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Facilitating Postformal Thinking Through Problem-Based Learning in the History Survey Course: An Empirically Tested PBL Model

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ABSTRACT

This case study presents a problem-based learning (PBL) model that guides general education history students to practice and acquire more advanced problem-solving skills – those found in postformal thinking systems – and to apply these thinking skills to develop and share solution alternatives both to periodized historical issues and to current problems and issues. The article also summarizes findings from three studies that tested the impact of the PBL model on students' cognitive growth, level of course engagement, and perception of content relevance. These findings include student comments on the impact their PBL experiences had on their thinking skills and the usefulness of these skills in problem solving. The article concludes by providing tips on implementing the PBL model in a college general education history course.

Keywords: problem-based learning, postformal thinking, survey history courses, history education

Effective critical thinking and effective problem solving are common general education goals among colleges and universities (Markle et al., 2013). The history survey is often a required course in general education curricula, under the assumption that, in addition to historical content knowledge, students will gain critical thinking skills, especially the ability to connect the present with the past in a way that will help them address problems and issues in the classroom and beyond. However, most history survey courses default to a "coverage" model and fail to guide students to achieve primary general education goals, with students often regarding teaching methods and learning outcomes as redundant and

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irrelevant (Calder, 2006; Mintz, 2018). The PBL model confronts history survey students with complex periodized historical issues and guides them to systematically apply postformal thinking operations as they develop and defend their solutions and compare them with the actual outcomes and consequences of the historical issue addressed, and, finally, at the end of the course, to apply these skillsets to current problems and issues that affect their lives.

THEORETICAL FRAMEWORK OF THE PBL MODEL

The PBL model is based on a cognitive apprenticeship framework (Collins & Kapur, 2014) through which the instructor scaffolds students through modeling and coaching to practice and acquire more advanced problem-solving/cognitive skills (Hmelo-Silver, Bridges, & McKeown, 2019). The steps or processes of the PBL model are based on Lev Vygotsky's (1978) concept of Zone of Proximal Development (ZPD) and are designed to guide students to practice cognitive systems that would normally be out of their reach (Lajoie, 1993) due, in part, to a dual system of cognition in a problem-solving context that is common among first-year college students and common among students and individuals in general (Evans, 2008; Keating, 2004; Witteman et. al, 2009). The first system in this dual cognition dynamic is *intuitive/emotional thinking*, which is guided by an "if-it-feels-right-it-is-right" approach that leads students to shut down inquiry and accept their intuitive conclusion (Basseches, 2005; Berger, 2008; Wynn, 2015, 2018; Wynn, Mosholder, and Larsen, 2014, 2016; Wynn, Ray, & Liu, 2019). The second is *closed-systems formal thinking*, in which students apply abstract reasoning to solve problems but do so in an absolutist way that often leads them to quickly select solutions based on what they consider to be similar problems they have encountered and "solved" in the past and to shut down further inquiry. This causes closed systems problem solvers to overlook important contextual variables, judge key aspects of the problem as irrelevant to the solution and select a "correct" answer they consider applicable to all similar problems (Wu & Chiou, 2008; Wynn, 2015, 2018; Wynn, Mosholder, & Larsen, 2014, 2016; Wynn, Ray, & Liu, 2019).

Vygotsky (1978) defined ZPD as "the distance between the actual developmental level as determined by independent problem-solving under adult guidance or in collaboration with more capable peers" (p. 89). The steps of the PBL model prompt students to inductively recognize the limitations of the common inadequate problem-solving systems described above as they are guided to practice the more adequate postformal thinking systems in problem-solving contexts. Postformal thinking involves the application of two subsystems: relativistic thinking and dialectical thinking (Scott-Janda & Karakok, 2016). Relativistic thinkers recognize that reaching an accurate understanding of the context and complexities of a problem is key to developing workable solutions. They systematically

look for multiple truths, multiple perspectives, complexities, and contradictions as they work to contextualize the problem through multiple frames of reference (Chang & Chiou, 2014; Chiou, 2008; Kahlbaugh & Kramer, 1995; Kallio, 2011; Kramer, 1983; Marchand, 2002; Sinnott, 1998; Wynn, 2015, 2018). Dialectical thinkers combine relativistic considerations and recognize that contradictions within a problem are interrelated and connected. They seek to understand the rationale and reasoning that support opposing perspectives and use the knowledge and insights gained to develop resolution alternatives (Basseches, 1984, 1989; Ho, 2000; Kallio, 2011; Savina, 2000; Scott-Janda & Karakok, 2016; Wu & Chiou, 2008). They also recognize that change is constant and inevitable and will challenge any solution reached through the problem-solving process (Blouin & McKelvie, 2012; Wynn, Mosholder, & Larsen, 2014, 2016; Wynn, Ray, & Liu, 2019). The steps of the PBL model are based on postformal thinking operations and are as follows.

Step 1 – Problem Development:
The instructor introduces the issue to pique student interest and establish student "stakeholdership" and to portray the historical or current issue as multidimensional with multiple frames of reference or valid points of view.

Step 2 – Initiation of PBL Events-Argumentation and Student Inquiry:
The instructor guides students to define the issue at hand, to identify both its contextual complexities and its multiple frames of reference or perspectives, and to recognize the need for further inquiry to better understand its complex dynamics. A decision-based or argumentation structure is then used to prompt students in groups to generate arguments or solutions and to work to resolve conflicts and contradictions among competing positions. This is done primarily through simulation/debate, or other activities based on periodized historical issues (See the topical outline/PBL activities list below.) After each PBL activity through which students construct an understanding of the contextual complexities of the problem/issue at hand, students identify what they've learned about the issue and the inherent contradictory, opposing, or multiple positions and then identify and gather additional information as needed to develop solution alternatives.

Step 3 – Problem Solution and Debriefing:
Students generate solution alternatives, deliberate, and select the most appropriate one and evaluate its historical or potential consequences. Students are then guided to compare their solution with the actual outcomes and consequences of the historical issue. A concluding essay may be assigned that prompts students to accurately frame the issue, summarize opposing/multiple perspectives and inherent contradictions, reach, and support a solution alternative, and compare it to actual outcomes and consequences. This is followed by debriefing, which includes a review of the content, concepts, and skills applied during the problem-solving cycle. A metacognitive reflection questionnaire

(MRQ) is administered to guide students to recognize and reflect upon the thinking systems 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 context. (Adapted from Wynn, 2018)

PBL CONTEXT AND IMPLEMENTATION

The PBL implementation took place as part of three studies conducted at a Kennesaw State University, Kennesaw, Georgia, USA between 2013 and 2019. The pilot study (Wynn, Mosholder, & Larsen, 2014) and second study (Wynn, Mosholder, & Larsen, 2016) tested the PBL model's impact on student engagement, perceptions of content relevance, and postformal thinking gains (pre/post treatment) of students in first-year learning community (FYLC) sections and stand-alone sections of a U.S. history survey course (HIST 2112-*US Since 1890*) and compared the outcomes with student outcomes from the same US history course taught primarily through lecture/discussion. In both studies, the primary researcher (PBL instructor) taught two FYLC sections, capped at 25 students each, under the theme, "Stepping into America's Past: What Would You Do?." FYLC students were included in the studies due the transitional nature of late-adolescent cognition (Baxter Magolda, 2009; Nelson Laird, et. al, 2014; Pascarella, 2005; Pascarella, & Terenzini, 2005; Reason, Terenzini, & Domingo, 2006; Steinberg, 2005; Tanner, Arnett, & Leis, 2008). Both FYLC sections of HIST 2112 were paired with a first-year seminar that focused on student success skills which was taught by a colleague from the University's First-Year Program. The PBL instructor also taught one regular PBL section of HIST 2112 in both studies capped at 40 students. In the pilot study, a history department colleague used primarily lecture/discussion to teach three sections of the same US history course capped at 50 students per section and used lecture/discussion to teach two sections of HIST 2112 in study two, each with 112 students. The PBL instructor developed and implemented six PBL activities using the steps described above in each of the three PBL sections in both studies. The curricular outline, including the PBL activities, is below.

Unit 1 - The U.S. as an Empire: Global Power Structure (1890-1905)

*PBL Activity: *The Question of U.S. Expansion: Expansionists vs. Anti-Expansionists* - Simulation/Debate-US Senate Subcommittee Hearing on US Expansion

Unit 2 - Social and Political Dynamics in the Progressive Era

Unit 3 - The Nation at War

*PBL Activity: *Wilson and the Paris Peace Conference: Constructing the Treaty of Versailles*[1] - Simulation/Debate-1919 Paris Peace Conference

Unit 4 - Economic Expansion of the 1920s, The Depression, Franklin D. Roosevelt and the New Deal

*PBL Activity: *Solving the Problems of the Depression: Constructing the New Deal* - Simulation-Roosevelt's Brain Trust

Unit 5 - America and the World (1921-1945)

*PBL Activity: *The Atomic Bomb: Truman's Decision and Its Impact* - Simulation/Debate: Truman's Interim Committee on Using the Atomic Bomb

Unit 6 - The Cold War and Beyond

Unit 7 - Civil Rights in the U.S.: Tracing Social, Economic, and Political Dynamics in the Last Half of the 20th Century

*PBL Activity: *The Issue of Affirmative Action: The Atlanta Case* - Simulation-Supreme Court Hearing of Affirmative Action Case

Unit 8 - Challenges of the New Century

*PBL Activity: *Group Current Issue Presentations: 1) Healthcare Reform; 2) Immigration Reform; 3) Debt, Spending, Taxes: Balanced Budget Amendment and Entitlement Reform; 4) Climate Change/Energy Policy.* A fifth issue was added in the second study, 5) *Increasing the Federal Minimum Wage*.

(This final PBL activity explicitly targets one of the primary goals of the history survey, connecting the past to the present as students apply content knowledge and postformal thinking skills gained from previous PBL activities to develop solution alternatives to current issues.[2] For example during the *Solving the Problems of the Depression* activity, one group of PBL students was tasked with stimulating business growth and demand. One of the solution alternative they developed was a federal minimum wage which was accepted as part of the overall "New Deal" as constructed and approved by the class. During debriefing the class compared their minimum wage proposal to the Fair Labor Standards Act of 1938. The group that was assigned the Federal Minimum Wage issue at the end of the course applied insights and knowledge gained from the PBL New Deal activity, along with additional research, to develop and share a solution proposal to effectively address the issue of whether to raise the federal minimum wage.)

Each PBL activity took between one and two 75-minutes class periods to complete. Each section of HIST 2112 met two times a week for 16 weeks. In addition to the PBL activities outlined above, the PBL instructor used lecture, discussion, and guided questions (Reisman & Wineburg, 2008) to guide students to construct an accurate historical context of the issues addressed. After each PBL activity, the PBL instructor administered a metacognitive reflection questionnaire (MRQ) to guide students to reflect on the thinking

systems they applied during the activity, which were operationally defined on the MRQ.[3] The research team used a similar curricular outline and FYLC structure in the 2019 third study (Wynn, Ray, & Liu, 2019) that measured postformal thinking gains of students in two sections (experimental and control group) of the FYLC, "Stepping into America's Past: What Would You Do?". The only change was the time frame addressed in HIST 2112, which was expanded to 1877 to the present and included a new Unit 1*: An Overview of Post-Reconstruction America (1877-1890)*.

RESULTS AND CONCLUSIONS FROM THE PILOT AND SECOND STUDY

The research team used the *Postformal Thought Questionnaire*-(*PFT*)[4] (Sinnott and Johnson, 1997) to measure changes in postformal thinking skills among groups (pre and post treatment) in both studies, and used two items from an End of Study Questionnaire (ESQ):[5] Question 4-Do you believe you have expanded your ability to think critically as a result of this course? If so, can you explain how your thinking has changed and/or evolved? Question 5-To what extent do you believe you may utilize the thinking skills you may have gained in this course as you continue your education and life in general? The ESQ was also used to measure student engagement and perceptions of content relevance using a Likert scale (1-5) with a prompt for students to explain their ranking. A summary of results from the first two studies indicated the following.

1) The PBL model was significantly more effective than traditional instruction (lecture/discussion) in facilitating postformal thinking as measured by the *PFT*.
2) The PBL model facilitated a significant increase in postformal thinking skills among PBL students as measured by the *PFT*.
3) The PBL model promoted high levels of student engagement.
4) The PBL model promoted the perception among students that course content was highly relevant. (Wynn, 2021)

These results led the research team to conclude that cognitive scaffolding and modeling of postformal thinking operations along with the MRQ were factors that explained significant PFT gains among PBL students. Cognitive and PBL theorists and researchers have argued individuals must be confronted by the diverse perspectives, multiple truths, and contradictions inherent in complex problems and issues to recognize the need for more advanced thinking skills in a problem-solving context (Basseches, 2005; Hung, Moallem, & Dabbagh, 2019; Sinnott, 1989; Sinnott, 1998; Sinnott, 1999; Sinnott & Johnson, 1996). Since the PBL model was designed to prompt students to apply postformal operations as part of the problem-solving process and then use the MRQ to reflect on the effectiveness of the multiple thinking systems they applied during the six activities, the research team concluded the MRQ was significant in facilitating the pre to

post-test PFT gains (Wynn, Mosholder, & Larsen 2014, 2016). This conclusion was based on empirical evidence but was still hypothetical. Would PBL students still have significant postformal thinking gains if the MRQ wasn't used? This question prompted the third study.

TESTING THE RELATIONSHIP BETWEEN METACOGNITIVE REFLECTION, PBL, AND POSTFORMAL THINKING

The *PFT* questionnaire was used in the third study to measure PBL students' postformal thinking gains in an experimental (n = 20) and control group (n = 17) FYLC section of "Stepping into America's Past: What Would You Do?" Pre to post-score comparisons reported showed significant PFT gains for both the experimental and control group and no significant difference between mean PFT gains. These results were unexpected and led the research team to conclude that the steps of the PBL model, which systematically prompted relativistic and dialectical operations in the problem-solving process along with PBL instructor modeling and cognitive scaffolding, explained postformal thinking gains. Simply put, within this limited sample, the MRQ wasn't necessary to facilitate postformal thinking gains among control group students. Also, the experimental and control group scores on ESQ 1 (level of engagement) and ESQ 3 (level of content relevance) showed no significant difference between the two groups, with both groups reporting a similarly high level of engagement (Experimental, M = 4.35; Control, M = 4.25) and a similar positive perception of content relevance (Experimental, M = 4.80; Control, M = 4.76), which aligned well with PBL section results from the previous studies (Wynn, Ray, & Liu, 2019).

REFLECTIONS ON FINDINGS AND TIPS FOR IMPLEMENTATION

These studies were conducted in a time of intense political polarization in the United States. One of the most significant observations made by the PBL instructor in all three studies was the extent to which students with very different, even opposing social/political views, respectfully deliberated to reach a consensus on how best to address issues in U.S. history. Students then applied these cognitive and deliberative skills to complete the Group Current Issue Presentations assignment. ESQ comments from two PBL students help frame this dynamic.

> Study 2-PBL Student 19: "One other way that I feel like I have gotten better is collaborating with others to make a better solution. I learned how to reach a solution with people who have very different viewpoints than me." (Wynn, Mosholder, & Larsen, 2016)

> Study 3-Control Group Student 8: "It helped me with finding solutions in a group with diverse thoughts. It will definitely help me with working with people with different ideas to mine and come up with solutions that benefit both sides of an issue." (Wynn, Ray, & Liu, 2019)

This explicit application of historical content knowledge and cognitive skills to address current issues is often lacking in a traditional lecture/discussion-based coverage model. Results from the three studies indicated the Group Current Issue Presentations assignment helped strengthen students' perception that the history survey is relevant to their lives and enhanced their ability to effectively deliberate and develop solution alternatives to solve pressing problems and issues.

Findings from the three studies, along with continued successful student outcomes in the PBL instructor's sections of HIST 2112, indicate the PBL model helps facilitate a potentially transformative social learning dynamic in the history survey. Guiding students to apply relativistic and dialectical operations to collectively address historical issues within the context of problem-solving seems to circumvent the polarizing dynamic that is so pervasive today and helps promote a true community of learners in which students learn to trust each other as problem-solvers and welcome diverse points of view. The social/political divisions that often limit effective problem-solving soften as students deliberate to develop solution alternatives. The collective goal becomes problem-solving rather than simply debating or pushing a specific point of view.

Implementing this PBL model requires an instructional paradigm shift for most history survey instructors, moving from presenting "what happened" to contextualizing turning point issues and guiding students to apply relativistic and dialectical considerations to collectively develop solutions or plans of action and compare them to "what happened," which helps support a deeper, more applicable, understanding of history. The PBL model requires instructors to model postformal operations as part of the scaffolding process and to be open to diverse perspectives and ideas during PBL activities. Pushing a specific viewpoint or opinion limits the opportunity for students to practice postformal thinking systems. Without guidance and practice, many individuals may not gain these more advanced problem-solving skills and may tend to rely on the inadequate thinking systems discussed earlier (Basseches, 2005). This case study was introduced with Steven Mintz's and Lendol Calder's perspective that the history survey course is often regarded as redundant and irrelevant and is failing to guide students to meet general education goals. This PBL model is an empirically tested instructional method that may help history survey instructors actively engage students in relevant and meaningful turning points in history, and in the process, guide them to practice and gain advanced thinking skills that may serve them well as problem-solvers far beyond the university classroom and as they seek solutions to pressing issues in a diverse society.

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Endnotes

[1] Detailed instructional procedures for the *Constructing the Treaty of Versailles* PBL activity are shared in Wynn, C. (2015). A cognitive rationale for a problem-based U.S. history survey. Teaching History: A Journal of Methods, 40(1), 28-42. https://doi.org/10.33043/TH.40.1.28-42

[2] The following directions guide the Group Current Issue Presentations assignment. Read/view the article(s)/clip(s) related to your assigned issue on D2L and gather additional sources to support your research. Your group will have five primary responsibilities to complete during your 35-minute presentation:

1. To provide a brief summary that accurately frames the issue, explains inherent complexities, and includes a timeline of events/factors that have shaped its current dynamics; – 7 Minutes.
2. To summarize multiple, even opposing, views of the issue and explain the rationale and/or reasoning behind those views; – 7 Minutes
3. To present contradictions you believe are inherent in opposing perspectives on the issue and how these contradictory views/perspectives were used as your group developed solution alternatives; – 7 Minutes
4. To present your group's resolution alternative; – 7 Minutes
5. To present challenges or potential impediments to the effective implementation of the proposed resolution. – 7 Minutes

You may use any presentation format (Power Point, Prezi, etc.). You must provide a list of all sources used and present these to the class. Each member of your group must be directly involved in the planning/preparation and presentation of one of the five responsibilities listed above.

[3] The MRQ is included as an appendix in each of the following research articles.
Wynn, Mosholder, & Larsen, 2014 – https://files.eric.ed.gov/fulltext/EJ1112494.pdf
Wynn, Mosholder, & Larsen, 2016 – https://doi.org/10.19030/tlc.v13i1.9567
Wynn, Ray, & Liu, 2019 – https://files.eric.ed.gov/fulltext/EJ1240095.pdf

[4] The *PFT* questionnaire includes 10 statements that represent a different operation of postformal thinking. Participants respond to each statement by indicating the extent to which it characterizes their own thinking (7 = very true, 1 = not true). The sum of the 10 items provides a PFT score. The *PFT* is included as an appendix in each of the research articles (Wynn, Mosholder, & Larsen 2014, 2016; Wynn, Ray, & Liu, 2019) and can be accessed using the links provided.

[5] The ESQ is included as an appendix in each of the research articles (Wynn, Mosholder, & Larsen 2014, 2016; Wynn, Ray, & Liu, 2019) and can be accessed by the links provided.