

A USABILITY STUDY ON GOOGLE SITE AND WORDWALL.NET: ONLINE INSTRUCTIONAL TOOLS FOR LEARNING BASIC INTEGRATION AMID PANDEMIC

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Abstract: Much has been said about the new normal education in the time of pandemic. All schools, including public basic education institutions, are in a quandary about which distance learning modality should be implemented to fulfill their vision and deliver quality education for all, with no single learner left behind. The rise of varied internet servers did not bring an assurance that all learners are able to attend real-time online classes. In the same way, the interest and engagement of learners seem low due to many factors that are way beyond the teachers' control. This situation demands more flexible and relevant instructional materials that students can use at any place and time. This case study aimed at exploring the effectiveness, efficiency, and satisfactory attributes of an online instructional tool for Basic Calculus created using the web-based applications, Google Sites and Wordwall.net. This allows fun independent learning of basic integration among Grade 11 STEM students from Pamantasan ng Lungsod ng Valenzuela. Due to quarantine restrictions, usability testing was done online and was accomplished by the participants asynchronously. To assess the users' experience, the participants answered an evaluation tool which revealed that the site helped them achieve the learning objectives and that they experienced no trouble accessing it. Through debriefing, selected participants recommended minimal modifications in terms of its compatibility with any kinds of devices. Further research was advised to improve the layout and features of the site that will altogether guarantee the attainment of expected learning outcomes, interactivity among learners, and feasibility across any distance learning modality.

Keywords: Basic Integration, Google Sites, Usability, Wordwall.net

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Introduction

The community quarantine restrictions and lockdowns caused by the global health crisis demanded all educational institutions to shift from the usual face-to-face classes to a distance learning system. In the Philippines, the Department of Education (DepEd) issued policy directives that prohibited school activities requiring physical attendance to ensure the health and safety of all the learners, as well

as the teachers. Calls for “academic freeze” did not win over the “victorious” opening of classes in which varied distance learning modalities were adapted (Malipot, 2021).

United Nations Educational, Scientific and Cultural Organization (2017) believes that educational quality, access, and system strengthening cannot be compromised in times of crisis (as cited in the Most Essential Learning Competencies (MELCs) Guidelines, 2020). For that reason, the DepEd modified the curriculum and implemented the MELCs for Academic Year 2020-2021 which emphasized the lessons that students need most for lifelong learning. Quality education must be given to all learners, leaving no one behind, whatever modality the school applies.

Despite many apprehensions, educators continue to fulfill their sworn duties. Issues on the quality of modules, access to the internet, and safety of school and home environments (Malipot, 2021) did not hinder them from carefully planning and teaching the lessons. Because of such challenges, especially with gadgets and internet connectivity, teachers constantly look for best strategies that can make online learning worthwhile and effective.

Philippines ranked 114th in the world for mobile speeds and 108th for fixed broadband speeds (Ookla, LLC, 2020, as cited in Devilla & Manalo, 2020). This means online synchronous sessions and urgent communication with students are constantly interrupted due to slow internet connectivity, poor signal, and defective devices which are out of their control.

De Villa & Manalo (2020) reported that instructional delivery adds up to the major concerns of teachers. Aside from their limited knowledge of Information and Communications Technology (ICT), they have pressing concerns over the difficulty of applying inquiry-based and experiential learning with technology. Teachers are not comfortable taking advantage of technology while neglecting the learning design. Unexpected internet lags during synchronous sessions cause students to miss essential discussions (Alvarez, 2020, as cited in De Villa & Manalo, 2020). This poses a challenge to teachers and learners since most of the lessons, especially on major subjects like mathematics, need further explanations and illustrations.

Fritz et al. (2019, as cited in Almarashdi & Jarrah, 2021) shared that mathematics is usually viewed as challenging even under normal circumstances. In the Philippines, the teaching and learning of this subject amidst pandemic has been a concern since the start of classes. Technological platforms are helpful in initiating discussions and sharing ideas through distance learning; however, Fedele and Li (2008, as cited in Almarashdi & Jarrah, 2021) argued that these are inadequate for teaching mathematics as efficiently as face-to-face teaching. Cassibba et al. (2020, as cited in Almarashdi & Jarrah, 2021) puts it in a clearer perspective:

For example, teaching many subjects requires discussions, presentations, and elaboration on the learning outcomes from the students and their teacher while this is not the case for teaching mathematics where, in addition to the discussion, the teacher needs to communicate with students by writing words and symbolic language on the blackboard. This is not easy in distance learning.

For students, learning mathematics from a distance is challenging as well. They miss classroom interaction with teachers and colleagues which, for some reason, makes the learning process fun and interesting despite the difficulties that the subject matter entails. In addition, they disapprove of unfavorably long screen times, especially during online synchronous classes where they are required to watch the teacher present his lessons and participate through minimal chats, reactions, or oral recitations while struggling to secure good internet connection and staying focused despite unavoidable disturbances at home. Based on study, 78.3% of the student-participants showed no preference for choosing to study mathematics by distance learning in the future, given a choice (Almarashdi & Jarrah,

2021). This is not a surprise, especially now that the limitations of online distance learning pose a threat to demonstrating mastery of the subject and achieving expected learning outcomes for all learners. Although a recent study found that students have their own coping mechanisms to adapt to remote learning, i.e., finding a good space and time to connect to the internet, borrowing learning resources when their gadgets lack enough features to perform their tasks; the truth remains – remote learning amid a crisis may present tremendous stress to students (Rotas & Cahapay, 2021).

Studies show that in this time of pandemic, students are required to learn independently through flexible distance learning. This modality provides them options in choosing the time to study, review, perform, and deliver tasks. Moreover, they are open to the existence of new digital technology, especially those tools that their teachers utilize. They become accustomed to finding out about information technology despite the lack of ICT training caused by the sudden shift to use online learning platforms (Irfan et al., 2021; Almarashdi & Jarrah, 2021). Truly, independent learning is much valued and encouraged in times like these.

Given the present situation, there is no denying that teachers of mathematics are demanded to adapt to the new learning modes and utilize innovative tools that can assist them in delivering quality education to all learners. Issues on connectivity, ease of access, interaction, and lesson mastery urge them to devise best plans and novel strategies that make the learning process at par with the goals of education.

Wilson et al. (2014) opined that the teachers' roles in a technology-enriched mathematics pedagogy are evolving. Their perspectives on the technology, their familiarity with it as a teaching tool, and their understanding of mathematics and how to teach it are all crucial factors in designing and constructing learning tasks.

Pre-pandemic, the educational paradigm is described to be flexible, mobile, collaborative, and participatory. Learning through mobile devices is considered timely, relevant, and increasingly necessary (Sevillano-García & Vázquez-Cano, 2015, as cited in Munafo, 2016). In today's education system when gadget and internet issues hinder the success of the learning process, independent learning is encouraged; thus, teachers must innovate their strategies to increase efficiency in elearning content, design, and media. Educational web tools must be good for promoting collaboration and additional resources should be made available for student access (Petchtone, 2012, as cited in Munafo, 2016).

E-learning is advantageous to learners in many ways. Every student has the luxury of choosing the place and time that suits him. It takes into consideration the individual differences of learners – some prefer to concentrate on certain parts of the course, while others are prepared to review the entire course. It allows self-paced activities which permit students to study at their own pace and speed. Asynchronous activities increase satisfaction and decrease stress among learners (Arkorful & Abaidoo, 2015). Its environment also encourages learners to depend on themselves because instructors are no longer the solitary source of knowledge. They instead become advisors and guides (Alsalem, 2004, as cited in Arkorful & Abaidoo, 2015).

The need for supplementary instructional tools demands the creation of educational websites and software. Websites provide access to educational content from anywhere. It permits learners to watch videos related to the lesson as many times as needed. (Cetin & Ozdemir, 2013; Zhang et al., 2006, as cited in Arkorful & Abaidoo, 2015). However, it must be noted that websites used for Elearning are supposed to promote interactivity and personalization for the continuous engagement of the learners (Zhang et al., 2006, as cited in Bhat et al., 2018). The focus must be the learners rather than the teachers, thereby influencing individual learning.

As a solution to this dilemma, Google Sites has become one of the popular tools that educators use to survive e-learning. Google Sites is one of the products of Google Suite for Education that is proven to be a useful, user-friendly tool in creating websites for e-learning purposes. It is free, ensures sustainability at minimal cost; easy to create and maintain; allows user collaboration; compatible with other Google products; and searchable on Google search engine. A study of Harsanto (2014) revealed that most of the students agree that Google Sites is helpful in sharing information, easy to use and well-functioned, and attractive in terms of design and features. It can serve as a reservoir of various supplementary materials like articles or documents, educational videos, infographics, and even assessment forms – all materials gathered in one site for easy access of students.

Google Sites can also be a medium of promoting interactive and enjoyable learning experiences. There are several research studies that explored the use of some frequently used web tools such as Quizlet and Kahoot (Wright, 2016; Medina et al., 2017, as cited in Cil, 2021), but only a handful of studies explored the usability of specific web tools like Wordwall.net. Wordwall.net is an edutainment website where multiple game choices, played interactively or individually, can be created. Teachers either create their own games out of ready-made templates and add up content (words and images) in the games or they make use of games created by other teachers (Cil, 2021). These fun educational activities can be embedded on other sites, for instance, Google Sites. If essentially combined, Google Sites and Wordwall.net can make an effective online instructional tool that aids teachers in making interactive learning possible.

From the literature presented, the researchers realize the need of devising innovative “virtual” classroom strategies that can accommodate all learners of mathematics given their challenges in accessing the internet during online synchronous classes, thus demanding asynchronous or self-paced independent learning. Moreover, the researchers presume that creating interactive educational websites, specifically Google Sites integrated with Wordwall.net, can greatly influence the quality of learning that students can achieve even from a distance. All things considered, the researchers created an instructional material with these two platforms for teaching a mathematics lesson, Basic Integration for Grade 11 students. To assess if the instructional material is a good fit for mathematics learners amid pandemic, this usability study aimed at answering the following questions:

1. How do the student-participants evaluate Google Sites and Wordwall.net as instructional materials for learning Basic Integration in terms of:
 - 1.1. effectiveness;
 - 1.2. efficiency; and
 - 1.3. satisfaction?
2. Based on the users’ experiences, what modifications are needed for Google Sites and Wordwall.net to become more effective, efficient, and satisfactory instructional materials for online distance learning?

Google Sites

Google Sites is a program that makes creating a website as simple as updating a document. With Google Sites, groups, instructors, and students can simply assemble a variety of content in one place - including videos, calendars, presentations, attachments, and text - and share it with a small group, an entire organization, or the entire globe for viewing or editing. Google Sites can be used to create internal project sites, classroom websites, and student ePortfolios.

It is a free online platform that teachers can use as an instructional material to support the teaching and learning process in an online distance education. Here are several advantages of using Google Sites in a virtual classroom:

1. Teachers can use Google Sites to direct student learning by creating and organizing different instructional materials such as ebooks, videos, and pictures.
2. Teachers can use Google Sites to supplement instruction. It can be used as an additional tool to support the teaching and learning process.
3. Google Sites promotes independent learning. It allows the learners to navigate their way through their own learning.
4. Educators can create webquests with Google Sites. It allows teachers to create activities in a fun and exciting manner.
5. Google Sites allows teachers to design problem-based learning or project-based learning (PBLs).
6. Google Sites permits students to work collaboratively.
7. Google Sites can be used to flip a classroom.

Wordwall.net

Wordwall.net permits educators to create interactive games and printed materials for learners. The role of the teachers in this platform is just to input content and the rest will be processed by the application. This application provides various themes and different types of games depending on the type of lesson to be discussed. The interactives are played on any web-enabled device, like a computer, tablet, phone, or interactive whiteboard. They can be performed by students alone or by the teacher with students taking turns in front of the class. On the other hand, the printables can be printed out directly or be downloaded as a Portable Document Format (PDF) file. They can be used as a partner to the interactive or as stand-alone activities.

Wordwall.net activities are created using a template system. The application has arcade style games like Maze Chase and Airplane, and there are classroom management tools such as seating plans. The teacher can also switch templates from one to another with a single click. This feature permits differentiation of activities and allows the teacher to save time. Additionally, a teacher can also edit any existing activity to complement the type of lesson and the teaching style. Further, this application also offers a variety of themes with different graphics, fonts, and sounds and other options such as setting a timer and changing the gameplay.

Methodology

Participants

The participants of this study were the Grade 11 students of Science, Technology, and Mathematics Strand (STEM) at Pamantasan ng Lungsod ng Valenzuela. They were taking up Basic Calculus for the Second Semester, Academic Year 2020-2021 through a combination of modular and online distance learning modality. At the time of the conduct of this study, they were specifically discussing the essential learning competencies on “Basic Integration”, which served as the last topic for the subject indicated in the K-12 MELCs guidelines. A total of 268 student-participants were chosen through convenience sampling.

Based on the initial observation of their subject teacher, the student-participants faced several challenges in learning mathematics, particularly Basic Integration. Aside from their fear and loss of interest in the subject due to its level of difficulty, the Grade 11 students struggled to concentrate on the class discussion especially through remote learning. There was little or no participation during online synchronous classes and some students experienced being disconnected from time to time because of uncontrolled connectivity issues. For these reasons, the researchers thought of conducting this case

study, creating an instructional tool, and testing its usability. Their main objective was to propose an innovative online instructional material which the student-participants can utilize at their own pace, allowing independent learning, and eliminating fear of the subject matter through the embedded interactive games.

Procedures

The instructional tool was created using two web-based applications: Google Sites and Wordwall.net. The overall design of the site was simple but creative enough to capture the interest of the students. After establishing the layout, the lesson contents were encoded, the educational videos were attached, and the interactive activities were embedded. Deliberate proofreading, revisions, and simulations were completed in preparation for the usability testing. The following procedures were done for the usability testing:

1. Upon the instruction of the subject teacher, the participants explored and utilized the instructional material within their 3-day asynchronous class schedule.
2. With their permission, the participants answered the usability evaluation scale through Google form questionnaire.
3. The results of the usability test were tallied and analyzed.
4. After analyzing the results, the researchers selected 5 participants who gave low ratings and conducted a follow-up interview for further feedback and suggestions.

The usability evaluation tool was a researcher-made instrument based on the ISO 9241-11 standard on usability which considers effectiveness (user achieves the objectives of the project), efficiency (user performs the tasks easily), and satisfaction (user describes it as engaging and aesthetically pleasing) as characteristics of a usable tool. These categories are also in line with Quesenberry's, the UX and Usability Expert and former President of the Usability Professionals' Association (UXPA), 5 criteria of a product's usability: Effectiveness, Efficiency, Engagingness, Error Tolerance, and Ease of Learning. The scale was a modified version of the SUS (System Usability Scale) of John Brooke in 1986, originally consisting of a 10-item questionnaire with five response options for respondents. In this study, the instrument has three parts and a total of 15 questions which aimed at assessing the perceptions of the participants based on their user experience.

Since the collected quantitative data were in ordinal scale, the researchers used median as a measure of central tendency to describe the usability of the instructional material in terms of efficiency, effectiveness, and satisfaction. For the debriefing interview to selected participants, the qualitative data were interpreted through thematic descriptions.

Discussion

Table 1: The Usability of Google Sites and Wordwall.net as Instructional Tools
In Terms of Effectiveness

IN TERMS OF EFFECTIVENESS						
EFFECTIVENESS	SA	A	D	SD	M	INTERPRETATION
	4	3	2	1		
	FREQUENCY					

1. The learning contents included in the site are rich and meaningful.	184	82	2	0	4	Strongly Agree
2. The lessons are clearly and systematically organized and delivered.	180	86	2	0	4	Strongly Agree
3. The educational videos helped me achieve the lesson objectives.	187	76	5	0	4	Strongly Agree
4. The games and activities are relevant to the subject and suitable to evaluate learnings gained.	184	74	9	1	4	Strongly Agree
5. I successfully completed the exercises and tasks required for each lesson.	147	101	17	3	4	Strongly Agree
6. I encountered minimal/ no errors while using the site.	99	108	49	12	3	Agree

Table 1 shows the usability of Google Sites and Wordwall.net as instructional tools in terms of effectiveness. It was found that the learning contents of the online instructional tool such as the discussions and educational videos were clearly and systematically organized. The learning contents were aligned with the games and the activities which enabled the students to achieve the lesson objectives. The participants found it easy to use the educational website. Furthermore, the results showed that they encountered minimal errors or no errors while using the instructional materials. Overall, the online instructional tools were found to be effective to achieve the lesson objectives in studying basic integration.

Table 2: The Usability of Google Sites and Wordwall.net as Instructional Tools
In Terms of Efficiency

EFFICIENCY	SA	A	D	SD	M	INTERPRETATION
	4	3	2	1		
	FREQUENCY					
1. The instructional material is easy to use and less complicated.	162	90	13	3	4	Strongly Agree
2. Various functions in the site are consistent and well-integrated.	154	98	14	2	4	Strongly Agree
3. There is a smooth transition from one page to another.	132	105	28	3	3	Agree
4. I did not need the support of a technical person to be able to use this site.	180	74	12	2	4	Strongly Agree

5. I believe most people would learn to use this site easily and quickly.	172	83	11	2	4	Strongly Agree
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Table 2 exhibits the usability of Google Sites and Wordwall.net as instructional tools in terms of efficiency. It was found that the participants found the site easy to use even without the assistance of a technical person. This implies that the students can navigate the website independently. For them, the site displayed smooth transitions and consistency on its functions. Additionally, the respondents would likely recommend the site to other people for it is easy to perceive affordances without the need to consider the functions of its different features. In conclusion, Google Sites and Wordwall.net are regarded to be efficient educational tools in learning basic integration.

Table 3: The Usability of Google Sites and Wordwall.net as Instructional Tools in Terms of Students' Satisfaction

SATISFACTION	SA	A	D	SD	M	INTERPRETATION
	4	3	2	1		
	FREQUENCY					
1. The overall design, layouts, and features are pleasant and engaging.	168	92	8	0	4	Strongly Agree
2. I felt confident using the site.	151	98	18	1	4	Strongly Agree
3. I think that I would like to use the site frequently.	130	119	15	4	3	Agree
4. I am convinced that the website is a good and credible instructional material.	202	55	10	1	4	Strongly Agree

Table 3 shows the usability of Google Sites and Wordwall.net as instructional tools in terms of students' satisfaction. Since the instructional tools received very good feedback in terms of its effectiveness and efficiency, this implies that the students were highly satisfied. It was established that the design, layout, and features of the site were pleasant and engaging which made it more userfriendly for the participants. Moreover, they were able to build confidence in navigating the educational website which led to their desire to frequently use the instructional tools. As a result, Google Sites and Wordwall.net as instructional materials were able to meet the students' satisfaction in learning the basic integration lesson.

Debriefing

After utilizing the online instructional tool and answering the survey questions on its usability, a debriefing interview was conducted to five of the student-participants who answered one (1) or strongly disagree on most items on the survey questionnaire. When asked if the instructional material was helpful, all five agreed and said that the tool was simple and easy to understand. Likewise, the participants claimed that they had fun answering the activities. Majority of them did not encounter any problem in navigating the educational website. Additionally, the students mentioned that they enjoyed

answering the activities in the form of games. They declared that the games made the learning process more exciting compared to traditional assessment.

However, some participants, especially those using mobile phones as their device, had problems with the controls of the instructional tool. According to the data collected from the debriefing interview, some students were not able to see and navigate some buttons on the site. One of the students also mentioned that he experienced difficulties answering the activities because instructions were not explicitly given. Furthermore, interviewees suggested some modifications on the font size, navigation buttons, and compatibility of the site to different possible devices such as mobile phones.

As a conclusion, Google Sites and Wordwall.net brought desirable outcomes in terms of its usability in learning the basic integration lesson. Conversely, this study cannot formally conclude that the use of Google Sites and Wordwall.net as instructional tools in learning basic integration will be able to cater to all students regardless of any other factors. This is because many factors really affect the success of online learning modality such as the availability of the resources, stability of the internet connection, compatibility of digital devices, etc.

Conclusion

This paper presented the usability of the combined Google Site and Wordwall.net as an instructional tool that aids the learning of basic integration amid pandemic. In this paper, the effectiveness, efficiency, and students' satisfaction toward the online instructional tool were tested and assessed.

The results of the usability scale showed that the learning contents such as the discussions and lecture videos are helpful to successfully achieve the objectives of the lesson. It also revealed that the online teaching tool is user-friendly, since the respondents had no difficulty navigating the site even without the help of a technical expert. Moreover, the online instructional tool was able to meet the satisfaction of the student-participants in learning the basic integration lesson.

Through debriefing, the participants shared the difficulties they encountered and corresponding recommendations to improve the learning experience in using the site. Since some of them experienced problems in navigating the site, they recommended improving its compatibility and functions across any possible devices, especially mobile phones. The feedback gathered in this study is taken into consideration for the improvement of the learning experience offered by this online instructional tool.

Recommendations

Based on the literature and the results of the usability testing of Google Sites and Wordwall.net as instructional materials, further modifications are recommended to improve the educational website such as ensuring the compatibility of the devices so that the learners will be able to view the content, as well as the features of the site using any digital device. This is a significant factor that instructional designers should consider when crafting instructional tools. Since the Philippines is a third-world country, educators should not assume that all students afford to have laptop or desktop at home. In view of this, teachers should ensure that the website will be properly viewed and utilized by students who are only using mobile phones or tablets. In terms of design and layout, the designers should carefully choose the font style and font size of the texts. The textual content of the instructional tool should be readable to avoid mistakes and confusion among the users. Furthermore, group activities should be added in the educational website to promote collaboration among the learners. Aside from encouraging students to work independently, teachers should also provide activities where students will be encouraged to communicate with their classmates and work as a team. This is to increase engagement and interaction among students in a virtual classroom.

Another vital factor that the system designers should consider is the accessibility of the educational website offline because not all students can secure a strong and stable internet connection in the Philippines. Thus, providing instructional tools that do not require the use of internet will increase the number of students who will be able to access the tools. The researchers should explore whether offline access is possible when using Google Sites and Wordwall.net.

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