Project-Based Learning and Perceived Effect on Behaviors for Students with Adverse Childhood Experiences: A Case Study

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Abstract

The purpose of this qualitative case study was to explore the perception of educators transitioning from a traditional learning environment to a project-based learning activity environment. Teachers' perceptions of student behaviors ranging in age from 8 to 17 were captured. Data were collected from 1-1 interviews with five participants with Missouri teacher certification ranging in grade levels from elementary to high school working with a total of 175 students within a mental health residential school for children and youth throughout Missouri. Additional data were collected from lesson reflections, lesson plans, behavioral logs, regulation logs, and supplemental data from critical incident reports from classrooms of students with the same background as teacher participants over the last four school years, 2018-22, of teachers who have taught project-based learning units. Study findings support the teacher's perception that project-based learning activities decrease negative behaviors for students with adverse childhood experiences while increasing engagement, academic skills, and self-regulation. Further, implications from these findings support that project-based learning activities increase student choice, allowing students within a residential mental health classroom to have control.

Keywords: behavior changes, case study, mental health, adverse childhood experiences, project based learning, residential students

1. Introduction

Students with at least one ACE have changes noted in their developing brain, and students with four or more ACEs are 32 times more likely to have behavioral issues in school (Banyard et al., 2017; Hambrick et al., 2019). The inability to self-regulate makes it difficult for students with ACEs to learn and process cognitive information in a classroom (Erol & Karaduman, 2018; Ferrero et al., 2021; Hambrick et al., 2019).

Behaviors and discipline issues impact academics and often draw teachers' attention away from academics as teachers deal with disruptive behaviors (Taylor et al.,2018). Taylor et al. (2018) further shared that students with disruptive behaviors often benefit from engaging and active learning. However, studies have indicated a link between PBL and behavioral changes (Ferrero et al., 2021), but there is a gap in literature noting how project-based learning impacts the neuroplasticity and behaviors of students with ACEs.

Nonetheless, students who express negative behaviors cause a distinctive demand on teachers and decrease learning in the learning environment for all students (Taylor et al., a2018).

Enhancing educators' understanding of the impact of trauma from ACEs and how inquiry-based learning can positively impact behaviors can help educators counter the impact of negative behaviors within the classroom (Lee & Blanchard, 2019; Robertson et al., 2021). Therefore, the following research question was generated to address the study's purpose.

Research Question

What are educators' perceptions of how the behaviors of students ranging in age from 8 to 17 with ACEs change when presented with project-based learning activities?

Research Process

Project-based learning conceptual framework outlining social interaction and hands-on learning appeared to blend with

Dr. Perry's regulate, reason, and related framework. Moving from the bottom of the brain to the top of the brain, a dysregulated child can be supported in regaining control (Day et al., 2017; Hambrick et al., 2018; Hambrick et al., 2019; Jazulie et al., 2020). It is important to note that the formula regulates, reflects and relates does not have a set formula, and teachers can move between different perspectives as determined by the child's regulation (Hambrick et al., 2019; Jazulie et al., 2020). One of the key concepts within PBL allowed students to show mastery of academic skills through the use of real-world projects (Jazulie et al., 2020). Using PBL, teachers began by regulating students as they used academic skills they had already mastered while giving students the freedom to complete rhythmic activities such as moving desks, carrying materials, and working with the same peers. Furthermore, using the framework of PBL, teachers are further able to create a structured environment which is also a key concept within regulation in NME (Keels, 2018; Koh, 2020).

Participants of this study all work within a residential classroom located in mental health facilities throughout Missouri. Due to the nature of the clients, participants were aware of the egregious behavioral challenges of each student due to collaboration between education and residential teams. The predominant educational diagnosis in the program is emotional disturbance; however, roughly 45% of students have an educational diagnosis of other health impaired, multiple disabilities, learning disabled, and/or speech-language impaired (Great Circle, 2019). Additionally, 20% of students have mental health concerns such as bipolar, schizophrenia, multiple personality disorder, and/or depression. Specific behaviors noted in these classrooms include: (a) emotional outbursts, (b) lack of appropriate boundaries, (c) oppositional, (d) oppositional defiance, (e) refusal to complete assigned tasks, (f) apathy, (g) lack of proper classroom socialization, (e) regulation concerns, and (f) avoidance techniques (A. Montoya. personal communication, January 17, 2022; D. Jones, personal communication, January 17, 2022; Great Circle, 2019; E. Rackers, personal communication, January 17, 2022).

Covid-19 restrictions noted limitations in lesson plan reflections, regulation logs, and behavioral logs. Specific to lesson plans, teachers noted challenges relating to virtual learning and students who did not have internet access or who had software issues. During the first part of the 2020-21 school year, several teachers conducted classes virtually due to COVID exposure and quarantines, limiting their perception of PBL activities. Moreover, the quarantine of student groups also disrupted lesson flow, groupings of students, and the requirement of six feet of separation impacted collaboration on PBL, as noted in several lesson plan reflections. Behavioral logs for 2020-21 and the beginning of the 2021-22 school year also noted challenges with expectations due to the continued use of quarantine and virtual/remote instruction as necessary due to COVID-19 restrictions and exposure. Furthermore, national staffing shortages resulted in the need for regulation staff to step into classrooms to aide teachers, limiting regulation logs and notes from late March 2020 through December 2021 school year.

Within this study, there is a potential for bias due to personal experience with students with ACES and have used PBL in the classroom both within a mental health facility and a public school. Therefore, an internal audit and peer debrief of analysis techniques,themes, and member check of interview questions was conducted to overcome personal and participation bias. These discussions encouraged the sequencing of methods and helped articulate the rationale of the findings.

2. Limitations

This work was carried out under research specific to an applied educational doctorate of Northcentral University (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1978). Dr. Foster conducted this research to complete educational doctorate and received no compensation for this research. Dr. Foster worked for the last seven school years within a school setting set within a mental health field, specifically with students aged 8 to 14 who have multiple ACEs. Working in this field, Dr. Foster noted a positive relationship between PBL and decreased negative classroom behaviors specific to the classroom. Furthermore, Dr. Foster, as well as the study participants, have extensive training in trauma-informed practices. This training needed to be noted as all participants and lesson plans used will need to be identified within this study to reflect research on PBL activities through a trauma-informed care lens or practices.

The authors could not pull data on behavioral logs for the 2018-19 school year, as the only logs accessible belonged to Dr. Foster. Through some investigating with the current Director of Curriculum and Assessment, it was discovered the agency moved from the S drive to the online server site Credible during the 2018-19 school year. Unfortunately, during this changeover, several archived files were inadvertently destroyed, lost, or not moved to the TEAMS site (E. Rackers, personal communication, May 4, 2022). This lack of data could generate false findings and not generate the trust understanding of the impact of PBL on behaviors.

Assumptions

This research study assumed that participants had a minimum of one year of training in trauma-informed care. Long-term staff members of the residential classrooms are considered experts in dealing with students within a residential classroom. Teachers, teacher assistants, regulation coach, and educational therapist accept that student behavior within a residential classroom can be characterized as lacking neurodivergent development, creating a need for a smaller teacher-to-student ratio. These class sizes are smaller than the traditional classroom and are often capped at a ratio of one teacher to five students. Additionally, it is assumed that participants will be open, honest, and truthful in their interview responses. Furthermore, lesson plans are assumed to reflect both positive and negative outcomes.An inconsistency when reviewing archived behavioral logs was noted. In addition to the missing 2018-19 school year logs, some classes did not have completed logs for all days of activities. Other times it appeared a log was started; however, it was incomplete. Different regions completed different behavioral logs until 2019, when all logs were entered on Credible, an online documentation provider for mental health facilities. With this changeover, there continue to be updates and changes to behavioral logs as the needs of the mental health facility change to meet the needs of students and follow changing laws. Although these inconsistencies generated frustration for the authors as a researcher, it is not do not believed they impacted the findings of this study.

Participates

The study received approval from Northcentral University's Instructional Review Board before data collection. Site approval was also required. A written proposal was submitted to the Senior Leadership Executive Teams and approval was given on 12/8/2021. Participation in this study was voluntary, and no compensation was given. Participants signed a waiver outlining involvement needs.

Confidentiality was ensured as all names were removed, and codes were assigned to participants before peer debriefs and analysis. Interviews were transcribed and reviewed by the participant to ensure no misinterpretation by myself before coding and peer debriefing. Before peer debriefings, the material was typed for clarity, and each peer reviewer was assigned a different color to code.

The study population was drawn from 50 teachers, 55 teacher assistances, 5 regulation coaches, 4 instructional coaches, 7 directors of special education, and 10 educational therapists who work within the mental health field in residential schools with approximately 500 students ranging in age from 5 to 19, with specific behavioral needs and have experienced ACEs throughout Missouri, Kansas, and Illinois (Great Circle, 2019; Great Circle: Our School, 2021). Unfortunately, teachers within the autism school could not be included as this program was shut down in late 2020.

Data were collected from interviews with five participants who represented a sample of educators who teach students aged 8 to 17 within a mental health residential agency in Missouri.

Table 1. Demographics of Residential Mental Health Education Facility and Students

		17-18	18-19	19-20	20-21	21-22
Faculty	Men	65	54	57	63	54
Full-Time	Women	121	114	116	123	95
Employees	Total	193	168	173	186	149
Number of	Boys	219	223	227	229	216
Students	Girls	109	110	113	116	102
	Total	328	333	340	345	318

Table 1 shows the demographic breakdown of the mental health residential agency educational employees and students served over the last five years.

Table 2. Demographics of Project-Based Learning Teacher Interview Participants

Participant Number	Gender	Student Taught at Mental Health Residential Facility 2017-2022	Years of Experience with PBL with students with ACEs
1	Male	39	20 years
2	Male	61	5 years
3	Male	60	8 years
4	Female	41	3 years
5	Female	56	2 years

Table 2 shows a demographic breakdown of the five interview participants. Ethnicity was not included in Table 2 as a means to protect the identity of participants.

Teachers who choose to participate had a minimum of monthly training beginning in August 2021 through April 2022, of training in Dr. Bruce Perry's Neurosequential Model of Education (NME) and additional training in regulate, reason, and relate techniques also known as trauma-informed training provided by the mental health facility before participation in this study. Additionally, each teacher had an established regulation area and regulation protocols before participation in the study.

Procedure

To better identify the perceived impact of PBL and the perceived impact on behavior and any overlap with PBL strategies, teachers' experiences were conducted via interview questions that had been field-tested. The authors transcribed each interview and returned it to the participants for a member check. Once participants confirmed their responses' accuracy, Dr. Foster began coding manually.

Coding was conducted using the following method for all interview questions, lesson plan reflections, and behavioral log notes. For the first round of coding, the authors began with deductive coding, as outlined by Linneberg and Kargaard (2019). To generate deductive codes, the authors first reviewed themes noted in the literature review, explicitly using academic engagement, student engagement, and behavioral impact, as well as commonalities identified in interview questions, engagement, regulation, and implementation. Next,each transcript was reviewed and highlighted each code using a different color. The authors then broke down each of these more extensive codes into an evaluation and thematic analysis (Clarke & Braun, 2017; Gibbs, 2018; Saldaña, 2021) to note specific trends in the teacher's perspective relating to behaviors.

First round findings

During this first coding process, the authors noted a positive relationship by eighty percent of participants regarding interview sub-question seven, which asked, "would you say behavior(s) is/are comparable to what you would see when you do more traditional lecture activities?" Four interview participants stated from their perspective that behaviors were better during PBL activities. Participant 2 stated, "definitely better." Participant 5 shared a noted decrease in passive defiant "I'm just not going to do"; however, a slight increase in bullying "just because of different levels and perhaps students are embarrassed." Participant 5 went on to share that once expectations were re-established during collaboration, "peers began to support each other and offer suggestions for success including reminders of regulation techniques and to keep trying." Participant 3 was the only participant to note no change in behaviors and shared, "I would say that the behaviors I am trying to address in my class currently exist regardless of my pedagogical approach."

In the second coding cycle, conducted approximately a week after the first codes, the authors used pattern coding to condense large amounts of data into smaller analytical units to help find categories and themes (Saldaña, 2021). The categories generated included specific unit examples, behavioral changes, and control.   In addition to manual coding, electronic coding via NVivo was used to auto-generate themes and ensure bias from participants and authors was not present in generating codes and themes to be analyzed. NVivo auto-generated themes and first-round and second-round manual coding were compared to see how well each code aligned (Saldaña, 2021). Overlapping categories of behavioral changes, techniques, expectations, support, and knowledge emerged. From these categories, a word tree was generated to note additional overlap allowing for   generating themes.

In addition to interview responses, the authors reviewed lesson reflections from the last five school years, 2017-2022, of teachers who had taught PBL units throughout the mental health agency's residential schools, which span six locations throughout Missouri. Project-based lesson plans were found using the mental health agency's TEAMS site. Table 3 shows a breakdown of lessons taught by school level for each of the five school years.

Table 3. Demographics of Project-Based Learning Lessons by School Level and Year

School Level	2017-18	2018-19	2019-20	2020-21	2021-22
Elementary	1	2	5	7	8
Middle	1	2	10	4	5
High School Boys	1	2	4	3	5
High School Girls	1	1	5	6	2
Autism	0	2	1	n/a	n/a

During the fall of 2020, the decision was made to discontinue school services for the autism unit within the residential mental health facility. Due to this decision and school services being discontinued by January 2021, there were no

lesson plans to be reviewed for this subcategory after the 2019-20 school year. Within the other school levels, there could be additional students with Autism; however, this information was not listed within the lesson plans or reflections and, therefore, could not be noted. Lesson plans specifically stated high school boys or high school girls; thus, it was necessary to make this distinction. This distinction was not considered when reviewing the teacher's perceived impact of PBL activities on behaviors.

Behavioral logs were also pulled from one of two operating systems specifically for the dates noted during PBL activities, 2017-2022, and the year before PBL activities, 2016, to triangulate interview responses and lesson plan reflections. In addition, the behavioral logs for the year before PBL activities were pulled and coded for the Central Region to note perceived behaviors for a similar time frame before PBL activities. For the Eastern Region and Autism-specific classroom, I pulled logs for the month before PBL activities as there were no logs for previous years available on either drive. Behavioral logs were not pulled for other regions as there was no achievable data available to review, nor did they have lesson plans specifically listing PBL activities.

The authors pulled 1,448 behavioral logs for the 2016-17 school year, the year prior to PBL activities, to generate a baseline of behaviors. A blank log was printed and   a tally marked for each yes or no noted from the pulled behavioral logs. Each yes and no response was converted into a percentage. The 2016-17 behavioral log had specific behaviors noted as a yes or no option and a note section. The 2017-2019 school year behavioral logs broke into the three expectation criteria of being safe, cooperative, and respectful and asked staff to note the class period if an issue was noted. These logs also included a place to note behaviors during transitions to related services and special teachers. There was also an area for IEP goal reporting and a section for additional comments with a statement to include location. The 2019-2021 behavioral logs had fewer specific or outlined behaviors to track, with more areas for teacher comments. These logs ask students to identify their mood or zone for both morning and afternoon, including regulation activities and techniques, academic activities, related services, and a section for medical and other concerns, which is where teachers can add additional comments. For the 2021-22 school year, behavioral logs add a section for residential students specifically to include more medical information such as medication taken during school as well as note any injuries as well as a section with yes and no questions with a follow-up comment section for an explanation if a yes is marked regarding peer interactions and interactions with staff.   Archived behavioral logs for the autism-specific classrooms also had specific behaviors listed. For these behavioral logs, staff also noted behaviors in fifteen-minute increments. The autism behavioral logs were tallied via a tally system and compared.

An issue discussed by participant 2 as this participant shared, "Our students come to us because they are unsuccessful in a traditional public school… and most of them have failed in school, in a spectacular way. Because they have missed so much at their other school, they often are afraid to try again." Disengagement from behavioral logs and lesson plan reflections included refusals to work, sleeping, head down, and creating a disruption. Generated from noncompliance to complete activity or worksheet, redirections to return to work, and not following directions. Participant 1 noted refusals as "students not getting work together, misplacing, or not staying on assigned activity, but hopping to different websites to look busy and engaged." Pushing boundaries from behavioral logs included attempted elopement and running from the classroom. Participants 3 and 4 shared that having multiple grade levels and ability levels caused students to push boundaries. Four shared, "I have to spend a lot of my day stopping behaviors from older students to younger students, or the younger ones will pick up bad habits. And then everyone becomes dysregulated." The final behavior coded was physical aggression. From behavioral logs, this included horseplaying, throwing food, and kicking. Participant 5 echoed physical aggression as their top behavioral concern noting "(kids) have physical aggression towards both teachers and peers."

Next, the authors created a line graph for each month of PBL activities using the similarities in lesson plan reflections and percentages from behavioral logs by month and year. From Dr. Foster's experience within a residential classroom and knowing how student placement can change throughout a school year, it was decided to compare teacher's perceptions relating to the behaviors within the same time frame year to year to minimize outside influences such as students' familiarity with the structure within the classroom as time with the teacher lengthens, natural breaks within the school calendar, and changes in classroom dynamics as students transition into and out of the program., therefore, used a baseline generated from the same time frame before the implementation of PBL activities to compare teachers' perceptions of appropriate language and word choice, completion of activities, appropriate conversations, appropriate boundaries, and followed expectations. For most months, this baseline came from the 2016-17 school year; however, February and March began with a baseline in 2017, and April began with a baseline in 2018. did separate logs based on traditional residential classrooms and Autism classrooms when comparing logs in 2018-19.

In 2019 two regions reported completing project-based learning activities in January, February, and March. The behavior logs for these two regions were pulled; however, it should be noted that one region used the online mental health charting system Credible, which asked teachers to report on morning zone, academic activities, regulation

activities, and rewards and allowed teachers to make specific notes. In contrast, the other region used an administrative generated chart on a Word document which consisted of ten behaviors: following directions, manners, completed work AM, completed work PM, participation, personal goal, appropriate physical and appropriate boundaries, staying in the assigned area, used appropriate language, appropriate interactions with staff and peers. The authors were unaware of the collaboration process to generate either behavioral log, nor was it   uncovered why the mental health residential schools did not use a consistent behavioral log.

While it is important to note that there was a decrease in negative behaviors noted in both sets of behavior logs that were reviewed, it is equally essential to note that there is an inconsistency in the reporting information. For example, one region had areas where teachers recorded information, and this was coded, and the other region consisted of a yes-no checkbox with limited notes included.

Supplemental data, including critical incident reports, were also reviewed to confirm and/or disprove perceived changes in behavior during PBL activities. While there appears to be a negative relationship between years, PBL activities were taught and critical incidents by numbers alone, when reviewing specific critical incidents, only two or 0.384% regarding incidents during PBL activities. Of the other 518 critical incidents reviewed, all occurred outside PBL activities.

Teachers within the Autism school work with a population of students aged 8 to 17 not only with ACEs but also with a medical diagnosis of autism-generated PBL activities relating to running a cookie business in March of 2019. Behavioral logs for this population of students included a yes/no checklist for inappropriate vocalization or scribbling, socially inappropriate self-regulating by self-stimulating, and movement/ sensory breaks. Logs did not note if the movement or sensory breaks were teacher-led or if the student could take a break independently. One hundred forty-five behavioral logs were reviewed for March 2018, and 140 were reviewed for March 2019. When comparing inappropriate vocalizations/scribblings, there were 72 noted in Match 2018 and 66 recorded for March 2019. These decreases note a positive perception by teachers between decreasing negative behaviors during PBL for students with ACEs within the Autism residential school. In addition, the autism classroom behaviors further confirmed that teachers perceived a positive relationship between PBL activities and behavioral changes.

To further investigate this perception, the authors returned to lesson plan reflections and interviewed responses to investigate further and find support for the perceived changes in behavior. In addition, the authors reviewed both sets of manual codes and codes auto generated by NVivo. Comparing my manual codes and NVivo's codes, Lesson plan reflections, and interview responses noted that teachers across all classrooms using PBL activities perceived an increase in engagement.

It must be noted that while there was a positive relationship between behaviors and PBL, interview questions and lesson plan reflections showed an increase in one type of negative behavior. Participants 3 and 5 both noted increased bullying between students while in groups. Participant 5 indicated that this increase could be linked to a discrepancy in academic abilities. Participants 3 and 4 echoed the concern that having multiple academic abilities levels also showed increased bullying. Participant 3 shared having students with abilities ranging from "PK to twelfth." Participant 2 also shared that even with students showing greater engagement and focus, there was also an increase in name-calling when students discovered others had similar ideas for planning a water park. "Behaviors will always be an issue for students within a residential program. Often this is because they need help regulating emotions and hyperactivity. However, with PBL activities, the behaviors are different." Participant 2.

Specific to the autism classrooms, teachers noted an increase in social skills such as washing hands, flexibility, and respecting personal space and an increase in verbal and nonverbal communication skills. Teachers in the traditional mental health residential classroom also noted increased peer engagement and collaboration. Participant 4 shared, "The environment is comfortable. The classroom feels calmer, and there is a desire to learn." These similarities lead to the generation of choice as one theme for perceived changes in behavior.

3. Themes

Choice

The study findings incorporated word choice into PBL lesson reflections 27 times. It encompasses the conceptual framework of this study of regulating as students begin to feel in control of their situation. Providing students, the opportunity to choose how to solve problems independently improves their sense of control and self-responsibility (Kwietniewski, 2017). The National Academies of Science, Engineering, and Medicine (2018), Ross (2018), and Shin (2018) each found an increase in motivation specifically from using PBL strategies as children selected the methods of learning and selected from given activities. Furthermore, increasing choice from PBL impacts social skills and academics and the skills learned during PBL transfer and allows students to transfer the skills to different situations (Williams, 2018).

Students who have had the opportunity to develop their ideas instead of following the teacher's instructions are more

engaged and ready to learn (Kwietniewski, 2017; Ross, 2018; Sin, 2018). For example, one lesson plan reflection stated, "Students enjoy selecting which part of the lesson to complete instead of me telling them what to do next." An additional reflection on a lesson plan continued the impact of choice and PBL: "Students seemed eager to create their ideas and make their waterpark their own. This will be a repeat activity due to huge engagement and focus." Even lesson plan reflections from literature units mentioned choice, increased teacher-prompted discussion questions, and more profound responses to literature elements and connections.

Project-based learning encourages students to explore, make judgments, and interpret and synthesize information in meaningful and creative ways (Williams, 2018). Moreover, increasing choice from PBL impacts social skills and academics, and the skills learned during PBL transfer allow students to transfer the skills to different situations. For example, the National Academies of Science, Engineering, and Medicine (2018), Ross (2018), and Shin (2018) each found an increase in motivation specifically from using PBL strategies as children selected the methods of learning and selected from given activities. Furthermore, increasing choice from PBL impacts social skills and academics and the skills learned during PBL transfer and allows students to transfer the skills to different situations (Williams, 2018).

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Recommendations for Educational Practice

Students with ACEs and in a residential mental health classroom often feel they have limited control and thus do not have many choices. To generate greater student engagement while reducing disruptive behaviors and to begin to offer choices, teachers need to transfer their leadership during lessons and project management to students, thus allowing choice to naturally and organically germinate and grow. In contrast, students showcase their academic skills through projects and collaboration. This process can begin with teachers finding ways to offer non-threatening choices, for example, offering a choice of writing instrument, standing or sitting during work time, or showing students they can select where on an assignment to begin working. Implementing PBL activities where students have helped allows them to trust their choices while increasing engagement. For example, teachers can allow students to help select the larger concept by offering two options and allowing individual groups to select one of the options.

Nontraditional

A second theme relating to behaviors and PBL appeared to be the nontraditional methods used to teach traditional skills. The use of nontraditional methods highlights the relating portion of the framework as teachers use student interest or a currently popular theme and create a unit to teach traditional skills. Lesson plan reflections noted thoughts of "areas of interest," "practical way to explore fractions," and "easy to transition to virtual." One reflection included a statement from a parent and a note regarding PBL and virtual instruction. A teacher recorded on a PBL hot chocolate stand PBL lesson plan reflection "a parent shared, 'Fractions, I saw my kid who hates math doing fractions to find the price of ingredients.'" Participant 5 shared how PBL helped them ensure skills were covered well and students did not "fly under the radar because I got to see them interact with peers, and this helped shed light on exactly who could do what skill." Participant 5 elaborated that shared PBL allowed them to "Give them (students) freedom to talk with their friends and get creative instead of just writing answers on a worksheet or feeling like teachers are making threats such as 'do it this way or else' helped my classroom regulate and decreased behaviors of defiance." Perhaps the best articulation of how PBL uses nontraditional methods was from Participant 2. Participant 2 began to laugh during the interview when asked question seven. Participant 2 stated that the only metaphor they could think of for PBL,

You know how you have animals you trick into taking medication by wrapping it in cheese? Not that our students are animals, but they don't like doing traditional skills. So instead of fighting them through traditional activities, we wrap a skill in something they like or explore an area of interest. We (the teachers) get to see if they can do the skill like compare and contrast, and the student does not realize the amount of learning they are doing because they are hyper-focused on having fun with peers or the topic. So yeah, PBL is like the cheese around the skill.

4. Recommendations for Future Research

Combining the findings of this study with those of previous studies indicates additional research studies need to be conducted across three main areas. First, the research could focus on the impact of new methodologies, such as trauma-informed education practices or growth mindsets that overlap and/or intertwine PBL strategies. For example, Ijodi-Maghsoodi et al. (2017) highlighted the impact curriculum centered around understanding trauma has on students.

Secondly, additional studies could be conducted to discover how PBL units are selected and how formalized training specific to PBL, and trauma-informed care impacts teachers' confidence regarding the implementation, selection, and engagement of PBL for students with ACEs. Participants in this study indicated they had limited formal training in PBL. Participant 2 indicated that a book was ordered to increase PBL through a professional learning community. While this participant read the book, they do not recall any formalized professional learning community or professional development.

Finally, the research could continue with the population outlined within this study; however, the focus would shift toward specific subject engagement, grade level, gender, and/or ethnicity. Additionally, the framework and research questions from this study could be repeated for other groups of exceptional children, such as gifted, to gain teacher perception of how PBL impacts their behaviors and PBL strategies.

5. Conclusions

Traditional learning environments that offer little movement and high amounts of academic stress do not work well for students who have encountered ACEs, as evidenced by an apparent link to separation anxiety, oppositional defiant disorder, impulse control, attention issues, acts of aggression, as well as difficulty navigating relationships with peers and adults (Ford, 2017; Uzezi & Jonah, 2017; Van der Kolk, 2017). By beginning to understand the impact PBL has on students with ACEs, students who express negative behaviors cause a distinctive demand upon teachers and decrease learning in the learning environment for all students (Taylor et al.,2018). The purpose of this qualitative case study was to explore the perception of teachers within residential mental health facilities in Mid-Missouri have on behavioral changes. Enhancing educators' understanding of the perceived impact of PBL on behaviors may help educators counter the negative impact of ACEs on behaviors (Hunt et al., 2017; Lee & Blanchard, 2019; Uzezi & Jonah, 2017).

This study supports using PBL activities with students across grade levels from elementary to high school who have encountered adverse childhood experiences. Study findings support the teacher perception that PBL activities decrease negative behaviors for students with ACEs while increasing engagement and academic skills. Participants and archived lesson plan reflections and behavioral logs triangulated teachers' positive perceptions of students' behaviors while engaged in PBL activities. Implications from these findings support that PBL activities increase student choice, allowing students within a residential mental health classroom to have control. Through positive relationships and the use of relevant, nontraditional techniques, teachers appeared to keep students engaged, becoming "the cheese around the skill, tricking students into doing more academic work" Participant 2.

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