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The journal accepts articles for peer-review that describe classroom practice which positively impacts student learning. We define teacher action research as teachers (at all levels) studying their practice and/or their students' learning in a methodical way in order to inform classroom practice. Articles submitted to the journal should demonstrate an action research focus with intent to improve the author's practice.

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COMPARING COOPERATIVE LEARNING STRATEGIES IN ASSESSMENT INSTRUCTION

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Abstract As a follow-up to a prior exploratory investigation of cooperative learning in teaching assessment to early-childhood-education majors, the present study systematically compares the pedagogical efficacy of two variants of cooperative learning. In the first cooperative learning condition, students reprised the simulated classroom practice evidenced in the Cooperative Assessment Portfolio (CAP) assignment used in the previous study. In the second condition, students completed a Cooperative Assessment Case Analysis (CACA) assignment with distinguishing features of case-based learning. On all quantitative and qualitative measures, results favored the CAP over CACA assignment. Findings are discussed in light of social constructivist pedagogy and future directions for research.

Keywords: cooperative learning, social constructivism, constructivist pedagogy, educational assessment, early childhood education, post-secondary classroom research, action research

Introduction

Recent decades have witnessed an increase in active-learning pedagogies in college classrooms (Fink, 2004). Cooperative learning continues to hold a prominent place in this changing classroom landscape (e.g., Davidson & Major, 2014; Gillies, 2016; Healy, Doran, & McCutcheon, 2018; Love, Dietrich, Fitzgerald, & Gordon, 2014). Among the most researched of all topics in the teaching literature, a significant body of evidence supports cooperative learning as a means for students to optimize their own learning while facilitating the academic performance of their classmates (Johnson, Johnson, & Holubec, 2008). As a structured application of collaborative learning, the merits of cooperative learning at the college level can be classified under two broad categories: academic and socioemotional (Jones & Jones, 2008). More specifically, cooperative learning encourages higher-order reasoning, goal-setting, idea-generation, group-to-individual learning transfer, promotive interaction, positive interdependence, and interpersonal competence (Johnson, Johnson, & Smith, 2014; Mayo, 2010; Williams, 2007). Cooperative learning, as the underlying pedagogical basis for the present study, has longstanding theoretical roots within the constructivist tradition. Social interdependence theory derives from the confluence of Kurt Koffka’s (1935/1999), Kurt Lewin’s (1935, 1948), and Morton Deutsch’s (1949) shared
recognition of groups as dynamic initiators of varying levels of interdependence among individual group members. Vygotsky (1962/1986) built upon this perspective with his sociocultural theory of development. According to Vygotsky, there is interplay between cognitive processes and social activities such that social interaction becomes essential to active knowledge construction on an intrapersonal level. In practice, cooperative learning brings together the basic elements of these theoretical stances. Groups of students work together to learn, while each individual becomes personally accountable for his or her own learning within the group context (Brame & Biel, 2015).

Literature Review

Background and Purpose of the Present Study. In a prior exploratory investigation, I asked groups of students to complete an end-of-semester project, called the Cooperative Assessment Portfolio, in junior-level assessment classes for early-childhood-education (ECE) majors (Mayo, 2013). The study focused on the extent to which this assignment served as a formative learning tool for ECE candidates in successfully designing teacher-developed strategies for assessing the learning of young children. Students’ performance on the assignment demonstrated assessment proficiency as applied to simulated classroom practice. Moreover, students’ surveyed perceptions toward completing the assignment pointed to its effectiveness in both promoting mastery of academic content and fostering productive group interaction. The observed success of the Cooperative Assessment Portfolio in this pilot study served as a springboard for my undertaking the present investigation.

The purpose of the current study is to systematically compare the pedagogical efficacy of two group-based assignments using case-based learning (CBL): the Cooperative Assessment Portfolio (CAP) examined in the aforementioned preliminary investigation and the Cooperative Assessment Case Analysis (CACA). CBL typically incorporates collaborative-learning processes that permit students to solve problems and reflect on their experiences (Hmelo-Silver, 2004). The primary purpose of CBL is to teach students to apply theoretical knowledge (Ching, 2014). In the context of teacher education, the manner in which CBL accomplishes these intersecting educational aims can be summarized as follows:

[CBL] provides generative contexts for prospective and certified teachers to work together in small collaborative groups. Together, they analyze problems, discuss options, and make informed decisions to solve problems based on authentic teaching situations with real, multifaceted challenges (DeSimone, 2014, p. 17).

Within the group-centered and applied-theoretical focus of CBL, both the CAP and CACA assignments are aimed at permitting students varied opportunities to demonstrate a working understanding of the factors underlying well-conceived teacher-developed assessment strategies. With the CAP assignment, students engage in simulated classroom practice by creating their own classroom assessments. In contrast, students completing the CACA assignment critique already-created classroom assessments as an exercise in professional decision-making.
In spite of CBL’s widespread use in teacher education, there has been relatively little published research on CBL-reliant instructional methodologies or outcomes related directly to teacher preparation (Goeke, 2008). The present study aims to add to this area of research. It also seeks to make an original contribution to the teacher education literature through systematic comparison of two cooperative-learning assignments in the framework of teaching ECE assessment.

Methodology

Participants. Participants were 96 ECE baccalaureate candidates enrolled in four equivalent-enrolled sections of a junior-level course in ECE assessment for which I served as instructor. Classes, which were taught at a public state college in the southeastern United States, occurred in an accelerated four-week summer semester (two hours of instruction per day, five days a week). Two class sections were offered in each of two consecutive summer terms.

The participant pool consisted of 87 females and 9 males. The racial demographic was approximately 85% Caucasian, 13% African-American, and 2% multiracial. Participants ranged in age from 21 to 43 years ($M = 23.98$). Roughly 60% of participants were first-generation undergraduates, with nearly two thirds holding a full- or part-time job while enrolled in the course. All participants had completed two semesters of classroom field experience in pre-kindergarten through fifth grade before taking the course.

Design. I used an independent, two-group, quasi-experimental design in which intact classes were assigned to one of two conditions. In one condition that took place over the initial summer of the study, 50 students completed the CAP in fulfillment of their term-length project requirement. In another condition, 46 students completed the CACA as their term-length project in the second summer of the investigation. There were no appreciable differences between conditions on the basis of age, gender, or GPA. Additionally, I held course content, testing format, and other relevant instructional variables constant between conditions.

Course Description. The learning objectives of the course were broadly inclusive as relates to early-childhood assessment topics; however, the principal focus of the present study was students’ understanding and development of appropriate strategies for assessing the learning of young children from pre-kindergarten through grade five. This primary focus—which was canvassed in both the CAP and CACA assignments—included deciding accurately what to assess and how to assess it, with emphasis on the cognitive domain of the revised version of Bloom’s taxonomy of educational objectives (Krathwohl, 2002). It also encompassed the detection and prevention of bias when assessing children with special needs and children from culturally and linguistically different backgrounds.

I administered a unit exam at midterm in each of the two conditions. This exam contained 50 conceptually applied multiple-choice questions from the non-principal focal areas of the course, including theories embedded in assessment practices, test validity and reliability, interpreting standardized tests, and applying proper test-preparation practices toward high-
stakes standardized testing. At the conclusion of the semester, I administered a second unit exam to students in each condition that served as the current investigation’s dependent measure for comparative statistical testing. This second exam also consisted of 50 conceptually applied multiple-choice questions, but these questions pertained to the chief focal points of the study that were addressed in both the CAP and CACA assignments. In order to minimize the possibility of experimenter effects in composing the second exam, I selected all multiple-choice questions from conceptually based test-bank items. Consistent with considerations surrounding both test security and alternate-form reliability, I matched questions on both content and level of difficulty in the process of selecting items for inclusion on four different-but-comparable exam versions (one for each of the four participating class sections).

*Instructional Procedures* (CAP Condition). In the CAP condition, the initial three weeks of the semester consisted of in-depth classroom instruction over the entire gamut of assessment topics (both principal and non-principal focal points as described under *Course Description*). Throughout the final week of the semester, students worked in class within pre-assigned groups of four or five individuals to complete the CAP assignment with slight procedural modifications from the previous preliminary investigation (Mayo, 2013). These modifications, which included eliminating affective assessment and placing greater emphasis on absence-of-bias in assessment, were predicated largely on instructive student feedback from prior summative course evaluations. Once assigned to their corresponding groups, students met preliminarily to select individuals to serve in the flexible and rotating capacities of facilitator, recorder, and other defined roles.

In completing the CAP assignment, each group selected the grade level(s), subject area(s), and specific topic(s) to incorporate into the portfolio. Each group also established a collaborative division of labor in which each member was exposed to a representative sampling of every assessment strategy outlined below:

1. selected-response assessment [20 binary-choice (true-false) items; 10 multiple binary-choice items in two sets of 5; 20 multiple-choice items; and 10 matching questions in two sets of 5]
2. constructed-response assessment (20 short-answer items and two different essay items with an accompanying analytic scoring rubric for each)
3. performance assessment (one concept map, case-study analysis, analogical reasoning project, and autobiographical and/or biographical journaling assignment, with a concomitant analytic scoring rubric for each assignment)
4. portfolio assessment (five hypothetical work samples related to targeted skills and/or knowledge for prospective students to master, along with a single analytic rubric on which all work samples could be scored)

Students composed answer keys for all selected-response and short-answer constructed-response items. For constructed-response essays, performance assessment, and the portfolio-assessment items, students designed prototypical responses upon which they based their associated scoring rubrics.
Along with demonstrated mastery of each assessment strategy, the evaluative criteria for scoring each group’s assignment included an applied understanding of Bloom’s taxonomy (knowledge and cognitive-process dimensions) and absence-of-bias in assessment plus evidence of a collaborative division of labor. I rated students on all evaluative criteria except for collaborative division of labor, which was reserved solely for students in corresponding groups to evaluate. On the division-of-labor score, students in each group rated one another in terms of individual contributions to the group (e.g., effort, cooperation, and dedication to team work), with the group’s average per person used for individual scoring purposes. Peer ratings occurred on a Likert scale ranging from 1 = unsatisfactory to 5 = exceptional. I afforded additional opportunity for students to offer their evaluative comments. I kept all peer ratings anonymous to other students.

The CAP assignment counted for one third of the final course average. In calculating each student’s grade for this assignment, I weighted all of the following eight evaluative criteria equally in calculating the cumulative grade for each student: (1) Bloom’s knowledge and cognitive-process dimensions per content standard; (2) absence-of-bias in assessment; (3) average within-group peer rating per respective student; (4) selected-response assessment; (5) constructed-response assessment (short answer); (6) constructed-response assessment (essay); (7) performance assessment; and (8) portfolio assessment. In assigning grades for each evaluative criterion, I relied on a numerical-rating system with similar anchors as the students’ peer ratings (1 = unsatisfactory to 5 = exceptional). I collapsed all evaluative criteria onto a grading summary sheet, which also included space for a concise synopsis of my evaluative comments and a scheme for converting rubric point-totals to grade-level percentages. For clarification, I distributed and reviewed the content of this summary sheet during the first class meeting. Once grading was completed, I returned these sheets to respective students at the end of the semester.

**CACA Condition.** In the CACA condition, the first three weeks of the semester involved the same classroom instruction as occurring in the CAP condition. Similar to the CAP condition, students worked in class during the final week of the semester—in pre-assigned groups of four or five—to complete the CACA assignment. As in the CAP condition, students in the CACA condition met briefly after groups were assigned to choose individuals to act in various flexible and rotating roles within each group.

In the CACA condition, I asked each group to write critiques of a series of fictitious reference cases that reflected all of the teacher-developed assessment strategies canvassed in the CAP assignment: selected-response, constructed-response (short answer), constructed-response (essay), performance, and portfolio assessment. In completing the CACA assignment, I also required students to address the same considerations as those observed in the CAP condition, including Bloom’s knowledge and cognitive-process dimensions, absence-of-bias in assessment, and a collaborative division of labor within each group.

I designed all cases as narrative experiential-learning exercises based on the principal focal points of assessment canvassed in the course. Cases originated from two sources. The first source involved my own instructor-created cases that included various types of errors in assessment practice. The second source derived from appropriately referenced adaptations...
of case scenarios appearing as applied assessment exercises within leading textbooks, workbooks, and other publications within the realm of educational assessment. In some situations, these cases already incorporated one or more errors that students could identify and discuss in their CACA assignments. In other instances, assessment blunders were not present. In either event, I modified case content—ranging from moderately for error-inclusive cases to extensively for correct case applications—such that errors of omission and/or commission were introduced. A simple, illustrative example of a constructed-response (short answer) item for second-graders appears next. This language-arts item—which includes in italics a brief discussion of the accompanying assessment error—is adapted from extended-applications exercises appearing at the conclusion of Popham’s (2014) classroom-assessment textbook:

These letters are all vowels: A, E, O, and U. What is the one missing vowel? ____________

*Although the intended correct answer is “I,” “Y” and “W” are occasionally accepted as vowels. Therefore, this item violates one of the basic tenets of developing sound short-answer items, namely, the intended correct response must be unique.*

I used the same peer- and instructor-rating scales and procedures in the CACA condition that had been used in the CAP condition. I incorporated all evaluative information into the same grading summary sheet that had been utilized in the CAP condition. Once again, I distributed and reviewed this grading sheet at the start of the semester and then returned it to students after I had completed grading at the semester’s conclusion. As with the CAP assignment, the CACA assignment was also worth one third of the final course average.

**Results**

*Comparative Statistical Testing.* As described in methodology, the dependent measure was students’ scores on the end-of-semester unit exam that addressed material related to the major content concentrations in the course (teacher-developed assessments in conjunction with both Bloom’s taxonomy of the cognitive domain and absence of bias in assessment). The means and standard deviations for student scores in each condition are CACA (*M* = 80.92, *SD* = 10.36) and CAP (*M* = 84.88, *SD* = 8.65). I used independent-groups *t*-testing to compare student scores in the CACA condition with those in the CAP condition. Results show that student performance in the CAP learning condition differed significantly from performance in the CACA condition, *t*(94) = 2.04, *p* < .05.

*Questionnaire Data.* I gauged students’ perceptions of completing corresponding assignments in the CACA and CAPA conditions with an anonymous 10-item questionnaire that combined a 5-point Likert rating scale (*not at all effective* = 1 to *highly effective* = 5) with several questions about respective assignments to which students responded narratively. I asked students to rate numerically the experience of completing the assignment in question in terms of how effectively it accomplished a total of 10 educational objectives. I also asked students to comment narratively on what they liked best and least about the respective assignments, along with whether they would recommend that assignment to other students. Students’ numerical ratings are shown in Table 1.
Table 1: Students’ Numerical Ratings of the Cooperative Assessment Case Analysis (CACA) and Cooperative Assessment Portfolio (CAP) Assignments

<table>
<thead>
<tr>
<th>Questionnaire Item</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>CACA (n=46)</td>
<td></td>
<td></td>
<td>CAP (n=50)</td>
<td></td>
</tr>
<tr>
<td>Thinking beyond the classroom</td>
<td>3.83</td>
<td>.70</td>
<td>4.72</td>
<td>.61</td>
</tr>
<tr>
<td>Fostering participation in learning</td>
<td>3.66</td>
<td>.48</td>
<td>4.58</td>
<td>.42</td>
</tr>
<tr>
<td>Increasing practical relevance of information</td>
<td>3.74</td>
<td>.62</td>
<td>4.88</td>
<td>.31</td>
</tr>
<tr>
<td>Facilitating understanding of course content</td>
<td>4.01</td>
<td>.39</td>
<td>4.56</td>
<td>.51</td>
</tr>
<tr>
<td>Increasing motivation to learn</td>
<td>3.45</td>
<td>.80</td>
<td>4.27</td>
<td>.54</td>
</tr>
<tr>
<td>Promoting intellectual challenge</td>
<td>3.62</td>
<td>.53</td>
<td>4.44</td>
<td>.46</td>
</tr>
<tr>
<td>Stimulating interest in the subject matter</td>
<td>3.36</td>
<td>.75</td>
<td>4.31</td>
<td>.49</td>
</tr>
<tr>
<td>Distinguishing between varied assessments</td>
<td>3.71</td>
<td>.43</td>
<td>4.67</td>
<td>.63</td>
</tr>
<tr>
<td>Recognizing the importance of absence-of-bias</td>
<td>3.50</td>
<td>.72</td>
<td>4.39</td>
<td>.58</td>
</tr>
<tr>
<td>Applying Bloom’s Taxonomy (cognitive domain)</td>
<td>3.55</td>
<td>.68</td>
<td>4.78</td>
<td>.42</td>
</tr>
</tbody>
</table>

Questionnaire ratings coincided with the results of comparative statistical testing. Students preferred the CAP to the CACA assignment across all surveyed measures. Students’ narrative comments were also consistent with their numerical ratings. Although approximately 60% of respondents in the CACA condition commented about the cooperative case-analysis assignment’s general utility in bolstering understanding of the targeted course content, only about half that number said that they would recommend it to other students. In contrast, more than 90% of respondents in the CAP condition asserted that they would recommend the cooperative portfolio assignment to other students. In response to what students liked best about the CAP assignment, the vast majority stated that it provided valuable hands-on experience that should later benefit them in their future teaching responsibilities. Many of
these respondents also remarked that they had never realized how much time and energy went into creating good teacher-developed assessments. Not unexpectedly, the major criticism of both assignments was the perceived workload associated with their completion. Students in the CAP condition voiced this criticism most often; however, many of these same respondents qualified their concern by noting that the end product was both personally gratifying and worth the concerted effort.

Discussion

Within the broad context of understanding and applying varied types of teacher-developed assessments, the present results show that the CACA assignment did not compare as favorably as the CAP counterpart on the joint measures of comparative statistical testing and analysis of surveyed attitudinal data. The core reason why this occurred might relate to fundamental differences in the underlying foundations of these two types of cooperative learning.

The CACA and CAP assignments are variant forms of social constructivist pedagogy (Mayo, 2010) that encourage small groups of students to work together to create shared understanding. In these types of assignments, students collaborate to produce, not reproduce knowledge (Millis, 2002). The CACA assignment aligns with the longstanding tradition of using case-based learning in numerous undergraduate disciplines as a means of linking knowledge and practice through developing students’ critical thinking and applied reasoning skills. (e.g., Allchin, 2013; Floyd & Bodur, 2005; Heitzmann, 2008; Kaddoura, 2011; Mayo, 2002, 2004; Pariseau & Kezim, 2007). Both the CACA and CAP assignments qualify as problem-centered approaches that advocate for authentic applications of course content in the framework of active and interactive learning. Yet these assignments take differing routes to these educational outcomes. As mentioned briefly in the literature review, the CACA assignment uses case studies to introduce practical examples and analogous contexts for analysis, critique, and vicarious learning and practice in professional decision-making. On the other hand, the CAP assignment relies on actual simulated classroom practice that offers students ample opportunities to create their own assessments to demonstrate applied understanding of sound principles of test construction. Of the two approaches, then, the CAP is more inherently active in practice. This conclusion is not only supported by related pedagogical findings in other academic disciplines (e.g., Jeffries, 2005), but it also upheld in the present study by students’ perceptions of the CAP assignment as fostering demonstrably greater participation in learning than the CACA assignment (see Table 1).

Conclusion

Overall, the results of the present study validate the merits of cooperative learning in ECE assessment instruction that emphasizes simulated classroom practice as a vehicle for promoting what Hmelo and Guzdial (1996) described more than two decades ago as knowledge-building-for-action. Additional research, involving assignments similar in nature but perhaps different in scope to the term-length CAP assignment, might show if these
findings also apply to assessment instruction in middle-grades or secondary education programs. Another potentially inviting direction for future research on pre-service students’ assessment instruction might involve a systematic examination of the pedagogical efficacy of a hybrid cooperative-learning approach that integrates key elements of both the CAP and CACA assignments from the current investigation. As a proposed example, students might begin with carefully planned case analyses as a way to scaffold learning experiences (see Hmelo & Guzdial, 1996) in preparation for later simulated classroom practice.

About the Author

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