PBL 2018
International Conference
PBL FOR THE NEXT GENERATION - Blending active learning, technology and social justice
Santa Clara | California | USA | 16 - 19 February, 2018

Santa Clara University · NAP · Into Actions

PROBLEM-BASED LEARNING AND TEACHER TRAINING: A CASE STUDY OF THE IMPACT OF PBL ON CANDIDATE PERCEPTIONS DURING THEIR FIELD EXPERIENCE

Charles T. Wynn[1]

1 REREARCH AND EXPERIENCES PAPER PRESENTATION

In this time of intense and increasing political polarization, the question arises over the extent to which the U.S. population has the reasoning capacity, as individuals, and with others, to effectively address the pressing issues of the day (Griffin, 2011; Inglis & Steel, 2005; Rosenberg, 2004; Talisse, 2005). When faced with complex problems and issues, individuals often approach problem-solving and decision-making with intuitive/emotional thinking that can be loosely defined as if it feels right, it is right (Basseches 2005; Berger, 2008; Wynn, 2015; Wynn, Mosholder, & Larsen, 2014, 2016), or a closed systems approach that limits the consideration of diverse, even opposing perspectives, and the multiple truths, complexities, and contradictions that are inherent in complex problems and issues (Sinnott, 1998). Problem-based learning (PBL) offers an ideal context in which to explicitly guide students to recognize and practice the more advanced cognitive systems associated with effective adult complex problem-solving, and if broadly implemented into curricular contexts, could help increase individual and collective problem-solving/decision-making capacities (Sinnott & Johnson, 1996; Wynn, 2015; Wynn, et al., 2014, 2016).

2 PBL AND THE COGNITIVE DYNAMICS OF PROBLEM-SOLVING

PBL is generally defined as focused, experiential learning organized around the investigation of and resolution of complex/authentic problems (Torp and Sage, 2002, Hmelo-Silver, 2004), through which students use advanced thinking processes (Lenkauskaite &

---

[1] Kennesaw State University

Mazeikiene, 2012). PBL confronts students with authentic problems as a catalyst for them to practice and gain higher order thinking skills (Hmelo-Silver, 2004;), and can guide students to recognize the inadequacy of closed systems and intuitive problem-solving to prompt a search for more adequate systems (Wynn, 2015; Wynn et al. 2014, 2016), those found in the postformal stage of reasoning (Basseches, 1984; Reigel, 1975; Sinnott, 1989, 1998). Postformal thinking includes the two substages, relativistic thinking and dialectical thinking. Relativistic thinkers expand the lens of problem-solving beyond fixed truths or good versus bad; realize that context, complexities, and contradictions are key to understanding a problem/issue and central to developing possible resolution alternatives; and recognize that some problems/issues may not have workable solutions; Dialectical thinkers combine relativistic thinking with the recognition that contradictions within a problem or issue are interrelated and connected; use inconsistencies and contradictions as catalysts for problem-solving; seek to determine why opposing sides believe what they believe and use this knowledge to develop resolution alternatives; and recognize that on-going changes will challenge any stability or solution reached and will often produce a tension-to-resolution-to-tension cycle dynamic (Adapted from Wynn & Mosholder, 2016). The ability to consciously apply postformal operations, as the situation warrants, enables students to "range more widely in finding solutions to life's problems" (Sinnott, Tobin, Chrzanowska, & Hilton, 2017, p. 244).

My colleagues and I (Wynn et al., 2014; 2016) tested the effects of a PBL instructional model, with an explicit metacognitive reflection component, on the development of postformal thinking skills in a history survey/first-year learning community context, and found that the PBL model was more effective than traditional instruction (lecture/discussion) in facilitating postformal thinking as measured by the *Postformal Thought Questionnaire* (Sinnott & Johnson, 1997). We recommended PBL as an ideal instructional method to confront students with the contradictions and complexities inherent in real-world problems and issues to guide them to recognize and practice postformal thinking skills. The operational dynamics of the PBL method (Adapted from Wynn & Mosholder, 2016) are described below.

Step 1 – Problem Development: Presenting the problem/issue to pique student interest and "stakeholdership," and to portray the problem/issue as multidimensional.

Step 2 – Initiation of PBL Events-Argumentation and Student Inquiry: Guiding students to define the problem at hand, identify its multidimensional or multi-truth characteristics, identify

the need for advanced thinking systems, and initiate a decision-based/argumentation structure to prompt students to generate arguments, and allow them to work to resolve conflicts and contradictions among competing positions. This is done primarily through simulations based on periodized historical issues and current issue presentations. After each simulation and issue presentation, students identify what they learned about the problem/issue and the inherent contradictory or opposing positions, and identify additional information needed to develop solution alternatives.

Step 3 – Problem Solution and Debriefing: Students generate solution/decision alternatives and examined their "fit," and then propose the most appropriate one, and evaluate its historical or potential consequences. We assign a concluding opinion essay, and guide students through debriefing, which includes a review of the content, concepts, and skills encountered and practiced during the problem-solving cycle, and use a metacognitive reflection questionnaire to guide students to recognize and reflect upon the types of thinking strategies they used, and the successes or failures of each in the problem-solving process. This helps students develop a cognitive self-awareness in a problem-solving/decision-making context.

As history/social studies educators at Kennesaw State University, we recognized the alignment of outcomes associated with PBL and the goal of social studies education according to the National Council for the Social Studies (2010), which is to help young people become reasoned citizen decision-makers to support the public good. We concluded that preparing social studies teachers to facilitate effective problem-solving and the related cognitive skills among their students would help mitigate the individual and collective reasoning gap cited above. Therefore, we restructured our senior teaching methods course to immerse our preservice teachers (PSTs) in the PBL method described above to help our student operationalize this goal during their year-long field experience. We also designed a qualitative study to analyze the impact this restructuring had on our students' instructional decisions and related perceptions in the field. The following segments of this paper have been adapted, and in some portions directly pulled, from the article that reported the results of our study (Wynn & Okie, 2017).

3 RESEARCH QUESTIONS

Based on the theory and research outlined above, our research questions addressed the extent to which our modeling and scaffolding practices during multiple PBL experiences in our methods course would influence our PST's use of PBL in the field and their related perceptions, specifically:

1. How will our PSTs perceive their level of preparation and level of confidence in implementing PBL during their fall practicum and spring student teaching?

2. To what extent will our PSTs utilize PBL during their fall practicum and spring student teaching and what positive and negative factors will they perceive related to its use?

3. What factors will our PSTs perceive as encouraging or discouraging their use of PBL during their fall practicum and spring student teaching? (Wynn & Okie, 2017, p. 3)

4 METHOD

Research Design

We chose a case study approach to gain a better understanding of our PSTs' perceptions related to the above questions. "This approach allowed us to take into consideration the lived realities and nuances experienced by our PSTs in a way that would not be possible through a quantitative approach (Glesne, 2006). Through a case study approach, specifically through data source triangulation, we identified themes and consistencies that helped explain factors that affected our PSTs' use and perception of PBL over time and in different secondary social studies classrooms (Stake, 1995; Yin, 2014)" (Wynn & Okie, 2017, p. 3).

5 PARTICIPANTS AND INSTRUCTIONAL DESIGN

Our participants included sixteen students in the required senior secondary history/social studies methods block in the fall of 2015. The block included the methods course, which met one day a week for two hours and 45 minutes for 16 weeks, and a practicum which required 75 hours of observation and teaching supervised by their assigned classroom teacher (CT) and university supervisor. Each participant agreed to complete an end-of-practicum questionnaire, an end-of-practicum focus group, an end-of-student-teaching questionnaire, and end-of-student-teaching focus group. Only 12 of the original participants completed the methods block and student teaching (16 weeks) and completed and the questionnaires and focus group sessions. Data

analyzed in our study were limited to these 12 PSTs. Each participant was assigned a pseudonym for reporting purposes.

We structured the first three weeks of the methods course to immerse students in PBL activities based on our PBL instructional method. After the first PBL activity, we prompted our students to reflect on their PBL learning experience and compare the outcomes they gained with the goals and purpose of socials studies education as stated by NCSS (2010) and the related cognitive outcomes. This comparison prompted our PSTs to identify the operational dynamics of postformal systems practiced and recognize during the initial PBL activity, and cognitive systems that may not have been adequate. We guided our PSTs to identify the cognitive skills involved in each of the methods they experienced and practiced as the course progressed, including two additional PBL activities (Wynn & Okie, 2017).

6 DATA COLLECTIONAND ANALYSIS

As stated above, we collected data at two points during the 2015-2016 academic year, after the fall practicum and after spring student teaching. The field director of our History Education Program administered the questionnaires in December 2015, and after the final week of student teaching in April 2016. All questionnaires were coded to maintain the anonymity of each participant. Both audio recorded focus group sessions were facilitated by our field director. She prompted our PSTs to expand on, explain, add to, or discuss their responses on the questionnaires. The focus sessions were limited to 45 minutes. We defined problem/decision-based learning on both questionnaires as "experiential learning (minds-on, hands-on) organized around the investigation of and resolution of messy, real world problems." Both questionnaires ask students to address the following: Ranking (0-3) and explaining their level of preparedness to plan and teach a PBL activity during their fall practicum and spring student teaching; Ranking (0-3) and explaining their level of confidence to plan and teach a problem/decision-based activity during their practicum experience; Identifying the number of PBL activities they taught during their practicum and student teaching and briefly describing those activities; Identifying and explaining the most positive aspects/outcomes and challenges related to PBL, and factors that encouraged and discouraged its use, and explaining whether or not they plan on using PBL during student teaching and when they secure their first teaching job (Wynn & Okie, 2017).

We used open coding to analyze and triangulate the data to identify themes related to research questions among individual participants and among the 12 PSTs as a group. Responses to each prompt on the questionnaires and during both focus group sessions were coded by the emergence of themes relevant to the research questions. Case reports were constructed for each PST to identify common patterns and contradictions. We crosschecked each individual report with other PST reports to identify prominent and consistent themes, that were then used to provide a description of the experiences of each PST relevant to those themes and to other PSTs' experiences. We analyzed these reports to provide the empirical data from which we drew conclusions regarding the research questions (Wynn & Okie, 2017).

7 RESULTS

End of Practicum

Two primary themes emerged from our analysis of the post-practicum responses regarding our PSTs' perceptions of their readiness to teach PBL lessons. They reported being somewhat to very prepared/confident in planning and implementing PBL (Prepared-M = 2.33, Confident-M = 2.5) and attributed their confidence and level of preparation to their experience with multiple PBL activities in our methods course. Representative comments included:

Ian – (I know) "what PBL lessons are and how to implement them in the classroom. My score of 2 rather than 3 is based on lack of practice." Jane – found that some lessons/topics were more amenable to PBL than others: "I feel like it (PBL) requires a certain level of creativity that I am still trying to master, although this class (methods) has made it clear how to distinguish and approach PBL." Second, our PSTs were anxious about how their students would respond to PBL lessons, which may be reflective of PSTs' recognition that PBL rarely, if ever, occurred in their practicum classrooms. They attributed their anxiety to a fear of "unexpected issues" that could arise and their concern over whether they had the skill to address effectively those issues. Ten of the 11 PSTs who taught a PBL lesson indicated their confidence rose and level of anxiety diminished after teaching their first PBL lesson, and added that gaining more experience in teaching PBL lessons would increase their effectiveness and confidence (Wynn & Okie, 2017).

Eleven of 12 PSTs reported they developed and taught at least one PBL lesson during their practicum. The total number of PBL lessons reported by the group was 22, with Debra teaching four, Carly, Ed, Frank, Gary, Ian, Jane, Kathy, and Lou teaching two; and Bob and Hank

teaching one. Anne did not teach a PBL lesson. She reported that her CT would not allow her to implement a PBL activity based on her concerns over student readiness (Wynn & Okie, 2017).

Our PSTs were very enthusiastic about the effect of PBL and the factors that encouraged its use, listing the following as positives outcomes related to their decision to use PBL: "improved student performance on exams, improved writing skills, significantly higher levels of engagement, fewer classroom management issues or disruptive students, and improved deliberative and cognitive skills" (Wynn & Okie, 2017, p. 4). Representative comments included: Lou – "PBL allows you to take standards to the next level. Their essay writing improves. They get it! My students had never been in a PBL environment before. It was cool to see kids who normally were not engaged become interested and involved." Ian - "Students who would have been problems became my best students. PBL gave them an outlet to be exemplary students." Kathy – "My experience in [the methods] class encouraged me to do this. I saw, through PBL lessons, how engaging and interactive PBL lessons can be. Also, PBL lessons align so well with the purpose of social studies, promoting civic competence." Frank – "One student in particular was a student who has an internal seizure disorder, which makes her lose up to five minutes of time at a time. Her scores struggled until PBL. In our debate, she shined. From then on, she was excited about class and it made all of the difference in her performance. On our Civil War test, she scored a perfect score. With just one problem-based activity, she totally changed her perspective on history. Each time I plan a PBL, I will think about how the activity changed her whole attitude toward school."

Our PSTs identified the following discouraging or limiting factors regarding PBL during their practicum: time to implement, time to plan, coverage demands, standardized testing, and lack of student experience with PBL. Representative comments included: Kathy – "It took me 24 hours to plan a PBL lesson that lasted an hour and a half. The effort it took limited my ability to do more." Ian – "It is highly improbable to be able to teach only these quality lessons and cover all the content required by the end of the year." Frank – "Students are not overly familiar with PBL, so it takes a little more planning time to get the desired results." Despite these discouraging factors, each of our 12 PSTs planned on using multiple PBL lessons during student teaching. All PST quotations regarding their practicum experiences are from Wynn & Okie (2017, pp. 4-5)

8 END OF STUDENT TEACHING

A comparison of PSTs' experiences with PBL during their practicum and student teaching yielded an increase in their overall ranking of their level of preparedness in planning and teaching PBL, with seven of our 12 PST selecting 3-Very Prepared (M = 2.58). Their level of confidence to plan and teach PBL lessons remained unchanged during student teaching (M = 2.5). Overall, the group felt confident with PBL during student teaching. As Ed explained:

> I felt very prepared to teach problem/decision-based activities during my student teaching experience. I think that is a credit to our professors from last semester who drilled us on the importance of students being involved in their learning and how these lessons can help them get to higher levels of thinking. It also helps having done PBLs last semester so I had a better feel for what I was doing. (Wynn & Okie, 2017, p. 6)

Eleven of 12 PSTs reported developing and teaching one or more PBL lesson during student teaching, with Ian and Jane teaching five, Debra and Kathy teaching four, Anne (who wasn't allowed to implement PBL in her middle school practicum) and Carly teaching three, Ed, Gary and Lou teaching two, and Frank and Hank teaching one. Bob did not teach a PBL lesson during student teaching, due to his concerns over classroom management, and his negative experience with PBL during his practicum. (Wynn & Okie, 2017).

Encouraging factors our PSTs associated with PBL during student teaching were like those identified during their practicum: "improved student performance on exams, improved writing skills, significantly higher levels of engagement, fewer classroom management issues or disruptive students, and improved deliberative and cognitive skills" (Wynn & Okie, 2017, p. 6). Representative comments included: Debra - "My students had to develop a plan for dealing with immigration in the late 19th and early and early 20th centuries. My inclusion students developed higher level of thinking which could be seen in their plan of action." Jane – "I loved seeing the authentic solutions that students came up with (on current European immigration) based on information they were given. At the end of the day, the solutions might be different, but they all had the goal in mind to promote human rights. A lot of people think social studies is simple. My students know it's not. They came up with their own solutions. They understand there isn't one truth. There are multiple truths. Their solutions were complex. Coming to one solution as a class was one of the most powerful results of PBL, watching these students come together and deliberate to solve problems."

The negative/discouraging factors our PSTs associated with PBL during student teaching were also like those identified at the end of their practicum: time, coverage, and pacing demands

and standardized testing. Carly's explanation was representative of the entire group during the focus group session:

> We have the EOCTs (End of Course Tests) next week. We are on Standard 22. We have to cover the Civil Rights Movement and everything from Watergate to 2001 in *four days*. The kids want to debate and do PBLs on topics that are most relevant to them and would be so helpful, but we have to cram this stuff down their throats and it makes me mad. We're losing three weeks on stupid standardized testing. This is the stuff they *need* to be participatory citizens! It really stinks not to have the time to do awesome problem-based activities with this stuff because this is actually extremely relevant to their lives today and the world around them. (Wynn & Okie, 2017, p. 6)

Despite these challenges, each of our 12 PSTs stated they planned to use multiple PBL lessons once employed as secondary history/social studies teachers. All PST quotations regarding their student teaching experiences are from Wynn & Okie (2017, pp. 5-7).

9 DISCUSSION

After examining the results, we are encouraged by the potential role of a PBL-oriented methods course in guiding secondary social studies PSTs to be effective classroom teachers.

"We did not require our PSTs to develop and teach a PBL lesson in the field at any point during the fall methods block or student teaching" (Wynn & Okie, 2017, p. 7). However, our PSTs reported teaching a total of 54 PBL lessons during their year-long field experience, which indicates, along with their specific comments, that they perceived PBL as an effective method to facilitate standards-based student outcomes. Our PST's also indicated that they felt prepared and relatively confident to plan and teach PBL lessons and attributed their readiness to the experiences they gained as learners in our methods course and as teachers in the field (Wynn & Okie, 2017).

Reports of PBL as a transformative pedagogy among our PSTs was also very encouraging. Eleven of our 12 PSTs explicitly identified the potential power of PBL to improve the learning environment in contrast to the traditional learning environment that was common in their classrooms, and noted the facilitative, collaborative, and deliberative dynamics of PBL as positive and perpetuating factors in its use. Frank framed this transformative dynamic by referring to it as the "game changer," or the point at which our PSTs began defining themselves outside the parameters of traditional social studies teaching after successfully implementing PBL. Our PSTs also identified the more advanced cognitive skills practiced by their students during PBL as an encouraging factor, and connected deliberative, collaborative, and decision-making

skills practiced by their students to the goal of facilitating citizen decision-makers, which was our intent as we designed our methods course. It was also encouraging to see our PSTs report the extent to which they operationalized this connection in the field, and their desire to continue to use PBL to achieve this goal after securing teaching jobs (Wynn & Okie, 2017).

We were not surprised by the negative/limiting factors identified by our PSTs, the planning and preparation time necessary to implement an effective PBL lesson, and the pressure to cover content in support of standardized testing. However, they generally reported that the extra time and effort paid off as they witnessed and assessed student outcomes, and implemented PBL lessons despite the coverage/standardized testing demands (Wynn & Okie, 2017).

10 IMPLICATIONS AND CONCLUSIONS

Our study confirms the importance of the modeling process in our secondary history/social studies methods course. Our PSTs identified these PBL learning experiences as a key factor in their decision to use PBL in the field. They wanted their students to experience the same kind of motivation, engagement, and learning outcomes they had experienced. Making that happen required a working understanding of the postformal cognitive systems associated with advanced problem-solving and decision-making as well as the procedural dynamics of PBL and the associated outcomes. Developing that working knowledge among preservice teachers requires both modeling and cognitive scaffolding (Brush & Sayes, 2014; Wynn, 2015; Wynn et al., 2014, 2016). Working knowledge in our methods course/practicum context means that we must guide PSTs to practice, recognize, and model postformal thinking systems so they can facilitate their practice among their students. Although the results of this study cannot be generalized, they indicate that this explicit focus was perceived as effective in facilitating the use of PBL among our PSTs and in guiding them to focus on and develop more advanced cognitive skills among their students. As Ian put it, "The focus on higher level thinking skills has almost become subconscious" (Wynn & Okie, 2017, p. 8).

Our results suggest our decision to restructure our secondary history/social studies methods course around PBL and the related cognitive skillsets had a "game changing," transformative, impact on our PSTs perceptions of their relationship with their students and the student outcomes they sought to facilitate. Their comments suggested they left their preservice

training with an operational understanding of a problem-based teaching and learning model that aligns well with NCSS goals and standards (Wynn & Okie, 2017).

11 LIMITATIONS

"We designed this study to analyze the impact of our PBL-based revisions to our social studies methods course as perceived by our PSTs in the field. To that end, data collected were based on self-reports of their experiences and their students' performance during their practicum and student teaching. Therefore, results are not generalizable to a broader context. Collecting data from CTs and students would provide a richer, more valid, and more holistic study, as would teaching observations and a content analysis of lesson plans. We plan on working with our IRB and local school systems to expand our research accordingly" (Wynn & Okie, 2017, p. 8).

REFERENCES

Berger, K. (2008). *The Developing Person Through the Life Span.* New York, NY: Worth.

Basseches, M. (1984). *Dialectical thinking and adult development*. Norwood, NJ: Ablex.

Basseches, M. (2005). The development of dialectical thinking as an approach to integration. *Integral Review, 1*(47-63).

Brush, T. & Sayes, J. (2014). An instructional model to support problem-based historical inquiry: The persistent issues in history network. *The Interdisciplinary Journal of Problem-Based Learning, 8*(1), 39-50.

Glesne, C. (2006). *Becoming qualitative researchers: An introduction* (3rd ed.). New York, NY: Pearson Education, Inc.

Griffin, M. (2011). Developing deliberative minds- Piaget, Vygotsky and the deliberative democratic citizen. *Journal of Public Deliberation, 7*(1), Article 2.

Hmelo-Silver, C. E. (2004). Problem-based learning: What and how students learn? *Educational Psychology Review,16*(3), 235-266.

Inglis, J. & Steele, M. (2005). Complexity intelligence and cultural coaching: Navigating the gap between our societal challenges and our capacities. *Integral Review, 1,* 36-46.

Lenkauskaite, J. & Mazeikiene, N. (2012). Challenges of introducing problem-based learning (PBL) in higher education: Selecting problems and using problems. *Social Research, 2*(27), 78-88.

National Council for the Social Studies (2010). *National curriculum standards for socials studies.* Silver Spring, Maryland: NCSS.

Riegel, K. F. (1975). Toward a dialectical theory of development. *Human Development, 18,* 50-64.

Rosenberg, S. (2004). Reconstructing the concept of deliberative democracy. *Center for the Study of Democracy Working Papers.* Retrieved from http://escholarship.org/uc/item/2rd8m486. Accessed October 21, 2017.

Sinnott, J. D. (1989). A model for solution of ill-structured problems: Implications for everyday and abstract problem solving. In J. D. Sinnott (Ed.), *Everyday problem solving: Theory and applications* (pp. 72-99). New York, NY: Praeger.

Sinnott, J. D. & Johnson, L. (1996). *Reinventing the university: A radical proposal for a problem focused university*. Norwood, NJ: Ablex.

Sinnott, J. D. & Johnson, L. (1997). Brief report: Complex postformal though in skilled administrators. *Journal of Adult Development, 4*(1), 45-53.

Sinnott, J. D. (1998). *The development of logic in adulthood: Postformal thought and its applications*. New York, NY: Plenum Press.

Sinnott, J. D., Tobin, E., Chrzanowska, E., & Hilton, S. (2017). The relationship between attachment style and postformal thought. *Journal of Adult Development, 24*, 239-251.

Talisse, R. (2005). Does public ignorance defeat deliberative democracy? *Critical Review, 16*(4), 455-463.

Torp, L., & Sage, S. (2002). *Problems and possibilities: Problem-based learning for K-16 education*. 2nd edition. Alexandria, VA: ASCD.

Wynn, C. T., Mosholder, R. S., & Larsen, C. A. (2014). Measuring the effects of problem-based learning on the development of postformal thinking skills and engagement of first-year learning community students. *Learning Communities Research and Practice*, 2(2), Article 4.

Wynn, C. T. (2015). A cognitive rationale for a problem-based U.S. history survey. *Teaching History: A Journal of Methods, 40*(1), 28-42.

Wynn, C. T. & Mosholder, R. S. (March, 2016). *Facilitating Advanced Thinking Skills through Problem-Based Learning* SoTL Commons Conference, Savannah, Georgia. Retrieved from http://digitalcommons.georgiasouthern.edu/sotlcommons/SoTL/2016/13. Accessed October 21, 2017.

Wynn, C. T., Mosholder, R. S., & Larsen, C. A. (2016). Promoting postformal thinking in a U.S. history survey course: A problem-based approach. *Journal of College Teaching and Learning, 13*(1), 1-20.

Wynn, C. T., & Okie, W. T. (2017). Problem-based learning and the training of social studies Teachers: A case study of candidate perceptions during their field experience. *International Journal for the Scholarship of Teaching and Learning, 1*(2), Article 16.