**1.0 Background Information**

1.1 **Specific Learning Need**

The instructional technology-based program focuses on addressing reading in science subjects such as biology, physics, and chemistry in K-12 class. Reading is equally important in other non-science classes. This is critical, especially for the 11th and 12th reading classes where student are engaged with advanced concepts which lay a foundation for college and universities in different career fields. For instance, in biology, reading requires concentration and participation. The curriculum includes engaging learning outcomes such as anatomy, physiological processes explained through botanical terms. For science subjects and others, reading in 11th and 12-grade students and teachers is a critical need for success. How well students and teachers participate in reading determine satisfaction with the subject and the level of success.

For average students and struggling readers, the reading process influences their final grade and commitment to the subject. Reading in K-12 high-level grades extends to building learners' interests in the subject. The reading platforms present a unique set of opportunities and challenges (Westwood, 2008). Most of our current students are digital natives and experience comprehension difficulties in the traditional systems of printed textbooks or their written notes. The digital natives thus find reading in the traditional set up less interesting, and to some extent, they are frustrated (Morrison, & Bowen, 2005). In some instances, students are not able to comprehend what they wrote.

There is more to reading than word, numbers, and image recognition. Although some students have reading difficulties, word recognition, diagram comprehension, and memorizing process presents comprehension difficulties among all students through different levels. According to Westwood (2008), even students who have adequate word reading competencies experience difficulties in understanding some key concepts. The best students in literature and language classes do not automatically achieve high grades on all subjects by that language.

One of the key requirements for good comprehension in reading is the ability to use different cognitive skills, including creating mental pictures. In this case, readers need to have skills to substantiate opinions, which is achieved through a different cognitive process. Another requirement for good comprehension is to be cognitively and emotionally involved using information for enjoyment and solving problems. In order for digital natives to be emotionally and cognitively involved, they need a reading environment that emphasizes on technology (Morrison, & Bowen, 2005). On the other hand, weak readers are unable to interact cognitively with information.

Researchers have found challenges in the higher level of science literacy among high school students. These challenges and limitations are found in our school, even among the top performers. Shwartz, Ben-Zvi, and Hofstein (2006) found that 10th -12th-grade students have critical challenges in a higher level of chemistry literacy and recommendations for changes in the curricular and instructional strategies as an initiative to foster chemistry literacy. Also, O'Reilly and McNamara, (2007) explain that student reading skills are one of the key achievement which compensates for a deficit in science knowledge and in greater effect among the higher knowledge students. Although cognitive abilities can influence learners' science knowledge, the reading capabilities present a critical determinant in students' overall grade.

**1.2 Technology to Address the Learning Need**

The technology which is intended to address the reading need is learning management systems (LMS) supported by augmented reality or virtual reality where necessary. Learning management systems such as Schoology.com has proved to be a key instrument for reading among K-12 students. The technology is useful in all subjects, including biology, chemistry, and physics. The technology is useful in the class setting, and students can access it for personal reading.

The learning management systems represent one of the fundamental applications of computer technology in education (Watson, Lee, & Reigeluth, 2007). LMS technology presents a new method of delivering knowledge to the student by use of a laptop, smartphone, and other computing devices. For the school, the LMS technology is also appropriate for managing instructional content, assessment of the learning goals for each lesson (Kats, (Ed.) 2013). LMS technology presents the most basic technique for change from the mechanistic sorting-oriented system into a customized learning-oriented system in the information age (Watson et al., 2007).

Delivering instructional content through the LMS enhances the active participation of learners in the reading process. In a class scenario, instead of a student reading from the textbooks and personal notes, they readily access content using computing devices. According to Morrison and Bowen, (2005), the digital natives are challenging the traditional systems where reading occurs through the set-up of students in books focusing on the teachers to dictate the instructions. Although the teacher can lose control of what is happening in class, they have positive results.

LMS is also an appropriate reading technology since it enhances collaboration in class. A biology teacher, for instance, customizes activities for active reading among students during the class lesson and in assignments. Considering that technology as a source of content is fundamental among students, LMS will discourage the use of open-source content from the internet. The open-source content also includes ads that can distract the student from reading. Concentration is a fundamental element of reading.

Reading needs using the LMS technology will also require other support technologies appropriate for specific subjects include augmented reality (AR) and virtual reality technology (VR). The AR and VR technology is appropriate for the average students and those with reading difficulties through an improved reading experience. Improving the cognition participation of the student is effective in improving reading comprehension. The AR technology will offer critical benefits to students with intellectual disability and autism spectrum disorder (McMahon et al., 2016). The technology will help to teach key vocabulary terms.

The extensive use of the AR and VR technologies among the digital natives in videogames will increase their overall participation. According to Westwood (2008), enjoyment and reading experience through reflections improves reading comprehension. For instance, the VR and AR tools have an effective application in the biology class. The technologies increase engagement among the students (Zimmerman, 2019, June 05). Exploring the different processes of the body will help the student to be engaged fully in the knowledge of that specific lesson. This increases high-level biology literacy among the top performers and improves basic comprehension among those with lower cognitive abilities. The mixed reality software technology will thus provide better reading strategies for students in some specific subjects.

In general, the technology required to facilitate reading in the K-12 classes is the learning management systems in all lessons with support technology tools like AR and VR in the more engaging subjects. The primary consideration of the technology in each reading is for teachers to evaluate the need for improving reading comprehension and to improve the engagement of the readers.

**2.0 Project Description**

**2.1 Activities to Support Project Goals and Objectives**

The school will select specific learning management systems appropriate and affordable for use to meet the specific learning need. Based on affordability and usefulness within the k-12 environment, the first option will be Schoology.com. Schoology is one of the most commonly used LMS, which is necessary for these project goals. Another activity necessary to meet the goals is to select set-up options. This will include a need and readiness assessment in the school and among the stakeholders. There are two options available for the use of Schoology.com, which is either on cloud or on-site, which will involve the installation of the software devices on individual computers. During this activity, the school will establish a rubric on the most important element of an LMS. Some of the most primary requirements which the school will explore during this activity are the ability to modify for special education, supporting personalized learning, and the ability to integrate with other resources.

The second activity involves a review of the curriculum and access to electronically stored instructional details. While the technology will deliver the content to the readers, the school needs to have a mechanism to ensure all the stakeholders will be actively involved in the use of the technology. This activity will also focus on a connection of the curriculum with the LMS. One of the key initiatives is to introduce the LMS to the teachers. Another initiative will be training the teachers on how to use the technology. Finally, it will be necessary to nurture the teachers to expand their knowledge on how to use the technology. Interested teachers can be encouraged to enroll and complete certificates and a master's degree in instructional technology. The purpose of the activity is to create an enthusiasm for utilizing the technology to promote reading among the students.

We understand that teachers have increased fear of using technology as the primary learning instrument (Morrison & Bowen, 2005). Teachers may not get other time for planning and working as a team to utilize the technology, and hence an elaborative training technology will be required. The teachers will be trained in the use of AR and VR tools for reading. A considerable effort in this activity will also include a trip to other schools using the LMS. The school-based LMS technology will also require establishing a committee of teachers, leaders, and IT to create a common vision for the technology. This will enhance promoting pushing forward an initiative for the future development of the program. The activity will also include focusing on teachers who can be the best advocate of LMS to lead the committee. These are individuals with professional development goals in instructional technology. The committee will also include teachers from all subjects and in all grades to provide insight into the development of the program.

Another activity will include inviting independent personnel to sensitize and motivate the students on the use of technology. Both teachers and students will find it considerable to receive training sessions from experts in instructional technology. Information technology will be a useful instrument in the implementation of these activities to meet the program goals. This includes in the training of the teachers, establishing a communication system for the committee and selection of the appropriate LMS technology. The computer technologies, including laptops and smartphones, will be useful to demonstrate the value of the technology among teachers and students. There is different software available for need and readiness assessment. Network technology will also be important in establishing these systems among administrators, teachers, and students.

LMS technology purchases such as Schoology.com will be accessed by the student and teachers from the cloud. This is an asset for the school, and hence all authorized stakeholders will have a username and password to access the instructional content. The program team will ensure that all the individuals have established technical controls that would maintain the security and credibility of the system. Since the LMS will also be used for other administrative functions such as student registration, customized, personalized access to the instructional materials will be facilitated to meet the needs of the users. The school will be committed through the subject teachers and the curriculum personnel to promote the accessibility of the technology throughout. The objective is to also promote mobile application, which enhances users to have ready access to the instructional content despite network challenges.

**2.2 Project Timeline and Resources**

Transforming the idea into practice will take some time since there is a need for establishing need and readiness for the school. There is also the need to ensure that all the intended users will appropriately use the technology. The project timeline has two major milestones. The first milestone is to implement the program while the second milestone is to enhance effective problem-solving. One of the critical commitments in the implementation is to fit the technology to the organization's goals. The school will acquire the technology from the vendor either as a SaaS or hosted from the internet.

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| --- | --- | --- |
| Activity | Time | Responsibility |
| Need and readiness assessment | April 01- April 15, 2020 | Project manager/ Program coordinator |
| Set-up a prototype | 16th -05th May 2020 | IT expert, Schoology. com |
| Test the LMS | 06th -15th May 2020 | IT, committee |
| Assemble AR and VR tools | 16th -20th May 2020 | Coordinator |
| Prepare to launch the program | 20th -30th May 2020 | Coordinator, Committee members |
| Launch the Program | June 01, 2020 | Program committee, sample users, instructional technology experts, end-users |
| Test program | 01st - 15th June 2020 | Program Committee |

Implementation of this program will require financial resources. To acquire the resources from the vendor, the school will pay license fees to access the technology for one year. The organization will also pay approximately $6000 as a set-up fee. The set-up fee will cover for training and customer support services and branding the product. Other resources needed in the implementation of the program include personnel for offering technical support services. The IT systems resources in the school will help respond to the different needs of the users once the program is launched.

**3.0 Management**

**3.1 Leadership Skills, Roles and Responsibilities**

The program will be headed by a program coordinator selected from among the teachers. The program coordinator needs to have a master's in instructional technology and demonstrate digital competences. A teacher also a current student for the master's program in instructional technology also qualify taking up a critical role in the management of the program. The key role is to maintain the vision for the program, which is increased commitment in the use of technology for teaching and learning. The leader will also advise the administrator on the need for change on the current technology to meet the changing needs.

The responsibility of the program coordinator is to ensure that LMS and AR or VR technologies are maintained as the primary tools for delivering instructional content to students and teachers. The leader will also be responsible for innovations for program sustainability and leveraged value for the stakeholders. Other key roles involved in the implementation of the program are curriculum review to ensure a commitment to quality education to the users. An IT role is also fundamental in the implementation of the project to test the program and ascertain its effectiveness in the organization.

**3.2. Staff Skills, Roles and Responsibilities**

The teachers will promote the program to the students. Teachers will also provide a key learning environment for the students. Communication through technology will also enhance active interaction and access to instructional content materials. Teachers require having skills in the use of computational technology and its benefits to students. Teachers will be responsible for guiding students on access to material and the use of different tools in class.

**3.3 Professional Development**

There is a need for professional development to leverage the value of technology among users. Teachers will receive training on emerging technologies to promote reading. The teachers will also receive training on the updates and changes in the available product and how to maximize value to users. Training will be offered by the vendor or other instructional technology experts hired by the schools. At an individual level, teachers interested in instructional technology will be encouraged to enroll for certificates or master programs in instructional technologies. The training will be provided online and in physical meetings organized by the school regularly.

**4.0 Evaluation**

The primary focus in the use of this technology is to enhance reading among the digital natives. One of the ways to assess its effectiveness is through improved reading comprehension. In all the subjects, including science subjects, the student needs to demonstrate increased enthusiasm and leveraged literacy for each subject. Teacher's attitudes toward the use of technology in the lesson plan will also be a key indicator of the program value. The frequent use of technology for communication between teachers and students will also be another measure of success. The commitment to update the instructional content to meet the users' needs will be another major measure of success. The user's enthusiasm and commitment to using LMS and other support technologies will also be reflected in the teaching and learning outcome.

Different measurement tools will be used, such as grades. Through the LMS, the use of technology by the teachers and students will be measured and recorded. Surveys on the effectiveness of the program will be completed on teachers. For students, an evaluation form focused on the value of technology will be completed randomly. Other measurement tools will include a commitment to the growth and development of the program through submitted proposals, suggestions, inquiries, and criticism. The program coordinator will be proactive in evaluating the program.

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