Science 9 Distance Education
Project Proposal

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Introduction

Science 9 is a mandatory course in most high schools in Canada. Although in the province of Saskatchewan grade 9 marks do not show up on high school transcripts, it is still an integral part of science education. All high school graduates of Saskatchewan must have a 20 level science, which is equivalent to a grade 11 science. Science 9 is a foundational course that potentially sets the stage for the rest of a student's journey in science. There are four main topics in Science 9: Electricity, Chemistry, Reproduction and Space. Together these topics form the cornerstones for science literacy. For this proposal we will focus on the topic of Reproduction within the Science 9 curriculum. This course will be delivered in a branched manner via a course management system such as Blackboard.

Institutional Context

Most organizations would benefit from having a Science 9 distance learning course that is available as an option for students to choose. For starters, this course could be piloted in a division with sufficient student population and diversity. Saskatoon Public Schools Division (SPSD) has 49 schools, 10 collegiates, two associate schools, one alliance school and more than 24,000 students from K - 12 (Twitter, September 27, 2017). SPSD's guiding principle for students coincides with our course goals to engage students "in relevant and challenging learning opportunities to enhance their academic, personal, and social/cultural growth" (SPSD, September 27, 2017). Moreover, our course is designed from a constructivist point of view which also happens to be the guiding principle for teachers in SPSD (SPSD, September 27, 2017). Collegiates within SPSD offers a wide array of courses from the traditional face-to-face classrooms to outdoor school to online learning. A Science 9 DE course would be a great addition to the collegiates that are looking to enhance their course options for students. SPSD is already paying for the rights to utilize Blackboard for their online classes, thus the addition of a Science 9 course will enrich their online school without adding more cost for a course management system.

The Learners

The intended learners would be anyone who needs a Science 9 credit in order to proceed with their high school education. These learners will be predominantly grade nine students who may be homeschooled, who may not be able to attend

a regular classroom due to training for sports or illnesses or extended trips. These students could also be individuals who may want to fast-track through science so they can open up their schedules to take more electives. However, this course would be a great alternative for any student who did not experience success in a regular classroom and are looking for outcome completion in a different way. As Bates (2015) points out, "the increase in diversity of students presents major challenges for all teachers" due to "prior knowledge, language skills, and preferred study styles" (p.312). Distance education that is readily accessible to students provides an alternative platform of learning. Distance education may be the solution that addresses the diversity of students' "backgrounds, characteristics, or unusual learning needs that may require or benefit from specialized instruction" (Simonson et al, 2015, p.131).

Taking Science 9 as a distance education course might provide a form of social interaction that students today might be more accustomed to compared to the traditional face to face classrooms. The key word here is interaction. It is equally important for students to feel a sense of belonging in a distance learning course as they would in a regular classroom. Feeling connected and that one's existence matters is an integral part of the human condition. Thus, every effort will be made in this course to give students opportunities to interact with each other and with their instructor. Just as Bates (2015) pointed out, "it is the interaction between teachers, learners and online resources within the unique context of the Internet that are the essential component of online learning" (p.238). A more productive learning environment can be established when instructors take the time to get to know their learners (Simonson et al, 2015). An informal discussion to kick off the course can be a great way to get to know students. Students can be prompt to introduce themselves and share their interests, hobbies, jobs, expertise, preferred learning style, prior experiences with science, etcetera. Instructors are more equipped to address learner needs and gaps when they know their students.

Science 9 DE will observe a combination of linear and branched-design model. Modules will be presented in a linear manner, but students have the option to accelerate as they master the concepts in each section. Assessments will be used to diagnose students' progress and how well they are learning the concepts (Simonson, et al, 2015). If students are grasping the concepts well they get to move faster or even skip ahead, but if they are not learning the concepts then additional/alternative lessons and practice is provided (Simonson, et al, 2015). A branched course meets students where they are. It caters to the the needs and

learning gaps of students most effectively. Students can spend more time on concepts that are difficult for them and receive more guidance and practice with that material. Students can move along more quickly with concepts that they are grasping with ease. Students who may want the opportunity to take more electives or simply have more time to focus on other courses or extracurricular activities can move through the course at their own prescribed pace so they can complete the course in a shorter amount of time. Students who choose to follow the linear progression of the course still have some freedom over the pace of individual lessons. They can pause a lesson and research a concept that they didn't have prior knowledge of, thus bridging some of the learning gaps. Compare this to a face to face classroom where it would be very difficult to address the learning needs and learning gaps of every student in the allotted time. A wide range of media (text, audio, video, computing) will be provided to address the learning needs of various students. That is not to say there will be multiple versions of Science 9 for different styles of learner because that is "likely to be impractical in most cases" (Bates, 2015, p.315), but opportunities will be provided for the student to learn with different media and demonstrate their learning using various media.

The Philosophies and the Learning Theories

Previously, the importance of feeling a sense of belonging was discussed. Students taking Science 9 are typically at a very formative age. They need to be given opportunities to interact with their peers and instructors in order to build relationships that facilitate learning. The constructivist view puts great value in social interaction. "For constructivists, learning is seen as essentially a social process, requiring communication between learner, teacher and others" (Bates, 2015, p.61). Learning science relies on previous skills and knowledge. Students have to take the materials that they are presented with and make it their own by integrating new knowledge with their previous understanding of the world. True acceptance and understanding of science happens when new knowledge is integrated with previous knowledge. The constructivist view lends itself very nicely to learning science. Learning Science 9 through distance education is no exception. Bruner's idea of constructivism doubles as a description for learning science in that it is an active process where learners construct their understanding of the material "based upon their current or prior experience and knowledge" (Bruner, 1986, p.8 as cited in Jones, 2015).

Pedagogical

Purpose and Goal:

The purpose of this proposal is to deliver the Saskatchewan grade 9 science curriculum, and specifically the unit on Reproduction, online so that students who require this unit within the course have options on how to take it. The goal of designing a distance education course is to see an overall increase in the percentage of students who take and successfully complete the Science 9 Reproduction unit. The ultimate goal is to see more students interested in Science and significant increases in student enrollment in high school science courses.

Instructional Need:

There is a need for a Distance Education Science 9 program within Saskatchewan. Students in the province have diverse needs and abilities and many may not be able to, or choose not to, attend a face-to-face traditional classroom environment. Reasons could include remote locations, lack of transportation, sport commitments, homeschooled, sickness or adult learners with families and jobs that require them to study outside school hours. "Online learning can be a lifeline to those who have obstacles, such as geographical distances or physical disabilities." (Levinson, 1997 as cited in GoodReads.com 2017)

Providing an online distance education course allows students to take the program any place, any time, using any device.

Rational:

The Science 9 curriculum forms the foundation of high school science and is the stepping stone to other areas in the high school science curriculum. All students are required to take this course as a prerequisite. Beyond the fundamental science knowledge gained through this course students gain valuable skills in utilizing technology and learning online, which is becoming more prevalent in the 21st century.

> Virtual schools at the K - 12 level are now seeing significant growth… Virtual schools can have many benefits for students, districts and states. They can supplement existing curricula, promote course sharing among schools, and reach students who cannot or do not attend school in person. (Simonson, 2015, p.117-118).

Through the offering of a distance education course to Saskatoon Public School students, the division is meeting the needs of the new generation of digital learners.

<u>Learner Assessment:</u>

The majority of Grade 9 students are between the ages of 13 - 15 years of age. There is a wide range of demographics that could be present in an online course, that could include but is not limited to, First Nations, Metis, recent immigrants, English as an additional language students. At this age students tend to become more independent learners and self-directed. While variances do exist, most students are familiar and comfortable with utilizing technology within their daily life. With teacher-guided instruction on how to navigate an online course, most students will become comfortable with distance education delivery. Students at this age are naturally drawn to learning tasks that are rich media and hands-on learning. An emphasis on games and fun learning tasks helps to motivate them to learn. Students also tend to be naturally curious about the world around them. Students at this age are beginning to internalize rewards and can see the benefits of their learning but many still enjoy tangible external rewards. Students can have a natural anxiety to learning new science concepts based on their experience in previous grades. These needs must be considered when designing the course to be as user-friendly as possible.

The online Science 9 course will still follow a time frame similar to the semester system present in most Saskatchewan K - 12 and high schools, with specific school divisions deciding what affordances and extensions they will allow for course completion.

Technological

To efficiently meet needs of all students it is imperative to consider a variety of low cost techniques to effectively communicate them. Simonson (2015) cites, "Assessing available technologies often requires that the instructor determine the level of lowest technologies" (p.99). The best practice to apply the lowest technologies would be by considering the type of hardware that students will need to access the course online. Student will be required to accept and abide by the terms, conditions, and policies of the Saskatoon Public school division.

The internet based platforms that will be utilized for this online course are BlackBoard and Google Apps, they allow interactive learning at a low cost to the students. Given the high prevalence of mobile and internet technology usage in Canada, today's students have a high confidence in their ability to navigate the internet. Training options will be provided for students in need of technical guidance. Some of the technical presentation tools that can be utilized to train students on how to navigate the course would be videos and slides with specific instructions. Given that it is an open course and we want to promote inclusiveness this course will follow the idea that students have access this course at anytime, anyplace, on any device. Students will be allowed to use their own device be it smartphone, laptop, or netbook. Students may need to obtain headphones with a mic for online meetings. To interact via Google Apps, students will be provided a free account and use their personal Login to access google tools.

Interface

The interface chosen for this proposal is a course management system similar to Blackboard as our first choice. Blackboard is already installed in the Saskatoon Public School Division and staff and students have some familiarity with its operation. Blackboard allows both asynchronous and synchronous instruction that will lend itself well to a Science 9 online Reproduction unit. This combined with student's use of Google Apps will allow for course delivery, interaction / collaboration between students and the teacher, and easy submission of assignments.

This unit will also require training of the students on how to use the course website. A key component that must be considered is ensuring this unit is well structured with clear organization pathway and goals that are easy for the students to follow. A mixture of branched and linear course structure will need to be in place to ensure that students complete the unit within the school divisions timeframe and actually learn the content. This course will integrate the power of the web by utilizing the best in rich media (videos of science concepts, virtual guest speakers) to make the content engaging and relevant.

Program Course Evaluation

"Evaluation serves two purposes in instructional design: to assess individual student's performance and to provide information about what kinds of revisions are needed in the instructional materials". (Smith & Ragan, 2005, p.104)

While this online program is in its infancy, it is imperative that evaluation measures are in place to ensure effectiveness. Measures can be student feedback that will be administered at the completion of class segments. Stakeholders that have contributed to the creation of this online course need to be aware of the feedback for quality control; their awareness will assist in implementing changes when required to improve the method of delivery or to terminate the course. In addition to quality control, measures will ensure courses meet governmental standards and yield results similar to instruction in a traditional classroom.

To evaluate the online program, data collected from course evaluations completed by students, teachers, and the overarching superintendent will be reviewed. Another important measure to consider is the student success rate as it will provide insight to the effectiveness of the content in addition to measuring the overall average of students. Use of course data is an essential element to evaluate an online course but is not limited to data. Other important aspects to consider as stated by Morrison (2015) are student behaviors, student perceptions, knowledge creation/transfer by students, course design, use of current technology, and interaction between students and instructions.

A detailed SECTIONS analysis will be conducted periodically to ensure that this distance education course is effectively meeting the needs of the learners and achieving the results expected by the stakeholders.

Management

The management of this program will be held at the school division level. Ideally a superintendent will be put in charge of the distance learning education program for the school division. His role will be overseeing the budget for the program and ensuring the compliance of this course with the Ministry of Education's curriculum requirements. Working under the superintendent, a consultant or teacher (with training in online course delivery, instructional design and distance education) will manage the day to day operation of the Blackboard course management system

(CMS) and ensure the course content is online and accessible on the division's servers. This consultant will also oversee the registration and student access to the course.The consultant will also develop the training program that will help students learn how to use and navigate the Blackboard CMS system.

The actual delivery of the course will be by a high school science teacher selected to teach the Science 9 online curriculum. Previous experience with teaching the Science 9 curriculum will be an asset. Professional development training in the use of the Blackboard online system will be a crucial component to ensuring the success of this program. This person will be the "face" of the course for the students and be responsible for the delivery of the course, the pace and the evaluation of student work.

Resource support

Each student will have need to have access to a computer and the use of the Internet. As we mentioned in the technology section, the platform that will be utilized for the online programs are BlackBoard and Google Apps. In addition to teachers who are managing the teaching portion of the course, there will also be teacher liaisons who will be managing the well-being of students taking Science 9 online. Such support teachers already exist in the public school system. Thus, it will simply be a matter of connecting the science 9 students to these support teachers. Student can access the Online Learning Center website from SPSD to read about course descriptions as well as instructors facilitating the course. Other support available to students will be provided to them such as central office resource liaison and a teacher librarian, for research and issues beyond the scope of the course.

Ethical issues

Given the diversity of the students enrolled in the course, the highest ethical standards will be employed by all teachers and supporting staff administering this course. The core of this is that as deliverers of the course we will "do no harm" to the students and staff involved within the project. This includes, being sensitive to the cultural diversity of the student population and recognizing our student cultural diversity in the course content. It also includes delivering rich media and course instruction that allows multiple sensory input so that all learners can prosper. Taking a proactive approach to accommodations for those students identified with having special needs. Ensuring the course can be delivered on a

wide variety of platforms including desktop, laptop and mobile devices to allow access. Finally, every effort will be put into protecting the privacy and security of our online learners, including coding of students and the safekeeping of all personal data on secured division servers.

Institutional

Since the overall funding of this online course would fall under the umbrella of the Saskatchewan Education, funding is not an issue for students who reside in Saskatoon and wish to take the course. On the other hand, students who live outside the Saskatoon area will have to contact the SPSD school board to become informed of subsequent fees if need be. The online course would follow the government approved curriculum such as the Saskatchewan Provincial Curriculum Science 9, published in 2009. Their will be minimal barriers as the SPSD has already developed Blackboard as an online learning system.

A plausible hurdle for the division could be the retention of subject matter experts. When an instructor leaves or changes roles, their experience is lost, leading to a requirement for growth on the part of a new instructor. New instructors may not have the training or experience to implement an online course but through the extension of virtual learning classes, the SPSD will offer support to teachers. The support offered to instructors is through time and/or money. These instructor' accreditations would be reflected by their years of experiences and/or through their academic qualifications. The institution would be responsible to supervise the professional standard and the quality of the course. Judgments would be based upon a combination of quantitative and qualitative measures; if not met, extra support to the instructor would be given and professional development would be offer to assure quality and delivery control are achieved either on the human resource aspect and/or on the technical aspect of the course.

Task Distribution & Milestones

Going into the preparation of the final report and presentation, here are a list of the sections that needs to be addressed and thus this provides us with a template of tasks to be completed.

1) Writing an Introduction that will briefly summary the course (Science 9) we have designed and its significance to education and a conclusion that reiterates the importance of having Science 9 DE and the positive influence is will have for learners.

2) Building up the body of our project by addressing the following sections, which we have already started writing about but with more detail:
   - **Pedagogical:** Constructivist learning theory is being used but more detail will be investigated for this section. Investigate where grade 9 students fit on Piaget's Developmental level in order to best address their learning needs.
   - **Technological:** More time will be spent looking at software, both free and paid, that we can use to enhance student learning. Software that can be used for doing experiments on line will be investigated.
   - **Interface:** Investigate how to integrate Google Apps (i.e. Google Docs, Google slides, Google classroom, etc) with Blackboard to facilitate social interaction amongst students and between teacher and student. Decide on how to best familiarize our students to their DE course.
   - **Evaluation:** Come up with a plan for how to evaluate whether or not the instruction, delivery, design and learning environment is working to facilitate student learning.
   - **Management:** Address the issue of who is responsible for upkeeping the course management system (i.e. BlackBoard) and who is responsible for upkeeping the course content. Do instructors have any say in quality control, budgeting, staffing, security, and scheduling?
   - **Resource support:** Look into the availability of teacher liaisons that could provide additional support to students. While instructors focuses on student learning, liaisons can check in on the well-being of the student as well as provide some individualized assistance.
   - **Ethical issues:** Speak to possible social and political influence. Address diversity in student population by investigating and deciding upon some differing types of media that allows multiple sensory input so that all learners can prosper.
   - **Institutional:** Discuss who provides leadership and support to DE in Saskatoon Public Schools Division. Who are the stakeholders? Who will provide the financial support for Science 9 DE?

Milestones

In order to ensure that the our proposal stays on target for completion by November 20th the following delivery dates are proposed:

Tentative dates:
- Complete draft for Oct. 30, 2017
- Complete presentation materials for Nov. 13, 2017

Presentation

With formal presentations set for November 27th - December 7th, our group will come up with an engaging presentation to share our project.

Workload

We have done a really good job collaborating with each other in preparing the proposal. We each chose sections that we are passionate about or can speak to with a fair bit of confidence. We did some research and came up with a write-up for our sections. After coming up with a "raw" script, we went through each section together via video conference and Google docs and edited our document together. Thus, we plan to follow a similar process in preparing the final project.

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