



# PROMOTING CRITICAL INQUIRY IN TEACHER-EDUCATION CANDIDATES

*On a scale of one to ten, how would you rank your classroom as an environment of rich critical thinking?*

**P**roject-based learning is an educational method based on the premise that students learn best “by experiencing and solving real-world problems” through discovery and inquiry, with teachers serving as coaches or facilitators.<sup>1</sup> This method aims to help students think creatively for themselves, and makes learning come alive through inquiry and self-directed learning. Project-based learning includes the following four basic principles: (1) students apply things they have learned to solve problems; (2) learning is self-directed and controlled; (3) teachers adopt the role of coach or facilitator; and (4) students typically work in pairs or teams (as they would in real-world working environments).<sup>2</sup> Each of these components is necessary for the successful implementation of project-based learning. This article will provide a brief history of project-based learning, a review of the basic principles of this approach, and a description of how project-based learning was implemented in a teacher-education methods course.

## **A Brief History of Project-based Learning**

Principles of this inquiry-based approach to learning were modeled by Socrates as he taught his students through questioning, inquiry, and critical thinking about daily life. Confucius and Aristotle modeled the same philosophy and were early proponents of learning by doing.<sup>3</sup> Edu-

cation literature credits John Dewey with developing the initial concepts of project-based learning and advocating for the “learning by doing” approach. Dewey promoted his beliefs in his work *My Pedagogical Creed*, where he wrote, “The teacher is not in the school to impose certain ideas or to form certain habits in the child, but is there as a member of the community to select the influences which shall affect the child. . . .”<sup>4</sup>

Suzy Boss explains that Dewey’s ideas evolved into project-based learning. She writes: “Dewey challenged the traditional view of the student as a passive recipient of knowledge (and the teacher as the transmitter of a static body of facts). He argued instead for active experiences that prepare students for ongoing learning about a dynamic world. He pointed out, ‘Education is a social process; education is growth; education is not a preparation for life but is life itself.’”<sup>5</sup>

Dewey’s work influenced developmental psychologist Jean Piaget, who believed that learning took place as the individual constructed meaning from each experience. According to Boss, Piaget’s ideas “laid the foundation for the constructivist approach to education in which students build on what they know by asking questions, investigating, interacting with others, and reflecting on these experiences.”<sup>6</sup>

It is also interesting to note that Ellen G. White in the book *Education* discussed the effectiveness of learning by doing around the same time

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as John Dewey. She promoted the application of thought through real-life experiences, where the learner learns by doing. She wrote:

“Every youth should be taught the necessity and the power of application. Upon this, far more than upon genius or talent, does success depend. Without application the most brilliant talents avail little, while with rightly directed effort persons of very ordinary natural abilities have accomplished wonders. And genius, at whose achievement we marvel, is almost invariably united with untiring, concentrated effort.”<sup>7</sup>

Project-based learning, then, is not new; it has a long history of implementation. Today, this methodology is experiencing a renaissance with various levels of success among teachers and students.<sup>8</sup> And while the philosophy of project-based learning has gained a stronghold within educational circles, Adventist and Christian educators must think about how this philosophy supports their ability to integrate faith with learning. If Seventh-day Adventist educators believe that God’s ideal for His children is accomplished through “a path of continual progress,”<sup>9</sup> then they must also ensure that every youth is taught “the necessity and the power of application” as he or she walks that path.<sup>10</sup> Project-based learning can help educators achieve this goal and help students experience success.

### What Is Project-based Learning?

Project-based learning belongs to a family of teaching approaches that includes discovery learning, problem-based learning, experiential learning, inquiry-based learning, expeditionary learning, and constructivist learning. Using these approaches, the teacher is the “guide on the side and not the sage on the stage,”<sup>11</sup> providing a basic structure for what students learn through research and experimentation.

Teachers using project-based learning facilitate, coach, and guide students toward actively investigating and working on their own projects. According to John W. Thomas, teachers can lead their students into a deeper understanding of content by challenging them to solve problems or do simulations that mimic real life.<sup>12</sup> This model of teaching, he argues, facilitates quality learning. Teachers need to understand that coaching, facilitating, and guiding students are planned, intentional teaching tasks and not minimally directive ones. Minimal guidance during instruction is less effective, especially for learners who have limited prior knowledge within a content area. Effective coaching reduces the perpetuation of misconceptions and errors by providing feedback and prompts that guide students to higher levels of thinking and problem solving.<sup>13</sup>

Thomas<sup>14</sup> states that the project should consist of complex tasks involving students who problem-solve, make decisions, or investigate. Larmer et al.<sup>15</sup> include additional elements such as sustained inquiry, authenticity, student voice and choice, and reflection. Of reflection, these authors state: “Throughout a project, students—and the teacher—should

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reflect on what they’re learning, how they’re learning, and why they’re learning.”<sup>16</sup> Different authors suggest that a class discussion of real-life issues can lead to deep thinking and involvement in project-based learning, encouraging greater student engagement and interest in the assigned tasks.

Similar to Darling-Hammond, Jane L. David<sup>17</sup> lists four major approaches when considering a project for students to develop:

1. Solve a problem (“How can we reduce environmental waste?”).
2. Investigate a phenomenon (“Why does a tennis ball bounce higher than a basketball?”).
3. Design a model (“Create a model of a cell and its parts.”).
4. Research a topic to present information that will help others make a decision (“Should the school board vote to require uniforms?”).

Larmer and Mergendoller<sup>18</sup> suggest an additional seven essentials:

1. A need to know about the topic.
2. A driving question.
3. Student voice and choice.
4. Twenty-first-century skills.
5. Inquiry and innovation.
6. Feedback and revision.
7. Publicly presented product.

Varied approaches can be used to implement project-based learning in the classroom. The teacher needs to use his or her discretion in choosing the methods best suited to meet the needs of the curriculum and the students involved. The teacher must lead the students to think, research, and learn through their own research while serving as coach, facilitator, or guide.<sup>19</sup>

### Introducing and Using Project-based Learning in the Classroom

Implementing project-based learning in higher-education classrooms became a mandate from the Education Department of the Government of Alberta, Canada, in 2013.<sup>20</sup> Educators were also required to fully implement project-based learning in all schools from K-12. Alberta universities with teacher-education programs were coached regarding how to introduce and implement project-based learning in their classrooms. University-based students were thus exposed to real-life project-based learning activities in their practicum classrooms. This practice is still ongoing in K-12 classrooms in both Adventist and public schools in Alberta, and in teacher-education programs throughout the province.

### Initial Implementation

During the 2006-2007 academic year, the opportunity arose for me to apply my theoretical knowledge of project-based learning in my EDCI470 Reading and Writing Skills in the Content Areas class. My desire was to see how my university-age teacher-education students would use the knowledge they gained in my class to construct a project-based learning assignment for children who would be in their practicum classes.

The experience is summarized below, where I share how I navigated the process, results, and reactions from my students.

Students in EDCI470 usually develop several microteaching lessons based on relevant strategies taught in class. Because the course did not require a unit plan, I opted to introduce project-based learning instead. I referred my students to various journal articles on project-based learning, based on the concept of teaching students to think “outside the box” and to think for themselves while making learning “happen” or “come alive” with and through discovery and inquiry.

By the 2010-2011 school year, while expanding my study of inquiry-based teaching-learning approaches, I came across many more strategies that included the use of technology. This discovery led to having students use “new literacies” (e.g., hypertext, hypermedia, Weblogs, Wiki, Ning, WebQuest) in constructing their project. According to the primary textbook used for the course, students should be able to “Surf the Internet and bookmark, learn how to blog and build a wiki, be able to read and write and learn with texts that have multimodal elements such as print, graphic design, audio, video, and nonstop interaction.”<sup>21</sup> A shift in how information is shared has occurred, and teachers must ensure that students can navigate both print and screen literacies.

After reading selected articles and textbooks, and searching for resources on the Internet, the EDCI470 students began to create project-based lessons that included the new literacies described above. They used the ideas presented in the text and searched the Internet for additional ideas on project-based learning. Working individually or in teams, they selected topics typically taught in junior high or high schools, or that

they planned to teach in their major or minor content area(s) in the future.

Students received a copy of the activity and grading rubric shown below before they started on their project, which gave them prior knowledge about what was expected of them in terms of project-based learning, and how they would be graded at the end of the project.<sup>22</sup> These rubrics have been used in this particular class for the past four years (2011-2015).

### **Current Implementation**

From the 2013-2014 academic year to the current 2015-2016 school year, students in the EDCI 470 Reading and Writing Skills in the Content Areas class have been given a project-based learning assignment. This project requires them to develop an assignment built on principles of the project-based learning model. They work on a topic typically taught in their major or minor content areas, and focus on involving their students in active learning.

Grading rubrics were again shared with the pre-service teachers before they started on their project. They were given the option to work with others who were specializing in the same content area or work alone on a chosen topic. They were expected to complete their projects within a seven-week time frame.

### **Examples of Student Projects 2013-2014**

Since this class was smaller than usual, the students chose to work on individual projects. During the 2013-2014 school year, two students gave

## **EDCI470 Reading and Writing Skills in the Content Areas Project Rubric<sup>23</sup>**

### **Rubrics for Project-based Learning Activity**

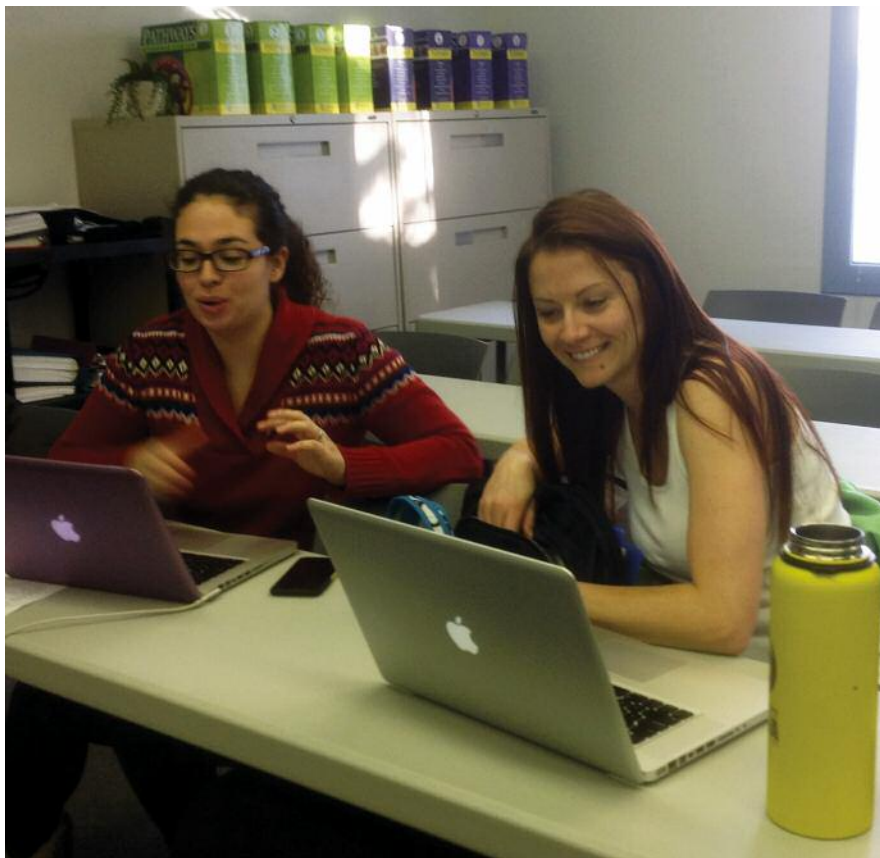
This activity is based on information learned in class regarding “new literacies” that permeate our classrooms. You will construct a project-based learning activity where students will have to learn in a community rather than by themselves. Remember to give guidelines for students to use as they work in a group. Include your expectations and rubrics on how you plan to grade your students.

<b>Comments</b>	<b>Total Points 100</b>
Entry Event	10
Steps to Use in Project	10
Directions for Students	10
Looping Students	10
Concluding Project	10
Deadlines	10
Grading Scheme	10
Project – Final Evaluation	10
How well does this activity cover “new literacies”?	20
<p>You may use this rubric as a template or create your own. Your final product will be evaluated based on the rubric you choose.</p> <p><i>Created by June Fiorito, 2013.</i></p>	

me permission to cite their projects and use them as demos in my classes. Annina<sup>24</sup> worked on an art project that she planned to use in a workshop for her students. Naomi<sup>25</sup> chose the topic of “Globalization” to present to a high school social studies class.

Using “Art 30 Lab Class” from Google.docs, Annina instructed her high school students to focus on Art 30 (Alberta, Canada: Grade 12 equivalent). Students were expected to assimilate all knowledge and skills they would or should have acquired throughout high school and implement them in a final exhibition. They worked in small groups to set up, advertise, and then present a full-fledged exhibition of their work and to record it in an electronic or hard-copy portfolio.

Naomi, on the other hand, chose to use Wikispaces for her project-based learning assignment. Her project had two guiding questions: “To what extent should we embrace globalization, and what can we do to make a positive change in the world around us?” Naomi led her students through the following steps: Planning, Retrieving, Processing, Creating, and Sharing. She ended her project by calling on her students to participate in a “Final Reflection” during which they were to discuss and debrief their experiences during the project.



Students were given the option to work alone or with classmates who were specializing in the same content area, or in areas that worked well together.

### Examples of Student Projects 2014-2015

During the 2014-2015 school year, more students opted to work on project-based learning assignments in groups. Students who had similar specializations or minors grouped together to work on their projects. The process worked much better with group participation because input from their classmates helped to strengthen each student’s project. As they collaborated, and sometimes disagreed about what to include or not to include, they were able to fine-tune their strategies.

Cody and Hazel<sup>26</sup> chose to work together on a project that involved poetry, part of their English specialization. They led their students into a hands-on study of poetry. “New Literacies” played a major part in their presentation.

Kayla, Joseph, and Sarah [pseudonym],<sup>27</sup> who were specializing in science, worked on “Grade 11 Biology: Human Systems Unit D–Project Outline: Systems and Diseases.” Their high school science lessons incorporated principles of project-based learning.

Zachary and Tristan<sup>28</sup> chose to work on a project that would enhance the teaching of Bible-related topics. Their title, “Coexist,” was based on the *Journey to Excellence* Grade 9 Secondary Religion Standards in North American Division Seventh-day Adventist schools. The project used Web-Quest to help students complete assignments based on the content.

### Conclusion

Over the past nine years, as I introduced project-based learning in

my higher-education classes, I have experienced both positive responses and indifference from my students. Reflecting on each experience helps me build on the successes and look for ways to address student indifference. My goals are to get students interested in their own learning and help them prepare to teach their future students.

The question should not be: “Is there a perfect version of project-based learning?” I believe there are no neat or tidy solutions for real-world problems. Individual educators can add or subtract features to create what they regarded as an ideal project-based learning assignment. This will help them (and teacher-education candidates) learn to navigate challenges, seek opportunities to integrate their faith, and become comfortable with searching for practical solutions to real-world problems. Currently, project-based learning is one of the hands-on approaches that has caught the vision of K-12 students and teachers in higher-education classrooms. Teachers who encounter challenges may access many online resources and books on how to plan and implement project-based learning in the classroom. I recommend collaborating with colleagues, as well.

Project-based learning allows students to be self-directed in pursuing topics pertaining to curricular needs and interests. Teachers in turn serve as coaches, facilitators, or guides, supporting students as they engage in inquiry and discovery. The approach provides Adventist educators with multiple opportunities to create learning experiences that mirror real-world experiences as students solve problems, investigate difficult topics, and create solutions to problems. ✍



During the collaborative process, students relied on input and feedback from their peers. Team discussions helped them navigate disagreements, and ultimately, fine-tune the strategies used in their final projects.

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*This article has been peer reviewed.*

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