Chapter 5
Overarching Outcomes, Implications, and Conclusion

Abstract  In this last chapter, overarching outcomes, implications for practice and research, and conclusions are covered. In a discussion of overarching outcomes, a summary of seven findings is provided about PBL instruction and 21st-century skills in elementary education. Each finding is separately addressed, and insights are articulated, illuminating strategies of PBL instruction that influenced the development of the 5Cs. Building on the key instructional strategies previously reported, the information provided effectively addresses the research question asking what key strategies of PBL instruction influenced the Profile of a Virginia Graduate’s expectations of the 5Cs for fourth and fifth graders at one elementary school in Virginia. Implications for practice and research are also described, with school principals and educational researchers in mind. The study’s purposes are re-examined involving what PBL instructional strategies were in use within elementary classrooms and which aided in skills development from the point of view of educators. The gap in PBL at the elementary level and in relation to 21st-century learning is also revisited. The chapter ends with a look at the present and future, with applicability to PBL education, using the metaphor of navigating uncharted waters.

Keywords  Conclusion · Key strategies · Overarching outcomes · PBL instruction · Principals · Relevance and implications for practice · Relevance and implications for research

Overview

Here we cover overarching outcomes, implications for practice and research, and conclusions. In a discussion of overarching outcomes, we summarize seven findings about PBL instruction and 21st-century skills in elementary education. Each finding is separately addressed, and insights are articulated, illuminating strategies of PBL instruction that influenced the development of the 5Cs. Building on key instructional strategies previously reported, we effectively address the research question asking what key strategies of PBL instruction influenced the Profile of a Virginia Graduate’s expectations of the 5Cs for fourth and fifth graders at one elementary school in Virginia. Implications for practice and research are also described, with school
 principals and educational researchers in mind. We re-examine the study’s purposes involving what PBL instructional strategies were in use within elementary classrooms and which aided in skills development from the point of view of educators. The gap in PBL at the elementary level and in relation to 21st-century learning is also revisited. We end by looking at the present and future, with applicability to PBL education, using the metaphor of navigating uncharted waters.

Discussion of Overarching Outcomes

In this section, light is shone on the findings identified regarding PBL instruction and 21st-century skills in an elementary school in Virginia. First, we identify the overarching thematic outcomes from this elementary-level PBL study with participating teachers/staff, and then discuss each in turn. The seven themes culled from participant responses were:

1. The implementation of PBL successfully supported student gains.
2. Working in small groups increased student communication and collaboration skills.
3. Student-centered learning and choice aided in developing creativity and communication skills.
4. PBL instruction increased students’ critical-thinking skills.
5. Peer-to-peer relationships aided in furthering citizenship skills.
6. Modeling was a helpful strategy for guiding students in PBL classroom environments.
7. PBL and project-based learning co-exist and function as PBL.

PBL Implementation Successfully Supported Student Gains (Finding 1). All teachers/staff shared that students made academic and social gains from PBL instruction. They confirmed that communication and collaboration skills improved with PBL interventions. Similarly, Koray et al. (2008) reported that students participating in PBL performed significantly better on a problem-solving skills assessment than on an assessment following traditional instruction. Specifically, they indicated that students experiencing PBL “developed problem-solving skills,” “enhanc[ed] their communication,” improved their “group working skills,” and acquired “knowledge” (p. 16). In their case, the students were 85 preservice elementary school teachers in an education faculty in Turkey. Interestingly, just as the teachers in the current study indicated that PBL instruction takes more time and effort than traditional instruction, students in Korey et al.’s study mirrored this comment, reporting that while “PBL required more time and effort than projects in other courses” the learning process was far richer and results superior (p. 15). The researchers recommended that PBL be integrated into preservice teacher education to expose students to student-centered inquiry through which communication, collaboration, and so forth are advanced. A balance needs to be struck between giving students freedom and providing feedback, and PBL should favor facilitation over instruction. Also, participants need to
be patient with the process of learning because the results can take time and success comes from the willingness to navigate all such tensions.

A slight point of departure in the PBL instructional dynamics within the elementary classrooms we studied is that there was likely more of a heavy-handed instructional approach, at least at the outset of activity-based tasks, than with secondary and postsecondary level research. Children who are learning the ropes simply need more time and attention, which the teachers/staff pointed out numerous times in the interviews. For example, the interviewees described how students need guidance on how to work collaboratively on a task because often the children in groups would work individually on their own part of the task rather than collaborate. It was if they had to be taught how to work productively with others. With the proper instructional guidance, children can then become absorbed in PBL learning and collaborate, create, communicate, think critically, and accept responsibility. Development of such 21st-century skills was also broken down into specific gains, like learning to make choices, finding one’s voice, researching challenging problems, creating artifacts of learning, and presenting said artifacts. All such developments were realized by the children who participated in PBL learning, as reported by the educators we interviewed.

**Working in Small Groups Increased Student Communication and Collaboration Skills (Finding 2).** Most of the educators shared how working in small groups allowed students to freely share ideas, work as a team, and establish viable roles to complete tasks effectively. One educator shared that students realized working with a good friend might not be the best fit because they did not always communicate well. Neville (2009) supported the idea of working in a small group and noted that one of the most important differences between PBL curriculum in the medical setting and traditional medical school curriculum lies in the learning environment. “PBL curricula,” Neville (2009) clarified, “use small group tutorials with a student-centered approach, active learning, the use of cases or problems, and a significant amount of time for independent study” (p. 2). The interviews conducted for our study support this premise of PBL—that using small groups enables students to develop their communication and collaboration skills in an exploratory fashion and more quickly and thoroughly than in traditional classroom environments.

**Student-Centered Learning and Student Choice Aided in Developing Creativity and Communication Skills (Finding 3).** Allowing students to make choices in PBL settings—within such areas as topics to be studied, problems to be undertaken, activity-based tasks to be completed, and presentational style of the knowledge acquired or learning gained—was discussed by interviewees. A fifth area of student choice that unevenly appeared in the interview data was choosing whom to work with as partners and group members. However, as explained earlier, while this option was weighed by the teachers, in some cases it was dismissed as problematic or just not realistic for youngsters, whereas in other cases it was the norm, typically for the more involved, time-consuming projects and units.

By allowing students a role in actively making choices, the process of learning became meaningful, according to most of the interviewees. In this way, students could leverage their personal strengths and develop creative and critical minds to explore ideas and demonstrate knowledge and understanding. Allowing students
to choose among topics, activities, and so forth puts learners at the center of their learning. Student choice is an important element of PBL that fits with Savery’s (2006) explanation of PBL as a student-centered learning experience that empowers participants to research and apply knowledge to arrive at one or more solutions to a defined problem. While referring to PiBL and its utilization in a study involving new and practicing science teachers, Colley (2008) asserted that student-centered teaching approaches enable students to “produce tangible learning outcomes by posing and answering research questions that are relevant to their own lives and communities” (p. 75). Another benefit noted by Colley is that such learning processes put students in charge of their own learning. Most of the interviewees in our study felt that allowing students choice and focusing on student-centered learning improves their creativity and communication skills.

**PBL Instruction Increased Students’ Critical-Thinking Skills (Finding 4).** All participants thought that PBL provided the students with the opportunity to learn how to become critical thinkers. The children were developing critical-thinking skills by making choices, asking questions, and applying PBL tasks to the real world. Simultaneously, they were learning to consider multiple possibilities in the realm of solutions to problems (rather than only one definitive solution), explain/justify solutions, and become independent thinkers. They were learning how to grow as critical thinkers, which involves identifying issues, formulating questions, discovering multiple solutions, and making inferences (VDOE, 2019b).

**Peer-to-Peer Relationships Aided in Furthering Citizenship Skills (Finding 5).** Working together through peer-to-peer relationships was considered a major strength of PBL approaches in elementary settings. PBL allowed students to partner or collaborate constructively and provide feedback to one another in a non-threatening way that promoted respect, such as by welcoming ideas and thoughts, including different ones. Students need opportunities to demonstrate trustworthiness, respectfulness, fairness, responsibility, and caring (VDOE, 2019a). Learning about the past, participating in the present, and caring about the future can produce strong citizens. Allowing students to work together (while focusing on individual student strengths) promoted the development of citizenship skills.

**Modeling Helped Guide Student Learning in PBL Classroom Environments (Finding 6).** PBL instruction is not something that came naturally to the teachers or students. All participants felt that it succeeded in their classrooms largely owing to teacher modeling. Elementary-aged students need guidance on how to work together, how to communicate their thinking, and how to provide constructive feedback. PBL gives students a structured opportunity to practice these skills with guidance and facilitation from teachers.

Hmelo-Silver (2004) described the PBL teacher as a facilitator of knowledge who models good strategies for thinking and learning and scaffolds learning through modeling and coaching. Sage (1996) explained the coaching strategy known as “model/coach/fade” for PBL in elementary classrooms—wherein the “teacher as coach” carries out essential steps—prepares students to “meet the problem” and define it, and provides guidelines and information (pp. 21, 26). Students are likely
gathering some or all the information needed in the problem context and generating possible solutions, as well as assessing their own performance and/or having it assessed. And the teacher debriefs about the problem and anything else, such as the students’ performances, which may involve artifacts, and learning outcomes.

To facilitate effective small groups, the interviewees described how they fulfilled the very steps outlined by Sage (1996)—they set the problem context, modeled a skill and associated PBL strategies such as how to ask questions, coached group members on that skill, and faded instructional input to allow the groups to work on their own and learn interdependently. The group process involved organization, planning, struggle, brainstorming, negotiation, discovery, appraisal, and many other elements of independent learning, in addition to peer modeling.

**PBL and PjBL Co-exist and Function as PBL (Finding 7).** When discussing PBL in their classroom, some teachers/staff stuck with the acronym PBL while others interchanged it with PjBL, problem, project, problem-based, and problem-solving. Regardless, the idea of student-centered learning involving a real-world complex problem remained at the forefront of their responses. Their views were consistent with PBL as described in the literature—anchored in student-centered learning and incorporating real-world relevance, collaboration, and other dynamic features (Barrows & Tamblyn, 1980; Hmelo-Silver, 2004; Marra et al., 2014; Savery, 2006).

All interviewees discussed projects they used or assigned within single classes, for an entire week, and for longer periods. One perspective on PBL is that it is typically conducted in a short time and involves a simpler problem, whereas PjBL encompasses a longer period and often includes multiple tasks, disciplines, and responses (Buck Institute for Education, 2018). However, the implication of PBL as always or by default occurring in a short period and involving a simpler problem is a source of debate. The controversy to which we refer is literature that addresses as well as illustrates complexities of learning challenges in PBL settings at all grade levels. These extend to engineering, science, and other (multi)disciplinary settings, formal and informal alike (e.g., Evans et al., 2014).

**Relevance and Implications for Practice**

Elementary school principals and education leaders can do a lot to support PBL learning in their domains. Understandably, the COVID-19 pandemic has been systematically disrupting schools, worldwide, and the work of personnel responsible for educating the young. Budgets are shrinking in public education, with fewer resources available for classroom learning. The restructuring and consolidation of grade levels, units, and so forth, including the shrinkage of teachers and support personnel is unprecedented in this historic moment, with no end in sight. Regardless, leaders and their teams can work to offset the negatives with positives. Knowing that their administrative leaders support PBL instruction, trust their teachers/staff, and have buy-in can be enough for some practitioners to proceed. While it may not be
realistic or practical to carry out PBL on a comprehensive scale in and across grades levels and even within single classrooms during rapid changes and crises, mini-PBL initiatives are still possible, as a teacher interviewee exclaimed based on experimentations with this alternative. As more groups in education utilize electronic spaces like “break rooms” in the Zoom conferencing interface for carrying out teamwork, just as we (the authors) are doing these days, it is certainly possible that PBL activities can unfold using cloud-based technologies.

Anyone interested in supporting the implementation of PBL initiatives in individual classrooms, schools, or districts can benefit from consulting our study findings. There are three actions that school principals can take:

1. **Principals should provide professional development or training for teachers/staff interested in PBL implementation.** This support will give teachers background knowledge about PBL; enable them to brainstorm with their colleagues and create teacher support networks and planning teams; and help them figure out how to go about implementing, facilitating, and assessing PBL instruction in their own classrooms. Our data analysis confirmed that PBL instruction encompasses crucial skills, namely communication and collaboration, for developing activity-based conditions and realizing student success. As such, coming to terms with the 5Cs in the context of PBL and how it can advance 21st-century capacities is on target with local, state, national, and international expectations of global-ready graduates. Strengthening PBL practices beyond the schoolhouse, principals can look to family engagement strategies for innovatively building curriculum like e-platforms where youngsters need informed guidance at home (Boyles & Mullen, 2020).

2. **Principals should be knowledgeable about PBL instruction relative to such realities as changing norms, risk taking, delayed outcomes, and failed attempts.** PBL is often viewed as chaotic and unorganized, and it is said to be time-consuming, laborious, and potentially expensive. Those trying it for the first time, both teachers and students, will find themselves feeling uncertain of what to do, how, and when. However, principals should be knowledgeable of the structure, processes, and conditions of PBL. Understanding that PBL is upheld in education as a best practice approach to rewarding teaching and learning should be motivating. Far from being “the flavor of the month,” PBL has long been confirmed by scholars and practitioners from widely ranging disciplines and different countries. Many in schools and universities have experimented with this teaching method and sponsored active learning and real-world and meaningful projects. Knowing about PBL’s credibility, staying power, and even transformative effects on instruction, pedagogy, teacher morale, collegiality, and collaboration can help justify the time and attention it takes. Being creative and resourceful about the funding involved and helping teachers with supplies would be applauded.

3. **Principals should ensure that teachers understand the expectations associated with 21st-century development to benefit student learning, social development, and academic attainment.** In the study context of this book, the associated
policies at the state level concern the Profile of a Virginia Graduate and the 5Cs, which are consistent with the expectation that students’ knowledge and skills will reflect the demands of a global economy and society (VDOE, 2019a, b). PBL in today’s educational world addresses standards (possibly testing oriented) and subject-specific content. It involves such teaching practices as designing and planning (e.g., aligning with standards), identifying the problem context and building the culture, generating and operationalizing the activity-based tasks to be fulfilled, engaging and coaching, scaffolding student learning, and assessing student learning. Anyone interested in seeing PBL operate will be looking for a challenging problem, question, task, or assignment; student voice, choice, and reflection; student commitment and motivation; authenticity and real-world relevance; critical and creative thinking; citizenship values; and learning performances (including artifacts or products).

**Relevance and Implications for Research**

Based on our research findings and the gaps in the literature that were addressed by this study, we offer 13 suggestions for further inquiry. These ideas expand on PBL-oriented elementary inquiries and 21st-century skills investigations, both of which are aimed at developing young students for school, career, and lifelong success.

1. Investigate PBL instruction, implementation, and engagement at the elementary (or middle school) level with relevance for fostering development of 21st-century skills.
2. This study could be adapted or expanded to gain more information about teacher-reported strategies used during PBL implementation. It would be advantageous to do this study with different grade levels to see if strategies operationalized to develop skills change with student age or other demographic variables (e.g., socioeconomic class).
3. Conduct research on the key PBL instructional strategies identified through this interview study with elementary teachers/staff (see Table 4.7); alternatively, explore beyond the top 10 strategies to consider all 29, which together played important and supplementary roles in influencing 21st-century skills development in a Virginia school context.
4. Further research could narrow the key PBL instructional strategies identified in the study to one or a few: collaboration, asking questions, communication, modeling, real-world relevance, hands-on learning, small groups, student-centered learning, student choice, peer-to-peer relationships (Table 4.7).
5. Modern-day PBL units, activities, lessons, and tasks embed 21st-century skills. Further research could be conducted on which skills are incorporated into PBL curriculum in elementary, middle, or high schools.
6. Standardized testing is a reality of contemporary schooling, as was evident whenever teachers/staff mentioned it in connection with how they would approach PBL activities to facilitate gains for students, especially struggling
test-takers. Research could examine the role of standardized testing in shaping PBL curriculum in the academic subjects that are tested. The influence of testing on PBL teaching and learning can be monitored to understand how learners are being prepared to develop as 21st-century citizens.

7. Focus inquiries on underrepresented student populations at risk of academic, occupational, and other struggles in life, and challenges/barriers and successes/gains relative to urban/rural/suburban, race/ethnicity, class, dis/ability, and so forth.

8. Further research on PBL learning and 21st-century skills could be conducted with feedback from various education stakeholders (e.g., district/division leaders, principals/other building leaders, teachers and staff, parents, and students).

9. To gain a deeper contextual or broader sense of key PBL instructional strategies with children, expand the present study to consider more US-based schools, divisions/districts, and states. Explorations can encompass many different possibilities and configurations.

10. The current study was qualitative in nature, so new studies could be qualitative (involving interviews and/or other data sources), quantitative, or methodologically mixed. Researchers are welcome to adapt our PBL Teacher Interview Protocol for carrying out interviews with education stakeholders.

11. PBL explorations carried out in cyberspace could be designed by researchers in partnership with classroom teachers, with the aim of involving students in problem-solving endeavors within virtual spaces that produce growth in the 5Cs.

12. Obtaining feedback from students participating formally or informally in PBL could not only benefit PBL instruction and curriculum but also professional development opportunities and training for principals, teachers/staff, and others.

13. Utilizing the literature cited in this book, research-based instructional programming could be incorporated into university-based preparation programs for aspiring teachers and leaders to expose adult students to PBL theory and practice, instruction, curriculum, and assessment.

Conclusion

This book pursued a knowledge gap in investigations of PBL at the elementary level, which is underrepresented in the literature. Based on individual interviews with seven PBL teachers/staff at one elementary school in a rural area of Virginia, key PBL instructional strategies were identified. The top 10 strategies operationalized by the educators were described from their frame of reference. A total of 29 strategies were recognized for playing a role in influencing the 21st-century skills development of children in grades 4 and 5.
The study contributes to the body of research on key strategies used during implementation of PBL in the classroom and how 21st-century skills were developed. The focus on PBL in elementary school, in addition to the Profile of a Virginia Graduate, makes this study especially helpful for educators who work with children.

A valuable finding was that PBL is a worthwhile instructional tool for engaging as well as improving elementary students’ capacities in critical thinking, creativity, citizenship, and particularly communication and collaboration. Modeling by teachers was identified as an essential method for guiding elementary students in the facilitation of new learning in PBL activity-based settings. The participating teachers/staff made it known that children need explicit guidance and direction on how to effectively communicate and collaborate with peers and interact with their teachers. Through PBL, students were able to develop and practice the 5Cs, which generated momentum for meeting expectations associated with global-ready, literate graduates.

As verbalized by the participating educators, the support of building principals is crucial for PBL to be realized in elementary classrooms. From the outside looking in, PBL appears noisy and chaotic, so it can be easily misconstrued as lacking structure. However, PBL structures student freedom, choice, and problem contexts, and it gives space to process-based learning and the practicing of skills. Gains are tracked in 21st-century skills and in relation to the academic content to be mastered or understood. With permission to try something new and allowing teachers and students to find their own way with non-traditional learning, principals who understand the purposes and character of PBL instruction make it possible. Because the school principal serves as the instructional leader in elementary buildings, the principal should encourage the implementation of research-based instructional strategies and attend to such matters as the budgeting of resources.

Our research purposes have been fulfilled. We have pinpointed key instructional strategies from interviews with teachers/staff with knowledge and information to share about PBL, having experimented with this approach during the 2017–2018 and 2018–2019 school years. We also found out what strategies aided in the skills development of the 5Cs for elementary students about the expectations of graduates who have been prepared for college, careers, and life. The study context benefitted from the leadership of the superintendent, who had encouraged experimentation with alternative classroom pedagogy.

We offer pedagogic strategies endorsed by educators for creating the conditions for 21st-century learning and meeting the expectations of global societies and workforces. Our hope is that other researchers and practitioners will find value in this book and make good use of it for their own purposes.

Summary

In this last chapter, overarching outcomes, implications for practice and research, and conclusions were covered. The study’s purposes have been fulfilled involving what PBL instructional strategies have been in use within elementary classrooms
and which ones aided in skills development from the point of view of educators. The gap in PBL at the elementary level and in relation to 21st-century learning has been addressed. The understandings relayed benefitted from those on the frontlines—educators who are teaching and learning in new ways and who generously shared their personal stories.

Navigating Uncharted Waters

The PBL literature we reviewed considered elementary student engagement and achievement and extended to related areas of interest. This book covered the background of PBL and its evolution into public education and classrooms. Together with our elementary study, it adds to the knowledge of PBL instruction, with attention on PBL strategies utilized in elementary, middle, and secondary levels, extending into informal settings. Those answering the call seek non-traditional approaches to classroom learning that enrich the quality of educational experience extending into the future. Thus, they are future-minded in their preparation of students for lifelong learning and contribution.

While we recognize that PBL is certainly not new, it is new to teachers in Virginia, which puts the teachers/staff who participated in our study at the leading edge of instructional change. Researching PBL and gaining insight from teachers through this investigation has allowed us to share research with the global educational community. We are excited about emboldening preK–12 teachers to try something new and encouraging principals and other leaders to get behind their initiatives and join them in their journey. The Portrait of a Graduate (BattelleforKids, 2018) and Profile of a Virginia Graduate (VDOE, 2019a) can add value for preparing learners to enter the global economy with the capacity to be not only effective but also public-spirited.

We are pleased to have added to the breadth of literature surrounding PBL in elementary classrooms and to have had this opportunity to feature the experimentation at one school in Virginia. Based on our research results, coupled with insights gained from the literature reviewed, we think that PBL is a worthwhile instructional tool that has great potential to improve children’s 21st-century skills. However, the support of principals and other building leaders is vital for the success of PBL implementation. We hope that principals who wish to support PBL at their school review the findings and reflect on their own practices. Finally, we encourage principals to implement PBL in their schools and support teachers who wish to experiment with PBL in their classrooms. We encourage the utilization of this book in any way that can help with making PBL-related decisions in the context of 21st-century learning.

During the COVID-19 pandemic, educational systems suddenly went from daily face-to-face instruction to being physically closed and moving to online instruction, with a new kind of schooling dependent on creative adaptations presently emerging. PBL in the world of online learning is largely uncharted. However, we believe that the basic components of student-centered learning and real-world application are adaptable to online learning. Also, online learning can allow teachers and students the
time needed for PBL, which was said to be the greatest challenge of PBL instruction in the physical classroom. In electronic spaces there are innovative tools for enabling collaboration, communication, and so forth, with cost savings a noteworthy benefit. Students’ creativity, choice, and much more can be maximized in electronic spaces. Sponsoring PBL learning can help with closing equity gaps in elementary schooling and for all student groups, particularly vulnerable populations. Constraints allow us to exercise our imaginations in entirely new ways. By imagining new possibilities for PBL, we push boundaries in the world of learning. PBL of tomorrow is being charted today.

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