Summary:

• The ability to apply knowledge once learned—deeper learning—is a critical outcome for students. Project based learning (PBL) is a dynamic framework in which students actively investigate problems and develop deeper levels of knowledge through self-directed, hands-on application.

• Efficacy data around PBL is strong when projects are student-driven and designed to foster sufficient levels of discovery and authentic application.

• Differentiation in PBL helps ensure student engagement as well as student ownership and agency.

• Key benefits of student agency include boosted confidence, self-trust, a sense of engagement and belonging within an active learning community, and a perception of relevance regarding the learning experience.

Introduction:

Throughout the history of US public education, policy makers have varied on the goal of education – from developing students as democratic citizens to preparing them for a global economy (Labaree, 1997). No matter the purpose of education, fostering the ability to apply knowledge to unique situations is a critical outcome for students. This kind of learning is often described as deeper learning.

The American Institute of Research (AIR) has identified three key aspects of deeper learning: (1) deeper understanding of academic content, (2) the ability to apply that knowledge in novel situations, and (3) the development of a psychosocial skills (e.g. “people skills” and self-control). This definition of deeper learning mirrors the success factors identified in college and career readiness research. Recent research from AIR suggests that students attending schools with an emphasis on deeper learning are more likely to graduate on time and with higher levels of achievement (Huberman et. al, 2014).

Deeper learning stands in contrast to the kind of surface learning common to the No Child Left Behind (NCLB) era and its emphasis of success on annual, summative assessments.
Inquiry & Project Based Learning

Learning environments that emphasize the recall of a discrete set of facts and artificial problems stop well short of the kind of experiences required to foster deeper learning. To build deep learning experiences, educators can draw upon the research literature from a related set of fields including project based learning, differentiated instruction, inquiry-based learning, and student agency. This white paper summarizes the key principles and practices common to this research base and makes clear how such principles are reflected in GoQuest, a student-centered inquiry and project based learning environment designed by Compass Learning® to foster deeper learning experiences. In the pages that follow, each major domain of research is described, its key features are identified, and its connection to the design of GoQuest is made explicit.

Project Based Learning:

Project based learning (PBL) is a dynamic classroom framework in which students actively investigate real-world problems and challenges, and procure a deeper level of knowledge through a self-directed learning experience. The classroom and learning experience is shaped similarly to a real-world collaborative work-place environment. Students pool resources at various degrees for mutual ends to achieve project completion while developing deeper knowledge and breadth of understanding. The culminating product of the project allows students to wrap all the information they have gathered together to demonstrate what they have learned. The core of a successful PBL program is to understand that learning must occur during the project, rather than utilizing the project as a form of assessment or evaluation.

Efficacy for PBL is enumerated in a variety of experimental designs applied over the past two decades in the K-12 classroom setting. Within these experiments and studies, researchers have found consistently an effect size of approximately 0.25, which represents one-fourth of a standard deviation of difference between the means of traditional educational systems and PBL systems (Mergendoller et al., 2006). With students of lower achievement level in verbal ability, researchers found an effect size of 0.40, which is the equivalent of 6 to 7 points in the traditional 100-point grading system (Mergendoller et al., 2006). Such studies support the expanded use of PBL in classrooms.

In order to be effective, PBL must be a central learning strategy in the classroom (Thomas, 2000). A project must contain an open-ended solution, not a predetermined solution, to provide the student with the motivation to complete the project. Projects at this level are challenging to implement in a traditional classroom system because teachers often lack a system to manage the organization and communication structure of a project. GoQuest addresses this in its design by providing student-level tailored projects and learning activities to maximize the learning experience of each student. Students can be grouped by similar learning characteristics or grouped manually by the instructor. The activities in which students participate are processed through online exchanges. In-class learning groups can be supported through peer group feedback, but also monitored and enhanced by the facilitator.

Projects must drive students to encounter the central concepts and principles associated with the discipline rather than following a project based script (Thomas, 2000). The student must experience the problem and build the project utilizing conceptual knowledge and blending conventional knowledge. GoQuest projects grow out of a real problem; the student will need to master the basic vocabulary and concepts of one or more disciplines to complete various
projects. For example, one example of a GoQuest project may be a challenge to build a toothpick bridge that will support 10 pounds and stand up to wind. In the course of solving this problem, students would read books and consult websites on forces and types of bridges. They need to think originally, synthesize information, shape conclusions, and form and test projects.

The teacher can work with individual students, encouraging each to go deeper using the GoQuest bank of activities to learn about topics in a range of disciplines. These activities are recommended based on the results of the student’s GoQuest profiler and the built-in rating system. Teachers or facilitators can provide customized projects for groups or individuals to challenge students in various innovative ways.

The essence of a project is achieved through the experience of investigation, which guides students down the path of inquiry, knowledge building, and resolution (Thomas, 2000). The process must be constructive rather than reconstructive. A GoQuest project is not reconstructive, like the typical science lab, repeating an experiment performed by generations of students in order to arrive at a familiar result. In GoQuest projects, the student is engaged in constructing new knowledge, and the terms of the project—the focus on product and audience—ensure that this will include practical working knowledge.

Projects must be student-driven to allow for ownership and discovery rather than script following and routine (Thomas, 2000). Teachers should not lead the project process or provide instructional booklets, but allow the organic development of collaboration and techniques to flourish (Bereiter & Scardamalia, 1999). A fine line exists between an exercise and a project. The most pronounced distinction between the two is the application of previous knowledge and experience in PBL to solve problems throughout the project experience.

GoQuest projects allow wide latitude for student choice, both in final products and in the approach taken. Older students are encouraged to design and create their own projects. Ultimately the student’s motivation and integration of higher-level thought processes rely heavily on the level of personal control throughout the project experience. Personal control and ownership is the hallmark of GoQuest. Personalized activities and projects are presented to the student and then selected and rated upon completion allowing for continual enhancement of the curated items.

Projects must have a level of authenticity and/or real-world application that inspires the student to pursue the higher level thinking needed to take control of the problem solving process (Thomas, 2000). The authenticity level of the project can be observed through three lenses: academic challenges, scenario challenges, and real-life challenges (Gordon, 1998). PBL focuses on real-life challenges with outcomes that could be applied in a variety of scenarios outside of the classroom. With GoQuest, students can plant community gardens, assist in tracking butterfly migrations, start businesses, raise funds for charity, design houses, build inventions, and much more. All of these GoQuest projects center upon the introduction of real-world projects that are both accessible and manageable at the student level.

A typical GoQuest project has five phases common to PBL: introduction, exploration, problem statement, product creation, and sharing. A majority of projects that could be provided for students should be well supported with this basic flow, though these phases can be modified, added, or deleted to fit the needs of most forms of PBL. In each phase, there are steps/tasks that allow a student to progress through both open-ended tasks, such
as exploring a topic, and explicit tasks, such as reading instructions. Each phase ends with a check-in that signals the conclusion of that phase to the student and reports progress to the teacher, which appears on the project dashboard. With this mechanism, a student becomes self-aware of his or her progress, while also enabling a teacher to get a classroom view of project progress. This feedback loop addresses the important challenge of progress monitoring in PBL environments.

To support PBL, teachers can also pre-create GoQuest projects or select from a library of pre-built Super Starter Projects. Each project is designed around a meaningful real-world problem and provides scaffolding for student research and strategizing. Both assignments and projects can be assigned to groups as well as individuals. Collaborative inquiry often serves as a check to keep students from settling for the first or easiest solution.

**Differentiated Instruction:**

Differentiation is a framework for effective teaching that aligns what and how students are taught relative to their needs. Differentiated classrooms are responsive to student variety in readiness levels, interests, and learning profiles. For a teacher, differentiated instruction requires developing teaching materials and assessment measures so that all students within a classroom can learn effectively, regardless of differences in ability. Efficacy for differentiation is generated through the proper pairing of instruction with academic need, as well as increased motivation and engagement of students in differentiated classrooms (Subban, 2006).

The research literature on differentiation is broad and comprehensive, but the following represents the core characteristics of successful differentiation, as well as how such characteristics are supported in GoQuest.

**Clarify key concepts and generalizations.** Teachers are encouraged to identify essential concepts and instructional foci to ensure that all learners comprehend. The GoQuest database of resources includes recommended videos and animations designed to introduce a topic or show a process. GoQuest also has resources correlated to college and career readiness standards, ensuring that teachers can find diverse, multimedia resources for any core concept.

**Emphasize critical and creative thinking as a goal in lesson design.** The tasks, activities, and procedures for students should require that they understand and apply meaning. Instruction may require supports, additional motivation, varied tasks, materials, or equipment for different students in the classroom. Two of the 14 GoQuest enrichment categories are critical thinking and creativity training. Because Go Quest differentiates along four axes—interests, abilities, learning preferences, and expression styles—each student is provided access to critical thinking and creativity activities that are deeply personalized to his or her profile.

**Engaging all learners is essential.** Teachers are encouraged to strive for the development of lessons that are engaging and motivating for a diverse class of students and vary tasks within instruction as well as across students. In other words, an entire session for students should not consist of all drill and practice, or any single structure or activity, so the opportunity to engage all learners is maximized. The GoQuest profile differentiates resources for each student so students are interested and engaged in their learning.
Provide a balance between teacher-assigned and student-selected tasks. A balanced working structure is optimal in a differentiated classroom. Based on pre-assessment information, the balance will vary from class-to-class as well as lesson-to-lesson. One key to building meaningful projects for students is leveraging an intentional process that connects the open-endedness of real-world problems to student interests. The GoQuest learning environment is built to support such a process. It begins with first understanding student interests. Each student using GoQuest completes an interactive questionnaire that produces a personal learning profile. The first section identifies the student’s top three interest areas, which point beyond the classroom to fields of activity and aspects of our world. Another section identifies learning preferences, the ways in which the world affects the student; a third describes the expression styles through which the student demonstrates learning outwardly.

Having clear view into student interests, teachers can then begin to leverage the learning resources in GoQuest to create authentic learning scenarios that are automatically differentiated for each student. GoQuest maintains a database of 45,000 learning resources that are all tagged with learning profile categories as well as subjects, topics, and sub-topics. To differentiate learning experiences for their students, teachers need to choose which topics or sub-topics they want the focus of the experience to be, the students they want to receive the assignment, and the differentiation engine then automates a matchup instantly. Each student will receive a set of differentiated activities around the chosen sub-topic; optionally the teacher can choose a set of activities that every student receives. As a result, any topic in the curriculum can be connected to the student’s real-world interests and experience with a few clicks of the mouse.

Inquiry Based Learning:

Inquiry based learning (IBL) blends project-based learning with a strong focus on student advocacy. Inquiry based learning is traditionally defined as an active student-centered approach focusing on questioning, critical thinking, and problem solving. One of essential components of IBL is problem-based learning: students work in small groups to explore meaningful problems, identify what they need to learn in order to unravel a problem, and produce strategies leading toward a solution (Barrows, 1996; Hmelo-Silver, 2004). Design-based instruction is another component of IBL that follows the premise that children learn deeply when they are expected to construct or generate an artifact that requires moving from basic understanding and remembering to creating and evaluation levels of the well-researched hierarchy formed by Benjamin Bloom (Friesen & Scott, 2013).

The importance of inquiry based learning is evident when compared to the critical thinking and problem-based projects common to many vocations. Educational experiences that focus on narrow tasks, rote learning, and simple algorithms for solving problems do not produce the number of critical thinkers and problem solvers required for the work place of tomorrow (Bransford & Donovan, 1999). Inquiry based learning addresses this issue by providing complex and meaningful projects, sustained engagement, collaboration, research, and resource management (Barron & Darling-Hammond, 2008).

GoQuest provides a framework for inquiry based learning, supplying constructive rather than reconstructive activities and exercises in both an individualized and group-based structure. All of the “school” skills of reading, writing, talking, calculating, observing, and experimenting, and
all of the “life” skills of collaborating and using tools and equipment, come into play as students research problems and design solutions. The basic premise of GoQuest is that students always have one foot firmly planted in the classroom, the other in the wider world. GoQuest uses each student’s learning preferences to forge real-world connections. The program provides engaging enrichment activities that have been screened and rated for educational value and emphasize inquiry over skill-recovery or remediation.

**Student Agency:**
Researcher John Hattie notes that half of the variance in student learning outcomes is attributed to factors associated with students (Hattie, 2009). One of the key factors is the degree to which students take an active role in their own education, often referred to as student agency. Student agency is supported by four key behaviors: a growth mindset, self-efficacy, a sense of belonging, and relevance (Farrington et al., 2012). As factors that have heavy influence over student learning outcomes, GoQuest integrates these four student agency features in its core design.

**Mindset #1, Growth Mindset: “I can change my intelligence and abilities through effort”**

The concept of the growth mindset was pioneered by Carol Dweck to illustrate the view that the student’s ability to prosper within a learning environment is strongly influenced by previous behaviors and by a belief in behavioral changes (Dweck, 2007). Students who regard their abilities as immovable will struggle with learning because, in this view, mistakes are evidence of a lack of ability rather than signs of developing ability. Meta-analysis by John Hattie (2009) suggests that students’ self-expectations is the single most important factor shaping student learning outcomes. Students who can extend their own expectations while invoking a growth mindset should experience optimal learning outcomes. Fortunately, the growth mindset is a learnable behavior that produces harder-working students who utilize more effective learning strategies and, thus, attain higher levels of achievement (Blackwell et al., 2007). The growth mindset is the foundational mindset for student agency.

In the GoQuest learning profile questionnaire, many questions center on experimentation in learning, focusing students on what they would like to try. Through real and virtual field trips, GoQuest presents a world ready to be explored. These learning experiences expose students to possibilities, beyond the horizon of what they have done or what they’ve been told. And differentiated assignments help students achieve, not through remediation (and being branded as “less able”), but by drawing upon their individual strengths in learning and expression styles. Instead of assembling a paper trail of test scores and letter grades, the student develops a portfolio of problems solved and ideas developed, positively impacting the student’s growth mindset.

GoQuest turns the spotlight outward, away from student inabilities (and classroom tasks that expose them) to real-world problems. Students discover through their own experience that effort helps, however incrementally, to solve a problem. The lesson that one’s efforts can have an immediate, practical, and measurable effect on an audience beyond the classroom lays the groundwork for the insight that these efforts also change and develop students as learners and as people.
Mindset #2, Self-Efficacy: “I can succeed.”

Self-efficacy, or the belief that “I can succeed,” is a logical extension of a growth mindset (Bandura, 1986). Students who are more self-efficacious choose more challenging activities, work and learn more efficiently, and are more persistent in their academic endeavors (Zimmerman, 2000).

In GoQuest, students work from the strengths identified in their learning profiles. When a teacher creates a GoQuest assignment, the profiles are used to select relevant websites for each student. Thus, while an entire class may receive an assignment on fractions, one student may study music and compose a melody, another may visit the running track and create a chart, and a third may work in the kitchen and adapt a recipe. Every student begins with the message, “I have interests and strengths,” and then goes on to use those assets to grow – both to solve real-world problems and to achieve academic success.

The GoQuest attention to expression styles is, in itself, empowering for many students. They may be skilled at creating products not valued in a traditional classroom, and their GoQuest learning profile may be the first voice ever to tell them that these skills are strengths. The student who struggles with writing will continue to complete written assignments, but may also experience success by creating a diorama, performing a skit, or planning a service project.

Mindset #3, Sense of Belonging: “I belong in this learning community.”

When students perceive a community, and believe that they are members of it, they become engaged and student agency flourishes (Harvey, 1963; Oyserman, Bybee, & Terry, 2006). In a community, learning is a shared experience that provides immediate rewards and the sense of belonging gives each student the confidence to act. If the community extends beyond the immediate classroom and peer group, the student becomes a growing, self-efficacious agent who learns to participate in many contexts.

Schools that adopt GoQuest soon come to define their learning communities broadly. Over time, a “good” student isn’t only a student who speaks articulately and writes well; it may also be a student who organizes groups, builds, creates, designs, performs, or programs.

As they investigate problems and develop projects, students may venture outside the classroom to interview, observe, and “job shadow” local experts. They learn the specialized vocabulary and the research methods of one or more disciplines; they assume the role of a practicing professional. All the while, they observe their classmates trying out other roles and professions, creating specialized products valued by those groups (and sharing those products, and entering them in contests). It is as individual students join these professional communities —of architects, journalists, historians, artists, entrepreneurs, athletes, scientists, musicians, teachers, and engineers—that the classroom becomes a learning community.

Mindset #4, Relevance: “This work has value and purpose for me.”

Whether the learning environment is project-based, traditional, or blended, students’ commitment to the community and its work relies profoundly on their perceived value of the task at hand. William Damon, a leading expert in human development and the author of The Path of Purpose (2008), states that students today are high achievers, but lack a sense of purpose to direct this yearning to achieve. Research on intrinsic motivation supports this
judgment. Cordova and Lepper (1996) found significant increases in student learning measures when activities include personalization and choice.

GoQuest directs students’ attention to real-world problems that have obvious intrinsic value. They exist in an entirely different way than some school tasks; they are not contrived, but are stubbornly real. As students investigate these problems, they are not merely retracing the steps of a thousand classroom cohorts, but legitimately feel like pioneers and trailblazers. Their solutions, however provisional, can be genuinely creative and can have practical effects. Moreover, students’ contributions are highly personalized; each student consciously draws upon the strengths identified in his or her GoQuest learning profile. Many students find value and purpose in this work because of its intrinsic value to their communities.
References


About Compass Learning

Compass Learning® is a learning acceleration company, providing software solutions for blended learning, prevention/intervention, credit recovery, and inquiry and project based learning for Kindergarten through 12th grade. Compass Learning solutions identify current performance levels, diagnose skill and concept gaps, and draw upon literally thousands of digital learning activities to prescribe individualized learning paths for each and every student. Learning paths and activities contain Common Core and state standards-aligned direct instruction, supported practice, independent practice, and formative assessment. Instructional content is presented through a blend of highly engaging, grade-appropriate full animation, video, and digital interactivity to deliver the right instruction to the right student at precisely the right time.

More than 2,000,000 students and 70,000 teachers in 10,000 schools rely on Compass Learning for their personalized learning solutions. Accessible 24/7/365 via desktop, laptop, or mobile device, our software motivates learners and re-energizes the K-12 educational experience.

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