Individual Pursuits as Project-based Learning (/blog/article/2017/06/25/331-individual-pursuits-as-project-based-learning)

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Janice Dinelhas been a teacher at New Horizons School since 2001. In that time, she has taught a variety of grade levels and different courses. Her love for technology drives her to seek learning opportunities for her students that enhance their skill sets. Throughout her 16 years of experience with gifted learners, she has come to understand their unique needs. She strives to incorporate a more project-based learning approach in her teaching as a way to engage and push gifted learners to be creative problem solvers in a collaborative environment. This action research project was borne out of this need to provide this approach, but yet preserve the unique learning needs of each student.

Lori Vigfusson has been a teacher since 2006 at New Horizons Charter School in Strathcona County. She received her Masters in Education in 2015 and moved into the role of Vice Principal. She is also the school counsellor, providing social and emotional support to students in individual, small group, and whole class settings. Her 11 years of experience working with gifted students has allowed her to learn much about working with this unique population. She loves helping students find the joy in learning and has always strived to provide engaging, hands-on learning opportunities where students can collaborate and share their discoveries with others.

Summary/Abstract

This research focused on how to move individualized student research projects (Independent Studies) to a more project-based approach, yet still allow students to explore a research area that would be of their own choosing. Our first strategy moved from topic-based inquiry to a problem/question based inquiry, which is more in line with Project-Based Learning (PBL). Our second strategy moved toward a more collaborative approach in the inquiry process. This approach incorporated the collaboration aspect of PBL to solve inquiry problems. Finally, we incorporated a number of PBL components into our lesson plans including: PBL Elements from the Buck Institute for Education, PBL protocols, surveys, student self-reflections, and interview questions. Essentially, our research focuses on how, as teachers, we might change individualized student learning to more collaborative student learning.

Context

Our research took place with three Alberta elementary classes from a Charter school within central Alberta. Charter schools are unique in that they are publicly funded and therefore accountable for the Program of Studies as set out by Alberta Education; yet, each school has a specific mandate or charter for which it is also accountable. The school in this research includes kindergarten to grade 9 with about 250 students and has a charter of meeting the academic, social, and emotional needs of gifted learners.

The classes involved in the research were grades 4, 5, and 6 with a total of 68 students. The school's charter mandates that the school will "Promote specific projects geared to individual student interests and abilities while focusing on in-depth research and the development of strong presentation skills." To meet this mandate, every student in the school completes an Independent Study (I.S.) research project each year based on a unique area of interest to that student.

The school also has a focus within its Education Plan to incorporate Project-Based Learning activities throughout the school year. Because the format of the I.S. was intended to be inquiry-based and allowed students to research and share information on a passion area, some aspects of the I.S. fit within the Project-based Learning model and so became a strong foundation upon which to base our research project.

Aims and objectives

How can we move our independent studies (individual pursuits)

towards using a project-based learning approach?

At the onset of our research project, we were hoping to address three main problems over the course of our study. These were:

1. As previously mentioned, our school is moving towards implementing a more project-based learning approach to deliver learning outcomes.
2. We have also had an ongoing desire to improve our Independent Study projects to make them more meaningful to students and allow greater engagement within these individual pursuits.
3. Students at our school have access to a lot of technology (a 1-1 ratio from grades 4-9) on a Google platform and we were looking for ways to better incorporate this technology into student learning.

In the beginning, our interest was primarily how we could use technology to assess and manage project-based learning. We soon discovered the vastness and complexity of such a task. We narrowed our investigation to how we could use Google applications to manage and assess project-based learning. With this in mind, we began to explore areas in our current program that could be improved through a Project-based Learning approach using technology.

We had previously decided that our Independent Study (I.S) projects from grades 4-6 would be a good context for collecting our research data. We have linked our Independent Study projects in the Alberta Language Arts Program of Studies General Outcome 3; "Students will listen, speak, read, write, view and represent to manage ideas and information" (Alberta Education, 2000)**.** Through this outcome we assess the skills associated with research rather than the content so students are free to choose a topic that is of interest to them. Many key components of Project-based Learning were already embedded in the I.S. projects and technology use was also a key component to the research and presentation components. Through further discussion and understanding of Project-based Learning, we concluded that, although technology was a valuable tool in implementing project-based learning activities, it was not where the focus should be to move our educational program forward. Rather, we realized that we had an opportunity to improve the depth and complexity of these I.S. projects by including a more PBL approach.

This opportunity felt like a more meaningful approach to our research because it solved a problem we had been having about how to improve upon our current I.S. projects while at the same time incorporating more PBL into the learning environment. After studying the issue, we had that Project-based learning would provide deeper learning opportunities for our students; thus, our new question became:

"***How can we move our Independent Studies program to a more project-based learning approach?***"

Related Literature

As part of our research, we conducted a literature review. The literature review found here explores research in project-based learning and best practices within gifted education. Although our research took place in a congregated setting with gifted learners, we believe this review is applicable to a variety of learners across many grades and learning environments.

Project-based Learning

There are many definitions of project-based learning (PBL). For our research, we focused on the idea that "project-based learning is a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging and complex question, problem, or challenge" (Buck Institute, 2017). *Gold Standard PBL* (Larmer, Mergendoller, & Boss, 2015) notes seven essential elements to successful project-based learning activities: Student voice and choice, Authenticity, Sustained Inquiry, a Challenging Problem or Question, a Public Product, Critique and Revision, and Reflection.

PBL Benefits

Project-based learning has a variety of benefits: these include student engagement and acquisition of 21st Century skills. Soporat, Arnold, and Klaysom (2015) found that students participating in PBL learned the following 21st Century skills: Communication Capacity; Thinking Capacity, which includes students "show[ing] that doing projects helped them pay more attention" (p. 17); Problem-Solving Capacity; Capacity for Applying Life Skills through collaboration and supporting one another; and Capacity for Technological Application. This article also found that low-ability learners reflected on improvement in collaboration and high ability learners reflected on improvement in their ability to solve problems (2015).

In *PBL for 21st Century Success,* Larmer, Mergendoller, and Boss (2013) found that using PBL in the classroom improved achievement, helped students master 21st Century skills, provided equity amongst diverse learners, improved motivation in learning, and increased job satisfaction in teachers who had shifted their instructional pedagogy to PBL.

Gifted Education

Gifted Learners should be provided with regular opportunities "to be unique and work independently in their areas of interest" (Rogers, 2007, p. 385). Independent study projects provide opportunities for students to engage in meaningful research on individual areas of interest. Rogers also believed schools should "provide opportunities for gifted learners to socialize and to learn with like-ability peers" (2007, p. 388). Collaboration is a key component of Project-based Learning, and this collaboration provides students regular opportunities for socialization and peer feedback.

Kanevsky and Keighly (2003) explored factors contributing to boredom in gifted students who disengaged from classroom learning. They report that 5 Cs were necessary to keep students engaged in learning and to avoid underachievement: "control, choice, challenge, complexity, and caring" (p. 22). Our Independent Study Projects met these 5 Cs, although these seemed to be lacking in complexity for some students. By layering the PBL approach over our existing I.S. projects, we were able to help students create more complexity in their projects. All students in the study stated a need for complexity in their learning. "They sought novel, authentic, abstract, open-ended experiences" (2003, p.24). Students enjoyed tasks that allowed for high-level critical thinking and questioning that allowed them to express their emotions and/or interests.

Strategies We Discovered That Improved Our

PBL Experience

In reviewing what we have learned through our research, the following Steps emerged from our study as useful ways to promote effective PBL in our classrooms.

Step 1: Front-end loading (prior to kickoff event) individual classroom activities/lessons (approximately 1-2 weeks ahead)

First, our study found that we could improve student learning by teaching note-taking skills that helped students organize their research notes and helped them translate more complex documents into their own words. We found that teaching this skill was also beneficial throughout the year in other subject areas. To teach this skill, we reviewed Bloom's Taxonomy and focused on asking students questions, especially higher level questions, to help prepare them to write their Big Question. We also worked with students to turn their topics into questions.

We engaged a PFL (Possibilities for Learning) survey from Lannie Kanevsky in our grades 4 and 5. However, for the purposes of this project, using this survey did not add value to choosing the Big Question and focusing research questions, which we had hoped. However, we found that citing works for research about activities specific to grade level helped us introduce the 9 themes that added complexity to research as recommend by Kanevsky. We also used these to group students for collaboration.

Second, our study found that increased communication with parents prior to commencement of IS was helpful. Specifically, each teacher sent a memorandum to parents regarding the following: (a) nature of the project; (b) how the project was tied to curriculum; (c) expectations for project during school as well as outside of school; (d) appropriate ways for parents to assist students in the project; and, (e) additional information such as student resources and project components.

Step 2: Kick-Off Event

Three TedTalk choices were offered, and our students signed up for one of these. These choices were authentic examples of how young people conducted meaningful research. Students watched and then collaborated in small table groups to come up with possible themes and Big Questions that could result in the end product (TedTalk). Then, at each grade level, students were provided time to come up with a Big Question from their topic and then assign a possible theme that question would fall under.

Step 3: Proposal Writing for Research (planned focus for inquiry)

The focus in this step was to write higher-level questions to guide sustained inquiry. The summative assessment for this would be a written proposal. Grades 4-6 attended a seminar titled Creating Higher Level Questions. The seminar showed students how to take "lower-level (less) thinking questions" (knowledge and comprehension on Bloom's taxonomy) and turn them into "higher-level (more) thinking questions" (application, analysis, evaluation, and synthesis). After the seminar, students did two classroom activities to follow up: these were (a) Answering Questions - Little, More, Most and (b) Raising the Question Level. Additional instruction occurred at the classroom level for specific requirements at each grade level to help students prepare questions for their proposals.

Before submission, students engaged in a Fishbowl collaboration activity to share their proposals

for critique and revision (PBL Component). This activity proved to be really helpful, but we came to see that more attention to student groupings and a more time modelling should be spent on how to provide good feedback. Students were allowed time to make revisions before handing in the proposal two days later.

Step 4: Research

The focus of this Step 4 was to help students gather information to answer their guiding questions. We began the research phase with a seminar on using library resources before visiting our local Strathcona County Library. The seminar included instruction and practice determining and using keywords while searching for resources. We then had students go onto the online library catalogue to look for sources and record their call numbers. Students also explored the online reference centre and we discussed the importance of gathering valid sources and suggested encyclopedias as a good starting place for their research. Students were given a template for properly citing sources and were reminded to cite sources as soon as they began recording information from them. At the library, we divided students into groups of 4 and 5 with a parent volunteer to help locate and sign out books and other sources.

After our library visit, students were given approximately two weeks to read and record research findings. Students were encouraged to adjust their questions and research focus based on information needed to allow students to answer their deeper-level questions as part of sustained inquiry. Students met during this time using the Peer Critique Protocol (see supporting documents). The purpose of using this protocol was to foster collaboration as well as provide an opportunity to critique and revise research (PBL elements). The collaboration was useful for those students who were at a further point in their research. Some students did not feel they had gathered enough information to collaborate at this point and they suggested that, in the future, a longer research period might be useful along with a later collaboration so that information could be more thoroughly assessed and more useful feedback given.

At the time, it was felt that a full week of research was enough for students to complete their research; however, after presentations, it was clear that students needed longer sustained inquiry to fully answer their deeper questions. Grade 6 also needed more time both due to a greater number of higher-level questions being required and because they needed additional time to set up the expert interview required for authenticity at this grade level. Students were provided research organizers for recording research and grade level rubrics to help guide their inquiry and communicate their projects' criteria in relation to Alberta Education Program of Studies. (These items are also included in the supporting documents.)

Step 5: Presentation

A number of different information sessions were presented to students. All grade 4-6 students attended a seminar on Google Slides, which focused on slide show etiquette and using Google slides as a presentation tool. Grade 4's attended a classroom presentation on Do's and Don'ts of presenting in front of an audience. Grades 5 and 6 engaged in a classroom discussion and instruction on presentation skills. In general, we found that students seemed to need more assistance in the area of presentation skills because many had difficulty demonstrating these skills at a proficient level on the presentation rubric.

In general, we found that more time was needed to allow students to both prepare and practice their presentations. The Fishbowl protocol occurred too early and did not allow students to prepare and practice their presentations and to receive valuable feedback.

Presentations were held over a series of afternoons with the IS Fair on the last afternoon. Both were open to parents and students signed up for presentations they wished to watch. In discussing our work as teachers, we came to believe we should assign presentation dates and times earlier so parents would have adequate time to make arrangements to attend the presentations and to inform teachers of student absences.

A Google Doc was shared with all students that provided a short synopsis of the content of their presentations. An online software application was used (School Interviews.ca) for students to sign up for presentations. This application did not work as well as we hoped because it was complicated to set up and difficult for students to use. An alternative needs to be found.

Additionally, students prepared a booth based on their Big Question. This IS Fair (which was an hour long) was a public affair open to all students and parents. We found this fair provided an authentic aspect for students. However, an hour was not long enough; so, in the future we decided to give students an additional hour so they could participate to view other booths. We observed that many students would have benefited from additional direct instructions about how to prepare a good booth. We will include such directions in the future.

Step 6: Student Self- Reflection

Reflection was the final key aspect of Gold Standard PBL and we wanted to provide students opportunities to reflect on the process and their own learning. A Google Form Survey was sent to students that included questions about the various aspects of the project. These surveys were completed independently so students could comment on their own performances during the inquiry process. We found that, although some students found this step useful, more time should be allotted to review the questions with students and for more thoughtful reflection. This aspect was new to the Independent Study Projects and worked well. (The survey is included in the supporting documents.)

Our Data

We collected qualitative data using teacher self-reflections and teacher conferences to compare and contrast our past Independent Study projects with the project-based learning model as shown in the chart below. We wanted to see how our original format of Independent Study projects compared to Project-based Learning activities so we could see what areas needed to be changed.

Independent Study prior to PBL	Independent Study using PBL approach
Individuals working in individual Classes without collaboration	Multiple grades collaborating together using *critique and revision*
Teacher check-in on progress	Teacher check-in, self and peer check-in on quality of research using *protocols*
Topic Based	Question/Inquiry-based
Individual research based	Individual research based
Student voice and choice	*Student Voice and Choice*

No focus base for complexity	Theme base for complexity
Grade Specific instruction	Grade specific instruction and multi-grade seminars
Individual class presentation	Multi-grade ted talk style *public presentation*
Assessment on research process and presentation	Assessment on research process and presentation
Project began with instruction	Project began with Kick-off activity
Information organized under headings	Information organized under questions
Specific number of questions required	Focus on answering *challenging problem or question* using appropriate number of smaller question
Knowledge/Comprehension level questions (Bloom's Taxonomy) drove research	Synthesis/evaluation level question drives research
Sustained Inquiry	*Sustained Inquiry*
Reflection more focused on content	*Reflection* focused on research and collaboration process as well as presentation skills.
Limited authenticity	Increased *authenticity* due to larger scope of audience

Italics indicate gold standard PBL by John Larmer

At each stage of the project we collected qualitative data through teacher observations, informal discussions with students, teacher conversations and through assessing student work using teacher-created rubrics based on the Alberta Program of Studies for Language Arts. To keep track of our conversations and observations, we created a Google doc that included a timeline of activities and due dates for the various components of the project. Using a Google doc was the best method for recording this information as it was easily accessible and viewable as a collaborative document. In this document we added our reflections and observations at each phase of the project so that we could keep track of what worked well and what could be changed in subsequent years. This document was completed collaboratively with all three teachers contributing based on the conversations we heard during student collaboration as well as when working individually with students at the different stages of their research.

Research Findings

Our study began with a focus on technology and PBL, but realized the vastness and complexity of such a project. Because our school is on a Google platform, we narrowed our research to Google applications/tools and the PBL focused on our Independent Studies. Critically analysing the way we deliver the Independent Studies outcomes, we realized that we needed to find out how to move this program to a more PBL approach. We used the Gold Standard for PBL and its seven essential elements to guide our remodelling of the Independent Studies program.

We found a small number of key things to do to move from a more independent topic-based study to a question and collaborative-based study. Specifically, we came to believe we should:

1. Provide instruction about how to ask deeper-level questions.

2. Provide tools to collaborate on individual projects effectively.
3. Include Google tools and applications to enhance the PBL approach.
4. Provide more authenticity.

To help students ask deeper-level questions, we delivered a seminar on how to ask deeper level questions with several follow-up activities specific to grade level. This seminar provided the necessary Big Question or Guiding Question for PBL to ensure the complexity and depth of the research.

Throughout the project, we used several Google applications and tools. One useful collaborative activity was the sharing Google Documents between students. Additionally, students received a seminar about how to use Google Slides effectively so they could improve their presentations and also ease sharing this with their teacher and classmates. Delivery of materials to students was more efficient and effective using the Google Classroom application and gmail. Using a Google Form for the student self-evaluation allowed us to compile data in a more efficient format to analyze.

Collaboration protocols such as the fishbowl and table talk provided students with vehicles to collaborate about key components of the project such as creating questions for the proposal, sharing research, and presentations. This fishbowl, coupled with the Google sharing, enhanced the collaborative process.

Our current Independent Studies already were authentic in the sense that there was much student voice and choice with regard to the research focus. Additionally, students had to deliver a presentation to their peers. To improve this presentation, we increased the audience scope by setting up presentations as a seminar or Ted Talk style open to not just their own grade, but grades 4-6. Students would sign up for presentations they wished to attend. Parents were also invited to these seminars. Following the presentations, all students and teachers and parents from the school were invited to an IS Fair where students created a booth revolving around their Big Question to demonstrate the key learnings from their research.

Overall, the changes we made helped move our current Independent Studies program to a PBL approach. We found that our current program did have some key components of PBL, but was missing a collaborative approach. This aspect was probably the most problematic to incorporate because each student had his or her own Guiding Question rather than all students focusing in on the same question. We turned to some gifted literature to help us find a means to group students. Using the nine themes for guiding complexity in research provided us with this means. With regard to student engagement, we noticed that students were more invested in the presentation portion and IS Fair booth. The authenticity of these two aspects held students more accountable, but also seemed to be the portion the students worked the hardest on and enjoyed the most.

For next year, we intend to make the following changes:

1. More front-end loading on creating good questions because we found the quality of research really depended on this aspect.
2. More time provided for students to research. If students changed their topic or had difficulty obtaining resources, they were short on time.
3. More focus on presentation skills and allowing more time for students to prepare. Students need more direct instruction about what good presenting is and more time to prepare visuals and practice.
4. Allow more time for students to prepare their presentations before collaborating. Many students did not have the basics for their presentations completed, so the feedback

during this process was insufficient.

5. Smaller groups for the fishbowl collaborations. Students lost focus and the time required to collaborate was too long.

6. Add a peer evaluation component for the presentations. With regard to the feedback on the Student Reflection survey, students did not have a good sense of how well they presented.

7. Change some of the Student Reflection questions to better reflect data we needed and to focus on the skills and process, and also go over the survey with students to clarify what aspects they should consider before answering the questions. After looking at the survey results, we realized some of the questions were ambiguous and/or did not focus on what we wanted to analyze to improve the process.

Key Learnings

Project-based learning activities typically start with one big question that all students collaborate on throughout the research process. For our project, students created their own big questions to research and then used a PBL approach to explore these questions. Through this action research project, we learned that it is possible to successfully move Independent Studies projects toward a PBL approach provided there is enough time to complete all aspect of the project effectively. There were many benefits to PBL and using this framework for our independent study projects allowed our students to develop and practice key 21st Century skills. Student engagement increased through this process and students took more ownership over their work because there was more accountability as a result of collaboration and peer feedback.

As we discussed and reflected on our project as teachers/researchers, we found time was the biggest factor in determining success or failure at each step of the process. From start to finish, students were given five weeks to complete the project and at many points we found ourselves wishing we had provided more time to the students. PBL requires sustained inquiry to be effective and, while students were engaged in the process for a significant amount of time, there were still areas where more time was needed. For example, we found students needed more scaffolding at the beginning to be able to ask higher-level questions; so, additional time would have been beneficial to ensure student understanding. The time students needed to research their questions seemed too short, and many students commented that they would have liked more time to gather information and organize their notes. Throughout the entire project, we found that finding ample blocks of time for students to collaborate and being able to schedule that time around other curricular obligations proved challenging. Students appreciated the collaboration time, but the sessions often felt rushed: more reflection time would have been helpful. We also found that students wanted more time for collaboration and planning and organizing their presentation.

In the future, we think it would be beneficial for any teacher planning such individual PBL to begin the instructional portions (creating good questions, use of Google tools, note taking and organizing skills) of the project well in advance of the actual project so students would have ample time to practice and hone these critical skills before more independent inquiry.

What's Next?

This action research project allowed us to determine that Independent Research projects could be moved toward a more PBL approach. One future area of study that could emerge from this

research project might include gathering and analysing data on student engagement throughout the process. Teacher observations and informal class discussions suggest evidence that students were more engaged in this form of PBL research than in previous years, but statistical data was not collected to corroborate this. Another area for future study might be in the acquisition of 21st Century skills. Although students demonstrated these skills throughout the project, it is not clear to what extent this project taught and/or improved these skills in students.

This project opened our eyes to the power of authentic learning activities and the importance for allowing choice and voice in student learning. These have always been a part of our regular classroom teaching; however, we will definitely be more thoughtful to include these aspects into other areas of our teaching practice.

Supporting Documents

We have the documents listed below, but many of them are specific to our environment/project. If you are interested in any of these, please request copies via the contact information below.

- Themes (Lannie Kanevsky)
- Proposals 4-6 with rubric
- Creating Higher Level Questions Google Slide
- Fishbowl Protocols
- Google Slides Presentation and notes for seminars
- Creating and Answering Questions - Little, More, Most Slide Show and supporting activities
- Research Organizers
- Research Rubrics
- Bibliography and Citation student materials
- Presentation Guidelines and Rubrics

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