Examining the Effect of Small Group Discussions and Question Prompts on Vicarious Learning Outcomes

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Abstract

This study investigated the effect of group discussions and question prompts on students' vicarious learning experiences. Vicarious experiences were delivered to 65 preservice teachers via VisionQuest, a Web site that provided examples of successful technology integration. A 2×2 factorial research design employed group discussions and question prompts as independent variables and students' perceptions of their competencies and self-efficacy for technology integration as dependent variables. While three of the four conditions showed significant increases in perceptions of knowledge and skills, ANOVA results showed no significant differences among treatments. It is speculated that additional conditions may have distracted students from the content/message of the teacher models highlighted on VisionQuest. (Keywords: Group discussion, preservice teacher education, question prompts, technology integration, vicarious learning.)

Vicarious learning occurs when learners decide, after viewing the performances of others, what types of actions will be effective or non-effective for their own enactment of a task (McCown, Driscoll, & Roop, 1996). According to social cognitive theory (Bandura, 1997; Schunk, 2000), vicarious experiences can accelerate learning over what would be possible if we had to perform every behavior ourselves in order to learn. This is especially true when trying to learn complex skills such as riding a bike, swinging a golf club, or using computers in the classroom. By observing experts, teachers, and other models, learners may get a head start toward their own mastery of difficult tasks.

Vicarious experiences have been used to increase students' self-efficacy, or confidence, for performing tasks similar to those performed by the observed models (Bandura, 1986; Ertmer, Conklin, Lewandowski, Osika, Selo, & Wignall, 2003; Gist, Schwoerer, & Rosen, 1989). According to Bandura (1997), self-efficacy comprises personal beliefs about one's capability to perform at specified levels and, as such, is considered to be the "key factor of human agency" (p. 3). While not as strong of a source of efficacy information as personal mastery experiences, vicarious experiences often offer a more feasible method for enhancing preservice teachers' self-efficacy for technology integration, especially given the lack of resources and logistical difficulties involved in providing students with relevant mastery learning opportunities (Albion & Gibson, 2000; Ertmer et al., 2003). (Note: Additional sources of efficacy information, such as social persuasion and physiological states, are less powerful and were not considered relevant to this study).

Technology also offers an effective means for delivering vicarious experiences. In a study that explored the effectiveness of electronic models for increasing

preservice teachers' self-efficacy for technology integration (Ertmer et al., 2003), results showed a significant increase in students' judgments of confidence after viewing successful models in a hypermedia environment[1]. Albion and Gibson (2000) obtained similar results: After observing realistic examples of technology integration in an interactive multimedia environment, preservice teachers showed a significant increase in their self-efficacy for technology integration. Along similar lines, Driscoll and her colleagues (Driscoll, Craig, Gholson, Ventura, Hu, & Graesser, 2003) demonstrated the benefits of observing dialogue-like discourse (as opposed to monologue-like discourse) that was modeled by a virtual tutor in a computer-supported environment. That is, overhearing dialogues containing deep questions helped learners recall information and thus, increased their learning outcomes. Taken together, these studies suggest the possibility of increasing learning and self-efficacy through the use of vicarious experiences delivered via computer based environments.

Despite the many benefits noted in the literature, vicarious learning is not without its challenges. Since vicarious learning is, in and of itself, a fairly passive learning activity, learners may disengage from the activity entirely or fail to attend to critical aspects of the performance, thus missing out on the important benefits to be gained. Given these potential difficulties, it may be beneficial to combine vicarious experiences with additional strategies that will enable students to become—and stay—mentally involved in the experience. For example, Wang, Ertmer, and Newby (2004) demonstrated that vicarious experiences and goal setting in combination were more effective than either strategy alone for increasing preservice teachers' self-efficacy for technology integration. According to Schunk (2000), discussion groups and questioning are both effective methods for promoting active learning, and thus may increase students' engagement in the vicarious learning experiences.

POTENTIAL BENEFITS OF GROUP DISCUSSION

According to Koschmann, Kelson, Feltovich, and Barrows (1996), meaningful group discussions can lead to cognitive benefits by engaging students in deep reflections on their ideas. By exchanging ideas and considering others' perspectives, learners are prompted to reflect on their existing ideas as well as to integrate new ideas into their existing knowledge. Also, the cognitive processes involved in asking questions, providing explanations in response to questions, and elaborating on one's ideas to provide these explanations, all contribute to learning (Cohen, 1994; Slavin, 1996). Cochran-Smith and Lytle (1999) described how teachers' engagement in collaborative dialogue within a community of inquiry enabled them to share knowledge and co-create new understandings. Albion and Gibson (2000) emphasized the importance of including collaboration in multimedia-based, problem-solving environments, stating that the efficacy of problem-based learning stems from discussions among group members.

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[1] This study used *VisionQuest*, the same Web site used in this study for providing vicarious experiences. Details of *VisionQuest* will be described in the methods section.

Results from Levin's (1995) study on the contributions of case discussions to teachers' thinking, indicated that discussions helped student teachers and less experienced teachers clarify and elaborate on their ideas about issues in a case. Gokhale (1995) explored the effects of collaborative learning on drill-and-practice and critical thinking tests, and concluded that collaborative learning had a significant positive affect on critical thinking by helping students learn from each other's experiences and knowledge, and by stimulating more in-depth reflection.

Research also supports the hypothesis that group discussions can contribute to increased self-efficacy. In Rushton's in-depth qualitative study (2003), findings showed that preservice teachers' interactions with students and mentoring teachers helped them "cope with their doubts and abilities" (p.167), which led to increases in self-efficacy. Wilson (1996) examined the effectiveness of field experiences in a teacher certification program for elementary science, math, and technology students and noted that participants preferred small group discussions, which also increased their self-efficacy. Furthermore, learners have been shown to gain confidence and improve their performances when they observe models who initially showed the same fears as themselves, but who gradually reached mastery levels of performance (Driscoll, 2000). It was hypothesized that student interactions within discussion groups, as used in the current study, would help learners develop self-efficacy in similar ways. That is, learners' self-efficacy was expected to increase if they observed multiple people, similar to themselves, discussing and solving problems related to technology integration (Brown & Inouye, 1978; Schunk, 1987).

Still, not all studies indicate that group learning is more effective than individual learning. A study by Snyder and Sullivan (1995) reported that when given the learning goal of changing misconceptions, students working individually scored significantly higher on posttest scores than those who worked in groups. Research specifically aimed at identifying the relationship between group discussions and learning in computer-based environments also demonstrated no significant differences in achievement between students working in groups and students working individually (Carrier & Sales, 1987; Werner & Klein, 1999). To date, contradictory findings on the effectiveness of group work in computer-based and face-to-face environments suggest the need to explore how peer interactions affect both learning and self-efficacy outcomes when used in combination with vicarious experiences.

POTENTIAL BENEFITS OF QUESTION PROMPTS

Questioning is another strategy that might increase self-efficacy and learning, especially when used in combination with group discussions. For example, evidence for the relationship between questioning and self-efficacy can be found in a study by Powell and Ramnauth (1992). The study suggested that confidence among teachers increased when their peers made comments or suggestions and asked questions to stimulate the thought processes of each other. Additional studies suggest that by asking questions, peer interaction can be structured in ways to promote both cognitive development and self-efficacy. For instance, a

study by Ge and Land (2003), which investigated the effectiveness of question prompts and peer interactions when used during tasks involving ill-structured problems, revealed that question prompts facilitated students' performance. In their study, qualitative data indicated that students' thinking was enhanced during peer interactions in terms of problem representation, explanation, justification, monitoring, and evaluation. Van Zee and Minstrell (1997) suggested that when teachers ask reflective questions (i.e., questions that elicit further thinking about a topic) they encourage their students to clarify their meanings, consider various perspectives, and monitor their own discussions and thinking.

Certain types of prompts have been shown to be effective in computer-based environments as well. Davis and Linn (2000) demonstrated that for knowledge integration to occur, self-monitoring prompts, which helped learners reflect on the planning and progress of activities, were more effective than activity prompts that simply focused learners' attention on completing the activities. A study by Han, Crooks, and Xie (2005) showed that using unstructured question prompts (prompts which appeared separately from, but not inserted within, the text passage on the computer screen) can be effective for performance transfer especially when learners have to key in answers to the computer program.

It should be noted, however, that research findings on the effectiveness of questioning have been inconsistent. Wang (2001) explored the effects of summarization and structured questions, hypothesizing that structured questions would activate metacognitive and critical thinking skills. However, results of this study indicated no statistical effects of either treatment on transfer tasks.

While there are inconsistent reports on the effectiveness of group work and question prompts in both face-to-face and computer-based environments, in general, the literature suggests that both methods may have a positive effect on learning by facilitating reflection and critical thinking. This suggests that group discussions and question prompts may enhance the use of vicarious experiences with preservice teachers and thus may have an impact on the growth of their knowledge, skills, and self-efficacy.

The current study was designed to examine, in a vicarious learning context, the impact of group discussions and question prompts on students' knowledge/skills and self-efficacy judgments for technology integration. Specifically, this study was guided by the overarching research question: What are the effects of group discussions and question prompts on preservice teachers' judgments of computer competency and computer self-efficacy in a vicarious learning environment?

Based on the literature above, it was hypothesized that students who participated in group discussions while observing exemplary technology-using teachers (i.e., students who participated in vicarious experiences) would have increased perceptions of competency and self-efficacy in this area. It was also hypothesized that students who received question prompts to guide their reflections during vicarious learning experiences would demonstrate a significant increase in judgments of competency and self-efficacy for technology integration.

Finally, it was hypothesized that students who participated in group discussions and received question prompts would have the greatest increase in judgments of competency and self-efficacy compared to students who received either one of these conditions alone.

METHODS

Research Design

A 2×2 (group discussion × question prompts) research design was used to examine the impact of group discussions and question prompts on preservice teachers' judgments of competency and self-efficacy for technology integration. The independent variables were combined to form four experimental conditions: (1) NGD/NQP (the control group, that is, no group discussion and no question prompts), (2) NGD/QP (no group discussion, but with question prompts), (3) GD/NQP (group discussions, but no question prompts), and (4) GD/QP (group discussions and question prompts). The dependent variables included participants' pre- and post-perceptions of their competencies (knowledge and skills) and self-efficacy for technology integration.

Participants and Sampling Method

Participants were solicited from a group of 420 students enrolled in an introductory educational technology course during the spring of 2005 at a large Midwestern University. The 2-credit course consisted of weekly 1-hour lectures and 2-hour lab sessions, and was designed to provide students with the foundational knowledge and skills necessary to integrate technology into K-12 classrooms. Participation was solicited during the eighth week of the semester during 18 lab sessions that were taught by instructors unrelated to this study. An approved human subjects protocol was used and 65 students participated in the study.

Participants included 43 females and 22 males, ranging in age from 18 to 41 years (M = 19). The majority were freshmen (n=36) and sophomores (n=21). Participants were majoring primarily in either secondary (n=36) or elementary (n=18) education. At the time of the study, 92% of the students indicated that using computers was somewhat or very easy. In addition, 86% of the participants noted that it was important, or very important, to use computers in the K-12 classroom. Results of initial ANOVAs indicated no significant differences among the treatment groups in terms of age, class, major, or pretest scores on either the competencies (F=.09, p=.98) or self-efficacy (F=.34, p=.85) subscales.

Instrument

The *Technology Integration Knowledge, Skill, and Self-efficacy Assessment* (TIKSSA) survey, used to measure the dependent variables, was developed after reviewing similar surveys in the literature (Schunk & Ertmer, 1999; Wang, Ertmer, & Newby, 2004). TIKSSA was examined for both content and construct validity. A review by a content expert in the area of self-efficacy provided evidence of content validity. Evidence of construct validity was gathered by conducting an exploratory factor analysis (EFA). EFA was chosen based on the fact that TIKSSA was a new scale, and it was necessary to identify factor

patterns for each subscale. For EFA, principal factors analysis methods and the scree test were used to extract factors and determine the number of factors. Results indicated that for both subscales items loaded heavily on one factor, respectively: Skills/knowledge scale with an eigenvalue=8.52, explaining .78 of the total variances, and the self-efficacy scale with eigenvalue=9.69, explaining .85 of total variance. While readers should not consider the results from this EFA to be entirely reliable, because of the small sample size, it does provide preliminary evidence of construct validity.

To complete the TIKSSA, participants rated their levels of agreement (from 1, not well, to 4, very well) on 32 Likert-style items reflecting their current perceptions of competencies (knowledge and skills) and self-efficacy for tasks such as designing and managing technology integrated classrooms and overcoming barriers. Sixteen items were used to measure students' perceptions of knowledge and skills (e.g., "I know how to discuss my vision of technology integration with school colleagues or supervisors."). An additional 16 items were used to measure self-efficacy (e.g., "I feel confident that I can implement my vision of technology integration within my future classroom."). Surveys were accessed and completed online. The pre-survey was completed approximately a week before the study; the post-survey was completed immediately after participation in the treatment. Cronbach alpha coefficients indicated that the two subscales were highly reliable (knowledge/skills = .95; self-efficacy = .96)

Instructional Materials

Students in all four treatments reviewed *VisionQuest* (Ertmer et al., 2003) before participating in the treatment conditions. *VisionQuest* (VQ) is an instructional Web site that allows users to explore how classroom teachers effectively integrate technology into their classrooms despite differences in subjects, resources, and student characteristics.

The VQ Web site consists of three main sections (planning, implementation, and assessment) related to teachers' efforts toward achieving technology integration. Teacher cases are presented through various media including video, text, and graphics; relevant artifacts (lesson plans, assessment tools, student work, etc.) are also included.

PROCEDURES

The entire experiment was conducted over four days during the ninth week of the semester. The researchers assigned treatment conditions based on the number of students who had signed up for each time slot and the overall numbers for each experimental group. Students learned which treatment they would receive after they arrived at the labs. Due to scheduling conflicts, a small number of participants (*n*=7) completed the study two weeks later.

As participants arrived at the lab, they received two handouts: the *VisionQuest* User's Guide and a General or Question Prompts Worksheet. The first handout familiarized students with the Web site and outlined the procedures for the study. The second handout guided students' individual reflections or group discussions over the contents of *VisionQuest*. Depending on their treatment

conditions, students received either a Question Prompt Worksheet (handout containing question prompts and space to record notes) or a General Worksheet (checklist of items to view, with space to take notes). Table 1 summarizes the types of worksheets and activities given to each experimental group. More specific descriptions of the worksheets are provided below.

Table 1: Treatment Conditions in 2x2 Factorial Design

Question Prompt / Discussion Group	No Question Prompt (NQP)	Question Prompt (QP)
No Discussion Group (NDG)	General worksheet Individual work	Question prompt worksheet Individual work
Discussion Group (DG)	General worksheet Group discussion	Question prompt worksheet Group discussion

Question Prompts (QP) Worksheets

Participants in the NGD/QP and GD/QP groups received a set of 11 questions to guide them as they explored the VQ Web site. Specific prompts included, for example: "Which class activity, from among all three cases, did you think was most innovative and effective? Why?" and "How were teachers' visions reflected in their students' learning?" The questions were designed to stimulate students' critical thinking on issues related to technology integration. Researchers emphasized the purpose of these questions on the worksheet and also orally at the start of the lab sessions.

General Worksheet (NQP – No question prompts)

Participants in the groups without question prompts were given checklists designed to ensure that they explored important components of *VisionQuest*. The difference between this worksheet and the question prompts worksheets was that it asked the students to take notes on general ideas related to each of the components of *VisionQuest* rather than responding to specific questions or prompts.

Discussion Groups (DG)

Students in the DG/NQP and DG/QP groups participated in discussions after exploring components of *VisionQuest* independently. Most groups had three participants. If the number of students was not adequate to make groups of three, groups of four were organized by the researcher for each time slot designated for group discussions. Participants were randomly assigned to groups as they arrived at the lab. Either the general worksheet or the question prompts worksheet was provided to each group. Each group was required to submit one worksheet to the researchers. The total time spent reviewing and discussing VQ was also recorded. Discussions lasted from 60-90 minutes, depending on the interaction level of the participants. Participants who were not assigned to the group discussion treatments (NGD/QP and NGD/NQP) reviewed and filled out their worksheets individually.

RESULTS

This study was designed to determine the effect of question prompts and group discussion on students' judgments of technology integration competencies and self-efficacy while engaged in vicarious learning experiences. A two-way ANOVA indicated no significant effects of either independent variable (question prompts, discussion groups) on the dependent variables (F = 1.04, p = .38 for competency judgments; F=.57, p=.64 for self-efficacy). In addition, there were no statistically significant interactions between the independent variables on competencies (F=.11, p = .74) or self-efficacy (F = .00, p = .96). The calculated effect size (omega square) was .03, suggesting that the systematic variance was only minimally explained by the treatment condition in which the students participated.

Results of paired *t*-tests indicated that students in all treatment groups, with the exception of the NDG/QP group, showed significant increases in their perceptions of knowledge and skills from pre-survey to post-survey. Results from paired *t*-tests also showed significant increases in judgments of self-efficacy from pre to post-survey for students in the Control Group (p = .001), and the DG/NQP (p = .001). Students in both treatment groups that used question prompts (NDG/QP and GD/QP) did not show significant increases in self-efficacy. In addition, the students who used question prompts individually (NDG/QP) did not show significant increases in perceptions of knowledge and skills. Surprisingly, this group also had the lowest scores on the post-survey. Means for both subscales on the pre and post-surveys, as well as *t* and *p* values, are included in Table 2.

Because this result was unexpected, we analyzed the responses that students wrote on their group and individual worksheets to obtain further insight into

Table 2: Treatment Group Scores on the Technology Integration Knowledge, Skill, and Self-efficacy Assessment Pre-survey and Post-survey

Group	n	Knowledge/Skills				Self Efficacy			
		Pre-Mean	Post-Mean	t	p	Pre-Mean	Post-Mean	t	p
NDG/NQP (Initial Control Gp: general Wksht)	14	2.56	3.06	4.37	.0008	2.77	3.10	4.10	.0013
NDG/QP	16	2.49	2.76	1.80	.092	2.66	2.88	1.81	.090
DG/NQP	18	2.49	3.10	4.29	.0006	2.58	3.16	3.99	.001
DG/QP	17	2.47	2.93	3.88	.0015	2.75	2.99	1.11	.2845
NDG/NWK* (Control: No Wksht)	15	2.45	2.90	4.48	.0006	2.60	2.97	3.01	.010

Note: This condition was added to address initial findings suggesting that the original control group may have benefited from the use of an open-ended worksheet.

how the prompts may have guided their interactions with *VisionQuest*. In general, responses from the question prompt groups were composed of sentences that tended to repeat pieces of information found on the VQ Web site, contrary to the expectation that they would be more substantive and reflective (e.g., "The teacher … used technology by having her students create their own songs." (DG/QP); "… school teachers integrated their classroom to a more hands-on experience. … The class layout contained 16 computers."). In contrast, responses from students in the non-question prompt groups appeared to be in the students' own words, and tended to refer to broader ideas rather than specific facts (e.g., "Incentives are based on the teacher's beliefs, and student's motivation," and "Computers can help students judge information and make decisions with their own conclusions.").

Again, this illustrates an unexpected trend. That is, students who used a worksheet that simply asked them to "jot down their ideas" relating to components of *VisionQuest*, seemed to respond in more reflective and thoughtful ways than those who used a worksheet that asked them to respond to specific questions (e.g., "Describe how teachers' visions influenced the design of their classroom activities or materials. Give at least one specific example."). An unintended effect may have occurred in which students' attention was directed toward answering questions, as opposed to reflecting on what they were observing in *VisionQuest*. Thus, the more general worksheet may have actually served as the type of reflective prompt we were hoping to create with the more directed questions. In effect, this may have modified the condition that we intended to serve as a control into one that utilized a different—and perhaps more effective—type of question prompt.

Because of these findings, an additional condition was added to the design of the study and implemented with a new group of 13 students enrolled in the same course the following semester. ANOVA results indicated no significant differences between the new and initial participants in terms of class, age, or computer skills. In the hopes of creating a "true" control condition, that is, one in which no prompts were provided, students in the new condition did not use worksheets while exploring *VisionQuest*. Rather, students were simply asked to mark, on a provided checklist, those parts of *VisionQuest* they had viewed. Thus, the students in this condition did not write down any notes or comments as they went through the program. While results of a t-test showed a significant increase from pre to post-survey on both the knowledge/skills subscale (p=.006) and the self-efficacy subscale (p = .01), one way-ANOVA results indicated no significant differences between this control group and the other NDG treatment conditions on either the knowledge (F=1.21, p = .31) or self-efficacy (F = .66, p = .52) subscales. Students in the initial Control Group showed the greatest increases on both the knowledge scale (t = 4.37; p = .001) and the self-efficacy scale (t = 4.10; p = .001).

DISCUSSION

This study was designed to determine if the effects of vicarious experiences could be increased when used in conjunction with additional instructional

strategies known to be effective in promoting learning. For example, in a previous study, Wang et al. (2004) found that the use of goal setting strategies, when paired with vicarious experiences, significantly increased students' judgments of self-efficacy for technology integration. In this study, we examined the specific benefits of pairing vicarious experiences with group discussion and question prompts. Despite the fact that students in all but one treatment group significantly increased their perceptions of knowledge and skills, the additional use of discussions and question prompts did not create any significant differences among students' perceptions across groups. In fact, students who viewed *VisionQuest* individually, using only a worksheet without question prompts, appeared to make the most gains in perceptions of knowledge, skills, and self-efficacy. Adding group discussions and/or question prompts did not appear to enhance the benefits of these vicarious learning experiences over those which occurred without them.

In this study, students who participated in group discussions while using VQ did not benefit significantly more or less from the vicarious learning experiences than those who did not participate in group discussions. While previous research (Gokhale, 1995; Levin, 1995) has suggested that group discussions can stimulate students' reflection and understanding of complex issues, and may raise judgments of self-efficacy (Wilson, 1996), this was not the case in our study. This may have been the result of a number of factors, including the relatively small number of participants in each treatment group and the relatively limited amount of time to carry out a number of in-depth discussions on a variety of topics. In addition, students may not have been comfortable discussing their ideas with others whom they did not know very well, or simply may not have been motivated to do any more than was required to complete the assigned tasks. Because these activities were not part of their required curriculum, students may have felt that the activities were not particularly interesting or relevant to them. This may have caused them to simply "go through the motions" when discussing the content because they had no real incentive to reflect deeply on the questions at hand. Furthermore, adding supplementary materials or tools for group work may actually have had a negative effect on learning. A study by Van Boxtel, Van der Linden, and Kanselaar (2000) demonstrated that additional materials, such as the use of textbooks, can inhibit elaborative and constructive interaction among peers. Other researchers (Webb, 1989; Werner & Klein, 1999) have reported similar findings: Group learning does not always lead to significantly greater learning outcomes compared to individual learning.

Of particular interest in this study were the results related to the use of question prompts. While it was expected, based on the literature, that question prompts would support students' learning by stimulating deeper thinking about the content (Ge & Land, 2003; Van Zee & Mistrell, 1997), students in this study who did not use question prompts scored consistently higher on the post-survey scales than those who did. Although these differences between groups were not statistically significant, as demonstrated by the ANOVA results, they do suggest an interesting trend.

By asking students to respond to questions that guided their learning in a specific direction, researchers may have inadvertently focused students' attention on specific answers, rather than on the rich vicarious experiences being presented on *VisionQuest*. These prompts or questions may have actually distracted students from fully attending to the vicarious experiences they were expected to observe, thus leading to smaller gains in perceived knowledge, skills, and self-efficacy. While this result was not expected, there is some evidence in the literature to support this finding. For example, Davis (2003) found that students actually incorporated more ideas, evidence, and scientific principles in their reflections when guided with "generic" prompts (e.g., "Right now, we're thinking…") rather than more "directed" prompts (e.g., "To do a good job on this project, we need to…"). She speculated that students who received the directed prompts may not have been able to thoroughly interpret what was needed or they may have been superficially completing the task. This seems to have been true in our study as well. Participants who did not use question prompts may have had more opportunity to engage in broader reflections over the content. They were guided by their own judgment and thus engaged in deeper reflections compared to those using more specific question prompts.

While it is possible that the students in this study were not motivated or prepared to think deeply about the content presented (Wang, 2001), another possibility is that the relatively long list of question prompts (n= 11) may have caused fatigue in participants. According to Kobayashi (2005), cognitive fatigue can have a negative influence on note-taking during long presentations. A full review of *VisionQuest*, without the additional requirement of recording ideas gained from the site, would take 90 minutes or more to complete. Adding a relatively lengthy worksheet to the review requirements may have caused a loss in concentration and motivation. In contrast, the no-question prompt groups were asked to record ideas related to only five key items—a substantially smaller number.

The results of this study suggest that vicarious experiences alone may increase learning and self-efficacy without the help of other methods. The addition of more conditions may have distracted students from the content/message of the teacher models highlighted on *VisionQuest*. It is possible that the cognitive load imposed on students during vicarious learning activities does not allow enough room for processing other, seemingly competing, instructional tasks. Conversely, it is possible that the extra tasks required too much additional attention and thus were not helpful in guiding students' efforts on the initial task (Chandler & Sweller, 1991; Sweller & Chandler, 1994). In addition, cautious administration of additional strategies should be considered when providing vicarious learning experiences. For group discussions to facilitate reflection, methods for developing group dynamics and increasing students' motivation to actively participate could be necessary. Question prompts that direct reflection could be more effective when they are not focused narrowly in specific directions. Prompts could also be more effective if they afford learners the freedom to choose their own approaches to processing the information gained from vicarious experiences.

LIMITATIONS

The results of this study are limited by 1) the small number of participants, 2) a lack of time for group dynamics to develop, 3) the voluntary nature of participation in the study, which was to "earn" credit (Students were just "completing a task" and may not have understood the relevancy of *VisionQuest* to their future career as teachers), and 4) structured questions that unintentionally narrowed the reflective process of learners. Assuming that group discussions and question prompts have the potential to increase learning outcomes, future research should incorporate strategies that address these limitations. For example, using *VisionQuest* as a required activity in a course might eliminate a few of the concerns noted above. That is, by asking students to discuss *VisionQuest* with others whom they know and to address a specific course goal might allow the benefits of both group discussions and question prompts to emerge. These are fruitful areas for future work.

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