot items based on a 5-point Likert scale with endpoints of “strongly agree” and “strongly disagree” to explore PA applicant expectations of the group experience (See Table 1). New items were based on characteristics associated with positive performance in a PBL setting, such as communication skills, cooperative learning, reflection, respect, self-directed learning, and self-evaluation (Chamberlain & Searle, 2005; Novak, Shah, Wilson, Lawson, & Salzman, 2006). We worded five of the items in the direction such that high scores signified behaviors/attitudes consistent with readiness for working within a PBL format, and we worded five items in the opposite direction in order to avoid the affirmative bias.

Table 1: Univariate Analysis of Variance Results Comparing Pre Experience Scores with Post-Experience Scores on Additional Questions

<table>
<thead>
<tr>
<th>Item</th>
<th>PreMean (Standard Deviation)</th>
<th>PostMean (Standard Deviation)</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is difficult for me to find trustworthy medical information on the internet.</td>
<td>2.44 (0.88)</td>
<td>2.52 (0.95)</td>
<td>3.30</td>
<td>.071</td>
</tr>
<tr>
<td>2. When I work in a group, others work as hard as I do.</td>
<td>3.30 (0.95)</td>
<td>3.62 (0.91)</td>
<td>33.99</td>
<td>.000</td>
</tr>
<tr>
<td>3. I typically learn better when I study alone.</td>
<td>2.69 (0.97)</td>
<td>2.63 (0.92)</td>
<td>1.68</td>
<td>.197</td>
</tr>
<tr>
<td>4. It is difficult for me to express my ideas to others.</td>
<td>1.75 (0.71)</td>
<td>1.94 (0.84)</td>
<td>15.41</td>
<td>.000</td>
</tr>
<tr>
<td>5. Learning in a group will enhance my understanding.</td>
<td>4.44 (0.71)</td>
<td>4.52 (0.55)</td>
<td>3.10</td>
<td>.079</td>
</tr>
<tr>
<td>6. I have as much to contribute to a learning group as others in the group.</td>
<td>4.45 (0.62)</td>
<td>4.32 (0.66)</td>
<td>9.04</td>
<td>.003</td>
</tr>
<tr>
<td>7. Others in a group typically know more about medicine than I do.</td>
<td>2.59 (0.60)</td>
<td>2.77 (0.71)</td>
<td>15.26</td>
<td>.000</td>
</tr>
<tr>
<td>8. Others behave respectfully towards me when I work in a group.</td>
<td>4.26 (0.57)</td>
<td>4.30 (0.53)</td>
<td>1.15</td>
<td>.284</td>
</tr>
<tr>
<td>9. I expect a faculty member to tell me when I am wrong.</td>
<td>3.80 (0.90)</td>
<td>3.38 (1.06)</td>
<td>67.52</td>
<td>.000</td>
</tr>
<tr>
<td>10. I can accurately evaluate my own performance.</td>
<td>3.85 (0.73)</td>
<td>3.95 (0.66)</td>
<td>5.43</td>
<td>.021</td>
</tr>
</tbody>
</table>

2.3 Procedure

Subjects were placed in groups of eight members—with a total of 32 groups. After brief introductions, facilitators presented a clinical case scenario. Subjects then proceeded to make hypotheses and ask questions of the “patient,” and facilitators intermittently questioned applicants to explore their depth of knowledge. At the end of the session, subjects learned the outcome of the “patient.”

Applicants completed the SDLRSNE and the ten pilot items before and after the PBL experience, assuring anonymity by not linking any identifying information to the questionnaires. Pre- and post-questionnaires were in the same envelope and had the same participant number attached, but this number did not provide any way to identify participants. We did not collect any demographic or
other identifying information in order to assure anonymity of responses. The University’s Institutional Review Board approved the study.

We entered data into Microsoft Excel 2010 and then migrated it into SPSS 18 software, which we used for all data analyses. Data analyses included Multivariate Analyses of Variance (MANOVA) and Univariate Analyses of Variance (ANOVA).

3. Results

A univariate analysis of variance with exposure (i.e., pre versus post) as the within subjects independent variable and SDLRSNE total scores as the dependent variable was computed. This analysis yielded a non-significant result, F (1, 248) = 2.87, p = .092. A multivariate repeated measures analysis of variance with exposure (i.e., pre versus post) as the within subjects independent variable and the three subscale scores from the SDLRSNE as the dependent variables was conducted. This analysis also yielded a non-significant result, multivariate F (3, 246) = 2.02, p = .111. Univariate analyses on each of the three subscales revealed that only one of the three subscales (self-control) was statistically significant (see Table 2). Given the non-significant multivariate F, however, researchers need to interpret this result with caution, especially given the non-significant F for the total score of the SDLRSNE. Given the very high mean score of this group of students prior to beginning the PBL experience, the distribution of scores was evaluated and, in fact, at both time periods only (delete period before the word “only”) 2 of 249 participants scored below 150, which is the recommended benchmark for readiness for self-directed learning (Fisher et al., 2001). Prior to exposure to the PBL experience, one participant scored an 87 and the other scored a 147. Subsequent to the exposure, one participant scored 146 and the other scored 149.

Table 2: Univariate Analysis of Variance Results Comparing Pre Experience Scores with Post-Experience Scores on SDLRSNE scores

| Scale               | PreMean (Standard Deviation) | PostMean (Standard Deviation) | F    | p 
|---------------------|------------------------------|------------------------------|------|---
| Self-Management     | 54.67 (4.33)                 | 54.86 (4.63)                 | 0.80 | .372
| Desire for Learning | 54.28 (4.07)                 | 54.42 (3.96)                 | 0.46 | .499
| Self-Control        | 65.10 (5.12)                 | 65.74 (4.90)                 | 5.36 | .021
| Total               | 174.06 (11.71)               | 175.01 (11.84)               | 2.87 | .092

In order to evaluate usefulness of the ten pilot items, we computed a multivariate repeated measures analysis of variance using the individual items as the dependent variables and exposure as the independent variable. This revealed a statistically significant result, multivariate F (10, 244) = 13.82, p = .000. Subsequent repeated measures univariate analyses on each of the individual items revealed that six of the ten items were statistically significant (see Table 1).

4. Discussion

Results from this study show that the SDLRSNE score did not change significantly after exposure to a small group PBL experience. One potential reason for the lack of statistically significant differences on the SDLRSNE from pre to post may be due to the study population. Applicants to the majority of PA programs tend to be older compared to students in programs from other research studies using the SDLRSNE and have completed at least three years of undergraduate baccalaureate education. Being older could contribute to readiness as those students would be more likely than those who are...
younger to have additional work and life experiences. Previous research studies have indicated an association between educational experience and high SDLRSNE scores. No Paragraph Here – should be continuous with next paragraph (your instructions said not to break a sentence between pages, so join next sentence please.

For example, first year Turkish nursing students had a mean score of 160, which increased to 185 by the completion of their fourth year of the program (Kokaman et al., 2009). In another study, mean score for first year Pharm. D. students was 148.6, but a significant number of Pharm. D. students scoring above 150 had a previous academic degree (Deyo et al., 2011). Subjects in many studies using the SDLRSNE were relatively young compared to graduate students in PA programs. For example, students in the MBBS programs in India and Nepal entered directly from secondary school (Abraham, et al., 2011; Shankar et al., 2011). The average age of the first-year Turkish and Chinese nursing students was 19.3 and 20.6 years, respectively (Kokaman et al., 2009; Yuan et al., 2012). These studies are consistent with the hypothesis that students with more education, and likely older, are more likely to score higher on the SDLRSNE than students with less education, likely younger.

Students who have a high level of readiness for self-directed learning may self-select into programs using PBL (Hendry & Ginns, 2009). Students who apply to PA programs using PBL have opportunities to learn about PBL prior to application (Midla & Coryell, 2010). Data from our study were consistent with this in that the mean score of students prior to exposure to the PBL experience was already 174 and only 2 of 249 students scored below 150 (the recommended benchmark for readiness for self-directed learning; Fisher et al., 2001). Given the very high mean score of this group of students prior to beginning the PBL experience, there was little room for improvement, exhibiting a ceiling effect. Although there are several possible explanations for the high scores of participants in the current study, it seems that one of the most likely explanations is that the SDLRSNE is not an appropriate measure for assessing students entering a graduate level PA program where high academic achievement is already a pre-requisite for admission. Scores on the SDLRSNE from this study indicate that applicants to a PBL-based PA program may already be self-directed learners.

Although the SDLRSNE is among the most widely used instruments for measuring readiness for self-directed learning, it does not contain items related to the facilitator or other group members that specifically assess readiness for self-directed learning in a small group experience. For this reason, ten pilot items used in this study were developed, six of which changed significantly after the PBL experience. Three of the items (2, 7, and 9) demonstrated significant change on a previous administration, and those three plus items 4, 6, and 10 demonstrated significant change in this study (Hawkins et al., 2013). All but one of the four items that did not demonstrate significant change related to items about the individual not related to the group. Five of the six items that did change significantly involved some aspect of expectations of the faculty or expectations of self or others related to the group. For example, scores on item number nine decreased significantly, indicating that applicants initially expected the faculty/facilitator to inform them when they were wrong, but learned through the experience that this was not part of the facilitator’s role, which is to guide rather than inform. Scores increased significantly on item number four, indicating that applicants had more difficulty expressing their ideas to other group members than they initially anticipated.

The three pilot items sensitive to change in both studies indicate that students may need to learn the role of faculty in a self-directed learning setting and may need to learn appropriate expectations of themselves and other group members in this learning environment, which may be a new experience for them. Therefore, there is a need to develop additional items that are capable of measuring readiness for self-directed learning in a population of PA students in a curriculum utilizing small group learning. This could include items related to expectations of faculty, expectations of themselves related to the group, and expectations of others related to the group. A focus group of students experienced in self-directed learning in a small-group learning environment could provide suggestions for items that relate to successful functioning in a PBL group. Utilization of a newly developed scale would allow for
implementation of activities to increase student awareness of appropriate expectations of faculty, themselves, and others in a small group self-directed learning experience. The development of these additional items represents an initial attempt to address the need for a scale that includes group- and faculty-oriented items in addition to the individual-oriented items in the SDLRSNE. No paragraph here – should be continuous with next This is consistent with the recommendation of Hendry and Ginns (2009) for the development of additional items that consistently assess self-directed learning in different populations.

A potential confounding factor is that we administered the questionnaire as part of an admissions process. Although we informed students that the experience did not relate to their admissions outcome and the questionnaires were not attached to any names, students might have answered in a way that they hoped would help their admissions chances. Because student responses to some items changed pre- to post-PBL experience and others did not change, this does not seem likely. Another potential confounding factor is that, like Midla & Coryell (2010), we encouraged our program applicants to observe an actual PBL session and we provided information about PBL on the program website. Therefore, some applicants may have had awareness of PBL prior to this experience, which may have decreased the amount of change evidenced.

Future research needs to perform psychometric analysis of additional group-oriented items related to group and faculty functioning and utilizing a group-oriented self-directed learning readiness scale to predict outcomes such as success in the didactic and clinical phases of the PA curriculum.

Given the relatively high level of self-directed learning required to be competitive in the PA applicant pool, there is a need to identify other characteristics that will predict good performance and success in their education and work in the PA profession. The additional individual questions developed specifically for this and the previous study represent an initial attempt to pilot items that might be sensitive to measuring impact of a self-directed small group learning experience. Results from the current study as well as from the previous study indicate that the types of items that appear most sensitive to change because of such an experience appear to be those regarding appropriate expectations of faculty and group functioning as opposed to individual-based attributes, which are the focus of the SDLRSNE.

References


