

Rigorous
Project-
Based
Learning
An Inquiry-
Based
Educational
Approach



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Why Social and Emotional Learning Is Essential to Project-Based Learning



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By serving as a kind of glue between social and emotional development and academic content, project-based learning can positively impact student growth and help young people manage emotions and forge good relationships.



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Why is social and emotional learning essential to project-based learning?

Students and teachers across the country seek relevant learning experiences that advance instructional goals, foster engagement in meaningful work, and promote a sense of purpose and belonging. For schools to have a greater impact on young people's lives, educators must encourage students to actively make sense of why content is useful and how it can be applied.

Schools should empower students to take ownership of their learning and see themselves as capable leaders and change makers. Social and emotional learning (SEL) lies at the heart of such efforts to transform school experiences and support students in shaping their learning and development. It's vital, however, for all stakeholders to recognize that social and emotional development isn't an add-on to academic experiences but is integral to those and a core part of a student's overall education.

Educators can help students develop critical SEL competencies—including the ability to regulate emotions, form positive relationships, work well with others, and demonstrate empathy—by modeling these behaviors and skills, by establishing classroom norms and structures, and through other instructional strategies. They can also teach SEL through project-based learning (PBL), which encourages critical thinking, communication, and collaboration and can enhance personal development and relationship building (Weissberg et al., 2015). Project-based learning encourages students to work together in an iterative cycle of planning, action, and reflection and in service of promoting well-being and positive change (Jagers et al., 2019).

While all learning experiences benefit from a supportive social and emotional learning process, the collaborative and inquiry-based nature of project-based learning necessitates an emphasis on students' SEL needs. And as with SEL, PBL requires attention to routines and practices that help students apply knowledge and skills to investigations and good decision-making.

In addition, by highlighting authentic connections to the world beyond the classroom, project-based learning helps students exercise agency, a core component of social and emotional development. Researchers at the University of Chicago Consortium on School Research define agency as “the ability to make choices about and take an active role in one's life path, rather than solely being the product of one's circumstances” (Nagaoka et al., 2015). Extended projects can contextualize academic content and provide more purpose and coherence to the learning process.

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Lucas Education Research (LER), a division of the George Lucas Educational Foundation, has been supporting independent research into project-based learning. Without a doubt, a supportive social and emotional learning process makes project-based learning experiences more effective and meaningful. In addition, PBL can help schools meet SEL goals. This paper examines the ways in which SEL is essential to PBL by describing the unique demands of PBL, highlighting the key elements of SEL, and discussing how SEL and PBL work together to cultivate agency and promote equity. In addition, this paper describes how PBL can support SEL, an area of growing importance for educators, students, families, and policy makers.



Social and emotional learning in schools

There generally is widespread agreement today about the importance of social and emotional learning as a way to encourage students to take charge of their lives and navigate the world. Academics, policy makers, and educators have coalesced around efforts to prioritize the social and emotional learning process and support its implementation in schools, particularly in response to the growing need to prepare students for a changing workforce. The consensus view is that SEL instruction should support the developmental process of learning with an explicit emphasis on practices, methods, and actions that must be cultivated and supported to help students develop personal competencies, pursue goals, and learn effectively (Humphrey, 2013).

The growing support for SEL follows research studies showing its positive impact on student outcomes. An analysis of more than 200 studies of educational programs that help educators teach social and emotional learning skills to students found that these programs significantly improved academic achievement and student behavior and led to reduced levels of emotional distress in youth (Durlak et al., 2011). Follow-up research showed that these positive benefits persisted over time (Mahoney et al., 2018).



The National Commission on Social, Emotional, and Academic Development (2019) recommended in a pivotal report to embed SEL in core content. The report asserted that promoting the development of students' social and emotional skills as well as their academic skills is not a fad but the substance of education itself. It is not a distraction from the "real work" of math and English instruction; it is how instruction can succeed. This is consistent with research findings showing that social and emotional development is important for student well-being and that emotions affect how and what students learn. Social and emotional learning also supports the development of caring relationships that help build a foundation for lasting learning (Zins & Elias, 2007).

Promoting the development of students' social and emotional skills as well as their academic skills is not a fad but the substance of education itself.

PBL educators and scholars are also focusing more on how students can learn, practice, and apply social and emotional skills while engaging in rigorous academic content. Researchers and practitioners are increasingly demonstrating ways that PBL instruction can help students develop SEL competencies. By serving as a kind of glue between social and emotional development and academic content, PBL can positively impact student growth and help young people manage emotions and forge good relationships.

The National Commission on Social, Emotional, and Academic Development also recommended that the field develop better assessments that capture the full range of student knowledge and skills, including SEL competencies. Project-based learning, in which students design and create products and engage in performances for public audiences that teachers can use to assess learning and knowledge building, can help educators and students meet this important goal.



Social and emotional learning in the project-based learning context

PBL necessitates a holistic picture that accounts for how individuals and groups relate to one another. Describing the process that best complements and supports the goals of PBL involves detailing the kinds of student and teacher interactions that help students

realize their goals and the types of experiences that help them develop important personal competencies.

To fully integrate project-based learning and social and emotional learning so they serve each other and students effectively, there must be greater clarity about the SEL practices, methods, and actions that help students meet the demands of project-based learning. Below are four key elements of social and emotional learning, derived from research and practice, that are integral to PBL.

KEY ELEMENTS OF SEL IN PBL

Collaboration

Collaboration is key for both SEL and PBL. Project-based learning often requires students to collaborate with peers when working on projects. In doing so, students apply concepts they learn to completing concrete tasks and making good choices along the way. PBL fosters an active classroom culture that relies on routine student interactions that drive the process of growth and discovery based on challenging content. PBL also encourages alternative ways of thinking and sees them as critical to investigation and sound decision-making.

By building students' individual SEL competencies, including the ability to collaborate effectively, PBL instruction sets a foundation for how individuals and groups relate to one another. Teachers have a strong role to play. For example, during group work, students may need guidance to learn to manage emotions and cooperate with and empathize with others. Such instruction can help students develop mutually supportive relationships, improve academic skills, and promote continued emotional growth (Caprara et al., 2000; Denham, 2015; Elliott et al., 2015).

Collaborative projects should be group worthy. As Gavin Tierney, an education researcher at California State University, Fullerton, explains, "In PBL, there needs to be authentic collaboration and teamwork, not just 'doing school' or being efficient about completion. There should be intentional distinctions between individual and group work."

And developing trusting relationships that help students feel comfortable contributing to the community of learners supports meaningful collaboration (Bryk & Schneider, 2002). For instance, PBL emphasizes student voice through public presentations, which require a safe and trusting learning environment.

Expression

Rigorous project-based learning provides students with ongoing opportunities to express what they know, can do, and are thinking and feeling. This ability to effectively express oneself is vital both to learning through projects and to developing SEL competencies. When PBL empowers students to express themselves through speaking, writing, and visual mediums, it opens multiple pathways for self-expression.

"PBL experiences should engage alternate ways of thinking and focus on valuing diverse thoughts and perspectives. Students should not only apply knowledge to new scenarios but also use their voice and choice to make decisions that matter to them," says Barbara Schneider, a professor of education and sociology at Michigan State University.

It is helpful for educators to remember that students need regular opportunities to practice expressing themselves and must see and hear examples of clear and accessible communication. In addition to modeling strong communication skills and empowering student voice, teachers can support students by creating safe, respectful learning environments with clear routines that



KEY ELEMENTS OF SEL IN PBL *(continued)*

promote active listening. These environments should encourage the sharing of diverse opinions and promote intellectual risk-taking and empathy for others.

Reflection

Skillful reflection plays a significant role in engaging students in sustained investigations that emphasize connections across learning experiences (Berger et al., 2014). Opportunities for reflection throughout the school year encourage students to experience PBL as a set of linked investigations with big-picture goals rather than as a group of unrelated projects with a narrow focus that lack coherence.

When students are able to critically reflect on themselves and their communities, they can identify patterns in their experiences and make changes that will help them achieve meaningful goals. In addition, critical reflection in the service of revising project work helps students learn how to interpret and incorporate feedback from others. Reflecting on work in this manner encourages growth and helps students develop the kind of self-management skills that empower them to persevere through difficulties as they reflect on and overcome problems within supportive, socially and emotionally responsive classrooms.


For teachers, reflection is important too. When they have non-evaluative opportunities to reflect on and identify areas for improvement and receive targeted coaching, they are better equipped to model and support deep reflection for their students.

Ownership

Researchers at the University of Colorado Boulder emphasize the importance of ensuring students feel deeply engaged in and invested in their work. Through authentic community connections embedded in rigorous PBL instruction, students can identify with what they are learning and have experiences that spark and sustain that kind of deep interest in and connection to what they are doing in school.

Students are empowered decision makers in high-quality PBL environments and engage in projects that promote an ownership of learning and the development of related SEL skills and behaviors, including the ability to make good choices, communicate ideas, and problem solve.

Importantly, for PBL to succeed, it is essential for students to feel a sense of belonging in an inclusive community and feel that their contributions are making a difference. Students must see their personal contributions as significant and consequential to the group. School belonging is tied to student well-being, self-efficacy, and school satisfaction (Jagers et al., 2019).

Education researcher Ruth Chung Wei, who codeveloped and studied the impact of a PBL [sixth-grade science curriculum](#) , puts it this way: “We learned through our pilots of the Learning Through Performance science curriculum that we needed to intentionally include in the curriculum design an explicit focus on building community among learners and supporting equitable participation practices. Otherwise, we get the usual patterns of one or two high-status students dominating the group work and marginalizing students who are perceived as low status. While classroom cultures and norms that support belonging take time to develop, we felt it was important to explicitly model interaction and language practices that allow all students to participate equitably in group work and collaborate productively. We believe that made the difference in supporting higher levels of student engagement and ownership of the work.”

For both students and teachers, the process of learning through projects should promote true investment in the outcome of the work. By providing opportunities to take action and contribute to addressing real problems, everyone should feel motivated to ask questions, assume leadership roles, and explore extensions of the learning in the community. Teachers and students alike need opportunities to connect classroom experiences to their personal interests, goals, and identities.



Fostering equity and agency in project-based learning

Social and emotional learning contributes to greater educational equity and can be particularly beneficial for students experiencing stress associated with poverty. Students benefit from supportive relationships and nurturing learning environments, and when adults foster those, children of every background can rise to meet expectations (National Commission on Social, Emotional, and Academic Development, 2019).

Researchers from the Collaborative for Academic, Social, and Emotional Learning have called for “transformative SEL” in schools—instruction that promotes equity and excellence, is justice oriented, and fosters the development of SEL core competencies with an emphasis on diverse learners. The goal is to harness the power of SEL to mitigate the educational, social, and economic inequities that exist between groups of students. This requires the explicit examination of the causes of inequities, including implicit biases and systemic racism, to foster self-awareness, social awareness, and individual and collective action.

The goal is to harness the power of SEL to mitigate the educational, social, and economic inequities that exist between groups of students.

Given what is known about the importance of SEL, it’s worth looking more closely at how PBL promotes SEL in ways that strengthen teaching and learning. With its emphasis on student ownership and agency, PBL can be a powerful strategy for weaving social and emotional learning into core instruction and empowering students to learn through projects. The more that PBL experiences cultivate student agency, the more students are encouraged to develop a growth mindset and confront life’s challenges as obstacles to overcome, not fixed limits (Nagaoka et al., 2015).

As researchers at the University of Chicago Consortium on School Research and others have reported, some students face more significant challenges than others when it comes to developing agency because of their exposure to violence, feelings of stress, and limited opportunities. And it’s important to note that

even when a culture of agency within a school or system is intended for everyone, patterns of negative interaction and damaging assumptions about particular students can restrict their actions and equitable participation (Baines, 2014; Steele, 2010).

Teachers must work together to interrupt deficit thinking based on negative stereotypes and assumptions that limit what is possible, or lower expectations, for some students. Researchers associated with Professor Joseph Krajcik’s CREATE for STEM Institute at Michigan State University highlighted one way this can happen. They studied results from Multiple Literacies in Project-Based Learning (ML-PBL), a PBL approach to science instruction used in third-through fifth-grade classrooms. The researchers then engaged with teachers who used the program in open and honest conversations about educational equity. The group examined widely used models of instruction based on deficit views that involved testing and assigning levels to students in these groups, and they discussed alternative approaches. Having these thoughtful conversations disrupted the use of the deficit-based approaches and supported the teachers’ use of more-equitable, asset-based practices in PBL science instruction.

Krajcik explains the work this way: “ML-PBL’s focus is on supporting all learners in developing deep knowledge and tools for understanding their world. As such, ML-PBL’s focus on equity was purposefully designed as a major component of our intervention. We examined a series of conditions that support science learning for children, including those who are non-English speakers, those who have special needs, struggling readers, and those in classrooms with limited access to science materials and resources.”

Growing evidence shows that PBL can improve equity. Researchers with the nonprofit American Institutes for Research cited collaborative experiences as among the factors that can contribute to positive changes in the academic trajectories of Black students. They found that for Black students, having opportunities for high-quality collaboration, which as previously noted is a core element of project-based learning, had a positive effect on grades (Surr et al., 2018). Additionally, the findings below from LER-funded studies demonstrate the powerful effects PBL can have on equity:

- A [study](#) examining the effects of a PBL social studies and literacy curriculum in low-income schools found children in the PBL classrooms performed significantly better than their peers in



the comparison classrooms for both social studies and reading. They performed 63 percent better on a researcher developed measure of social studies knowledge—the equivalent of five to six more months of learning—and 23 percent better on a researcher-developed measure of informational reading, the equivalent of almost two more months of learning (Duke et al., 2020).

- A randomized [study](#) examining the efficacy of embedding a project-based learning curriculum in Advanced Placement (AP) courses, along with extensive teacher professional learning, found students who took the PBL courses with trained teachers outperformed those in traditional AP courses on their AP exams. Sample students, within five predominantly urban school districts across the country, were composed of a higher proportion of low-income students than the typical AP test-taking community. Students of teachers in the second year of using a KIA curriculum had a 10-percentage-point boost in the probability of earning an AP Exam score of 3 or higher.

- A [study](#) on the efficacy of a PBL program developed at the CREATE for STEM Institute at Michigan State University found that third-grade students in ML-PBL classes performed significantly better on an independent science assessment than their peers receiving more-traditional instruction. The difference in performance for students in the PBL classrooms was 8 percentage points greater than the performance for students in the comparison classrooms. The study found students in the treatment group who struggled with reading had higher science test scores than a matched sample of struggling readers in traditional classrooms.
- In Stanford University's Learning Through Performance project, science assessment experts partnered with science teachers and language and literacy experts to develop a sixth-grade PBL science curriculum. These [study](#) results revealed that students who took the course experienced achievement gains, and English language learners performed significantly better on the state English language proficiency test than a matched sample of English language learners (Holthuis et al., 2018).





Lessons from the field

A number of curricular resources in use in schools, some of which LER helped fund, explicitly integrate social and emotional learning and project-based learning in effective ways. A few of those are highlighted here.

Compose Our World

A team of researchers and practitioners developed the [Compose Our World curriculum](#), a project-based approach to ninth-grade English language arts that integrates SEL into daily student work. Through projects, students collaborate, develop empathy, take the perspective of others, and learn to self-advocate.

The researchers found that students using Compose Our World reported more collaboration and more authentic learning experiences than students in comparison classrooms, and teachers associated the course with positive instructional shifts and stronger English language arts teaching (Boardman et al., 2021). A qualitative study of a subset of those classrooms showed that everyday forms of care for one another influenced the experiences of students and teachers, and these were shaped by how space was used in classrooms, project requirements set by teachers, and the materials and modes students used to author products (Garcia et al., 2020).

“Once we start centering caring and community in English language arts classrooms and schools in general, it completely shifts why we’re doing the work we’re doing,” says Antero Garcia, assistant professor in the Graduate School of Education at Stanford University and part of the Compose Our World research team.

From a teacher’s point of view, David Glover—an English language arts teacher at Olde Columbine High School in Longmont, Colorado—feels that the PBL curriculum went a long way toward improving social and emotional learning and empowering students. “It really gives student choice and agency in an authentic way,” he remarks.

Multiple Literacies in Project-Based Learning

Researchers studying the ML-PBL science program found that, compared with their peers, third-grade students in classes using ML-PBL more frequently reported the value of reflecting on their work and collaborating.

In addition, Miranda Fitzgerald, a University of North Carolina at Charlotte researcher, conducted a case study examining whether ML-PBL provided opportunities for students to learn and use social-emotional skills. Fitzgerald found that the project-based approach empowered elementary school students to meet goals associated with SEL competencies, such as expression, ownership, reflection, and collaboration (Fitzgerald, 2020).

For example, students work collaboratively to study birds in their community and consider how to help them survive and thrive. Specifically, they work together to observe phenomena, create reports, and design and build bird feeders. They also reflect on their goals and learning throughout the project. Fitzgerald reported that when tackling projects like these, students were self-directed, active learners who engaged in strong decision-making.

When using ML-PBL with students, classroom teachers provide effective and explicit instruction on and modeling of SEL competencies. Teachers guide students in constructive strategies for working together and motivate students to engage and invest in their work by connecting their learning to the local community and providing opportunities to contribute to solving real problems.

Stanford Center for Assessment, Learning, and Equity (SCALE)

In Stanford University’s Learning Through Performance Project, which developed a sixth-grade science curriculum aligned with Next Generation Science Standards (NGSS), the first unit of the year requires group-based project work. Teachers work with students to establish norms and expectations for collaboration and productive dialogue, for example, ensuring all students participate equitably.

“We developed an entire unit for teachers to implement at the start of the year where they helped students think about what kind of behaviors are expected of them when they work in small groups,” says Nicole Holthuis, director of science education at SCALE.

One goal of this approach is to address a common problem student groups develop, which is the creation of hierarchies with some members, such as those with higher academic or social standing, who are more active than their peers. The result can be that some students develop their knowledge and skills while others miss out.



Looking ahead

LER's mission of studying and sharing evidence of PBL effectiveness necessitates further study of the conditions required to support PBL, particularly through the lens of social and emotional learning design, enactment, experience, and evidence. Looking at PBL through these different lenses, as detailed below, can help improve our understanding of the conditions needed to promote and study SEL in a PBL setting:

- Considering a **PBL design lens**, curriculum development should focus on integrating SEL instruction within academic studies. Explicit objectives can include developing SEL skills, such as the ability to collaborate and work well with others, reflect on and revise one's work, communicate effectively, and make good decisions. For more on the development of PBL curricula, see "Designing Curriculum for Project-Based Learning" in the LER white paper series.
- Looking through a **PBL enactment lens**, curriculum developers and school and system leaders can consider how programs can help foster a safe and respectful learning environment and develop an inclusive culture of agency. Within a curriculum, teachers need meaningful professional learning to integrate PBL and SEL.
- Taking a **PBL experience lens** requires adults to understand students' experiences with project-based learning. Through structured observation, questioning, examination of student work, and other fine-grained assessment practices, teachers can gain insights into how students build their understanding as they grapple with the questions at the heart of projects.
- Using a **PBL evidence lens** can promote continuous improvement. The research community should seek progress regarding the measurement of SEL outcomes through the continued development of assessments focused on developmentally appropriate goals that are timely, engaging, and part of the teaching and learning process.



Photo: Brightworks



Conclusion

It is widely understood today that social and emotional learning is essential to well-being and contributes to student growth and development throughout one's K-12 experience and into the world of college and the workplace.

Explicitly weaving SEL instruction into project-based learning supports students in learning how to regulate their emotions, work with and relate to others, express themselves, and more. This integration of the two educational approaches also improves the quality of the PBL experience and ensures students are learning through projects in rich and effective ways.

PBL is a natural framework for teaching social and emotional lessons. With rigorous PBL, students hone their ability to work in groups, learn to communicate effectively, and engage in an iterative cycle of reflection and revision that can improve self-awareness and encourage a growth mindset. The PBL learning process is an active one, empowering students to take ownership of their work through authentic projects and public presentations.

All of this adds up to a rich educational experience that should be afforded to all students. The evidence is clear that social and emotional learning and project-based learning can improve outcomes for underserved student populations, including students of color, English language learners, struggling readers, and low-income students.

This report highlights freely available, evidence-based resources that pair SEL and PBL and can help drive equity and a culture of agency in schools. Additional resources are needed to further support educators in harnessing the power of these two instructional approaches and transforming education systems into those that work well for all students. Lucas Education Research welcomes new partners in pursuit of this vital goal. Together, we can help young people develop the skills, knowledge, and foundations needed to thrive in school and beyond.

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With rigorous PBL, students hone their ability to work in groups, learn to communicate effectively, and engage in an iterative cycle of reflection and revision that can improve self-awareness and encourage a growth mindset.



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Founded in 2013, Lucas Education Research operates as a division of the George Lucas Educational Foundation, a nonprofit operating foundation established by filmmaker George Lucas in 1991. Our work focuses on the design and evaluation of innovative practices in K-12 schools, including many of the core strategies described by Edutopia, another division of GLEF.