Examining the Role of the Instructor in Problem-centered Instruction

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Abstract

In this paper, we examine the role of the instructor during student-centered approaches, specifically those that are problem-centered, to outline effective strategies that are valuable for facilitating discussions. After describing the role of the instructor in each phase of implementation, from planning to evaluation, we discuss specific strategies for facilitating effective discussions. Strategies identified as being successful in problem-centered discussions included meta-cognitive questioning, peer facilitation, and teacher training, to name a few.

Keywords: Problem-centered instruction, problem-based learning, case-based instruction, case study method, role of instructor, case facilitation strategies, online discussion

Problem-Centered Instruction

While the need for practical application of knowledge is not new, globalization has caused an increase in competiveness for employment. In today's job market, 21st century skills, such as problem solving, communication, collaboration, and media literacy are essential for success and educators have realized the importance of teaching these skills to their students (Kaufman, 2013). Due to the increased interest in teaching 21st century skills, student-centered instructional approaches, such as problem-based learning (PBL) and case-based instruction (CBI), have gained in popularity over the last few years.

Originally developed in reaction to concerns about the lack of transfer between traditional, classroom learning and professional practice, PBL has evolved into an instructional approach that is geared toward developing students' problem-solving and self-directed learning skills (Barrows, 2002; Williams, 1992; Yew & Schmidt, 2012), while simultaneously developing their deep content knowledge about the subject matter at hand (Yadav, Subedi, Lundeberg, & Bunting, 2011). Since introduced in the early 1970s, problem-based learning has gained acceptance and is now widely used to educate professionals in fields such as medicine (Schmidt, Molen, & Winkelm, 2009), law (Driessen & Vleuten, 2000), and business through the use of the case study method (Heckman & Annabi, 2006).

In traditional instruction, it is assumed that when the teacher has transmitted enough information, the student will be able to repeat the given information or accomplish a given task. In contrast, student-centered approaches such

as problem-based learning embed the content within an ill-structured problem or open-ended case narrative. The instructor then facilitates discussion of the problem or case details to enable students to acquire the knowledge and skills that, ultimately, will be critical for their future job performance (Ertmer, Quinn, & Glazewski, 2014; Wood, 1994).

For effective implementation, instructors must have the appropriate skills to facilitate students' problem solving during group discussions and to ask probing questions that will focus discussion on identifying relevant issues and finding solutions to the presented problems (Leary, Walker, Shelton, & Fitt, 2013). Thus, the purpose of this literature review is to examine the role of the instructor in problem-centered approaches and to identify characteristics of effective facilitators. Furthermore, this review will highlight strategies that have been recommended for successfully facilitating problem-centered discussions, such as those that occur within the context of either PBL or CBI.

Method

A search of databases including Education Full Text, PsychInfo, Google Scholar, and Education Source was conducted in order to complete this review. Keywords such as problem-based learning, case-based instruction, case study method, role of instructor, and discussion in problem- and case-based learning were used to find relevant articles.

Specifically, for the purposes of this review, we examined literature on problem-based learning, cased-based learning, and the case-study method. These approaches share similarities including the use of ill-structured problems contextualized in real world scenarios, work in small groups, and the use of whole group discussions. Additionally, the role of the instructor is similar across the student-centered methods described. In all three approaches, the teacher assumes the role of a facilitator as opposed to that of a content expert who lectures. For the remainder of this review, we use the term problem-centered instruction (PCI) to refer to these student-centered teaching methods that depend on discussion as a key strategy for facilitating learning.

The Role of the Instructor in Problem-Centered Instruction

The role of the instructor in PCI differs from that of a traditional instructor. While traditional instruction requires teachers to be content experts and impart as much information as they can to their students, PCI requires a different set of skills. PCI requires teachers to assume the role of a facilitator and to help students consider the case specifics through the use of a guided discussion. The terms tutor or coach are often used to describe the teacher's role in this setting. As noted by Schwartz (2001),"The instructor in the [PCI] setting acts as a facilitator in the discussion process and not as a content knowledge expert who disseminates information" (p. 2).

According to Leary, Walker, Shelton, and Fitt (2013), a facilitator's content expertise is not directly correlated to student learning in a problem-centered approach. Rather, effective questioning skills are more vital to the implementation of the case study method than having expert content knowledge. "The art of a case method instructor is to ask the right questions at the right time, provide feedback on answers, and sustain a discussion that opens up the meanings of the case" (Ellet, 2007, p. 11).

Consequently, it is important for the instructor to understand the entire PCI process, from initial planning, to the implementation, and ultimately the evaluation of student learning. Due to the change in both the instructor and student roles, it is essential to have an established plan prior to introducing a PCI discussion. The following guidelines may be helpful to instructors who are just starting to consider using a PCI approach.

Planningforproblem-centeredinstruction. Planning your facilitation strategy is an important first step in effectively implementing PCI. Planning requires instructors to consider many factors, including expected learning outcomes, discussion structure, learners' prior knowledge, and class size. Case studies are used often to structure a PCI unit. Instructors should begin the planning process by considering the specific learning outcomes students should gain by analyzing and discussing the assigned case study. Typically, a case study is chosen because it "affords" opportunities for students to discuss specific content and/or issues. Hmelo-Silver (2013) and Ertmer and Koehler (2013, in press) define this learning potential as the learning space or afforded problem space, respectively. The afforded problem space provides a starting point for instructors, as it is within this space that potential learning outcomes reside. Identifying learning outcomes up front can help instructors frame the discussion so as to keep students focused on the most relevant concepts included in the problem space.

After objectives are determined, the instructors should consider how to structure the case discussion around issues/content

embedded in the case study so that the specific learning objectives can be met. For example, if the instructor identifies the objective of a case discussion as, " business students will identify the communication issues that exist within an international corporation," then the case discussion should be structured around factors/strategies that either led to miscommunication in the case study and/or can lead to effective communication going forward. In this way, students address the communication objective (i.e. cover the afforded problem space) while also gaining effective communication skills and strategies that they can apply to their own work.

Discussion structures can take a variety of forms including role play, debate, games, small group activities, formal presentations, and so on. Each of these structures requires different types of advance planning (Stepich, Ertmer, & Lane, 2001). For example, if an instructor plans to ask students to assume roles related to the key stakeholders in the case, he/she will want to determine, in advance, how to assign these roles. Discussion facilitation may also involve the use of materials or props, which will require the instructor to either create new materials or find props that engage students during the discussion. Activities should include guiding questions and instructors should plan for a variety of student interpretations.

Timing should also be taken into consideration; instructors should consider developing a tentative agenda that includes estimated time frames for each activity. Resources, such as articles or other readings, which scaffold students' understanding of the unit, should be chosen carefully and made available to students in advance of the discussion.

If the instructor decides to incorporate small group work into the discussion structure, it will be important to consider the class size and to determine how to group students so that all can contribute to and benefit from the activities. One option is to group students so that a variety of different viewpoints are represented. For example, instructors could use information about students' backgrounds to group them based on previous professional experiences. This, then, could increase the likelihood that all students will contribute to small group activities while simultaneously gaining new perspectives on case specifics. Research also indicates that the size of the group can have an effect on student self-directedness (Lohman & Finkelstein, 2000). Findings from the Lohman and Finkelstein study indicated that self-directed learning is optimal in groups of 3 to 6 members, with self-directed learning significantly decreasing when groups include 9 or more members.

When planning a discussion, it is also critical to consider how students might interpret case details differently, based on their diverse backgrounds. Due to the spontaneous nature of a problem-centered discussion, teachers must anticipate how students will interpret the case/problem and be prepared for a variety of possible responses (Lynn, 1999). Since cases used in PCI are often vague and open to interpretation, students tend to be influenced by their own experiences and often come to very different conclusions than anticipated.

To illustrate, imagine a problem-centered case discussion in which graduate students are asked to develop an instructional module to help 9th – 12th grade teachers learn how to use student analytics software. Student A may have a corporate background and while looking at the case details identifies the main issue as one of instructional development. Thus, student A recommends the development of an online self-paced module, based on similar training experiences in her past. Student B is a former 10th grade teacher and identifies the main issue as the lack of teacher technology skills. Student B then recommends conducting a comprehensive analysis of teacher skills prior to development of the instructional module. In this example the former teacher, Student B, interprets the issues based on her prior experiences working in a high school setting. Student A however, does not see the need for analysis based on assumptions made from her experiences working in a corporate environment.

As an active learning strategy, problem-centered instruction poses challenges for instructors who are accustomed to more teacher-centered approaches. As such, additional support is often needed to help instructors implement a problem-centered unit.

Implementing problem-centered instruction. According to Ertmer and Stepich (2005), there are two main processes involved in analyzing and solving the problems presented in a case study – problem finding and problem solving. Problem finding refers to the process of analyzing the given scenario and identifying the specific problems that are hindering the achievement of the case goals. More specifically, this includes synthesizing the given information in the case narrative by focusing on the underlying principles at work, identifying the relationships among the issues, and then articulating a clear and concise representation of the problems in the situation.

Initially, at the start of a case or problem-centered discussion, the facilitator guides the students through a series of metacognitive questions designed to stimulate problem finding (Barrows, 2002). Metacognition is often defined as "thinking about thinking" (Martinez, 2006). Therefore, metacognitive questions are designed to guide students to think about their own mental processes while identifying problems and finding solutions.

For example, an instructor in a business school setting may ask students to identify stakeholders in a given case and then look at the case situation from the perspective of the individual stakeholders. As students interpret the case issues through the eyes of these different stakeholders, the instructor then coaches them with additional prompts and probes: How would Stakeholder X think about that issue? What is motivating Stakeholder Y's concerns? How can these different perspectives be reconciled?

Following this, the instructor might ask each of the students to identify the major issues in the case and any situational constraints that may have an effect on the outcomes. Through the process of discussion and questioning, the instructor guides students to identify the key issues in a case before considering any potential solutions. As the students gain experience working with the case method, the instructor can provide less guidance (Hmelo-Silver & Barrows, 2006).

Students may initially struggle with problem finding. Therefore, it's important to help students understand the process of identifying issues and prioritizing those that are most relevant to the case/problem situation. Guiding questions may be used to help students understand the case details and focus, or re-focus, their initial and revised analyses.

Problem solving should not begin until after the issues are clearly identified. Ertmer and Stepich (2005) noted that problem solving comprises explicitly linking solutions to identified issues, considering the implications of the proposed solutions, and maintaining an open mind so that tentative solutions can be revised as new information becomes available. Given that novices tend to jump, almost immediately, to solutions when encountering an ill-structured problem (Ng & Tan, 2006), it is important that instructors use discussion prompts and questions to circumvent students' tendency to shortchange the problem-finding process.

When students are ready to propose and consider potential solutions, discussion and collaboration can help students gain different perspectives about possible solutions to the issues in the case. Well-designed activities will prompt students to collaborate and can guide students to find solutions that can only be uncovered or developed through teamwork (Nelson, 2010). For example, an activity might involve students working in small groups to create a project charter for a business case. Students could be given a specific mandate that the charter should reflect and be asked to rewrite the charter to reflect the new company's mission statement. By grouping students from different backgrounds together, each student would have the opportunity to apply their specific skill sets and work together to find a feasible solution (Razzouk & Johnson, 2013).

Implementation of PCI also requires students to reflect on their understandings of the case/problem situation (Ertmer et al., 2014). Students in problem-centered discussions are frequently asked to think about the case/problem specifics and reflect on the solutions they recommended. Facilitating a whole group discussion, after the completion of small group work, allows students to reflect on their own analyses and also helps them become more self-directed learners (Ertmer & Glazewski, in press). Opportunities to reflect on case details can be provided throughout the facilitation of discussion and again at the end of a discussion.

Evaluating problem-centered instruction. Assessing student progress is an important step in any instructional method. Evaluation can take many forms and traditionally requires students to complete exams to test content knowledge acquisition. However, in a problem-centered instructional setting, content knowledge acquisition is not the only objective being targeted (i.e., additional objectives include the development of both problem-solving and critical thinking skills), making it more difficult to measure student learning.

Since there are many possible solutions to a given case/problem scenario, evaluation is often more subjective than that used in teacher-centered instructional methods. Research findings indicate that those new to the method often struggle with developing assessment criteria to meet the goals of case-based instruction (Dahlgren et al., 1998; Driessen & Vieuten, 2000). PCI may also require instructors to evaluate student collaboration and acquisition of critical thinking skills, in addition to increased content knowledge.

Students may feel anxious being evaluated in a more open-ended manner and may be dissatisfied with initial case evaluations (Ladouceur et al., 2004). In addition to mea-

suring retention of knowledge, criteria such as self-directedness and contributions to small group work may be used to evaluate students' performances. For example, evaluating collaboration might include the use of peer evaluation forms. Additionally, rubrics are often used for self-assessment - students can evaluate their individual solutions and reflect on their own understandings of the case issues. Since self-directed learning is one of the goals of PCI, it is critical that students be held accountable for their solutions. Instructors can facilitate this by asking students to share their solutions to a case problem and to justify their recommendations. Students also should be expected to discuss how they prioritized the issues and how they came to their final recommendations. The instructor could then provide critical feedback, considering students' rationales, as well as the feasibility of implementing the proposed case solutions (Bush & Saye, 2000).

Facilitating Discussion in Problem-Centered Instruction

The role of discussion is critical in PCI (Flynn & Klein, 2001; Ertmer & Koehler, in press). During initial implementation of the problem-centered approach the facilitator will model the discussion format for his/her students, then conduct activities to engage students in problem finding and problem solving. PBL discussions that occur face-to-face can take place in a variety of formats, including mock town hall meetings or debates. Discussions frequently include instructor-designed activities meant to encourage students to work in collaborative groups and discuss case specific issues.

As with discussions in most settings, a good discussion includes participants who are well prepared and willing to engage in an open dialogue (Jensen, Ferrand, Redman, Varcoe, & Coleman, 2005). This, then, may require additional preparation on the part of students such as completing additional readings to gain background knowledge (Ertmer & Stepich, 2005).

Currently available tools, such as online discussion boards and web conferencing, have facilitated the use of problem-centered discussions in online courses. Conducting problem-centered discussions online has some advantages over the traditional face-to-face method, especially for those students who struggle to participate due to language barriers. In addition, online discussions provide additional time for students to collaborate and formulate solutions, free from the time constraints of a traditional classroom (An, 2013). Additional benefits, according to Donnelly (2010), include increased learning, collaboration, and student engagement.

However, instructors who implement PCI in a fully online course may need to provide additional resources for students to understand the problem-learning process. For example, it is recommended that instructors provide structured guidelines for an online problem-centered discussion (Nelson, 2010). These could include proper online discussion etiquette, description of student roles, student expectations for participation, as well as an example of appropriate student case discussion interaction. It may also be necessary to model the discussion process through a script or by recording a face-to-face discussion, so that online students understand the discussion format (Nelson, 2010). It is important that students understand the entire process prior to beginning a discussion, so they can participate effectively.

Strategies for facilitating problem-centered discussion. Using a discussion model in which the students, over time, take on more of the facilitation can help an instructor in the early stages of implementing PCI. This type of model, in which the teacher steps back and allows students to take the lead can be especially useful in online discussions. Allowing students to take a more active role in facilitation helps students gain critical presentation skills. As students gain experience with discussion facilitation, they learn to imitate, and then apply, effective instructional methods. Research findings indicate that students who have experienced the act of facilitating discussions tend to take on more active roles in subsequent case discussions (Murphy, Mahoney, Chen, Mendoza-Diaz, & Yang, 2005). The model for facilitation presented by Murphy et al. (2005) includes the use of teaching assistants who act as mentors for the students in the class, monitoring discussions and assisting students in discussion facilitation. Teaching assistants also provide scaffolding for the students in the course by assisting them in the development of discussion questions via private conferences. Findings by Murphy et al. (2005) support prior research and suggest that student-led discussions are more effective than instructor-led discussions for fostering active learning. Additional benefits of student-led discussions include increased motivation and participation (Murphy et al., 2005).

Prompting students to elaborate on their discussion responses can also be an effective strategy when implementing PBL. Asking students to explain their reasoning prompts them to integrate their background knowledge with their current understandings of the presenting issues and then to identify any gaps in their thinking. Pushing for elaboration can be accomplished through questioning. A facilitator could simply ask a student questions such as, "*Can you tell us more about your solution?*" It is important that when the facilitator asks for elaboration he/she does not judge a student's response or provide additional feedback (Hmelo-Silver & Barrows, 2006).

Restating students' responses is another strategy that can be helpful in discussion facilitation (Hmelo-Silver & Barrows, 2006). When restating the students' responses, the instructor has the opportunity to guide the discussion in the right direction while also clarifying the student's comment for the entire class. Additionally, asking students to summarize case/problem details can be an effective means for increasing student participation, especially among reluctant participants (Ertmer et al., 2014). Summarizing also allows students to reflect on their own understandings of the case/problem while giving them an opportunity to practice their communication and presentation skills. Asking students to hypothesize links between issues and solutions can also help students identify gaps in their understanding of the issues (Hmelo-Silver & Barrows, 2006). For example, after students have summarized the case details and listed the problems they identified, students could be asked to hypothesize possible solutions to the case problems.

Providing training for novice instructors about how to facilitate PCI is also an effective strategy for successful implementation. Meta-analysis results indicate that student learning is adversely affected when instructors are not trained in the approach (Leary et al., 2013). Untrained instructors tend to deliver instruction that is more aligned with lecture-based, teacher-centered instruction. Instructors who are new to PCI should receive training on how to manage a discussion, design effective questions, and implement strategies for developing cohesion within student groups. Cohesion among group members can be a critical factor in the success of a problem-based learning unit. Groups who work well together are more likely to support one another throughout the process and meet the identified learning goals (Hartman, Moberg, & Lambert, 2013).

Implications for Practice

The literature reviewed offers a variety of strategies for planning, implementing, and evaluating problem-centered instruction. The strategies outlined can have direct applications for educational practitioners in a variety of fields. Instructors who are new to PCI would benefit most from using these strategies during initial implementation.

Institutions such as medical and law schools, which commonly use PCI, should offer training to their instructors on facilitation techniques. Training in PCI methods has been shown to increase the effectiveness of discussion implementation and would benefit practitioners who are more accustomed to teacher-centered instructional methods (Leary et al., 2013).

Teachers might also consider participating in role-playing activities to become accustomed to the changes involved when switching from teacher-centered to student-centered instruction. According to Harland and Spronken-Smith (2009), case discussions may be ineffective if teachers are uncomfortable with the lack of control they have over the process.

Instructors who implement PCI online may need additional training to learn best practices in using online tools, such as online discussion boards. Online facilitation is different from face-to-face discussion (Heckman & Annabi, 2006) and instructors may need to provide students with additional resources, such as discussion outlines, to help students better understand the method.

Not only should instructors be trained in the facilitation of problem-centered discussions, but students should also receive instruction in facilitation. Providing students with opportunities to lead the discussion can be especially helpful in an online environment where the instructor does not have the ability to provide instant feedback, as they would in a face-to-face class. Studies indicate that students who facilitate discussions are more likely to take an active role in future case discussions (Murphy et al., 2005).

Additionally, evaluation should reflect the goals of the PCI unit, which may require instructors to design new sets of guidelines for assessing student performance. Since evaluations are likely to be more open-ended, instructors who implement PCI should consider designing rubrics to evaluate student performance. Contribution to group work, self-directedness, and critical thinking could be measured to determine whether the students

achieved the key learning outcomes made possible through the use of problem-based learning (Ladouceur et al., 2004).

Implications for Research

Future research is needed to find more effective methods of evaluation in problem-centered instruction. The subjective nature of assessing student performance in PCI often leads to frustration for both instructors and students who are new to the method (Ladouceur et al., 2004). Moreover, traditional assessments typically focus on content acquisition. Since PCI is a pragmatic instructional method, assessments that focus on the application of newly acquired knowledge may need to be created to accurately measure student achievement (Gijbels, Watering, Dochy, 2005). Thus, finding a reliable and consistent method of evaluating student performance in PCI may increase the feasibility of implementation.

While a great deal of research has been conducted on the use PCI, especially PBL, the majority has been limited to the medical school settings (Wirkala & Kuhn, 2011). Future research is needed to investigate the effectiveness of student-centered approaches in a variety of settings, such as K-12 schools and teacher education programs.

Because the goal of PCI is to assist students in acquiring knowledge and skills that can be applied in the real world, longitudinal studies should also be conducted to determine the long-term effects of PCI in the work place. Longitudinal studies could help determine whether students who are taught using PCI transfer what they learned in the classroom to their professional practice. Medical and law fields, for example, could benefit from such data and could be used by schools to develop instruction that is more aligned with current practices in the field.

Conclusion

This literature review of problem-centered instruction illustrates the need for instructors to understand the unique role they play during discussion facilitation. Evident from the literature are the benefits to training instructors on strategies for implementing PCI including discussion facilitation, collaborative learning techniques, and evaluating student performance. As student-centered instructional approaches become more common across all levels of education, it will be critical to help teachers understand the role they play and how to successfully implement the method. While research demonstrates increased student engagement in a PCI setting, many educators, especially those in K-12 settings, are still hesitant to implement these types of approaches (Wirkala & Kuhn, 2011). Assuming the role of facilitator can be challenging for instructors; the strategies outlined in this review provide a first step toward implementing student-centered learning. As such, the goal for instructors should be, through appropriate training and relevant experience, to cultivate a set of effective strategies that could be called upon during problem-centered facilitation (Hmelo-Silver & Barrows, 2006).

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