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Authors

Lundell, Ryan

Montoya, Jonathan Lee

Nava, Pedro

Publication Date

2024-04-13

DOI

10.3102/2113050

Peer reviewed



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Paper Title Constructivism, Critical Pedagogy, and Interdisciplinary Collaboration in a Building and Construction Pathway

Author(s) Ryan Lundell, Santa Clara University; Jonathan L. Montoya, University of California - Irvine; Pedro Nava, Santa Clara University

Session Title Working Toward a More Equitable Career and Technical Education (Table 8)

Session Type Roundtable Presentation

Presentation Date 4/13/2024

Presentation Location Philadelphia, Pennsylvania

Descriptors Career and Technology Education, Social Justice, Equity

Methodology Qualitative

Unit SIG-Career and Technical Education

DOI <https://doi.org/10.3102/2113050>

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Lundell, R., Montoya, J., & Nava, P. Constructivism, Critical Pedagogy, and Interdisciplinary Collaboration in a Building and Construction Pathway (2024). [Conference Presentation]. AERA 2024 Philadelphia, PA. (submitted)

Constructivism, Critical Pedagogy, and Interdisciplinary Collaboration in a Building and Construction Pathway

Abstract

The silo structure and neoliberal rationality of Career Technical Education (CTE) secondary pathways limit student learning and propagate the purpose of education as the creation of human capital, not a socially aware citizenry (Brown, 2017; Jacobs, 2010). Despite its history of racial tracking, CTE pathways still neglect critical thinking/dialogue around social/environmental justice issues, drastically hurting workers' ability to confront these inequities (Darder, 2017; Oakes & Saunders, 2011; Shor & Freire, 1987). Using a qualitative research design that employs ethnographic elements, this study found that constructivism, critical pedagogy, and interdisciplinary collaboration can positively impact the experience, participation, and critical consciousness of students and educators in a CTE building and construction pathway; however, more research is required to fully understand how these pedagogical shifts can be more effectively integrated into other CTE pathways.

Objectives or Purposes

In 1892, the National Education Association Committee of Ten, a group of educators tasked to make recommendations for the future of schools, decided the best way to teach secondary students was to separate each discipline (Jacobs, 2010). Most schools and CTE pathways still hold the same schedules and grouping patterns from the early 20th century (Jacobs, 2010). In this silo structure, educators go years without meaningful collaboration, critical feedback, or self-reflection.

Compounding the damage done by teacher isolation is the neoliberal reason through which we view the purpose of education. In *Undoing the Demos*, Wendy Brown (2017) joins Foucault in defining neoliberalism as more than a bundle of economic policies; rather it is “an order of normative reason that...takes shape as a governing rationality extending a specific formulation of

economic values...and metrics to every dimension of human life” (p. 30). Neoliberal reason diminishes a flourishing democracy by marketizing education, healthcare, and government as for-profit institutions, interpreting the citizen as an entirely self-interested piece of human capital, transferring public spaces into private ownership, and depicting social/environmental justice as obstacles to economic growth (Brown, 2017).

In education, neoliberal reason propagates the idea that democracy is founded upon technically skilled human capital rather than educated and active participants in public life (Brown, 2017). The concept of educating human capital is widespread in CTE, where the entire purpose is to create technically skilled workers, not critically conscious citizens. Nowhere in the CTE standards of the building and construction trades is there mention of critical dialogue around social/environmental justice issues in the built environment. Neoliberal reason emphasizes standardized testing, creating a false binary between “brain-work” and “hand-work” (Rose, 2014), and marginalized students are tracked into CTE pathways where the driving force behind the curriculum is not critical thinking but the creation of human capital who are seamlessly integrated into the economy (Darder, 2017; Oakes & Saunders, 2011). However, this lack of critical thinking depoliticizes students and impacts *all* worker’s ability to change inequitable policies (Darder, 2017; Shor & Freire, 1987).

This study aims to confront the silo structure and neoliberal reason of CTE and answer the following questions:

- **How does an interdisciplinary dual-enrollment construction technology class that utilizes constructivist principles and offers professional certifications impact the experience and participation of students and educators?**

- **Furthermore, how does a construction technology course taught with principles of critical pedagogy impact the critical consciousness of students and educators?**
- **And finally, how can these learnings impact curricular and leadership development in a building and construction pathway?**

Theoretical Frameworks

Constructivism

In constructivism, learning is viewed as an active process where teachers and learners co-construct knowledge by connecting new concepts and experiences with their existing knowledge structures (Ertmer & Newby, 2013). Each student's experience of the world is unique, and their culture, language, and relationships become integral vehicles for learning new concepts (Fosnot, 2005). Additionally, constructivists believe that students learn through sharing multiple perspectives and collaborating with others on real-world problems found outside the classroom; therefore, constructivist practitioners take the role of a mentor, avoid high stakes summative assessments, and give formative feedback to students as they use the skills they are learning to solve authentic problems (Fosnot, 2005). For a constructivist, the task is the test.

Critical Pedagogy

Without critical thinking, a banking model of education dominates pedagogies in CTE pathways. In *Pedagogy of the Oppressed*, Freire et al. (2020) argue this banking model works to depoliticize marginalized groups, rendering them susceptible to policies and ideologies of oppression. As an antidote to the banking model, Freire et al. (2020) promote a problem-posing pedagogy that is founded in praxis, the transformation of oppressive realities and ideologies through continual action and reflection. Through this *praxis*, students develop a critical

consciousness (political imagination), and they enlist in the struggle to transform reality (Freire et al., 2020).

The banking model perpetuates myths, a problem-posing model demythologizes; the banking model treats students as objects, a problem-posing model views them as subjects who create and recreate knowledge; the banking model subdues creativity, a problem-posing model stimulates creativity through reflection and action (praxis); the banking model is fatalistic, a problem-posing model is revolutionary (Freire et al., 2020).

Despite the history of racial tracking (Oakes & Saunders, 2011), CTE research still adopts the “learn to earn” model, decenters student voices, and neglects critical pedagogies (Megayanti et al., 2020). The field of CTE does not fully understand how critical pedagogy can simultaneously increase critical consciousness as well as technological skills.

Interdisciplinary Collaboration

The antiquated silo structure of education puts a ceiling on talented teachers, limits the authenticity of student projects, and becomes a breeding ground for implicit bias and racism (Jacobs, 2010). Interdisciplinary collaboration recognizes that real-world problems are multifaceted and require perspectives, methods, and insights from multiple disciplines to gain a comprehensive understanding (Carmichael & LaPierre, 2014; Wang et al., 2020); thus, this framework brings together educators, researchers, and industry professionals from various fields to work together towards common goals and address complex problems or topics that cannot be adequately explored within a single discipline.

Methodology

This research draws on constructivist and transformative philosophical worldviews, which articulate human understandings of knowledge to be partial, contextual, and socially

constructed in an environment with ever-present unequal power relations (Bhattacharya, 2017). Due to these constructivist and transformative worldviews, the nuanced experience of students and practitioners must be centered and understood; thus, the following data collection methods were utilized: autoethnography, focus group interviews, one-on-one interviews, student reflections, daily observation notes, and student artifacts.

This study was approved by an international review board (IRB) and focused on an introductory construction technology course for 9-12th grade students in a building and construction pathway at an urban high school in the Bay Area. The course had four unique elements that separate it from other secondary construction courses: first, students are dual-enrolled in a Building Information and Modeling (BIM) 101 course at a local community college, so they receive high school and three college credits simultaneously; second, the curriculum taught in the BIM 101 course also earns students a professional certification in Virtual Design and Construction (VDC) from a local university; third, the class is co-taught by science and English teachers who also hold CTE credentials in the building and construction trades; lastly, the class is taught using principles of constructivism and critical pedagogy, such as problem-based learning and critical dialogues centering around social and environmental justice issues in the built environment.

Data sources, evidence, objects, or materials

Autoethnography: A form of ethnographic research that gives the researcher the opportunity to connect personal experiences to cultural, political, and social meanings (Alexander, 2020, Camangian, 2010). To complete the autoethnography, I conducted journal entries each week that centered on my own experience and perceptions of teaching an interdisciplinary building and construction course with elements of critical pedagogy in the context of neoliberalism.

Daily observation notes: These captured detailed descriptions of social dynamics, interactions, and activities, providing a holistic view of how these factors influence instructional strategies, the effectiveness of differentiation, and overall learning (Creswell, 2013; Merriam, 2009). To gauge student participation/experience, my daily notes observed the depth of student questions/answers regarding technical skills, willingness to work through adversity, consistency of work habits, completion of learning objectives, openness to feedback, and student-teacher discussions.

Student Reflections: These provided space for students to share thoughts, experiences, and perceptions in a structured format (Eva & Regehr, 2010). In this study, participants were asked to complete two reflections about the course on a Google Form Survey. The first reflection was given at the halfway point of the semester and asked students to reflect on their perceptions of teacher-student relationships, curriculum relevance, and learning needs. The second Google Form survey was given at the end of the semester and asked students to reflect on their experience/participation with specific projects and the impact of the critical dialogues on their critical consciousness.

Student Artifacts: I collected classroom notes, written reflections, Google Slide presentations, and project portfolios. These artifacts provide tangible evidence of students' learning experiences and engagement (Yin, 2018). They also revealed insights into students' thought processes, creativity, and application of knowledge (Miles & Huberman, 1994).

Focus Group Interviews: These offered a diverse range of perspectives that allowed participants to build off one another's ideas and create collective meaning (Kruegar & Casey, 2015). In this course, three teams worked together to design and build a school community

project. At the end of the semester, each team participated in a focus group interview to understand how they experienced the community projects as well as other activities/assignments.

One-on-one interviews: After the focus group interviews, I selected six participants for one-on-one interviews. These interviews allowed participants to share more detailed individual experiences, creating more nuanced data to answer the research questions (Rubin & Rubin, 2011). In one-on-one interviews, participants also explained how their ‘symbolic experience collage’ captured their significant emotions of the class and explained how specific projects impacted their experience, participation, and critical consciousness.

Symbolic Experience Collage: A symbolic experience collage is an art-based methodological tool to help elicit the significant emotions, experiences, participation, and critical consciousness of the students as they went through the course. They build on relationship maps, a tool utilized for graphic elicitation of in-depth interviews in order to understand close and meaningful social connections (Esteban-Guitart, 2016). Participants were asked to choose three to five symbols that represent significant experiences or emotions that they felt in the class. These symbols were used as a launching point into discussion.

Results and/or substantiated conclusions or warrants for arguments/point of view

Through preliminary data analysis, I found that a dual enrollment construction technology class taught with these pedagogical shifts positively impacted the experience, participation, and critical consciousness of students and educators. While the autoethnography and observation notes exposed certain limitations on the structure of our interdisciplinary model, they also revealed positive impacts in the following areas: teacher-student relationships, reflection of practice, and educator critical consciousness.

Even though the surveys and interviews showed how students and educators struggled with project adversity, group dynamics, and absenteeism, nearly all participants explained how problem-based learning, sense of community, and the co-teaching model increased their desire to participate by creating a classroom experience where students felt challenged yet supported.

While the integration and structure of the critical dialogues must be improved in future studies, they did increase the desire in students and educators to become more socially aware and act on that awareness, essential elements of critical consciousness (Freire et al., 2020). For example, nearly all participants explained that the critical dialogues about Bay Area Superfund sites increased their awareness of how racial injustice is manifested in their own community; however, some participants were critical of the dialogue structure and expressed a sense of powerlessness to transform these social justice issues. This suggests that future research integrating critical dialogues into a CTE curriculum experiment with diverse instructional strategies to amplify student voice and create partnerships with community organizations to provide opportunities for social action.

Scientific or scholarly significance of the study or work

Most education research in building and construction utilizes constructivist pedagogies to enhance students' engagement and increase the learning of technical skills (De Salvio et al., 2023; Jin et al., 2018; Torres et al., 2019), but they all neglect to include critical consciousness as an important aspect of CTE. Ultimately, research in the building and construction industry continues to follow a neoliberal ideology: create a technically skilled piece of human capital that will not critically examine or question social/environmental injustice. In building and construction research, a gap exists that suggests the need to study how critical pedagogy can be merged with constructivism to impact students' and educators' experience, participation, and

critical consciousness. The silo structure and neoliberal reason disproportionately impact those underserved students who are tracked into CTE with no space given for critical thinking and dialogue, which drastically impacts a future worker's ability to change inequitable neoliberal policies (Darder, 2017; Shor & Freire, 1987). In the end, these pedagogical shifts could change the way we develop leaders and curricula in CTE.

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