Project-Based Learning and Multimedia Production

Submitted by:
Niall McFadyen

A paper submitted in partial fulfillment for the requirements of ECUR 805
August 11, 2018

Abstract

Project-based learning is a pedagogical approach that focuses on features such as a driving question, situated inquiry, learning technology, and the creation of a project, product, or artifact. Although project-based learning has potential limitations, there is evidence that suggests that it can be a beneficial approach in a variety of subject areas and with diverse learners. Connecting project-based learning to my own role as a middle years multimedia production teacher, I have written this paper with the purpose of exploring project-based learning and developing an initial draft of a model of how it could be implemented in my classroom.

Project-Based Learning and Multimedia Production Education

As a middle years multimedia and technology teacher, I work in a content area that does not have much in the way of a curriculum. Working in a school that grants teachers professional autonomy, I have a great deal of freedom with how I conduct my classes. However, within this context there is also not much developed in the way of pedagogical resources that are available to be used. I have chosen to write this paper as a discussion on the creation of a resource for the class that I teach by examining the pedagogical approach of project-based learning (PBL) and developing a model that could be implemented in my classroom.

PBL is a pedagogical approach that focuses on learning through experiential learning activities that moves beyond traditional rote memorization. It "has as its foundation the premise that the challenge of real-world problems can stimulate student critical thinking and sustain the high levels of engagement required to acquire and apply new knowledge" (Serim, 2012, p.26). It can be used in all grade levels and subject areas, and can work for all students (Larmer, 2018). Furthermore, project-based approaches can be beneficial to students with learning difficulties in language and mathematics, by benefiting them with academic performance, social engagement, motivation, and more (Filippatou & Kaldi, 2010). There is evidence that suggests that PBL is an effective method for teaching students complex processes and procedures relating to planning, communication, and problem solving, while increasing student engagement and academic achievement (Thomas, 2000, p.34-35). As a middle years multimedia production teacher in Winnipeg, Manitoba, I have identified PBL as a pedagogical approach that would be appropriate for the multimedia and technology classes that I teach. In the following paper I will examine the foundations of PBL, look at examples of PBL being implemented, discuss the context of the

course where PBL will be implemented, and design a project-based model that could be implemented in this course in the future.

Foundations of Project-Based Learning

PBL is a pedagogical approach that emphasizes a student's inner desire to learn by focusing on driving questions, student voice, student choice, communications skills, problem solving skills, revision, inquiry, and a publicly presented product (Larmer & Mergendoller, 2010). Krajcik and Blumenfeld (2006) describe PBL as an approach to address disengagement in schools by building on the work of John Dewey who argued that students will develop personal investment if they engage in authentic real-world problems and tasks that emulate what experts do in real-world situations. Krajcik and Blumenfeld further describe PBL as an approach that uses the ideas of active construction, situated learning, social interactions, and cognitive tools. PBL is a model where learning in organized around projects that involve students in complex tasks, challenging questions, and inquiry activities, while giving students the opportunity to work relatively anonymously (Thomas, 2000, p.1). Although there are slight differences between some of the guidelines and frameworks for PBL, they all generally follow similar principles, an example of these are listed by Krajcik and Blumenfeld (2006, p.318) which are:

- Students begin with a driving question.
- Students explore the question by participating in situated inquiry and in a process of problem solving related to the discipline.
- Students participate with teachers and community members to engage in collaborative activities to find solutions to the driving question.

- Throughout the process students are scaffolded with learning technologies.
- Students create a set of tangible products that address the driving question.

An additional consideration for PBL described by Larmer and Mergendoller (2010) is that student choice is an essential component to provide meaning and motivation to students in a PBL classroom. In the following sections of this paper these steps will be examined to elaborate on the framework that PBL is based on.

Driving Questions

Krajcik and Blumenfeld (2006) suggest that the driving question is the key to organizing and moving forward the activities of the project, and that it provides a context, continuity, and practice to the full range of activities (p.321). This essentially sets the vision and target for the project, and could in a sense apply to a wide range of topics and subjects. An appropriate driving question would represent the focus or heart of the project with clear language and it could be abstract, concrete, or focused on solving a problem (Larmer & Mergendoller, 2010).

Student Choice

Larmer and Mergendoller (2010) suggest that an integral part of PBL is allowing students to have choice within projects. This could range based on the how the teacher implements PBL, but Larmer and Mergendoller's examples include students choosing topics or driving questions, as well as students choosing how they create, design, and/or present their projects.

Situated inquiry

Throughout PBL, students engage with teachers and community members to explore the driving question and solve problems in a way that is central to expert performance in the related field (Krajcik & Blumenfeld, 2006, p.318). According to Thomas (2000), the research on

"situated cognition" suggests that in order to maximize learning, the context must resemble that of a real life situation (p. 7). Thomas also suggests that the projects must embody real characteristics that make them feel authentic to students, these can include the topic, tasks, or roles that students play (2000, p.4).

To guide student inquiry, Larmer and Mergendoller (2010) suggest that students generate a list of questions that then serve as a guide to searching for new resources, testing ideas, drawing conclusions, and developing new questions; and not just asking students to reproduce textbook or teacher generated material. The activities involved in this process must require the learner to transform, construct, or acquire new knowledge, or else it does not meet the criteria of PBL (Thomas, 2000, p.3).

Collaborative Activities

Collaborative activities are central to PBL as throughout the process students will work with others in their classrooms and their communities to ask questions, write explanations, form conclusions, and analyze information to share ideas, while offering criticism and feedback (Krajcik & Blumenfeld, 2006, p.325). This criticism and feedback is used by students to improve their process and final products or artifacts (Larmer, 2018). Projects may be worked on by teams of students where they can work on different components of their task, peer instruction is taught and encouraged, and students learn to assess the work of their peers and provide constructive feedback (Moursund, 1999, p.12-13).

Learning Technologies

Krajcik and Blumenfeld (2006) suggest that throughout the PBL process, students can use various scaffolded technological tools to assist them to participate in activities that are

normally beyond their abilities such as collaborate with others through networks, to gather data, represent information, to analyze data, to create models, and to produce multimedia artifacts.

Another consideration for technology in PBL is to consider how technology is being used by students. David Moursund suggests that one of the goals of using technology in PBL is to move students to "second order" uses of technology which focus on innovation, invention, rather than "first order" uses which essentially refers to technology being used to do something the same way as older technology, albeit just in a better way (Moursund, 1999, p.108-109). Moursund provides examples that these second-order uses could include the using a computer for the creation of videos, animations, or photographs.

Creation of Artifacts/Products/Projects/Presentations

Krajcik and Blumenfeld (2006) suggest that students can learn more effectively when they develop artifacts that represent their constructed knowledge as they actively construct and reconstruct their understandings through a continuous and reflective process (p.327). These artifacts could be in the forms of models, videos, drawings, games, or more. In the end, the product or project would be displayed and/or presented to people beyond the classroom (Larmer, 2018).

Project Based Learning in Subject Areas

In their book *Thinking Through Project-Based Learning: Guiding Deeper Inquiry* (2013) Jane Krauss and Suzie Boss describe strategies for integrating PBL into core subject areas, and identify the importance of making cross curricular connections. They write that typically in schools we close off disciplines and subject areas from one another, when in real life the problems we face are more interdisciplinary, thus it is important that we nurture students abilities

to produce interdisciplinary work (2013, p.68-69). PBL is one approach that can be used in relation to a variety of subject areas, and when working with information technology it can have the benefits including developing the ability to improve upon the transfer of knowledge between subject areas (p.39), while making the learning environment authentic and challenging, teaching students how to design and carry out a project that requires sustained effort, to develop information technology skills, and to gain self reliance (Moursund, 1999). A project in a PBL environment may connect through a variety of subject areas, and could potentially lead to the development of skills and attitudes well beyond what students may typically learn in a traditional classroom.

There are a variety of examples of PBL being implemented in classrooms. There are many websites that detail a variety of PBL examples and activities in schools, such as the list compiled by Miriam Bogler (2018) that includes examples that range from candy science experiments to cross curricular units based around zombie survival scenarios. Krauss and Boss (2013) suggest a variety of topics for the classroom including modern slavery, how information is power, how can we represent Newtonian physics, and more. There are also examples about using PBL in higher education such as Tiago Andrade's examples in his article *Project Based Learning Activities in Engineering Education* (2013), which detail his beneficial experiences of project-based approaches in his engineering education.

Project Based Learning and Multimedia Production

Within the context of students producing multimedia projects, different examples exist as to how PBL can be applied. John Larmer (2016) details teacher Al Summers engaged his students in a project-based approach about water quality, which results in students creating a

video to document their work. Similarly, Alfred Daniel Olivas (2013) describes using a project-based approach in a grade 6 science class where students engage in science projects, then produce a video as their lab report where they may learn and utilize a variety of media production skills including creating a storyboard, acting, and editing.

In their article *Energizing Project-Based Inquiry: Middle-Grade Students Read, Write, and Create Videos* (2012), Hiller Spires, Lisa Hervey, Gwynn Moriss, and Catherine Stelpflug, describe the process of students producing videos as part of a project-based approach while learning multimodal literacies. Their approach was to create films that followed the genre of "Cinéma vérité" that emphasized the content rather than production values. They followed a five stage inquiry cycle that began by students asking a compelling question, then gathering and analyzing information, followed by synthesis, critical evaluation and revision, and finally the sharing of the product. They emphasized a formative assessment approach that utilized a rubric as well as self assessment, peer assessment, and outside expert evaluation. Their conclusion was that this was an engaging and enjoyable process for students, and a next step would be more classroom based research, especially looking at how this approach would work with diverse learners.

Limitations of Project-Based Learning

One weakness of PBL is that occasionally inquiry questions become peripheral and that due to this projects can go off track unless the driving questions is centered on appropriate learning goals (Thomas, 2000, p.27). There are also concerns related to students using the internet as an inquiry tool if they do not have sufficient expertise with technology or in the content area, thus Land and Greene (1999) suggest that increased instructional scaffolding may

be needed to more effectively implement a project-based approach. An additional weakness reported by teachers with personal experience is that it is important for students to work in an environment where quality is emphasized through expert collaboration, learning exhibitions, and continued revision, all in order to ensure that projects are rich authentic learning experiences (Thomas, 2000, p.37).

In his dissertation, Robert Sahli notes that although PBL has resulted in higher academic scores, there is a need for teachers to have additional preparation and planning time with this approach, and it is important to consider the cost of such resources (2017, p.101). Larmer (2016, p.70) suggests that a common mistake in implementing PBL is that teachers are given inadequate training and support. Sahli also found that in one survey, teachers showed a preference to using traditional textbook based methods rather than a project-based approach as they felt the project-based approach required more planning and that the traditional textbook approach was more usable, more engaging, and was more academically rigorous (2017, p.93). Teacher attitudes and perceptions towards a PBL model and their amount of planning or prep time, could have implications as to the effectiveness of its implementation, and should thus be considered when implementing this approach.

A Model for Project-Based Learning in a Multimedia Production Class

In the following sections of this paper, I will describe a preliminary model for the implementation of PBL in the courses that I teach. This model is in an early stage, and is being developed for personal use within my own classes. Additional detailing and creation of resources would be needed to make it more universally applicable and before it could be implemented. In the following sections of this paper, I will examine the context of my teaching

practice, describe a rationale for why PBL is an appropriate approach, and describe a preliminary outline for the implementation of PBL focusing on goals, scheduling, the features of PBL, and assessment.

Context

This model is being developed as part a middle years multimedia production class that functions as part of a school division's technology education program which focuses on developing basic skills and positive attitudes in an area of learning, problem solving, critical thinking, and career information Within these programs there are a wide range of classes for students that range from industrial arts, performing arts, technology classes, sports, and more. The school year is broken up into three terms, where students will take one specific technology course for that entire term. There are multiple middle schools that take part in this program representing different neighbourhoods Winnipeg and the surrounding municipalities. These schools have a diverse population in terms of culture and background, as well as socioeconomic status.

In terms of assessment, this program uses both formative and summative assessment, while offering students the chance to express their own voice and to self-assess their own learning. Assessment methods used include portfolios, observations, written feedback, and rubrics. Report cards for individual courses are completed by the teacher during the last two weeks of each course and follow the *Manitoba Provincial Report Card Policy and Guidelines* (2017) which include the use of a four point ordinal for grade six students, and the combination of the ordinal scale and percentage grades for grades seven and eight students.

Although this multimedia course does not have an official Manitoba provincial curriculum, it has been developed within the guidelines of the technology education program and with outcomes designed through examination of the Manitoba *Literacy with ICT | A Model for 21st Century Learning* curriculum document, as well as an adaptation of the Manitoba *Senior Years Information and Communication Technology: Manitoba Curriculum Framework of Outcomes*.

It has been determined that the fundamental areas that this course covers are video production, audio production, computer science, photography, and graphic design, while making connections to a variety of other subject areas. This involves the creation of a variety of products or projects that may include a short film, a podcast, a video game, a website, or a graphic poster. The program has a variety of equipment that are available for students to use including high definition camcorders, DSLR cameras, various microphones, and Apple computers that have various multimedia editing and creation software installed from Apple and Adobe. Students attend this class for approximately 160 minutes every six school days.

Rationale

PBL is an appropriate model to be used within this program as the program emphasizes interconnected ideas such as student voice, hands on learning, problem solving, critical thinking, and cross curricular connections. Within the program there are resources including computer hardware, software, and audio/visual equipment that can allow students to create products and presentations that can demonstrate and share their learning.

PBL can also be seen as appropriate in this context as it can be beneficial to students who have learning difficulties by helping their content learning through alternative routes, however

this may require individual instruction and the adaptation of information sources by the teacher (Filippatou & Kaldi, 2010). Within this class, the opportunity exists for students to develop their learning in an open environment that does not function with a traditional prescribed curriculum. Thus in this context, while working closely with the teacher, students can have teacher assistance with exploring contents of their own interest while having the option of the teacher providing individual activities and adapting materials when needed.

With the additional consideration that the program focuses on cross-curricular connections, there is nothing prescribed as exactly what these need to be, so there is the opportunity for students to set this direction themselves. Thus this sets up an opportunity for students to set their own driving question to make connections to additional curricular areas while in the end presenting their findings and conclusions in a multimedia project.

Multimedia production provides an excellent opportunity for students to create a shareable project that can allow them to present their findings and conclusions in an authentic way. In her essay *Situating The Personal In Digital Media Production* (2008) Korina Jocson relates to the powerful expressive processes in the creation of digital stories and digital poems. Jocson describes these ideas in the context of a teacher creating a digital media production project in the guise of digital storytelling and digital visual poetry as a powerful means of self expression in a situated learning environment. Jocson's approach, as well as similar alternatives such as narrative or documentary films, would allow students to not only present their learning, but would also engage them in multimedia production based situated learning tasks such as digital editing, sound recording, photography, and more.

Goal

The goal of this model is provide students with a project-based approach where they can explore and investigate a topic that is interesting and relevant to them, while presenting and sharing their information through a digital multimedia production that will feature authentic situated learning tasks as directed by the teacher who is a specialist in this teaching area.

Time

This model is being designed as a unit that would take approximately eight, eighty minute classes to complete. This estimate may not be exact, as the nature of these projects could vary by class to class and student to student, therefore what is an appropriate amount of time for one class may not be for another.

Prior Knowledge

Prior to the commencement and implementation of this unit in class, students would receive some instruction on using various audio/visual equipment and computer programs. Students would not have been expected to have mastered everything, but would have a grasp on how they can use it, and would have an idea of what they could create. Throughout the project, students would likely need to develop further skills with this equipment through their own inquiry and guidance from the teacher.

Role of the teacher

Within this approach and model, the role of the teacher is not that of a lecturer of prescribed information. Instead the teacher functions as a facilitator, guide, and media production expert. Smaller lessons are still taught, but more in the sense of guiding students to develop their driving questions or assisting with the research process. When students require

assistance in developing their final products or presentations, impromptu on the spot lessons about planning or using media tools may be conducted.

Outline

Prior to the beginning of the implementation of this model, students will receive basic instruction on using the Apple computers with an emphasis on multimedia production programs such as iMovie. They will also receive instruction on the basics of using equipment such as DSLR cameras, microphones, and digital audio recording interfaces. The process for this project-based approach follow the following steps.

- Students begin with setting a driving question based on a topic of interest.
- Students explore this question and other related questions with an inquiry process that includes research, interviews, and possibly experiments.
- Students collaborate with other students, teachers, and experts, to critique and revise their information.
- Students organize their information using a word document or a graphic organizer such as a concept map.
- Students summarize their information and draw conclusions if possible.
- Students decide on an appropriate medium to create a product or presentation for their information.
- Students work with appropriate technologies and with the teacher who is a multimedia specialist to create their product/presentation with technology.
- Students present their product/presentation in a public forum.

- Throughout the project on an ongoing basis projects in process and when completed will be assessed using formative co-constructed assessment rubrics.

In the following sections of this paper, these steps will be elaborated in more detail.

Setting the driving question

Students will be guided by the teacher to choose a driving question that will encompass a social or environmental issue. They will be encouraged to pick a question that is relevant in a local context. This follows one of the suggestions of Krauss and Boss (2013, p.89-90) that driving questions related to social studies should align the projects with students' personal concerns by focusing on topics relating to the self, concerns of right or wrong, concern for others, and concerns for the world. Examples could include "Why is there poverty in Winnipeg?", "How can we stop bullying in schools?", or "How can I encourage people not to use harmful chemicals on their grass?". This will be adapted by the teacher so the focus is that students will develop a question that they are passionate about and potentially take action on. Throughout this process, the teacher will use some of the suggestions of Krauss and Boss (2013, p.88) where a focus will be on students being encouraged to take on the perspectives of roles such as economists, lawyers, city planners, folklorists, activists, philanthropists, and more. The teacher will guide the students to come up with an additional 5-10 questions relating to their driving question for the next steps.

Possible teacher prompts would include:

- What are some topics that you are interested in?
- Are there any specific problems or questions in these topics that you would like to explore?

Student Inquiry

As students begin to investigate their question, the teacher will model how to conduct an internet search to investigate information and record sources. As the students work, the teacher will provide feedback through casual conversations with students. Throughout this process a focus will be on information literacy using the guidelines suggested by Krauss and Boss (2013, p.85) which include asking students what they know about the source of their information, how reliable is the source, is there a bias, breaking the information down into chunks, and teaching strategies to analyze tasks. Tasks and prompts from the teacher could include:

- How do you search the internet?
- What types of websites and electronic sources are reliable sources of information?
- How could you collect, organize, and gather your information?

Depending on the abilities and needs of students, additional scaffolding may be required for individual students.

Collaboration

After students have had approximately one week to conduct their preliminary research, they will take part in a sharing and collaboration session where they will work with their peers to share the information that they have found. Students will be encouraged to provide 1-2 questions and 1-2 next steps for those that they work with at this stage.

Technology

Students will collect and record their information using the Google Apps for education platform. Students will also be encouraged to make a graphic organizer such as a concept map to

organize their information. At this stage, students will meet one on one with the teacher to discuss a media product that they can create that will serve to answer their question and present it to the public.

Situated Creation and Presentation of Products

Throughout the project, students will work with the teacher in the creation of their chosen digital project. This could be created as a film, a podcast, a graphic poster, or something else of their choosing. Students will meet with the teacher to determine a set of steps and tasks to serve as a preproduction and production plan. These may include writing a treatment, script, storyboard, shot list, as well as production techniques such as voice recording, photography, video production, web design, video editing, and more. This requires that the teacher has advanced knowledge in this area through academic, professional, or industrial work.

When all students have completed their project they would be presented in an open forum within the school. The exact event could vary depending on the nature of the created projects, examples could include a film festival or a poster exhibit. Digital projects would also be available on the internet using websites such as Soundcloud or Youtube.

Assessment

David Moursund (1999) suggests using a rubric (p.76) for an information technology project with a PBL approach. This approach can be adapted to fit with the policies and ordinal scale that are used in the *Manitoba Provincial Report Card Policy and Guidelines* (2017). As the school and the TAA/TAS programs incorporate self assessment and student voice this will also be utilized in this assessment. The assessment process will be as follows

1. Initially when students select their driving question they will be informed that they will be assessed on the project in the areas of inquiry, research, and multimedia production. They will be told that at a later date they will have input in this process.
2. After approximately one week, students will be shown a basic rubric and will contribute criteria to co-construct a more specific rubric with the teacher.
3. When students have all begun working on their product, the rubric will be revised through another co-constructed setting with the teacher.
4. When projects are complete, students will complete a self-assessment form where they will evaluate their own project.
5. The teacher will meet with individual students and go through their self-assessment form and provide written and oral feedback on the rubric areas. During this process the teacher and student will determine an appropriate rubric score.

Limitations

One limitation for this model is that it has been developed for a specific program that has unique characteristics that could differ greatly from other programs in other contexts, thus generalizability may be limited.

An additional limitation is that in this model the role of the teacher requires a flexible approach, knowledge of media production, knowledge of research skills and informational literacy, on the spot adaptations and assistance for students with difficulties, and an overall

knowledge base of a project-based approach. Without the required skill set, the implementation of this model may not be effective and may not be an appropriate approach.

Conclusion

In this paper I have examined the foundations of PBL and developed a personal model for teaching multimedia production in the context of a Winnipeg, Manitoba based middle school. The model has used various elements from the frameworks of PBL including driving questions, situated learning, and the creation of a product. The model developed is preliminary, and may be used in the future as a basis for a development of a more detailed version in the future. The full development of this model is out of scope of this paper. A next step would be the development of a more comprehensive model with teacher resources, a trial of the model and future revisions which could be subsequently described in a future paper.

References

Andrade, T. (2013). Project Based Learning Activities in Engineering Education. *International Journal of Engineering Pedagogy (iJEP), 3*(S2), 27-32.

Bogler, M. (2018). *17 Examples of Project Based Learning Activities.* Retrieved from https://www.projectpals.com/project-based-learning-blog/17-examples-of-stem-project-based-learning-activities

Bell, Stephanie. (2010). Project-Based Learning for the 21st Century: Skills for the Future. *Clearing House: A Journal of Educational Strategies, Issues and Ideas,83*(2), 39-43.

Duke, N., Halvorsen, A., & Strachan, S. (2016). Project-Based Learning Not Just for STEM Anymore. *Phi Delta Kappan, 98*(1), 14-19.

Filippatou, D., & Kaldi, S. (2010). The Effectiveness of Project-Based Learning on Pupils with Learning Difficulties Regarding Academic Performance, Group Work and Motivation. *International journal of special education*, *25*(1), 17-26.

Fogarty, R. (1997). *Problem-based learning and other curriculum models for the multiple intelligences classroom*. Arlington Heights, IL: IRI/Skylight Training and Publishing.

Haydari, N., & Kara, M. (2013). A collaboratıve media production project on human rights: Bridging everyday and media education. *Innovations in Education and Teaching International, 52*(4), 1-10.

Hidayati, R., & Nurjanah, S. (2016). Implementation of Project Based Learning Model with Windows Movie Maker Media in Improvement of Short Story Writing. *JETL (Journal Of Education, Teaching and Learning), 2*(1), 164.

Hull, G., & Katz, M. (2006). Crafting an Agentive Self: Case Studies of Digital Storytelling. *Research in the Teaching of English, 41*(1), 43-81. Retrieved from http://www.jstor.org/stable/40171717

Jocson, K. (2008). Situating the personal in digital media production. In ML Hill, & L. Vasudevan (Ed.)*, Media Learning, and Sites of Possibility*, (pp. 167-194). New York, NY: Peter Lang Publishing Inc.

Krajcik, J. S., & Blumenfeld, P. (2006). Project-based learning. In R. K. Sawyer (Ed.), The Cambridge handbook of the learning sciences (pp. 317–334). New York: Cambridge

Krauss, J., & Boss, S. (2013). *Thinking through project-based learning : Guiding deeper inquiry*. Thousand Oaks, Calif.: Corwin.

Land, S. M., & Greene, B. A. (2000). Project-based learning with the World Wide Web: A qualitative study of resource integration. *Educational technology research and development*, *48*(1), 45-66.

Larmer, J. (2016). It's a Project-Based World. *Educational Leadership, 73*(6), 66-70.

Larmer, J. (2018). Project-Based Learning in Social Studies. *Social Education,82*(1), 20.

Larmer, John, & Mergendoller, John R. (2010). 7 essentials for project-based learning. *Educational Leadership, 68*(1), 34-37.

Manitoba, Education, Citizenship, and Youth. (2007). Senior Years Information and Communication Technology: Manitoba Curriculum Framework of Outcomes. *Manitoba: Manitoba Education, Citizenship and Youth*.

Manitoba Education and Training. (2018). Literacy with ICT | A Model for 21st Century Learning. *Edu.gov.mb.ca*. Retrieved from: http://www.edu.gov.mb.ca/k12/tech/lict/index.html.

Manitoba Education and Training. (2017). Manitoba provincial report card policy and guidelines: Partners for learning. Retrieved from http://www.edu.gov.mb.ca/k12/assess/docs/report_card/full_doc.pdf

Moursund, D. G. (1999). *Project-based learning using information technology*. Eugene, OR: International society for technology in education.

Olivas, Alfred Daniel. (2013). Scientific inquiry meets storytelling and filmmaking: Creating video lab reports using a project-based learning approach. Science Scope, 36(5), 14-18.

Readman, M. (2003). *Teaching scriptwriting, screenplays and storyboards for film and TV production* (Teaching film and media studies). London: BFI Education.

Sahli, R. (2017). *An examination of the effectiveness of project-based learning on student academic achievement and teacher perceptions of project-based learning* (Order No. 10748735). Available from ProQuest Dissertations & Theses Global. (2026817186).

Retrieved from http://cyber.usask.ca/login?url=https://search-proquest-com.cyber.usask.ca/docview/2026817186?accountid=14739

Serim, Ferdi. (2012). *Digital Learning: Strengthening and Assessing 21st Century Skills, Grades 5-8* (Vol. 6). Jossey-Bass, An Imprint of Wiley. 10475 Crosspoint Boulevard, Indianapolis, IN 46256. Tel: 877-762-2974; Fax: 800-597-3299; e-mail: consumers@wiley.com; Web site: http://www.josseybass.com.

Spires, Hiller A., Hervey, Lisa G., Morris, Gwynn, & Stelpflug, Catherine. (2012). Energizing Project-Based Inquiry: Middle-Grade Students Read, Write, and Create Videos. *Journal of Adolescent & Adult Literacy, 55*(6), 483-493.

Thomas, J. W. (2000). *A review of research on project-based learning*. San Rafael, CA: Autodesk Foundation. Retrieved from https://documents.sd61.bc.ca/ANED/educationalResources/StudentSuccess/A_Review_of_Research_on_Project_Based_Learning.pdf