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1. All articles must have a high degree of scholarship;
2. All articles must be evaluated thru double-blind system by selected referees for publication;
3. The articles may either be written in English or Filipino. All articles written in either languages must be accompanied by an Abstract which is written in English;
4. All contributions must be original;
5. Articles must use APA style sheet; and,
6. Articles must be typed single-spaced, Times New Roman 11 pts on letter-sized (8 x11) paper in not more than twelve (12) pages.



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DISASTER QUICK RESPONSE APP WITH AUTOMATIC LOCATION DETECTION, LIVE VIDEO VERIFICATION AND AUTO ALARM IN RESCUER STATION

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ABSTRACT

The developmental research entitled “Disaster Quick Response App with Automatic Location Detection, Live Video Verification and Auto Alarm in Rescuer Station” was designed and developed for emergency disaster rescuer response. The application has its features that will capture disaster incident images, specific location, date, time, sender phone number and municipality/city then sent automatically to a particular rescuer station in a particular municipality/city without having their number. The mobile application located at the rescuer station was designed to receive reports of the client and it will automatically trigger the alarm to be heard through a loudspeaker connected to the rescuer station amplifier. The application also verifies the client’s report of a disaster incident by sending a request to have a live video or by phone call. The researcher developed the mobile application by the use of prototyping Development Methodology as a guide. The application was developed using the Android Studio for programming code construction and designing the user interface. Firebase is used as the back end and Google maps API in tracking the location of the incident. Vidyo.io is also used as a server for live verification as to the reliability and accuracy of the incident report. The mobile application’s quality was also evaluated according to the standards for computer software set by ISO 25010 International Quality Standards. The overall mean of 4.78 indicated that mobile application has “excellent” quality in terms of functional suitability, reliability, performance efficiency, usability, security, compatibility, maintainability, and portability.

Keywords: Auto Alarm, Automatic Location Detection, Disaster, Live Video Verification and Quick Response App

INTRODUCTION

Mobile phones have radically altered the way of life of many people. It has changed the way they work, socialize, and communicate among themselves. It becomes a very important part of our lives today. In the event of an accident or emergency, mobile phones ensure that emergency services are rendered accurately and sending notifications to family and friends are delivered immediately. Having a camera and video recorder always at your disposal can have a positive effect of deterring disaster in certain situations (Goodman, 2021).

Phones can be used to capture evidence of a disaster in progress or the immediate aftermath. In civil disputes such as looting, injuries, and burglary, it plays an important role in gathering data and pieces of evidence. It seems strange that, not long ago, we could not keep up with the live events in real-time. Today, phones can alert people in case of fire, flood, storms, accidents or calamities, and other current events (Toya, 2018).

Disaster could be an inevitable and unpredictable tragedy, especially during night-time. It takes away human lives and causes the loss of property. The catastrophic damage to property caused by the disaster is considered a big problem to the victim.

The communication system can be stuck during a natural disaster, as soon as mobile networks are re-established people try to use their furthermore devices to report the condition or ask to be rescued. Nowadays, apps and social networking are commonly used to share moments, feeling, and mood states, but they can be used furthermore to post-disaster locations and alert rescuers (Mota, 2014).

One of the many problems the researcher observed is the response of the rescuer to the disaster’s victim.

According to the Bureau of Fire Protection and Rescuer Station at Barotac Nuevo, during the disaster, the information fed by the caller is not detailed and leads to a misinterpreted place of disaster. Delayed short message service (SMS) is experienced during a disaster because of flooded messages in cell phone inbox; Cellphone memory is mostly limited in handling a massive amount of messages. The type of incident reporting is not always the same as the incident type initially dispatched and found out to be a false alarm.

The following situations often occur among the disaster victims when rescuers are unreachable during the night-time; they disregard phone calls intentionally, or disaster victim does not have a mobile number of rescuer station and hotlines.

The above situations are the things that caught the attention of the researcher and led him to develop this mobile application called “Disaster Quick Response App with Automatic Location Detection, Live Video Verification and Auto Alarm in Rescuer Station”

OBJECTIVE OF THE STUDY

The study aimed to develop a “Disaster Quick Response App with Automatic Location Detection, Live Video Verification and Auto Alarm in Rescuer Station.”

Specifically, this study aimed to:

1. capture, send and save incident details to the cloud database;
2. trigger the alarm via loud speaker connected to an amplifier in rescuer station;
3. block unruly clients; and,
4. evaluate the system based on ISO 25010 software quality standards in terms of its functional suitability, reliability, performance efficiency, usability, security, compatibility, maintainability, and portability.

METHODOLOGY

This section covers the design specification, project development, data gathering instrument, validity of the instrument and data processing and statistical treatment.

Project Development

The prototyping model was used to plan, define, design, develop, test and deploy. Figure 2 shows the following phases of prototyping model that includes requirements gathering and analysis, quick design, build prototype, user evaluation, refining prototype and engineer the product.

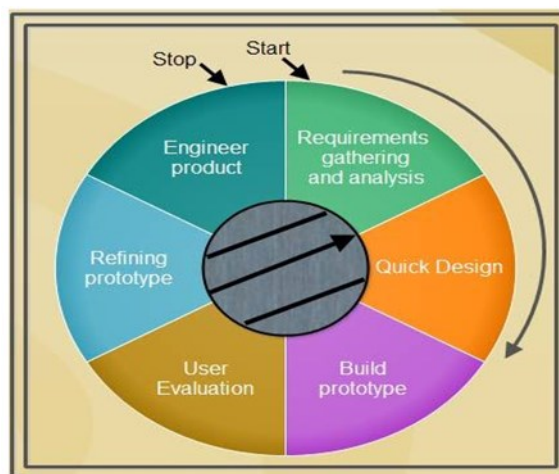


Figure 1. Software Development Life Cycle (Thakur, 2014) (Prototyping Model)

Requirements gathering and analysis

In this phase, the current process of catering client’s request and rescuer response was conducted and studied. After that, problems, scope and limitations were identified. The proposed Disaster Quick Response App with Automatic Location Detection, Live Video Verification and Auto Alarm in Rescuer Station was realized and subject to be tested.

In the development of an application, user capability to operate is considered. Not all users are literate enough to handle some features and settings of an android phone.

Quick design

When requirements were known, a preliminary design or quick design for the system was created. It was not a detailed design and included only the important aspects of the system which gave an idea of the system to the user. A quick design helped in developing the prototype.

In designing the system, the researcher used the UML Modeling Tools. The researcher created different diagrams such as use case diagram, sequence diagram, activity diagram and deployment diagram.

The incident images, specific location, date, date, sender phone number, and municipality/city were captured by Case One on the client side. Upon receiving the report from the rescuer station, Case Two will trigger the alarm and optionally, the rescuer can request a live video of the incident, call or block the sender.

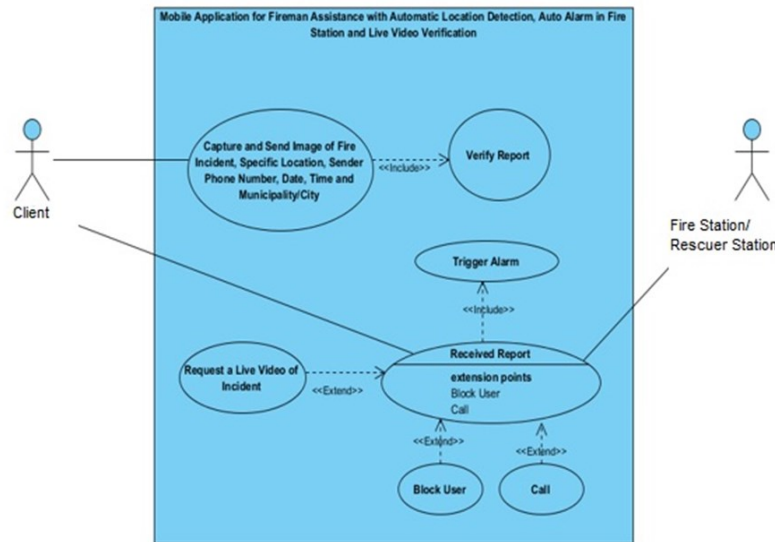


Figure 2. UML Use Case Diagram of Disaster Quick Response App with Automatic Location Detection, Live Video Verification and Auto Alarm in Rescuer Station

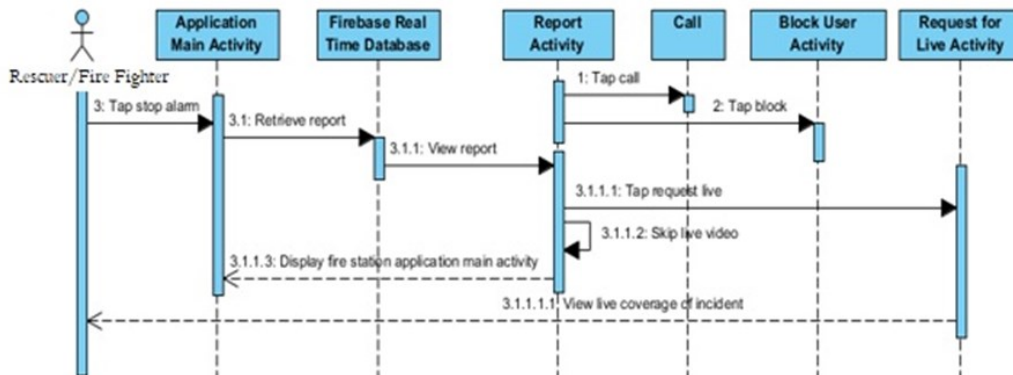


Figure 3. Sequence Diagram of Admin Application for Rescuer Assistance with Automatic Location Detection, Auto Alarm in Rescuer Station and Live Video Verification

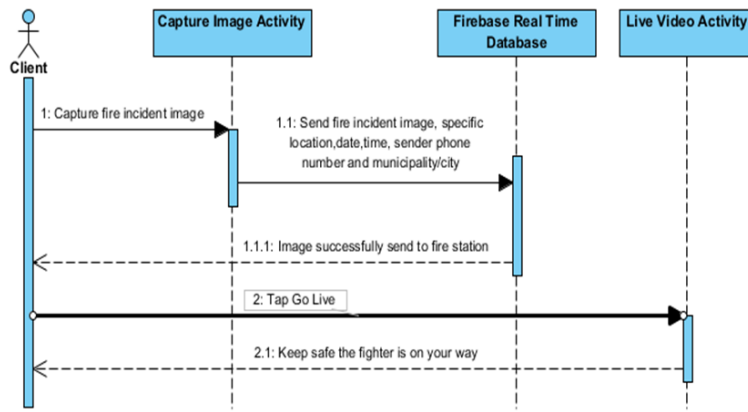


Figure 4. Sequence Diagram of Client Application for Rescuer Assistance with Automatic Location Detection, Auto Alarm in Rescuer station and Live Video Verification

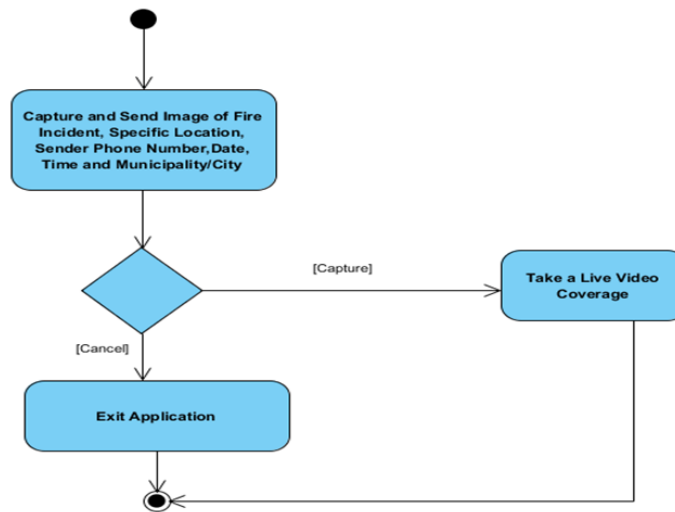


Figure 5. Activity Diagram of Client Application for Rescuer Assistance with Automatic Location Detection, Auto Alarm in Rescuer station and Live Video Verification

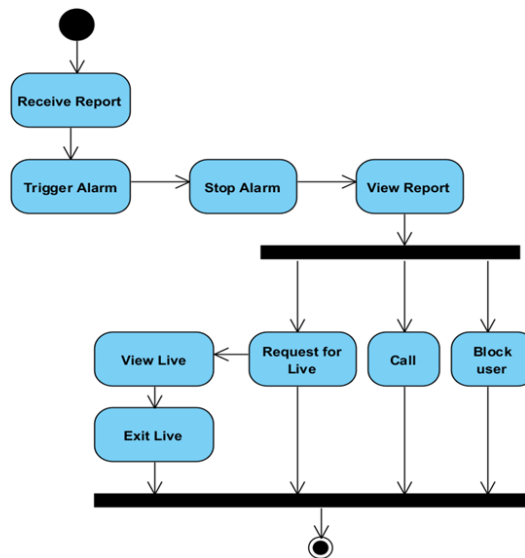


Figure 6. Activity Diagram of Admin Application for Rescuer Assistance with Automatic Location Detection, Auto Alarm in Rescuer station and Live Video Verification

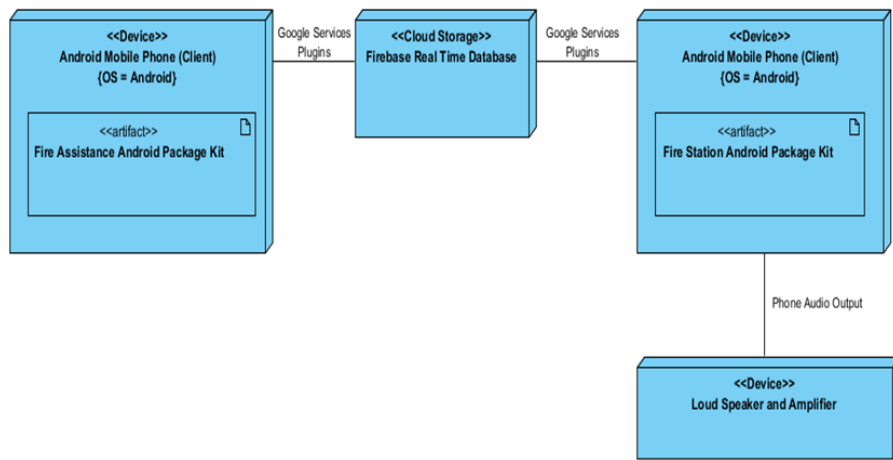


Figure 7. Deployment Diagram of Disaster Quick Response App with Automatic Location Detection, Live Video Verification and Auto Alarm in Rescuer Station.

Build prototype

In this phase, the researcher developed an android application that can capture image of disaster incident, specific location, date, time, sender phone number and municipality/city to be used by the client, and an android application that can receive report from client and automatically trigger an alarm to be used by the rescuer.

Refining

In this phase, the researcher collected suggestions and comments from rescuer station, police, barangay official, volunteers and civilians at Barotac Nuevo. Some user guide features were added to enhance the application.

Refining prototype

In this phase, the researcher re-presented to re-evaluate the application in rescuer station and police station for some refinement and tuning. Fortunately, rescuer station and police stations accepted the application.

Engineer product

Finally, the “Disaster Quick Response App with Automatic Location Detection, Live Video Verification and Auto Alarm in Rescuer Station” is deployed in rescuer station mobile phone. Likewise Android application for client will soon be available to download at Google play.

PROJECT EVALUATION

This project was evaluated by 5 IT experts, 5 firefighters/rescuers, 5 barangay officials, 5 policemen, and 5 civilians/respondents coming from Barangay Cruz, Tabuc Suba, Ilaya Poblacion, Ilaud Poblacion, and Tabucan, Barotac Nuevo, Iloilo. The project was tested at Barotac Nuevo rescuer station, police station, and barangay near the rescuer station.

The researcher used purposive sampling in determining the respondents of the system. The 5 IT experts, 5 firefighters/rescuers, 5 Barangay Officials, 5 policemen were all taken because the researcher knew that they can operate and evaluate the application properly and make the best use of the system.

The researcher used a letter as communication to conduct an evaluation addressed to 5 IT experts, 5 firefighters/rescuers, 5 barangay officials, 5 policemen, and 5 civilians/respondents coming from Barangay Cruz, Tabuc Suba, Ilaya Poblacion, Ilaud Poblacion, and Tabucan, Barotac Nuevo, Iloilo.

Data Gathering Instrument

The data requirements of the application were gathered through interviews, questionnaire and browsing related studies. The researcher used the quantitative method. The data were analyzed to form a simplest requirement for the development of an application.

Purposive sampling techniques was adopted considering the size of the respondents.

Letter requests addressed to the rescuer team leader/fire Marshall, barangay captain and Barotac Nuevo Police station were distributed personally by the researcher prior to the pilot testing of the application.

The feedback on the system's performance was gathered by conducting a system evaluation which was done through application accuracy and quality performance. The researcher used quantitative means of data gathering for the system evaluation by giving out survey questionnaires to respondents to determine how the respondents perceive the system as a whole.

Validity of the Instrument

Validity has to do with whether the instrument is measuring what it is intended to measure. The instrument used in evaluating the software was adopted from ISO 25010.

The areas considered in the evaluation were: functionality (4.88), maintainability (4.81), performance efficiency (4.72), compatibility (4.65), reliability (4.84), usability (4.83), security (4.72) and portability (4.75).

Data Processing and Statistical Treatment of Data

The evaluation responses were tabulated, the data were then examined and interpreted with the use of the following statistical tools:

1. To measure the degree of conformance to ISO standards, the mean results of the survey was computed and interpreted using the Table of Scale and Interpretation.

Table 1. Table of Scale and Interpretation

Scale	Interpretation
1.0 – 1.7	Very Poor
1.8 – 2.6	Poor
2.7 – 3.4	Fair
3.5 – 4.2	Good
4.3 – 5.0	Excellent

2. Mean was also used to determine the level of user acceptability of the application. It is computed by adding up all the values in the series and dividing them through frequency count.

REVIEW OF RELATED LITERATURE

“Environmental Guard App” is designed to cater the complaints against illegal activity in the environment using a mobile application. The complainant will take a picture and send it to the Department of Natural resources. Location is embedded in the report (Salapantan, 2018).

A “Web and Mobile-Based Philippine Emergency Quick Response Portal” is developed to help Filipino citizens in case of emergencies, disasters and calamities such as car accidents, crimes, earthquakes, typhoons, and fire accident. In a click of the fingertip, emergency units will be aware of the emergency being triggered by the users (Ramirez, 2016).

The “Cloud Computing for Vehicle Tracking System Using GPS” incorporates a GPS to track the location of their vehicle. Android was used to track the location using GPS installed in a vehicle (Mahalingan, 2016).

“GPS based Advanced Vehicle Tracking and Vehicle Control System” is designed to track the location of the vehicle via GPS and Google Map. The system can control the vehicle whenever it is stolen (Muktar, 2015).

A “Mobile/Cloud Emergency Response Application for Indoor Assisted Living” is using IPSOS Assistance, a cloud enabled mobile application for indoor assisted living in case of emergency situations in in-

door environments. It provides people assistance in case of personal and environmental emergency showing available escape routes in case of fire from the social contribution of other people located nearby in the same building (Pasaila, 2014).

A “Mobile Emergency Response Application Using Geolocation for Command Centers” is designed detect user’s current location through geolocation and sends to the web application deployed in a command center the name, age, mobile number and location of the user for easily dispatching of emergency units (de Guzman, 2014).

The “Android Application for Emergencies” is developed to let its users send notifications in case of an emergency or a panic situation. The users can send multiple text messages and emails on the press of a single button. The phone numbers, email ids, contents of the text and email messages can be set from within the application (Suryamanshi, 2014).

The “Emergency Reporting using Smartphone” is designed for quick emergency response. Pressing the emergency button triggers the application in the background and immediately the location of the user in terms of latitude, longitude and general information of the place is sent automatically to the registered emergency phone numbers in the application (Iniya, 2017).

The “Fire Disaster Intelligence Alarm System Applicable to Underground Space” is designed for fire disaster underground. The system is composed of computer system, several sensors, alarm and sprinkler for fire-fighting. The researcher uses fire intelligence alarming branch that is composed of smoke sensor, temperature sensor, fire light sensor and alarm. A fire alarm report will then send to the main systems the four stages which are normal, trouble, abnormal and fire disaster (Zhang, 2012).

The “GPS Tracking with Google Maps” is developed to monitor the fleet of vehicles and display their positions on Google Maps. This project is using GPS for tracking the location (Robec,2008).

THE RESULT OF THE ISO 25010 EVALUATION

The researcher used purposive sampling in determining the respondents of the system. The 5 IT experts, 5 fire fighters/rescuer, 5 Barangay Officials, 5 policemen were all taken.

Table 2. The ISO 25010 Evaluation Summary of Result

ISO 25010 Criteria	Mean	Interpretation
Functional Suitability	4.89	Excellent
Performance Efficiency	4.73	Excellent
Compatibility	4.62	Excellent
Usability	4.87	Excellent
Reliability	4.86	Excellent
Security	4.78	Excellent
Maintainability	4.86	Excellent
Portability	4.80	Excellent
Over-all Mean	4.80	Excellent

Summary of Result

The result, as shown in Table X, establishes that the system had “excellent” quality based on the ISO 25010 International Standards. Specifically, it had “excellent” functional suitability (M=4.89), performance efficiency (M=4.73), compatibility (M=4.62), usability (M=4.87), reliability (M=4.86), security (M=4.78), maintainability (M=4.86), and portability (M=4.80).

The result confirmed that that the system’s quality conformed to the international standard set by the ISO.

SUMMARY OF FINDINGS

The application had easily captured, sent, and saved incidents details to the cloud database. The application had triggered the alarm automatically at the rescuer station. The application could block unruly clients. Finally, the application has been rated “excellent” in terms of its functional suitability, reliability, performance efficiency, usability, security, compatibility, maintainability, and portability.

CONCLUSION

Based on the findings, the following conclusions were drawn:

The mobile application has been able to accomplish its intended objective to capture, sent, and saved incident details to the cloud database. It assists rescuers to detect disaster-specific locations, auto alarm in rescuer station, and live video verification of disaster. It conforms to the ISO standards. The application is functional, reliable, efficient, useful, secured, compatible, maintainable, and portable.

RECOMMENDATIONS

On the bases of the findings and conclusions, the following are hereby recommended:

- Rescuer and fire stations can adopt the application so that it can help the rescuer and firemen in tracking disaster specific location.
- The application should be opened to any organization or agencies in order to give financial support for the purchase/acquisition of gadgets and equipment needed to be used in case of fire incident.
- The application can be adopted by the Municipal Disaster Risk Reduction Management Council (MDRRMC).
- The mobile application can also be used for other emergency cases.
- Future researchers can enhance the application in order to run in different platforms.

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LEADING THROUGH THE PANDEMIC: AS PERCEIVED AND EXPERIENCED BY SCHOOL LEADERS

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ABSTRACT

The purpose of this phenomenological research was to study the experiences of school leaders as they lead through the pandemic. A purposive sampling of public school leaders (school head, headteachers, and coordinators) of Gulod National High School in the school year 2020-2021 was the focus of the study. Qualitative data was collected through individual surveys and focus group discussions. The sample consisted of 7 school leaders: 4 headteachers and 3 grade level coordinators. The focus group discussion comprised 3 school leaders from different schools: 1 senior high school principal, 1 elementary mathematics coordinator, and 1 secondary school grade level coordinator. Both individual interview and focus group discussions were conducted via google meet platform. The study utilized a qualitative research design which aimed to describe the lived experiences of individuals in a certain phenomena. Using transcriptions and codes, themes were extracted in the data analysis. There were four key conclusions from this study: (1) School leaders found it difficult to use technology in their work at the start of the new normal setup but have learned and used it with ease at present; (2) Patient and considerate leaders are needed in times of crisis like pandemics which limit face-to-face interactions; (3) Communication between school leaders and their subordinates is difficult in times of crisis which can be due to internet connectivity problems; (4) School leaders during the new normal setup need to adjust the range of time of work to comply with required reports. Further investigation on the use of technology and effective communication between school leaders and their subordinates was recommended in the study.

Keywords: *School Leaders, Pandemic, Leadership, Focus Group Discussion*

INTRODUCTION

The true test of leadership is how well you function in a crisis. -Brian Tracy

The emergence of the global health crisis brought about by the unprecedented outbreak of the COVID-19 pandemic makes educational leadership more challenging. With the physical distancing and community quarantine being among the safety measures, duties and responsibilities of school leaders are heavily affected since teachers and administrators were used to communicating through face-to-face meetings. In response, the Department of Education developed a Basic Education Learning Continuity Plan (BE-LCP) that provides clear guidance to all the stakeholders. One of the principles stated in the plan is to ensure learning continuity through the provision of corresponding training for teachers and school leaders.

School leaders play a crucial role in creating the conditions for success at all levels of the educational system. Leading amidst a crisis is not new to school leaders since challenges come from time to time. However, it is a history in the department of education to make a transition to the “new normal” system of education where technology is integrated with the curriculum and face-to-face interactions among administrators, teachers, and students are limited. The challenges in educational leadership entail daunting tasks to school leaders who will lead in implementing programs where changes impact the performance of teachers and students. Making the adjustments needed to achieve future readiness will require talent management leaders to change. While leaders often discuss the need for change, they consistently find it challenging to make the transformations they aim for. (Parker, et.al., 2020)

In consideration of the challenges faced by school leaders during the pandemic brought about by COVID-19, a research and knowledge gap on leadership changes and adjustment has emerged. In response, the researcher investigated the lived experience of school leaders particularly headteachers and coordinators through the pandemic.

STATEMENT OF THE PROBLEM

The study aimed at investigating the following central question:
What is the experience of school leaders as they lead through the pandemic?

METHODOLOGY

The phenomenological method was used in this study wherein qualitative data were utilized in the form of narrations. The phenomenological approach is used when you want to examine the views and stories of people who have directly or indirectly experienced the phenomenon (Adu, 2019).

The study was limited to school leaders particularly the school head, headteachers, grade level and subject coordinators of Gulod National High School, City Schools Division of Cabuyao, Laguna during the school year 2020-2021. From the population of 12 school leaders: 1 school head, 6 headteachers, 1 subject coordinator, and 4 grade level coordinators, 7 voluntarily participated in the study. Each respondent was given a copy of the Informed Consent Form and invited for an interview through the google meet platform. Ten open-ended questions about the experiences leading through the pandemic were asked to the participants.

The qualitative data collected included a structured interview and focus group interactions. The structured interview served as the primary method of data collection to understand the teachers' perceptions and experiences on being a leader in times of crisis. The interviews were completed by the 7 participating school leaders and answers were transcribed for data analysis. On the other hand, the focus group discussion of 3 school leaders from different schools enhanced the responses from the structured interview. The focus group discussion is useful in studying a particular set of cultures or behavior in a restricted bounded context (Gupta, et. al., 2019). The focus group included 3 school leaders: one principal, one math department coordinator, and one grade level coordinator from different schools. The focus group interview was conducted via google meet and was video recorded by the researcher. The code and theme procedures were used in analyzing and interpreting the narratives of the respondents which explored the experiences of school leaders as they led through the pandemic. The researcher abstract the themes from the code. The most common form of qualitative data used in analysis is text; this can either be a transcription from an interview or field notes from ethnographic work. Most audio and video data are transformed into text to be analyzed. (Gibbs, 2018).

REVIEW OF LITERATURE

Anyone in a leadership position, may it be a business or organization, even public institutions, face a range of threats. Crisis situations can be both opportunities and threats. Crisis leadership examines the challenges faced by leaders at the stage of the crisis lifecycle. Crises don't demand a certain type of leader. The leadership competencies required for successful leaders in times of crisis are the same as the competencies required in daily organizational life (Johnson, 2018).

The crisis brought about by the pandemic is expected to cause a critical shift in the education system in the future. Policy makers and educational leaders will remember these experiences as a learning stage in the life of the institutions and will impact the future policy decisions (Burgos, et. al., 2020). The life of a headteacher is a varied one. The scope of leadership requirements is extremely vast. Headteachers are required to be expert teachers, leaders in pedagogy. They are expected to be behavior gurus, to provide inspirational leadership to local communities and deliver high levels of impact (Solly, 2021).

Educators are charged with continually adopting and adapting new curricula while doing their best to ensure that students develop and apply the skills they will need in school and beyond (Zacarian and Silverstone, 2020). Every human is adaptable to change. Three superpowers give us this edge: connection, communication and cognition. Human connection is what holds us together. Another superpower is the advancement of humans' ability to communicate. While cognitive abilities allow us to remember the past and imagine a possible future. (Jennings, 2020). Since educational institutions were way behind in adopting technology, having focused more on classroom teaching and never having seriously considered online education as a credible model, they were slightly more unprepared than other sectors. However, due to the incredible resilience and determination, educators were quick to adapt to the new normal. (Saxena, 2020).

Effective school leaders understand and respond appropriately to the different contextual demands that they face (Day, Gu, and Sammons 2016). School leadership practices have changed considerably and maybe, irreversibly because of COVID-19. As a result of the pandemic, school leadership has shifted on its axis and is unlikely to return to 'normal' anytime soon, if ever at all. The research underlines that the principles of good leadership are constant. For instance, having a clear vision, developing others, managing people, building capacity and others.. (Leithwood, Harris, and Hopkins 2020).

FINDINGS

This qualitative research intended to answer the question: What is the experience of school leaders as they lead through the pandemic?

The question was answered by exploring the lived experiences of school leaders, particularly headteachers and grade level coordinators, through virtual interviews and focus group discussions that guided the research. Five themes emerged during the data analysis of the teachers' responses that were collected from the interview and focus group discussion. The most common themes that emerge are: patient and considerate leader, the use of technology, challenge of communication, the challenge of lack/poor internet connectivity, and time.

Theme One: Patient and considerate leader

The theme patient and considerate leader was discussed by participating school leaders and had a largest percentage of coverage in the surveys and focus group study. Teachers agreed that in times of crisis school leaders must be patient and considerate.

Teacher D: I learn to become more patient and understanding. I must understand the teachers to avoid conflict. I avoid psycho stress to teachers because I believe that stressful people are not productive.

Teacher: A leader doesn't have to be very intelligent. We need a leader who understands and gives consideration.

Teacher F: I learn to be more patient. For me, a school leader must look at different angles of the situation to understand the teachers.

During the focus group discussion, one of the participants stated that in times of crisis a leader who is considerate is what the school needs. Considerate leadership is a particular characterization of leader behavior that emphasizes commitment to developing personal relationships with followers, care and concern for others, willingness to attend to the unique preferences and work styles of subordinates, and facilitating cooperation among members of a work group (Piccolo, 2019).

Theme Two: The use of technology

The second most common theme discussed by the participants was the use of technology. Four out of 7 participants stated that they learn using technology in the new normal system of education. Teacher A and one of the participants in the focus group discussion expressed the advantage of learning to use technology tools.

Teacher A: I realize how easy a report can be accomplished by the help of technology. This is an essential learning that I gained in my experience as a leader during the pandemic. It was very difficult to gather data before because you have to meet all the teachers, but now with the use of google drive they can send the data right away. What I do is to call up a few teachers who failed to submit their data.

Focus Group Discussion: I learn something that I am not familiar with. I learn to explore technology and to use it in my work like conducting virtual meetings and gathering data for the consolidation of reports.

In contrast, Teacher B and Teacher G have expressed more of their difficulties in learning the use of technology tools in their work.

Teacher B: Everyone knows that we (headteachers) are not millennials and we have limited knowledge in the use of technology. Sometimes I feel ashamed of my teachers when I ask them to teach

me using those tools. There were instances that we (headteachers) had so many training/seminars online, but I didn't know how to use tools. But I understand that I need to learn it because that is the means of communication now.

Teacher G: Technical aspect has been very challenging. Imagine, I am now 56 years old, and they want me to learn these things. I have served the school for 29 years without applications like that. And it is also a challenge because during the start of the implementation of the new normal system, I was the Teacher-In-Charge. It was a stressful experience because I was the leader of the school and yet I had no idea how to reach them. Fortunately, I have learned it and am used to it.

Being a school leader is challenging but applying in your everyday work a new technology that you are not familiar with is more challenging. But teachers are adaptive and flexible. They can cope up even with how challenging a situation is. Fraser (2020), in his study *Teachers' Perceptions of Technology Leadership Impact Technology Use in the Classroom*, stated that aspects of technology leadership have been perceived as effective in school.

Theme Three: Challenge of communication

The third major theme discussed by the participants and perceived as the most common problem during their leadership is the challenge of communication. Four of the participants including one from the focus group discussion expressed the challenges that they experienced regarding communication within their department/grade level.

Teacher A: Communication is a challenge. There were instances that some teachers misinterpreted what I meant especially if written like text or chat messages.

Teacher C: It is a problem when teachers are not reachable through phone or online. For me, we (teachers) have to be reachable in any form especially during office hours because we are expected to be focused on our responsibility as a teacher during this time.

Teachers A and C stated the challenges as a leader regarding communication during the pandemic. Usually, public school teachers' official time is from eight in the morning until 5 in the afternoon. Teachers are expected by the school to be available during official time. Farajallah (2018) stated that his study reached a number of recommendations and the most important of which is that the interest of the management should be provided with a good nature of work and communication.

Theme Four: Challenge of lack/poor internet connectivity

Before the new normal setup, teachers were not required to use the internet in conducting a meeting. However, in the new normal setup teachers are obliged to use technology as means of communication.

Teacher A: Poor internet connection was really a problem. It was really difficult to consolidate a report when not all teachers are complying to submit their data. How can I consolidate if one or two pieces of data are missing? Teachers failed to comply because of lack of internet connection. Some of them can comply but poor internet connection hindered them from submitting on time.

Teacher E: Teachers experienced difficulties in complying to a report or attending meetings because of poor internet connection. Also, there were times that I experienced difficulty in giving technical assistance through class observation because of poor internet connectivity.

Teacher F: Gathering the required data for reports was really affected because poor internet connection. Teachers with poor internet connection failed to submit their reports on time. Before the pandemic, I never experienced submitting grade level reports late. I used to submit on or before due dates.

Teachers A, E, and F expressed the challenges encountered because of lack or poor internet connectivity. The start of the new normal setup was challenging because not all teachers have a good internet connection at home. The findings in the study of Putra, et. al. (2020) showed that the online course was less effective due to poor internet connection and limited internet quota and those problems affected their performance on understanding the mathematics contents, interacting with the teacher and other students, and doing assignments.

Theme Five: Time

Two of the respondents, one from the participants and one from the focus group raised their experiences with regards to the time of work.

Teacher E: Since I have to give teachers technical assistance, I really had to extend my time. Even beyond 5 o'clock I have to review my plan to avoid conflict of schedules. Compared to the traditional setup, we often have time to rest after five in the afternoon. But now, I have to work even on Saturdays and Sundays when there are urgent reports.

Focus group discussion participants also observed that official time needed to adjust to comply with the required reports. Before the new normal, teachers can rest after five o'clock. But now teachers have to have an open line 24/7.

The challenges in the adjustment of time were agreed by other participants in the focus group discussion. Teachers need quality time for their family. They need to be inspired. As Teacher D stated, happy people are more productive. A recent survey by Randstad conducted on work life vs private time balance states that 74% of the respondents indicate that their employers expect them to be available outside regular office hours. 78% of the employees mentioned that they are also expected to be available on phone and email during holidays. 64% of both, male and female respondents indicated that they feel pressured to do so, which clearly reveals the increasing work life balance issues among India Inc. (Mirror, 2015)

The tendency to work beyond hours is so strong among both the employee and employer communities that unlike in the developed world, where workers leave office on time; Indian offices sometimes equate employees 'leaving on time' as being lethargic and not proactive about their work (Golikeri, 2018).

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EARLY OR LATE: THE ASSOCIATION OF TIME OF ACQUISITION ON THE TYPE OF BILINGUALISM OF GRADE SEVEN LEARNERS

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ABSTRACT

The research study aimed to provide possible association of time of acquisition and types of bilingualism of students. It explored the association of early or late bilingualism and its type as to Additive, Dominant, or Semilingualism of thirty (30) selected Grade Seven students of Gulod National High School- Mamatid Extension, City of Cabuyao, Laguna. This study employed descriptive method to determine the significant association. An online survey questionnaire regarding the time of acquisition of bilingualism was used. Proficiency Report in Filipino and English subjects of the respondents were used as basis for the type of bilingualism. A chi-square test of independence was performed to examine the association between time of acquisition and the type of bilingualism. The result of the study revealed that sixty-seven percent (67%) of the respondents are early bilinguals while thirty-three percent (33%) are late bilinguals. Additive Bilinguals show high level of bilingualism in both English and Filipino subjects, Dominant bilinguals are of poor level of bilingualism in Filipino subject but high level in English subject, and Semilinguals show poor level of bilingualism in both subjects. Generally, the overall mean of 1.73 in English subject and 2.27 in Filipino show that the level of bilingualism of the respondents are both average. The data of $X^2 = 2.100$ and $p = 0.350$ show that there is no statistically significant association between the time of acquisition and the type of bilingualism of the respondents; that is, early and late bilingualism belong to additive bilingualism, dominant bilingualism, and semilingualism.

Keywords: Bilingualism, Early Bilingual, Late Bilingual, Additive Bilingualism, Dominant Bilingualism, Semilingualism,

INTRODUCTION

The different distance learning modalities in this time of COVID-19 pandemic posits many changes in the new normal classroom instruction. As promoted by the Department of Education, education never stops as we continue to persevere quality education regardless of all the challenges this pandemic brings. Online, Blended and Modular distance learning modalities emerge in order to cater the need to continue education without breaking the health and safety protocol implemented by the Inter-Agency Task Force of the Philippines. The daily face to face classroom discussion turned into hours of screen time for online and blended modality students while independent learning with learning partners at home was implemented for modular modality students.

Gulod National High School- Mamatid Extension submitted a report on the First Quarterly Proficiency of Junior High School students as required by the City Schools Division of Cabuyao. The result of the said report serves as the basis for the design of learning programs. Based on the results, it was then analyzed that English subject has the lowest proficiency while Filipino subject has the highest among all subjects. English subject's proficiency is noticeably lowest with 87.70% while Filipino subject has the highest with 91.33% proficiency. The difference of 3.63 % shows that regardless of being both language subjects, learners perform lower in English than in Filipino academically. Hence, the gap of academic performance between the English and Filipino subjects is evident and needs to be addressed.

The researcher was interested in conducting this research to identify possible association of the time of acquisition of bilingualism on the proficiency of the respondents both in Filipino and English subject. Since the gap in the proficiency between the two languages is evident and is a continuous academic problem in the country, this study provides sufficient data on the possible reason behind the gap and is a potential source of data on improving linguistic proficiency among junior high school students. As Filipino students using two languages, English and Filipino, factors in bilingualism should receive a closer look. Early and

Late stages of bilingualism may be one of the factors relating to bridging the gap between the two languages' proficiency.

STATEMENT OF THE PROBLEM

The researcher was interested in conducting this study to determine the significant association of the time of acquisition and the type of bilingualism.

Specifically, it aims to answer the following questions:

1. What is the time of acquisition of bilingualism of the respondents in terms of:
 - a. Early Bilingualism
 - b. Late Bilingualism
2. What is the type of bilingualism of the respondents in terms of:
 - a. Additive Bilingualism
 - b. Dominant Bilingualism
 - c. Semilingualism
3. Is there a significant association of the time of acquisition of bilingualism on the type of bilingualism of the respondents?

METHODOLOGY

This study used descriptive research design to identify possible association of the time of acquisition and type of bilingualism of the respondents.

The respondents of this study were thirty (30) out of eight hundred forty-two (842) grade seven students of Gulod National High School-Mamatid Extension in Cabuyao City, Laguna. Specifically, stratified sampling technique was used. The population were classified into different strata namely Additive Bilinguals, Dominant Bilinguals and Semilinguals thus, the sample were randomly selected from each group. Ten respondents from each strata were selected to ensure each type of bilingualism was represented in the sample.

The study utilized the following instruments:

In order to gather data on the respondents' time of acquisition, a researcher-made questionnaire was employed thru google form and accomplished by the parents or guardian of the students. It contained the profile of the students in terms of name and age as well as the number of languages used by the students and the exact age of acquisition of each language.

In terms of the type of bilingualism of the respondents, report on the first quarterly proficiency of the respondents in English and Filipino subjects was used. Additive bilinguals, as used in this study, refers to respondents who have excellent proficiency in Filipino and English subjects. Dominant bilinguals have one approaching proficiency in one language and developing proficiency in either Filipino or English subjects. Semilinguals refer to bilinguals who have developing proficiency ranging from both in Filipino and English subjects.

A letter of request was submitted to the school officer-in-charge and sought permission to conduct the study. With the permission of the officer-in-charge, online questionnaire was sent to the respondents immediately after the approval. A copy of the report on first quarterly proficiency in English and Filipino subjects was taken from the respective subject teachers. Data were later collected, tabulated, analyzed, and computed using the needed statistical treatment.

The following statistical tools were used in this study.

Table 1 shows the statistical treatment of the study.

Table 1. The Statistical Treatment Used in the Study

Analysis	Statistical Treatment
The time of acquisition of bilingualism of the respondents.	Frequency and percentage Distribution
The type of bilingualism of the respondents.	Mean and Standard Deviation
The significant association of the time of acquisition of bilingualism and the type of bilingualism of the respondents.	Chi-Square Test of Association

REVIEW OF LITERATURE

Ekici (2009), stated that arriving at a single meaning of bilingualism is impossible. Concrete evidence on whether bilingualism should be implemented at an early or late stage of learning is needed. Belonging to a country which is very rich in diverse and artistic languages, bilingualism is one of the great areas to dig in. It is important that many reliable, moreover local studies, will be used as reference in studying bilingualism. Global studies are of course great references, but local ones are expected to be more applicable as it includes many cultural and environmental factors present in the Philippine setting.

Koo (2008) stated that bilingual instructions in schools have long been debated. Strong nationalist resistance in using English language as a medium of instruction were evident believing that the language may separate Filipinos from the past. She further stated that pedagogical methods in teaching English language depends on students' language at home.

Heinlein and Williams (2013) stated that negativity in early bilingualism rooted from myths and misinterpretations rather than scientific findings. According to them, bilingualism is the ability to use two languages on a daily basis. Research on bilingualism is still insufficient especially in bilingual language learning among infants and toddlers. In addition, confusion and code-mixing are two separate things and should not be confused. Code-mixing is a normal part of bilingual development.

Klein (2014) stated that bilingualism may seem to be easily defined but is more complex to different people. Accordingly, bilingualism may mean the ability to speak two languages like a native speaker but contrasts with other definitions. Developing a clear categorization is a must as different kinds of bilinguals emerge over time. According to him, dominant bilingual is a person with more proficiency in one language over the other where in most cases is a native-like manner. In addition, proficiency in reading comprehension and writing but poor understanding and speaking are other classifications of bilingualism that need to be classified.

According to Birdsong (2018), bilingualism means the routine use of two languages be it at different level of proficiency in either language. He further reiterated that a language learned at an early age is not always the dominant language of a bilingual. Hence, no two bilinguals have identical language dominance for measures of dominance does not involve proficiency alone. Object naming speed, lexical diversity, and reading speed are just some of the other possible measures of dominance. Demonstrating dominance in a particular context is insufficient. Age-related effects are not the sole determinants of non-nativelike second language acquisition.

According to Houwer (2012), Early bilingualism is when children at young age hear two languages unlike monolinguals with just one. Early exposure to language may start from birth or at a somewhat later age. In case a child is exposed to two languages at a time, the classification is Bilingual First Language Acquisition. There is no chronological order as two languages were both spoken to them at home. The second classification would be Early Second Language Acquisition wherein a first language came in before another language both at an early age. A good example is when a child's language at home is different from the language outside it. In this case, the first language is usually a minority.

Putra (2014) stated that children's first language loss may occur in late bilingualism. This does not mean loss of an entire language but of some words, phrase or meaning. The solution given is exposure to their first language speakers and increase in frequency of conversations in their first language. On the contrary,

Putra explained that early bilinguals are more prone to language loss. Due to the young age, early bilinguals may have not mastered their first language yet interfering the development of the second language. Entisce (2017) stated that additive bilingualism involves maintaining the home language while the dominant language is learned. This results to appreciating their parent’s effort in exposing them the language as well as appreciating their society. According to her, teaching children the value of bilingualism should be promoted. Bilingualism should be discussed to bilingual children to embrace the idea of speaking two languages.

According to Diaz (2020), additive bilingualism is when a first language and culture are maintained and reinforced while learning a second language. She further enumerated three important points to maintain native language such as consistency, meaningful language models, and meaningful communication interactions. Accordingly, consistency in a child’s exposure to its native language as not exact method should be considered best in maintaining a first language. Reading to children is just one way of maintaining native language. Providing rich vocabulary at home is another way to develop and encourage language interactions. Playful interactions especially to young bilinguals is also encouraged. Creating family bonds while maintaining native language is an advantage in language learning.

Karbalei (2010) in her study” Who is in Advantage: A Balanced or Dominant Bilingual?” stated that dominant bilinguals are people with partial mastery of their second language but impressive competence in their first language. Accordingly, superior competence in only one of the two languages is evident. She still reiterated that bilingualism as a topic is growing, and many kinds and degrees continue to emerge.

According to Lucchini (2009), semilingualism means “half-knowledge” of both first and second language. It refers to the linguistic difficulties of children resulting to shortcomings in bilingualism. Accordingly, analyzing bilingualism may open new possibilities which may be a basis for revision of linguistic policy in education. Semilingualism is a clash of two or more oral linguistic systems. Investing in programs that develop oral skills of the standard language may result to the ability to read and write in the second language at an early age.

According to Salo and Karlander (2018) in their study “Semilingualism: The Life and Afterlife of a Sociolinguistic Idea”, the old idea of semilingualism is the seemingly incomplete mastery, detachedness, and incompetence of first and second language of bilinguals.

FINDINGS

Based on the statistical measurements done in this study, the following findings were evident:

Table 2. The Time of Acquisition of Bilingualism of the Respondents

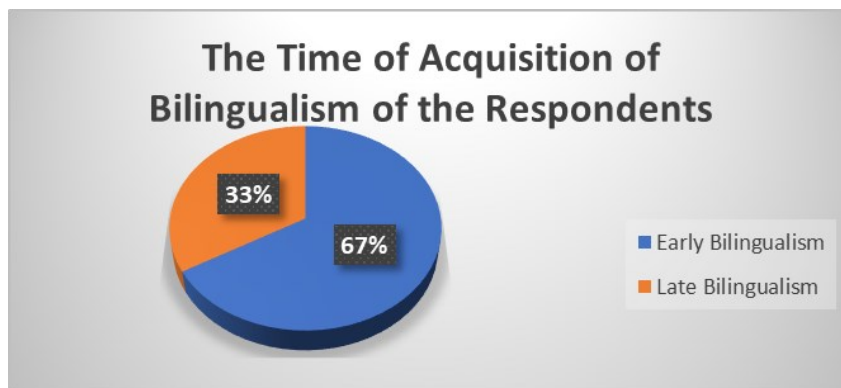


Table 2 shows the time of acquisition of bilingualism of the respondents. It shows that 20 or 67% of the respondents are Early bilinguals while only 10 or 33% of the 30 respondents are Late bilinguals. This further indicates that the samples are dominated by Early bilinguals in terms of their time of acquisition.

Table 3. The Respondents' Bilingualism Level based on its Type

No.	Bilingualism Type	English			Filipino		
		Mean	Std Dev	Interpretation	Mean	Std Dev	Interpretation
1	Additive Bilingualism	3.00	0.00	High level	3.00	0.00	High level
2	Dominant Bilingualism	1.20	0.63	Poor level	2.80	0.63	High level
3	Semilingualism	1.00	0.00	Poor level	1.00	0.00	Poor level
Overall		1.73	0.98	Average	2.27	0.98	Average

Legend: 1.00 - 1.66 = Poor Bilingualism level; 1.67 – 2.33 = Average Bilingualism level; 2.34 – 3.00 = High Bilingualism level

Table 3 shows the level of the type of bilingualism of the respondents. The data show that Additive bilinguals have High Level of Bilingualism in both English and Filipino subjects with the mean of 3.00 and standard deviation of 0.00. Dominant Bilinguals show a poor level of bilingualism in English with a mean of 1.20 and standard deviation of 0.63 while a High Level in Filipino subject with a mean of 2.80 and standard deviation of 0.63 was evident. Semilinguals show poor level of bilingualism both in English and Filipino subjects with a mean of 1.00 and standard deviation of 0.00.

Generally, the overall mean of 1.73 in English subject and 2.27 in Filipino subject show that the level of bilingualism of the respondents are both average.

Table 4. The Association between Time of Acquisition and Bilingualism Type of the Respondents

Time of Acquisition of Bilingualism	Bilingualism Type of the Respondents							
	Additive Bilingualism		Dominant Bilingualism		Semilingualism		Total	
	Fre- quency	Percent- age	Fre- quency	Percent- age	Fre- quency	Percent- age	Fre- quency	Percent- age
Early Bilingualism	8	40	7	35	5	25	20	100
Late Bilingualism	2	20	3	30	5	50	10	100
Total	10	33.3	10	33.3	10	33.3	30	100
Pearson Chi Square	2.100							
P-value	0.350							

* Significant at 0.01, **Significant at 0.05

A chi-square test of independence was performed to examine the association between acquisition of bilingualism and the type of bilingualism of the respondents. We could observe from the table that $X^2 = 2.100$, $p = 0.350$. This tells us that there is no statistically significant association between the time of acquisition of bilingualism and the type of bilingualism of the respondents; that is, both early and late bilingualism belong to additive bilingualism, dominant bilingualism, and semilingualism.

CONCLUSION

Based on the findings of the study, the following conclusions are made:

1. Sixty-seven percent (67%) of the respondents are early bilinguals while thirty-three percent (33%) are late bilinguals.
2. Additive Bilinguals show high level of bilingualism in both English and Filipino subjects. Dominant

bilinguals are of poor level of bilingualism in Filipino subject and a high level of bilingualism in English subject. Semilinguals show poor level of bilingualism in both subjects.

3. There is no statistically significant association between the time of acquisition and type of bilingualism of the respondents as tested in the chi-square test of independence.

RECOMMENDATIONS

Based on the conclusions of this study, the following recommendations are forwarded:

1. The age of acquisition of bilingualism should be considered in designing bilingual instruction in the Philippines since it determines the exposure of students to their second language. Age of acquisition vary among students and since most Filipino students are early bilinguals as represented by the sample, mastery of the English language should be intensified.
2. Type of bilingualism of students should be given more attention especially regarding semilingualism which deals with low proficiency in both first and second languages. Remediation may be given to semilingual students while guidance may be given to Additive bilinguals who are already proficient in both languages. Dominant bilinguals need support to balance proficiency in both languages.
3. Regardless of time of acquisition, type of bilingualism of our students should be the basis of improving or maintaining the proficiency of our students.

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COMPUTER-BASED LEARNING MATERIAL SURVEY DESIGNED ACCORDING TO THE 7E LEARNING MODEL AND INTEGRATED WITH COMPUTER SIMULATIONS (CBLM-7ECS)

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ABSTRACT

This paper attempts to develop and validate an instrument to measure constructs associated with learning materials designed according to the 7E learning model and integrated with computer simulations. The tool was developed through a series of stages that include planning, construction, quantitative evaluation, and validation. The instrument consists of twenty-eight (28) items with four items in each phase of the 7E learning model. The first three items in each phase are focused on assessing the learning material's pedagogical attributes concerning the 7E learning model. In contrast, the last item intends to evaluate the appropriateness and effectiveness of the integrated computer simulations. Cronbach's alpha validity coefficient based on the evaluation of three (3) subject matter experts reveals that all items are considered valid and relevant at $p=0.05$ significance. Also, the mean coefficients of the items in the different phases of the learning model are above the critical value, which conforms to higher relevancy and validity. Likewise, as assessed by thirty-two (32) target respondents, the instrument's reliability coefficient is 0.98, higher than the reference value for reliability. These coefficients signify that the scale developed is a suitable tool for assessing learning materials designed according to the 7E learning model.

Keywords: *computer-based learning material, computer simulations, 7E learning model*

INTRODUCTION

Computer-based learning (CBL) refers primarily to using the computer as a primary component of the learning environment. CBL assists individuals in learning using multiple representations of information for a specific educational purpose (Ifenthaler, 2012). Computer-based learning materials are instructional materials that utilize hardware and software to support computer-based learning (Adams, 2004). These learning materials vary depending on the variety of learners and the purpose to which these materials were developed, learning environments that are presented to learners and the subjects, and the level they are intended for (Clarke, 2018). Various terms are often associated with the use of computers or how technology is employed in education, such as Computer-Based Instruction (CBI), Computer-Assisted/Aided Instruction (CAI), Resource-Based Learning (RBL), and Interactive Multimedia Learning Environments (IMLE). The terms differ depending on how the authors define the purpose and mode of delivering the learning material. Commonly, CBL is used as a term to encompass the use of a computer to support instruction having three (3) components, namely, hardware, software, and the “underware” or the pedagogy that supports its development. The pedagogy is the most important component since the chosen approach will influence the creation of computer-based learning materials and determine how students are engaged in the subject matter (Adams, 2004). Thus, teachers are influential in selecting the most appropriate computer-based learning activities and should be aware of factors that will strengthen pedagogically effective computer-based learning materials. Computer-based learning must then utilize engaging and adaptable learning materials to provide students with a highly motivating learning experience. “CBL material fulfills the role of a teacher and provides teaching support, instruction, assistance, and feedback” (Halabi et al., 2010, p.23). Thus, there are plenty of factors to consider in designing and developing computer-based learning materials beginning with learners’ needs and characteristics.

One of the most critical features of a computer-based learning material is its interactivity or the ability to engage, communicate, and adapt to the learners since it can utilize various forms depending on the strategy adopted, medium employed, and delivery approach (Clarke, 2018). These interactive computer-based learning materials may provide effective learning experiences which motivate, adapt to individual differences, meet learners’ needs, maximize choice and allow for self-assessment. Different types of learning material

may take the forms of computer-based training (CBT), resource-based learning, virtual reality, drill and practice, multimedia, hypermedia, online learning, and simulation. It is to be emphasized that there are no fixed types or forms of computer-based learning materials, but combining some of the approaches may bring together the advantages and at the same time eliminate the weaknesses of some types. Several computer-based learning materials combining different types and approaches have emerged as advances in technology continue and increased access to the internet, making it easier for teachers and educators to integrate technology in their teaching. However, it is highlighted that integrating technology with curriculum and instruction can be a powerful education tool to improve the quality of education. A technology integrated into the learning material that fits the curriculum and instruction can stimulate higher-order thinking and problem-solving skills, and it can support collaborative, globalized learning (Reed & McNergney, 2000).

One way to restructure computer-based learning materials is using learning models and integrating existing technology such as computer simulations and virtual realities. Senan (2013) infused computer simulations in developing his multimedia package for secondary physics designed according to the 5E learning model. He suggested that the package has the potential to develop “the 21st-century skills in science education curriculum programs and instructional practices” (p.1). Furthermore, the newly designed and customized 5E learning model material integrated with energy simulation by Lye et al. (2014) resulted in a meaningful learning experience as manifested by students’ interest in using the material. Moreover, Warliani et al. (2017) implemented a 7E learning cycle model with the integration of simulations in selected phases to determine if it improves students’ conceptual understanding of mechanical wave material. Findings indicated that a group of students exposed to simulations had better conceptual understanding while also expressing positive feedback towards applying the 7E learning cycle. These findings have also been confirmed by Sarac (2017) on his research concerning the preparation and implementation 7E learning model supported with multimedia teaching materials in secondary science courses. Better academic achievement and continual learning were achieved, signifying that the 7E learning model can also be enriched with simulations at each stage or at a particular stage. As such, the incorporation of computer simulations into any learning model has the potential to affect science learning and teaching. Dwyer and Lopez (2001) developed a simulation within the constructivist framework through a learning cycle with the stages of exploration, concept/term introduction or invention, and concept application or expansion. Based on the excerpt, teachers stated that students who never do homework had obtained better results from the output derived from the simulation. Both student results and teachers’ self-report proved that the implementation of learning cycle lessons embedded with simulations could provide meaningful learning experiences for teachers and students.

There are few studies involved in the development of web-based and or computer-based learning materials designed according to a learning model, specifically the 7E learning model (Istuningsih et al., 2018; Sarac, 2017; Warliani et al., 2017). Assessing the pedagogical attributes of these computer-based learning materials to the 7E learning model have also not been carried out. Keser and Akdeniz (2010) have developed an instrument in assessing learning environments designed according to the constructivist 5E learning model but not the learning materials used in the model. On the other hand, Wang (2009) developed a web-based constructivist learning environment and came up with an instrument to evaluate pedagogical, social, and technological designs. The rapid development of varied computer-based learning materials advances for teachers and educators to integrate ICT in teaching. However, these learning materials should be assessed using evaluation instruments or scales to determine if the tool is appropriate and if it measures the construct it intends to measure. Sambrook (2001) emphasized that in evaluating the quality of computer-based learning materials, it is useful to consider all possible factors that include but are not limited to being user-friendly, presentation, graphics, engagement, information, knowledge, understanding, level, type of learning, language, and text. Anderson et al. (2005) also stated that a well-designed computer-based learning or instructional materials demonstrate many features. It must state the objective, engage the user, allow the user to explore and discover, correlate the information with other sources, provide feedback, require iteration, and take advantage of all features found. In addition, the design, development, and inclusion of CBL into courses must be based on sound pedagogical principles and not simply using sophisticated methods to present the content. Teachers and developers must be aware of what contributes to educationally effective and quality computer-based learning materials. Teachers are practically responsible for choosing and developing the most appropriate learning activities that will effectively promote learning. Reed and McNergney (2000) underscored the importance of technology in the classroom, where teachers must provide technology-supported learning opportunities for students. However, it is only through evaluation of these computer-based learning materials can help teachers and administrators make informed decisions on the use and production of these materials.

Keser and Akdeniz (2010) have developed and validated an instrument intended to evaluate a constructivist learning environment using the 5E model. Other existing instruments (Johnson & McClure, 2004; Nix et al., 2005; Wang, 2009) are not specific to evaluating computer-based learning materials but focused on measuring a constructivist learning environment. None of these instruments or tools were designed explicitly on assessing the pedagogical attributes of computer-based learning materials integrated with computer simulations and designed according to the 7E learning model. In general, these studies have not actually evaluated if these materials are consistent with the pedagogical attributes of the 7E learning model and if the computer applications used are appropriate to the phases of the model.

Instructional materials recommended for use in public schools should undergo quality checks as mandated by the Department of Education through their Learning Resources Management and Development System (LRMDS). Specific guidelines are set assessing and evaluating learning and teaching resources and professional development materials before these are to be recommended for use in public schools. There is an existing evaluation tool for digital (offline or online) learning materials that include CD-ROM, DVD, VCD, VHS, slides, transparencies, cassette tapes, and digital interactives to ensure achievement of educational and technical quality. The instrument's indicators are categorized into four (4) components which are content, instructional, technical, and other findings. In addition, the government's education agency has provided complete technical evaluation guidelines and checklists directing on usability, interoperability, and technical formats. All the indicators and descriptors in this instrument focus on assessing the general features of digital instructional materials. None of the indicators are specific to the pedagogical aspects that underpin the development of these learning materials. As stressed by Adams (2004), CBL materials must be based on sound pedagogical principles to ensure that effective teaching strategies are appropriately incorporated and not simply technology-driven learning materials. It is thereby necessary to assess and evaluate existing computer-based learning materials to determine if the chosen pedagogical approach that underpinned its development is appropriate or not. In addition, the result of the previous study on evaluating computer-based learning materials that are designed according to the 7E learning model recommends that an instrument be developed to assess the materials' pedagogical attributes with the 7E learning model and if the computer simulations used are appropriate to the phases of the model. However, without existing necessary instruments, there is a need to develop and validate new research instruments suitable for evaluating specific learning materials, which is the customary process of standardizing research instruments. Using a valid and reliable instrument that measures the intended constructs of a learning material helps teachers and instructional designers determine if the instructional materials are appropriate and effective.

RESEARCH OBJECTIVES

The main objective of this study is to develop an instrument in assessing computer-based learning materials designed according to the 7E learning model and integrated with computer simulations. Specifically, the objectives of this study are:

1. To determine the content validity of the Computer-based Learning Material designed according to the 7E learning model and integrated with computer simulations (CBLMS-7ECS).
2. To determine the internal consistency of the Computer-based Learning Material Survey according to the 7E learning model and integrated with computer simulations (CBLMS-7ECS).

METHODOLOGY

Research Design

This project is a research and development with the aim to standardize research instrument designed for teachers and experts in evaluating computer-based learning material designed according to the 7E learning model and integrated with computer simulations. The development and validation process follows the four rigorous phases, as outlined by Creswell (2005). These four phases are planning, construction, quantitative evaluation, and validation.

Participants of the Study

The participants of the study in the pilot testing were thirty-two (32) physics teachers. They were selected purposely based on their specialization as physics teachers and their experience in teaching physics at the secondary level. Out of the total population of potential respondents, thirty-two (32) accepted the invitation; thus, the evaluation tool and the sample learning material was electronically forwarded. On the other hand,

three (3) members comprised the panel of experts for the validity test. One is a regional science education supervisor, one (1) university associate professor, and one (1) science coordinator. The validators were selected purposely based on their expertise and experiences in utilizing the 7E learning model and computer simulations.

Ethical Considerations

In ensuring that the study adheres to the principles of conducting research, ethical considerations were strictly employed. These considerations, which are primarily centered on protecting research participants, are autonomy, beneficence, and justice. Following these established principles, participants were properly informed about the nature of the study and the extent of their participation. They were given an informed consent form approved by the researchers' institution ethics committee containing the details and nature of the study, emphasizing that they have the right to decide whether to participate in this study freely and the right to withdraw at any time without any consequences. Confidentiality and anonymity were consistently observed as participants were assured that the data gathered will be treated with strict confidentiality. Lastly, the principle of justice, which refers to equal share and fairness, was also given importance. The researcher recognizes the vulnerability of participants; thus, considerations into their availability and convenience during the conduct of this study were prioritized. Also, their contributions to this study were greatly acknowledged and emphasized.

Phases of the Study

The study's objective is to develop and evaluate an instrument which was carried out in four different phases. Each phase involves several steps that must be undertaken to create a tool that accurately measures the variables of the learning material to be evaluated.

Phase 1: Planning. This phase involves a series of preliminary steps that are significant in the development of the instrument. It includes the determination of the purpose of the tool, identification of the domain, review of the literature, and writing the instrument's objectives.

Phase 2: Construction. This phase primarily focused on developing the initial instrument, initial qualitative content validation, and revision of the primary instrument.

Phase 3: Quantitative evaluation. This phase was concerned with pilot testing and computing for internal consistency.

Phase 4: Validation. This is the phase where the instrument was tested for validity utilizing the rating of the 3 panel experts.

Analysis and Treatment of Data

The internal consistency of the instrument was indexed using Cronbach's alpha. The reliability coefficient may range from 0.00 to 1.00, with values of 0.70 or higher indicating acceptable reliability (George and Mallery, 2003). A higher coefficient means that the items are dependent on one another; thus, the items measure the same underlying concept. On the other hand, the content validity of the instrument was determined using Aiken's V formula. Based on Aiken's V index table, shows the content validity coefficient (V value) of each tested item has to be ≥ 0.64 at $p=0.05$ to reach a significant standard for a 25-item test (Aiken, 1985). Thus, an instrument with more items has a lower threshold index value. As V coefficient approaches 1, the question is very valid or very relevant. In general, a correlation coefficient of 0.60 or higher indicates a significant, positive relationship (Creswell, 2005).

RESULTS AND DISCUSSION

Validity of the CBLM-7ECS Instrument

The final instrument tested for content validity and internal consistency consists of 28 items subdivided into the 7 phases of the 7E learning model. For every phase, there are three (3) items dedicated to assessing the pedagogical attributes of the learning material in accordance with the principles of the 7E learning model, while a fourth item is intended to measure the appropriateness of the integrated computer simulation. The elicit phase is the first stage in the 7E learning model, where learners' prior knowledge and understanding are extracted through various strategies and materials. At this stage, students' misconceptions are assessed,

which are to be addressed in the subsequent stages. Table 1 presents Aiken’s V coefficients of the items in the elicit phase.

Table 1. Validity Coefficients of Items in the Elicit Phase of the CBLM-7ECS Instrument

Elicit	V-value	Remark
Learning activity allows learners to retrieve prior or existing experience and knowledge in the acquisition of new knowledge or information.	1.00*	Valid/ Relevant
Learners are provided with scientifically-oriented questions to focus their thinking towards the learning outcomes of the activity.	0.89*	Valid/ Relevant
Learning activity evaluates learners' misconceptions about a topic or a subject matter.	0.67*	Valid/ Relevant
The integration of computer simulation in the learning activity is appropriate and effective in achieving the purpose of the "elicit" phase.	0.78*	Valid/ Relevant
Mean	0.83*	Valid/ Relevant

**significant at $\alpha=0.05$ based on Aiken’s table of critical values*

Based on the data, item 3 has the lowest validity coefficient, just slightly above the critical index. This item is concerned with assessing the learning activity's ability to gauge learners’ misconceptions about the topic or subject matter. Balim, et al. (2012), in their study, emphasized the need for teachers to find out misconceptions and plan teaching strategies to remove these misconceptions, which prevents students from learning meaningfully. Hence, this item on evaluating learners’ misconception is necessary for evaluating a learning material designed according to the 7E learning model. Meanwhile, item 1 which focuses on determining learners’ prior knowledge and skills, has the highest validity coefficient. Retrieving prior knowledge of learners will serve as a diagnostic measure to prevent a mismatch between the teacher’s expectations and students’ actual knowledge base (Hailikari et al., 2008). Item 2 was also considered as a necessary item in the instrument, which deals primarily with providing learners with the expected outcomes of the learning activities. This will help learners focus their learning efforts and direct them to the expected learning activities. All of these items are necessary to determine the pedagogical attributes of the elicit phase accurately. The need to select appropriate simulation to be integrated into this phase is also needed, as indicated by the index value. For this elicit phase, the mean index value of the items reflects high validity and relevancy.

The second phase of the learning cycle is the engage phase, with a mean coefficient implying high validity. This value signifies that, in total, the items in this phase are valid and relevant based on Aiken’s critical value. These items with the corresponding coefficients are presented in Table 2.

Table 2. Validity Coefficients of Items in the Engage Phase of the CBLM-7ECS Instrument

Engage	V-value	Remark
Learning activity effectively captures the interest of learners, motivates, and engages them to think about the subject matter.	0.78*	Valid/ Relevant
Learning activity empowers learners to focus on a problem, situation, or event mentally.	0.78*	Valid/ Relevant
Learning activity effectively stimulates thinking by allowing learners to raise questions in their minds.	0.89*	Valid/ Relevant
The integration of computer simulation in the learning activity is appropriate and effective in achieving the purpose of the "engage" phase.	0.89*	Valid/ Relevant
Mean	0.86*	Valid/ Relevant

**significant at $\alpha=0.05$ based on Aiken’s table of critical values*

The focus of the items in this phase is on the quality of the learning material in capturing learners’ interest and focus on the subject matter. Specifically, items 1 and 2 both have a coefficient just slightly above the critical value, while the last two items can be classified as highly valid. Generally, the subject matter experts have agreed that all items may accurately assess the different attributes of the engagement phase. The

instrument must assess how learning activities found in the learning material capture students' attention, raise questions in their minds and engage them (Balta, 2016) since this will establish the learning outcomes that would focus on students' thinking toward the content. All items in this dimension are considered necessary to attract students' attention, allow students to make predictions, and support students' reasoning.

The components of the items in the explore phase intend to assess if the learning material provides students the opportunity to perform different activities "that help them use prior knowledge to generate new ideas, explore questions and possibilities, and design and conduct a preliminary investigation" (Duran et al., 2011, p.57). The coefficients of the items in this phase are reflected in Table 3.

Table 3. Validity Coefficients of Items in the Explore Phase of the CBLM-7ECS Instrument

Explore	V-value	Remark
Learners actively inquire about new knowledge and answer questions by themselves.	0.89*	Valid/ Relevant
Learning activity provides opportunities for learners to test ideas and questions generated in clarifying their knowledge and understanding of the subject matter.	0.78*	Valid/ Relevant
Learning activity provides opportunities for learners to design and plan experiments, record data, and develop hypotheses.	1.00*	Valid/ Relevant
The integration of computer simulation in the learning activity is appropriate and effective in achieving the purpose of the "explore" phase.	1.00*	Valid/ Relevant
Mean	0.92*	Valid/ Relevant

*significant at $\alpha=0.05$ based on Aiken's table of critical values

The mean coefficient strongly implies that the items in the exploratory phase broadly represent the content it intends to measure, which is one of the highest among the phases. The exploratory activities revolve around framing questions, suggesting approaches, providing feedback, and assessing understanding (Eisenkraft, 2003). Hence, items 1-3 intend to evaluate the activities offered to learners using their prior knowledge to generate new ideas, explore questions and possibilities, and design and conduct a preliminary investigation. Results show that item 3 is very highly valid while items 1 and 2 have coefficients that can be classified as high and moderate, respectively. Also, the need to assess the integrated computer simulation in a learning material to be evaluated is essential, as apparent by the item coefficient. Based on these values, experts have agreed that the items are likely measuring the content of the given construct (Straub & Gefen, 2004).

The explain phase provides learners the opportunity to express their understanding of the topics they have encountered in the previous stage. Calculation of the validity coefficients of the items ranges from 0.78 to 1.00, indicating that these items are representative of the attributes in this phase. The V-values of the individual items indicate that the experts have agreed that the items in this phase likely reflect the specific intended domain of content it wants to measure. Item contents in this phase focus on how well the learners express their understanding of the topics they have encountered in the previous stage. Table 4 displays the coefficients of the items in the explain phase.

Table 4. Validity Coefficients of Items in the Explain Phase of the CBLM-7ECS Instrument

Explain	V-value	Remark
Learning activity focuses students' attention on a particular aspect of engagement and exploration experiences, thereby providing opportunities to explain and demonstrate their conceptual understanding, process skills, and behaviors.	0.89*	Valid/ Relevant
Learners actively construct explanations based on data and observations derived from their explorations.	0.78*	Valid/ Relevant
Learning activity guides students toward coherent and consistent generalizations.	1.00*	Valid/ Relevant
The integration of computer simulation in the learning activity is appropriate and effective in achieving the purpose of the "explain" phase.	0.89*	Valid/ Relevant
Mean	0.89*	Valid/ Relevant

*significant at $\alpha=0.05$ based on Aiken's table of critical values

The explain phase also proposes its measurement if the learning activities present in the learning material permit the teacher to introduce a concept, process, or skill derived from students' explanations and experiences from the two previous phases (Duran et al., 2011). Thus, the learning activities should guide the students to construct their explanations, demonstrate their conceptual understanding, process skills, and behaviors towards coherent and consistent generalizations. All of these pedagogical attributes are well signified by the items in this particular phase due to the higher mean validity coefficient.

In the elaborate phase, the mean V-coefficient is considered highly valid and relevant with all items having coefficients that are above the critical value. Table 5 presents these values.

Table 5. Validity Coefficients of Items in the Elaborate Phase of the CBLM-7ECS Instrument

Elaborate	V-value	Remark
Learners make connections and relations of learned concepts to a similar but more complex context that includes raising new questions and hypotheses to explore.	1.00*	Valid/ Relevant
Formative assessment effectively evaluates learners' strengths and weaknesses and target areas that need improvement.	0.78*	Valid/ Relevant
Learning activity allows learners to justify and communicate their present findings or conclusion.	0.89*	Valid/ Relevant
The integration of computer simulation in the learning activity is appropriate and effective in achieving the purpose of the "elaborate" phase.	0.89*	Valid/ Relevant
Mean	0.89*	Valid/ Relevant

**significant at $\alpha=0.05$ based on Aiken's table of critical values*

Items in the elaborate phase intend to assess whether the learning activity permits learners to apply their knowledge to new domains, which may include raising new questions and hypotheses to explore (Eisenkraft, 2003) to construct new knowledge. Also, assessing learners' development and acquisition of deeper and broader understanding, more information, and adequate skills are the unstated focus of the items in this particular phase. Experts have rated item 1 the highest, which concerns learners making connections and relations of learned concepts. This means that this is a very significant content of the instrument that may accurately measure the objective of the elaborate phase. Also, the need to include formative assessment in this stage of the learning model is deemed essential by the experts as reflected by the high coefficient index in item 2. Also, the high coefficient of item 3 signifies that this component is appropriate and necessary to assess if the learning material allows learners to justify and communicate their findings and conclusions.

Subsequently, items in the evaluate phase emphasize the importance of using different assessment tools to measure students' progress towards achieving the course objectives. Thus, all items in this phase are concerned with the type, purpose, and appropriateness of the assessment tools provided in the learning material. Table 6 presents the mean and item coefficients in the evaluate phase.

Table 6. Validity Coefficients of Items in the Evaluate Phase of the CBLM-7ECS Instrument

Evaluate	V-value	Remark
Learning activity contains varied types of assessment (formative, summative, peer band self-assessment).	0.89*	Valid/ Relevant
Assessment develops and supports students' meta-cognitive skills.	0.89*	Valid/ Relevant
The assessment provides learners the ability to make sense of information, relate it to prior knowledge, and use this information for new learning.	0.89*	Valid/ Relevant
The integration of computer simulation in the learning activity is appropriate and effective in achieving the purpose of the "evaluate" phase.	0.89*	Valid/ Relevant
Mean	0.89*	Valid/ Relevant

**significant at $\alpha=0.05$ based on Aiken's table of critical values*

Based on experts' assessment, all items have the same coefficient beyond the critical value, indicating high validity and relevance. Experts have emphasized the need to measure if the varied assessments present in the learning material measure students' progress and performance. In addition, evaluating a learning material in promoting and developing the metacognitive skills of students is a necessary component of the instrument. However, it is emphasized that assessment activities may be included in the different phases of the learning model since formative assessment is not limited to a particular phase of the model but instead should take place during all interactions with students (Eisenkraft, 2003). Similarly, with the previous phases, computer simulations that are used in this phase must also be assessed in terms of appropriateness. Finally, the extend phase is one of the two phases with the highest mean coefficient, indicating a high degree of relevancy and validity. The contents of items are focused on how a learning material promotes and encourages learners to practice the transfer of learning to a new context. The mean validity coefficient and item coefficients are shown in Table 7.

Table 7. Validity Coefficients of Items in the Extend Phase of the CBLM-7ECS Instrument

Extend	V-value	Remark
Learning activity effectively promotes the transfer of skills and knowledge to a new context or framework for deeper understanding and retention of concepts.	1.00*	Valid/ Relevant
Learning activity promotes the transfer of knowledge to real-life applications.	1.00*	Valid/ Relevant
Learners effectively communicate new findings and justify their conclusions to others.	0.78*	Valid/ Relevant
The integration of computer simulation in the learning activity is appropriate and effective in achieving the purpose of the "extend" phase.	0.89*	Valid/ Relevant
Mean	0.92*	Valid/ Relevant

*significant at $\alpha=0.05$ based on Aiken's table of critical values

Based on the table, items 1 and 2, which aim to measure the transfer of learning to a new context and real-life applications for deeper understanding and retention of concepts, have both achieved the highest possible coefficient. The perfect coefficient value on these items indicates that the panel of experts placed significant importance on the retention of learned concepts and the transfer of learning outside of the classroom learning environment. It is also noted that there is a need for learners to effectively communicate findings and conclusions to others, as manifested by the item coefficient of item 3. Thus, a learning material designed according to the 7E learning model should contain activities that promote the transfer of knowledge, which are not limited to simple elaboration but rather to a new context and everyday life experiences. In addition, a computer simulation integrated into this phase should be assessed if it is appropriate and effective in attaining the purpose of the phase.

Reliability of the CBLM-7ECS Instrument

The reliability coefficients of the different dimensions were carried out in the pilot testing participated by the target respondents. In total, the twenty-eight (28) items were grouped into seven (7) different phases. The overall Cronbach's alpha of the different phases has been found to have excellent internal consistency as manifested by the high index value based on the data. The overall coefficient was the computed value when the total score variance and the sum of the variances of the 28 items were considered. As such, the items in the different phases are highly correlated, demonstrating acceptable reliability. However, the high value of the α -coefficient may be attributed to the fact that the size of a Cronbach's alpha coefficient depends upon the number of items in the scale with scales with more items having higher coefficients (Cortina, 1993). Since the instrument includes multiple dimensions of the 7E learning model, these phases' alpha coefficients were taken separately, with four items in each phase. The instrument's components were confirmed by component analysis when it reduced the 28 items to 7 components with 78% total variance. With the small number of items in each phase, the recommended Cronbach's alpha cut-off value is lower than 0.70 for components with four to six items (Hair et al., 2013). The coefficients of each phase and the overall coefficient of all items are presented in Table 8.

Table 8. Reliability Coefficients of the Items in the Different Phases of the CBLM-7ECS Instrument

Phase	Number of Items	Cronbach's α	Internal Consistency
Elicit	4	0.89	Good
Engage	4	0.89	Good
Explore	4	0.99	Excellent
Explain	4	0.95	Excellent
Elaborate	4	0.92	Excellent
Evaluate	4	0.98	Excellent
Extend	4	0.94	Excellent
Overall	28	0.97	Excellent

The reliability indices of the elicit and engage phase are the lowest but still within the good reliability index. All the other phases have an excellent reliability index, of which the explore phase has the highest. These values of Cronbach's alpha show that the items in each phase are closely related to one another, indicating that the items measure the same attributes the phase is intended to assess. In the elicit phase, the items are focused on how a learning activity in a material allows learners to retrieve prior knowledge and experiences, make connections between these past and present experiences, and assess misconceptions through the use of different strategies and techniques which are originally present in the engage phase of the 5E learning model (Bybee, 2014). The engage phase, on the other hand, encompasses items on the presence of short activities in the learning material to be evaluated in capturing students' attention, raising questions in their minds, and engaging them" (Balta, 2016). These attributes are the focus of the items in the engage phase, which collectively exhibits good reliability.

Items in the explore phase have the highest reliability coefficients among the 7 phases, signifying that these items are highly correlated with one another. Items in this phase are fixated on the opportunity provided to students to perform different activities "that help them use prior knowledge to generate new ideas, explore questions and possibilities, and design and conduct a preliminary investigation" (Duran et al., 2011). It should be noted that the teacher's role at this stage revolves around framing questions, suggesting approaches, providing feedback, and assessing understanding (Eisenkraft, 2003). Subsequently, the alpha coefficient value in the explain phase is considered highly reliable. Items in the explain phase are focused on assessing if the learning activities included in the material permit students to demonstrate their conceptual understanding, process skills, or behaviors (Bybee, 2014). Moreover, the engagement and exploration experiences of students in the engagement and explore phase should lead to the introduction of particular concepts, processes, or skills in the explain phase. Thus, it should be established by the learning activities that the function of the teacher is to provide scientific explanations, introduce essential vocabulary, and discuss or clarify misconceptions to help students focus on a specific aspect of their exploratory experiences (Duran et al., 2011).

Furthermore, the elaborate phase also has a high-reliability alpha coefficient signifying that the items are closely related. Item constructs converge on providing additional learning activities to learners to develop deeper and broader understanding, acquire more information, and have adequate skills. These knowledge and skills are to be applied to new domains that may include raising further questions and hypotheses to explore (Eisenkraft, 2003) to construct new knowledge. Subsequent to the elaborate phase is the evaluate stage, where the items are focused on assessing the different types of assessment tools and strategies embedded in the learning material. These assessments are also evaluated in terms of their capability to develop and support students' meta-cognitive skills and provide learners the ability to make sense of information, relate it to prior knowledge, and use it for new learning. Based on the alpha-coefficient, these constructs are all thoroughly manifested in the evaluate phase as apparent with the high index value.

Finally, items in the extend phase are closely related to one another, as manifested by the high-reliability coefficient. The construct that the items intend to evaluate emphasizes students' retention of concepts and transfer of learning. The learning activity in the instructional material should encourage students to transfer learned knowledge and skills to a new framework or context and everyday experiences for deeper understanding.

CONCLUSION

This study on the development and validation of computer-based learning material survey designed according to the 7E learning model and integrated with computer simulations was tested for content validity and internal consistency. Based on the results, it can be concluded that all the items in the instrument represent the components of the domains to be measured, in this case, the pedagogical attributes of the learning material and relevance of the computer simulations used. Also, the item contents certainly reflect the behavioral traits being measured in each phase of the learning model, as indicated by higher validity coefficients. Likewise, questions concerning the appropriateness and effectiveness of the computer simulations in each phase of the learning model are highly relevant and valid. On the other hand, reliability coefficients indicate that the items are highly correlated with one another. Based on the results of content validity and internal consistency, the instrument can be regarded as a suitable tool in evaluating computer-based learning materials designed through the 7E learning model with the integration of computer simulations.

RECOMMENDATIONS

Based on the findings of the study, the instrument can be used to evaluate learning or instructional materials that are based on the principle of the 7E learning model and integrated with computer simulations. However, items with validity and reliability coefficients that are just slightly above the critical value may be revised, omitted or changed. This is to increase the validity and reliability indices of the items and phases, respectively. Moreover, the instrument may be pilot tested to a greater number of target respondents to increase the probability of getting accurate and precise coefficients of validity and reliability.

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VOCABULARY BUILDING TECHNIQUES AND READING COMPREHENSION SKILLS: SPRINGBOARDS IN DESIGNING WORKSHEETS

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ABSTRACT

This descriptive study determined the extent on the use of teachers' vocabulary building techniques and reading comprehension skills among second year BEd/BSEd students of the State Colleges in the 4th District of Iloilo. Thirty English teachers and their 120 randomly selected students served as participants. The instruments employed to gather the data was a duly validated checklist-questionnaire for the extent of vocabulary techniques used by teachers and a reading comprehension test for students adopted from Jaula (2015). Frequencies, mean and rank were used for descriptive statistics. Mann-Whitney U-test and Spearman rho were used for inferential statistics set at 0.05 level of significance. Result showed that "context clue" is the most common vocabulary technique used. Among others are acronymy, compounding, clipping and etymology. When teachers were classified as to educational qualifications, the entire group whether classified as to master's and doctorate degrees had highly utilized vocabulary building techniques. Contrastingly, level of students' reading comprehension was "high" when teachers were taken as an entire group and classified as to master's degree. However, the level of students' reading comprehension was only "moderate" to those teachers with doctorate degree. Furthermore, there was "no significant difference" existed between the extent of teachers' utilization of vocabulary building techniques and their educational attainment. Further, no significant difference was noted between students' reading comprehension and educational qualifications of teachers. However, a significant relationship existed between teachers' use of vocabulary techniques and their students' reading comprehension. Eventually, vocabulary worksheets are designed for the enhancement of students' reading comprehension skills.

Keywords: *Teachers' Educational Attainment, Utilization of Vocabulary Building Techniques, Reading Comprehension Level, Reading Comprehension Skills, Worksheets*

INTRODUCTION

Reading is basic tool for learning all subjects. It is the skill that empowers readers to explore any sort of learning. It brings man into the world of imagination and adventure that enables him to acquire a deeper understanding of reality.

This study is primarily anchored on Rumlehart's (1977) schema theory of reading which also fits within the cognitively based view of reading stating that schemata serves as "building blocks of cognition" which are used in the process of interpreting sensory data, in retrieving information from memory, in organizing goals and sub-goals, in allocating resources, and in guiding the flow of the processing system. He also stated that if schemata are incomplete and do not provide an understanding of the incoming data from the text there will have problems on processing and understanding the text.

The essence of this study is that it reveals students' reading comprehension level that gives awareness to teachers on what is the appropriate strategy to improve their students' reading comprehension. It also ascertains the effectiveness of vocabulary building techniques on students' reading comprehension level. In addition, it discovers some factors that affect students' reading comprehension.

To illustrate the concept of this study, the schematic diagram in Figure 1, points out the variables covered in the study.

Figure I. Shows the relationship of variables covered in the study.

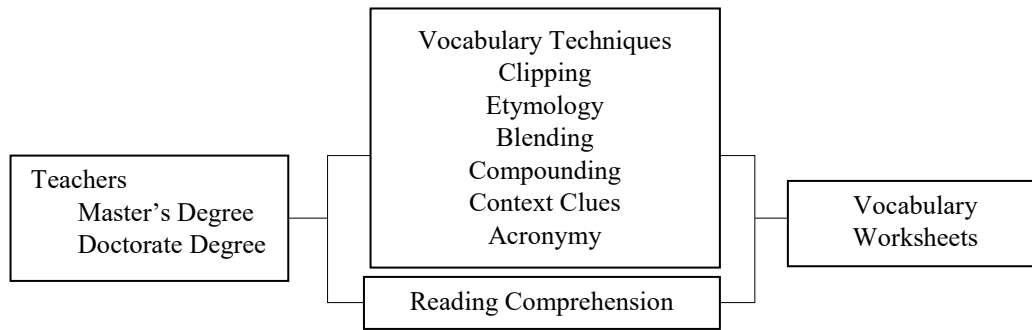


Figure 1. The use of vocabulary building techniques for students' reading comprehension skills as springboards in designing worksheets

STATEMENT OF THE PROBLEMS AND HYPOTHESES

This study determined the vocabulary building techniques of teachers and reading comprehension skills of students in the 4th district of Iloilo during school year 2017-2018.

Specifically, this study sought to answer the following questions:

1. What is the most common vocabulary building technique utilized by teachers?
2. What is the extent of teachers' utilization of vocabulary building techniques when taken as an entire group and when classified as to their educational attainment?
3. What is the level of students' reading comprehension when their teachers are taken as an entire group and when classified as to educational attainment?
4. Is there a significant difference in the teachers' utilization of vocabulary building techniques when they are classified as to educational attainment?
5. Is there a significant difference in the students' reading comprehension when their teachers are classified as to educational attainment?
6. Is there a significant relationship between the teachers' vocabulary building techniques and the students' reading comprehension?
7. What reading worksheets can be prepared based on the results of the study?

Hypotheses

1. In view of the preceding problems, these hypotheses were advanced:
2. There is no significant difference in the teachers' utilization of vocabulary building techniques when they are classified as to educational attainment.
3. There is no significant difference in the students' reading comprehension when their teachers are classified as to educational attainment.
4. There is no significant relationship between the teachers' vocabulary building techniques and the students' reading comprehension.

METHODOLOGY

To provide necessary data for the study, teachers and BEd and BSEd second year college students of 4th Congressional District colleges of Iloilo were the respondents during school year 2017-2018. The total number of teachers is thirty (30), among of those, sixteen (16) are Master's Degree and fourteen (14) are Doctorate Degree. On the other hand, the total number of students is one hundred twenty (120), among of those, seventy (70) are under the teachers with Master's Degree and fifty (50) are under the teachers with Doctorate Degree. The sample size determined with the use of random sampling.

Permission to conduct the study was sought from the research office and permit was also secured from the school administrators of the State Colleges in the 4th District of Iloilo to administer the research instrument to the teacher and students as respondents.

The questionnaires were distributed personally by the researcher during the actual data gathering. Retrieval of accomplished questionnaires followed thereafter. Scores were tallied, encoded, tabulated and subjects to

data analysis with the use of Statistical package for Social Sciences (SPSS) software.

Data for the study was obtained with the use of a researcher-made, validated questionnaire-checklist on vocabulary building techniques and reading comprehension test adopted from Jaula (2015). The data gathered was subjected to statistical treatments. All computations were done with the use of Statistical Package for Social Services (SPSS) Software.

To determine the extent on the use vocabulary, this scale of the mean and its description was used. 4.21-5.00, Very Highly Utilized; 3.41-4.20, Highly Utilized; 2.61-3.4, Moderately Utilized; 1.81-2.60, Slightly Utilized; 1.00-1.8, Not Utilized.

To determine whether significant difference existed between reading comprehension skills and the use of vocabulary building techniques when teachers were classified into educational attainment, Mann-Whitney U was used.

To find out whether significant relationship existed between students' reading comprehension skills and the extent of the teachers use of vocabulary building techniques, Mann-Whitney U was used. Level of significance was set at 0.05 alpha.

REVIEW OF LITERATURE

Reading is fundamental in every academic discipline. It is the foundation, of learning other content areas, a determinant of anyone's success both in personal life and in career. Learning whether in academic setting or on one's own is highly dependent on the comprehension of text structures; thus, according to Adams and Collins (1997) learners must be able to decode the individual words, word meanings and sentences to facilitate comprehension. On the other hand, issues relative to comprehension are not new; it can found among college students. It makes sense if the concerns on comprehension be given attention at all levels, otherwise we will be cultivating a country of nonreaders. In reading activity, transaction takes place between the reader and the text. According to Ozuro et al. (2009), the impact of prior knowledge on reading comprehension has even greater than that of reading skill. More so, Cote, Goldman & Saul (1988) noted that a reader can produce a high quality mental representation of the text and integrate this representation effectively with their prior knowledge. Though several conditions may affect readers, certain comprehension strategies are mentioned to help develop comprehension skills among students. One of the most prominent strategies taught to students is the SQ3R method as well as its recent variations. Some other strategies are thinks aloud protocols, making analogies, exploiting knowledge of text structure, the use of outlines, the use of concept mapping, directing to extra focus to new materials and information (O'Donnel et al., 2003; Lei et al., 2010). With the facility to modern technology, many comprehension strategies suited to a group of learners may work to make readers become proficient in comprehension. Conversely vocabulary knowledge aids in activating and building background knowledge to make connections to text, and having vocabulary knowledge will increase reading comprehension and fluency while reading. According to Villamin et al. (1994), word power is closely related to academic success. Zhang et al. (2008) affirmed that the crucial role of vocabulary knowledge in reading comprehension has been well recognized in first language situations and this has appeared to be true of second language settings as well. Like comprehension, vocabulary learning owes to several techniques and strategies use in learning word power. Commonly used are: synonym, antonym, word analogies, compounding, clipping, blending, acronym, etymology, context clues etc. Certainly, vocabulary knowledge can be acquired through reading and discussions about certain context (Nagy et al., 1985), but it appears that direct instruction is more effective than incidental learning for the acquisition of a particular vocabulary, and also more efficient (McKeown and Beck, 1988).

FINDINGS

Common vocabulary building techniques utilized by teachers. The data in table 2 revealed that the most common vocabulary building techniques utilized by teachers was context clues (M=4.81, SD=0.59). This was followed by blending (M=4.07, SD=0.89), acronymy (M=4.00, SD=0.44), compounding (M=3.95, SD=0.94), clipping (M=3.52, SD=1.04), and etymology (M=3.21, SD=0.95) as the 2nd, 3rd, 4th, 5th, and 6th respectively.

This implies that context clue is the most preferred techniques used by teachers among other vocabulary techniques. This supports the explanation that students can easily unlock the meaning of a word with the use of the hint surrounding the word. Students therefore can be easily led by the clue to the meaning of the word (Villamin et. al., 1994).

Table 2. Common Vocabulary Building Techniques Utilized by Teachers.

Vocabulary Building Techniques	Mean	Rank	SD
Clipping	3.52	5	1.04
Etymology	3.21	6	0.95
Blending	4.07	2	0.89
Compounding	3.95	4	0.94
Context Clues	4.81	1	0.59
Acronymy	4	3	0.44

Note: Ranking was used to interpret the results

Extent of teachers’ utilization of vocabulary building techniques. The data in Table 3 revealed that the teachers’ had highly utilized the vocabulary building techniques when taken as an entire group (M=3.93, SD=0.55) and when they were classified as to master’s degree holder (M=3.71, SD=0.44) and doctorate degree holder (M=4.07, SD=0.36). The obtained standard deviations which fell within the range of 0 – 0.55 showed a narrow dispersion of the means indicating almost homogeneity of the responses.

This implies that teachers are geared to use vocabulary building techniques to enhance students’ word power because limitations in vocabulary knowledge has been a putative cause of reading comprehension (Crombey and Azenedo, 2007).

Table 3. Extent of Teachers’ Utilization of Vocabulary Building Techniques

Vocabulary Building Techniques	Mean	Rank	SD
Entire Group	3.93	Highly Utilized	0.55
Educational Attainment			
Masters	3.71	Highly Utilized	0.44
Doctorate	4.07	Highly Utilized	0.36

Note: To determine the extent of teachers’ utilization of vocabulary building techniques, this scale of the mean and its description is used: 4.21 – 5.00, Very Highly Utilized; 3.41 – 4.20, Highly Utilized; 2.61 – 3.40, Moderately Utilized; 1.81 – 2.60, Slightly Utilized; 1.00 – 1.80, Not Utilized

Level of students’ reading comprehension. The findings revealed that the students’ level of reading comprehension was high when their teachers were taken as an entire group (M=18.24, SD=3.49) and when classified as to master’s degree holder (M=18.94, SD=3.13). However, those teachers belong to doctorate degree holder (M=17.81, SD=3.69) obtained a moderate level of reading comprehension. The obtained standard deviations which fell within the range of 0 - 3.69 showed a wide dispersion of the means indicating heterogeneity of the responses.

Direct instruction is more effective than incidental learning for the acquisition of a particular vocabulary, and also more efficient. In relation to the result that teachers who are master’s degree holder got high while doctorate degree holder is moderate, it maybe because those teachers who are doctorate degree holder were given designations and great responsibility in school (McKeown and Beck, 1988).

Table 4. Level of Students’ Reading Comprehension and Teachers’ Educational Attainment

Reading Comprehension	Mean	Description	SD
Entire Group	18.24	High	3.49
Educational Attainment			
Masters	18.94	High	3.13
Doctorate	17.81	Moderate	3.69

Note: To determine the level of students’ reading comprehension and teachers’ educational attainment, this scale of the mean and its description is used: 24.01 – 30.00, Very High; 18.01 – 24.00, High; 12.01 – 18.00, Moderate; 6.01 – 12.00, Low; 1.00 – 6.00, Very Low

Difference between the extent of utilization of vocabulary building techniques and educational attainment of teachers. The findings in table 5 revealed that no significant difference was noted in the vocabulary building techniques of teachers when they were classified as to their educational attainment. The obtained z-value of -0.899 of which the p-value of 0.369 was greater than the set 0.05 level of significance.

Vocabulary plays a fundamental role in the reading process, and contributes greatly to a readers' comprehension. Students learn the meaning of most words directly, through everyday experiences with oral and written language given by teachers. (Zhang, et. al., 2008).

Table 5. Mann-Whitney U Test Result for the Difference Between the Extent of Utilization Vocabulary Building Techniques and Educational Attainment of Teacher

Vocabulary Building Techniques	Mean Rank	Mann-Whitney U	z-value	p-value
Educational Attainment				
Masters	23.66			
		173.50	-0.899	0.36
Doctorate	20.17			

Difference between students' reading comprehension and educational attainment of Teachers. The findings in table 6 revealed that no significant difference was noted in the reading comprehension of students when their teachers were classified as to their educational attainment. The obtained z-value of -1.939 of which the p-value of 0.053 was greater than the set 0.05 level of significance.

This result supports with the statement of Loi, Rhinehart, Howard, and Cho (2010), to facilitate comprehension, different methods or techniques be used. Yet, not mentioning the category of teachers which means their being a masters or doctorate degree holder could not be an indicator rather the technique they used

Table 6. Mann-Whitney U Test Result for the Difference between the Level of Students' Reading Comprehension and Educational Attainment of Teachers

Vocabulary Building Techniques	Mean	Mann-Whitney U	z-value	p-value
Educational Attainment				
Masters	16.88			
		134	-1.939	0.053
Doctorate	24.35			

Relationship between teachers' utilization of vocabulary building techniques and their students' reading comprehension. The spearman's rho results in Table 7 revealed that a significant relationship existed between the teachers' utilization of vocabulary building techniques and their students' reading comprehension. The rho-value was 0.365 of which the p-value of 0.018 was less than the set 0.05 level of significance.

The result establishes clarity that reading comprehension and vocabulary are closely associated. With precision, this agrees with Ricketts, et. al. (2007), findings that showed the association between vocabulary and reading comprehension.

Table 7. Spearman's rho Test Result in the Relationship between Teachers' Utilization of Vocabulary Building Techniques and their Students' Reading Comprehension

Category	Teachers' Vocabulary r-value	Building Strategies p-value
Students' Reading Comprehension	0.365*	0.018

* $p < 0.05$

Vocabulary building worksheets. It was being designed base on the result of the study. It is composed of seven vocabulary building techniques such as acronymy, blending, clipping, compounding, context clues, and etymology. Each technique was given a short description and one activity with 30 items.

CONCLUSIONS

Based on the findings of the study, the following conclusions were drawn:

1. Teachers preferred mostly the use of context clues in teaching because this is the basic technique and most familiar to students among other vocabulary building techniques. Students can comprehend the content of the text easily because of the hint provided by the statements.
2. Teachers' responses are not the same but the result implies that students had acquired the necessary skills needed for them to have a high reading comprehension. Masters' degree holder got high while doctorate degree holder got moderate maybe because of their designation in school they have limited time.
3. Teachers' utilization of vocabulary building techniques is of big help to develop students' reading comprehension. As the teachers increase the use of vocabulary building techniques, the level of the reading comprehension of students also increases.

RECOMMENDATIONS

Based on the findings and conclusions of the study, the following were recommended:

1. Since the most common technique being used by the teacher is context clues, and the result of reading comprehension level of students is high, teachers may continue of using context clues in more creative way.
2. Educational attainment of teachers is not a hindrance for teachers to develop the reading comprehension skills of students. Teachers shall implement more alternative to create the best activity for students.
3. Since vocabulary building techniques is effective to enhance the reading comprehension level of students, teachers should provide daily activities with the involvement of vocabulary building techniques. To have good achievements, the output of this study can be used to enhance the vocabulary skills of students.

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THE LEARNING ACTIVITY SHEETS AS ALTERNATIVE LEARNING MATERIALS FOR STUDENTS IN SPECIAL PROGRAM IN THE ARTS

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ABSTRACT

This descriptive research aimed to determine the perception of the 134 junior high school (Special Program in the Arts) students in the Learning Activity Sheets as alternative learning materials at Doña Aurora National High School, Aurora, Isabela for school year 2020-2021. The following conclusions were derived from the findings: 1) majority of the respondents were 15-16 years old; females and residents in the nearby barangays of the school, do not have any family members who helped them explain the content of the LAS, and the family members who helped them finished high school; 2) All statement-indicators were agreed under the perceptions of the respondents toward the learning activity sheets as alternative learning materials; 3) The perception of the respondents toward the LAS as alternative learning materials has no significant difference with their profile variables signifying the acceptance of the null hypothesis; 4) The respondents agreed on the effects and benefits they derived in using the LAS as an alternative materials of learning; 5) The respondents perceived the enumerated encountered problems as moderately serious and they found a serious problem on pictures/figures that appeared blurry and undefined in the LAS; and 6) The respondents agreed on the proposed intervention activities to resolve the problems encountered by stating instructions clear, checking and guiding students' academic matters, formulating interventions, including encouraging feedbacks, addressing misconceptions, formulating attainable activities, designing and integrating theory that develop different skills, learning-to-learn skills before giving the LAS, and considering students' background in constructing and designing the LAS.

Keywords: learning activity sheets, perception, effects, special program in the arts, alternative learning materials, problems encountered, proposed intervention activities

INTRODUCTION

Presently, the world is facing one of the greatest crises which was brought by the novel human coronavirus causing COVID-19. Various parts of the nation were declared under different levels of community quarantine because of the chain of infection and surging number of deaths. It caused health crisis as well as economic crisis in the country – education is not much of an exception.

Institutions that were unable to finish the school year 2019-2020 because of the pandemic were left no choice but to undergo distance learning without enough preparation or conclude the school year on their own ways. As for the opening of the school year 2020-2021, Department of Education (DepEd) announced the decision of the President to push the school opening from August 24, 2020 to October 5, 2020, as suggested by the Secretary of Education considering the imposition of the Modified Enhanced Community Quarantine. This is in pursuant to Republic Act No. 11480, which directly amended Republic Act No. 7797, given that the current president, upon the endorsement of the Education Secretary, may fix a date far ahead than the 31st of August for the beginning of the school year, either the whole country or selected parts of that in the midst of a state of emergency or state of calamity.

The nation, as a whole, does not have enough time and money to produce the necessary technological materials for each and every student of the Philippines since there are various regions with diverse circumstances and different types of learners. Through this, the intended remote learning modalities that was once disapproved by the community across different parts of the country, finally approved. DepEd is set to implement a blended learning approach, since face-to-face classes are still prohibited, with television-based instruction being one of the three main set-ups besides modular and online learning as the other two options. DepEd Order No. 12, s. 2020, otherwise known as the Basic Education-Learning Continuity Plan, further supported the suggested learning modalities in the new normal which are blended learning, radio-based,

online classes, Education on TV and modular and learning activity sheets and etc. which is in response to the disruptions in education caused by this health crisis.

From the different memoranda and department orders issued by the department of education, a national survey on distance learning modality was done. Enrolment was facilitated through the Learner Enrolment Survey Form, the enrolment captures the basic profile of learners and profile of the household in terms of their readiness for distance education. Based on Aurora District LESF majority of the learners and parents had chosen the modular distance which include the use of learning activity sheets (LAS) as their modality of learning. According to Mangalit et al., (2020) modular learning could be a type of distance learning that uses Self-Learning Modules and Learning Activity Sheets supported the foremost essential learning competencies (MELCS) provided by DepEd. The modules and activity sheets include sections on motivation and assessment that function a whole guide of both teachers' and students' desired competencies. Teachers will monitor the learners' progress. This can be done through home visits (following social distancing protocols) and feedback mechanisms, and guide people who need special attention.

The researcher had seen Learning Activity Sheets as an approach in support of education and training continuity. Teachers hand over the printed Learning Activity Sheets (LAS) to the parents or guardians of students once a week. These encompass various activities, discussions, lectures, and performance tasks which the learners are required to accomplish on their own. This mode of learning is considered a response or solution to the call for education among learners who prefer the traditional way of acquiring knowledge. Thus, the conceptualization of this study came to mind of the researcher, determining the perceptions of the junior high school students specifically to Special Program in the Art (SPA) in the Learning Activity Sheets as alternative at Dona Aurora National High School, Aurora Isabela for school year 2020-2021.

STATEMENT OF THE PROBLEM

Generally, this study aimed to determine the perception of the junior high school (Special Program in the Arts) students in the Learning Activity Sheets as alternative learning materials at Doña Aurora National High School, Aurora, Isabela for school year 2020-2021.

Specifically, the study sought to answer the following questions:

1. What is the demographic profile of the respondents in terms of:
 - 1.1 Age;
 - 1.2 Sex;
 - 1.3 Location/Place of Residence;
 - 1.4 Family members who help in explaining the content of the learning materials; and
 - 1.5 Educational background of the family members who help explain the content of the learning materials.
2. What is the perception of the learners toward the Learning Activity Sheets as alternative learning materials?
3. Is there a significant difference in the perception of the learners towards the Learning Activity Sheets as alternative learning materials when grouped according to their profile?
4. What are the effects/benefits derived by the learners in the Learning Activity Sheets as alternative materials in learning?
5. What are the problems encountered by the respondents in the learning activity sheets as alternative materials for learning?
6. What proposed intervention activities to resolve the problems encountered by the respondents?

REVIEW OF LITERATURE

In this time of uncertainty, education is one of the sectors that is being affected due to the health crisis that everyone is battling. With this phenomenon, educators played an important role in providing quality education in the new normal way. Educators have the capacity to generate various teaching materials such as self-learning modules and learning activity sheets which learners can utilize even without the presence of their teachers.

Distance learning refers to a learning delivery modality where learning takes place between the teacher and

the learners who are geographically remote from each other during instruction. This modality has three types: Modular Distance Learning (MDL), Online Distance Learning (ODL), and TV/Radio-Based Instruction.

According to the study of Sejjal (2013), the LAS approach in education is greater effective, whereas, latest and more technology-based instructional method in the current education system. In the past recent years, the accord of LAS has been under discussion in secondary schools. Learning activity sheet method provides more flexibility to distance teaching mode as well as to learners.

Sadiq & Zamir (2014) conducted a study to find out the effectiveness of modular approach using the learning activity sheets in teaching in order to assess the student learning, performance and achievement and to determine whether the modular teaching is more effective than traditional methods. The result' scores were in the favor of usage of modular teaching approach. So, it is recommended that the modular approach should be widely used at various levels of education.

Padmapriya, (2015) studied the effectiveness of self-learning modules and learning activity sheets on achievement in biology among secondary school students and found out that the students treated with modular approach achieved higher mean scores than those students taught through activity-oriented method. The study reveals the effectiveness of self-instructional module on achievement among secondary school students and the administrators must take necessary steps to give special training to teachers in developing modular packages.

Cheng & Abu Bakar (n.d.) assessed the impacts of using modules in the teaching and learning of English in Malaysian Polytechnics. Based on the findings, more than 75% of the lecturers agree that the module is useful as a resource book for both students and lecturers and very helpful in providing guidance and support for new and inexperienced lecturers.

Romoroza (2017) compared the effectiveness of Modular Method which include the learning activity sheets and Traditional Method of teaching the selected Physics topics in Cantilan National High School, Cantilan Surigao del Sur. Findings were the basis for a proposal lesson guide. Age profile of students belongs to the usual age mostly within the bracket of 15-17 years old where most of them are females. The average grade level involved in the study were in scores from 85 to as low as 75 scores. Based on the academic performance level on the topic measurement, modular group had the pre-test mean lower compared to the traditional group achievement but were categorized qualitatively average. Based on the post-test score between traditional and modular groups, it was revealed that the score of the traditional group was higher compared to the modular group thus categorized as average. There is a significant difference of the level of academic performance of the traditional and modular groups in pre-test and post-test. In the measurement of the modular and traditional groups mean scores gained in pre-test and posttest, both traditional and modular methods of teaching are effective for students in High School Physics. The proposed lesson guide for modular techniques should be implemented to guide and improve the learning of students; with emphasis on the synchronization of lessons both lecture and laboratory activities in verbal and nonverbal interactions inside the classroom especially in difficult lessons and activities.

Vergara, (2017) concluded in his study that modules and learning activity sheets were very much acceptable with respect to content, language, presentation, and assessment; However, the married teachers find the developed module for problem solving, and critical thinking more acceptable as compared to the single teachers; the performance of the of the learners improved significantly after exposure to the developed module; there is no significant difference on the level of performance of the learners after exposure to the developed module and learning activity sheets in problem solving and critical thinking skills in terms of sex, monthly family income ethnicity and reason for dropping out but the married, older, who are working and are high school graduate performed better.

Lim (2016) determined the effects of modular instruction with the use of learning activity sheets to third year BEED students of Eastern Samar State University (ESSU) who were exposed to lecture method and modular instruction in teaching word problem solving. Based on the pretest and posttest mean scores of both control and experimental groups, the following findings were formulated; there is no significant difference between the pretest mean scores of the subjects; there is a significant difference between the post-test mean scores of subjects; and there is a significant difference between the mean gain scores of the two groups of respondents – experimental and control groups. The experimental group who were taught by

modular instruction performed significantly better than the control group who were taught using the traditional lecture method. Based on the findings cited, it is concluded that modular instruction with the use of learning activity sheets in teaching Math specifically word problem solving, is an effective teaching approach. Though the results of this study showed that learning took place in both groups using the two methods of teaching, the subjects who were taught by modular instruction performed significantly better than the subjects exposed to traditional lecture method.

Guido (2014) assessed the use of the modular teaching approach in engineering materials. A standardized faculty - student instructional module evaluation checklist that sought for the assessment of the learning objectives, evaluation of acceptability, effectiveness and the acquired skills in the module. The study shows that the instructional module in materials science and engineering are effective for students' knowledge adaptation and shows suitability to the level of the students and acceptability to the faculty evaluators. This reveals that the evaluators trusted that the module is very valuable to the course which makes students learning experience well stimulated.

Nardo & Hufana (2014) evaluated the development and evaluation of Technical Writing modules and learning activity sheets to develop autonomous learning among students. The materials were based on the needs such as special techniques in technical writing, constructing verbal to non-verbal data, writing conclusions from research findings, writing recommendations for research, stating research problems, among others. Module II was evaluated along subject matter, vocabulary and structures, exercises, illustrations, and physical make-up. Module II was rated "Good" by the control and experimental students. The English teachers rated the modules "Excellent". The modules were evaluated fit for the curriculum, for the students and for the teachers and were recommended for use in the Technical Writing class.

Auditor & Naval (2014) ventured into the study, "Development and Validation of Tenth Grade Physics Modules Based on Selected Least Mastered Competencies", to develop and validate modules in physics based on selected least mastered competencies for tenth-graders. Hence, the researchers developed a set of modules which covered six major areas of physics (i.e. motion, force, energy, momentum and impulse, and heat and thermodynamics). The result of the study showed that the developed modules were found acceptable for the 10th grade physics students. There was no statistically significant difference between the evaluation of the students, peers, and experts on the module's acceptability. Also, the developed set of modules was found to be effective in terms of knowledge acquisition. Therefore, this study suggests that the developed module can be a useful tool for teaching and learning basic physics.

Gonzales (2015) conducted a study entitled, "A Modular Approach Utilizing Decision Tree in Teaching Integration Techniques in Calculus" to test the effectiveness of modular approach using decision tree in teaching integration techniques in Calculus. The findings led to the conclusion that both modular integrating the learning activity sheets and traditional instructions were equally effective in facilitating the learning of integration by parts. The other result revealed that the use of modular approach with the use of learning activity sheets utilizing decision tree in teaching integration by trigonometric transformation was more effective than the traditional method.

According to Larawan (2013), the modularized learning could allow the students to evaluate their own development and progress and utilize their spare time to scan lessons they don't get easy and read the lesson as many times as his ability to master requires. Moreover, with the use of modularized instruction, more time could be used for the teacher's explanation instead of note-taking. With this, time is maximized and used wisely for learning by spending it more on students' facilitated interaction, topical role play, buzz sessions and other strategies instead of spending more time on the delivery of core lessons (p.11).

Yazon (2018) concluded that a module can be advantageous and beneficial for students and teachers because: It provides the opening of various opportunities for organizing numerous sequences of experience to reflect special interests of the teacher or student; Self-instructional units allow the teacher to see the weaknesses and focus on student deficiencies in subject matter that must be corrected and also serve to decrease and eliminate the necessity of covering subject already known to the student; It provides a way of assessing students' development, growth, and progress in learning; It reduces the routine aspects of instruction learning. The teacher is free to engage in personal contact with the student where good connection and relationship between student-teacher creates a strong bond; the independent nature of self-instructional units facilitated the updating of study materials without major revisions; and it serves as guide and basis or model for teachers who want or wish to grow and develop their own materials and insert their own personality.

METHODOLOGY

The quantitative method using descriptive survey method of research was used in this study to determine the perception of the junior high school (Special Program in the Arts) students in the Learning Activity Sheets as alternative learning materials at Doña Aurora National High School, Aurora, Isabela for school year 2020-2021.

The respondents of this study were the 197 Special Program in the Arts students of Doña Aurora National High School, Aurora, Isabela. The distribution of the student-respondents from the different grade levels is as follows: Grade 7 (30); Grade 8 (40); Grade 9 (83); and Grade 10 (44)

Originally, the total enumeration was employed in the selection of the respondents but due to the worsening condition of the whole nation brought by the pandemic, movements in all sectors including the department of education was minimally prohibited especially the learners who were considered vulnerable to the COVID 19 virus. With this reason, only 134 questionnaires was retrieved in the total floated questionnaires to the respondents.

The Instrument of the Study

A survey questionnaire consisting of two parts was developed by the researcher for the purpose of this study. Part one focused on the profile of the respondents while Part two concentrated on the perception, the effects/benefits, the problems encountered, and the proposed intervention activities to resolve the problems encountered by the respondents using the leaning activity sheets as alternative learning materials.

To establish the content validity of the self-developed questionnaire, it was subjected for validation by experts. The experts' suggestions were well taken and incorporated in the finalized questionnaire. It was administered to 30 students to gather data for the reliability test. Its reliability was assessed through computing Cronbach's alpha, which showed the reliability value of 0.84 indicating the consistency of the responses in the items which are indicated in the questionnaire.

Statistical Tools

Frequency counts and percentages were used to describe the profile variables of the respondents; Weighted Means were used to determine the perception, effects/benefits, and problems encountered in using the learning activity sheets as alternative learning materials, and the proposed intervention activities to resolve the problems encountered by the respondents; and Analysis of Variance (ANOVA) was used to determine the significant difference in the perception of the learners toward the Learning Activity Sheets as alternative learning materials when grouped according to their profile.

FINDINGS

Profile of the Respondents

It is revealed in table 1 that that majority of the respondents were 15-16 years old; almost one third were 13-14 (32.09%) years old; and the remaining 22 or 16.42% students were 11-12 years of age. Majority were females and 64 or 47.76% of them were males.

Most of them are residents in the nearby barangays of the school; 32 or 23.88% were living in other town; 20 or 14.93% residents within the barangay where the school is located; and there were 2 or 1.49% living within the school premises.

Table 1. Profile of Respondents

PROFILE	Frequency n=134	Percentage 100.00
Age		
11-12	22	16.42
13-14	43	32.09
15-16	69	51.49
Sex		
Female	70	52.24
Male	64	47.76

Location or Place of Residence		
Within the school premises	2	1.49
Within the barangay where the school is located	20	14.93
Located in other barangay	80	59.70
Located in other town	32	23.88
Family members who help in explaining the content of the LAS		
Parents	51	38.06
Siblings	11	8.21
Relatives (Aunts, Uncles, Grandparents, Cousins)	5	3.73
None	67	50
Educational background of the family members		
College Graduate	21	15.67
College Level	25	18.66
High School Graduate	83	61.94
High School Level	5	3.73

Most of them do not have any family members who help them explain the content of their learning activity sheets; 51 or 38.06% of them answered that their parents helped them; 11 or 8.21% are being helped by their siblings in explaining the content of their learning activity sheets; and the remaining 5 or 3.73% were helped by their aunts, uncle, grandparents and cousins in explaining the content of their learning activity sheets.

Majority the family members who helped the respondents explain the content of the learning activity sheets finished high school; 25 or 18.66% family members were college undergraduate; while there were 21 or 15.67% members of the family who are college degree holders; and the remaining 5 or 3.73% were high school undergraduate.

Perceptions of the Respondents toward the Learning Activity Sheets as Alternative Learning Materials

As inferred in table 2, the statement-indicators under the perceptions of the student-respondents toward the learning activity sheets as alternative materials in learning were all agreed which is evident in the overall mean of 3.87. They agreed that they need longer time to get used with the learning activity sheets as an alternative material for learning; they were able to practice independent learning; they were motivated in studying their lessons using the learning activity sheets; they feel more comfortable in studying because someone closed to them guide and help them throughout the lesson; they improved their study habit using the learning activity sheets; they found their subjects more interesting to study with the use of learning activity sheets; they can concentrate better in studying their lessons through the use of learning activity sheets; they prefer learning activity sheets more than any other alternative materials for learning; the knowledge they learned from the learning activity sheets last longer; and they feel less/no pressure in studying their lessons using the provided learning activity sheets.

Table 2. Perceptions of the Respondents toward the Learning Activity Sheets as Alternative Learning Materials

Statements	Mean	Description
I am motivated in studying my lessons using the Learning Activity Sheets.	3.98	Agree
I feel less/no pressure in studying my lessons using the provided Learning Activity Sheets.	3.53	Agree
I find my subjects more interesting to study with the use of Learning Activity Sheets.	3.86	Agree
The knowledge I learned from the Learning Activity Sheets will last longer.	3.71	Agree
I prefer Learning Activity Sheets more than any other alternative materials for learning.	3.76	Agree
I improved my study habits using the Learning Activity Sheets.	3.89	Agree
I am able to practice independent learning.	4.10	Agree
I need longer time to get used with the Learning Activity Sheets as an alternative material for learning.	4.11	Agree

I can concentrate better in studying my lessons through the use of Learning Activity Sheets.	3.82	Agree
I feel more comfortable in studying because someone closed to me guides and helps me throughout the lesson.	3.92	Agree
Overall Mean	3.87	Agree

1.00-1.49-Completely Disagree 1.5-2.49-Disagree 2.50-3.49- Neither agree or Disagree 3.50-4.49-Agree 4.50-5.00- Strongly Agree

This finding supports the ideas of Dangle, & Sumaoang (2020) that the use of modules and learning activity sheets encourages independent-study and independent-learning. One of the benefits of using SLMs and LAS for instruction is the acquisition of better self-study which develops independency in learning or learning skills among students. Students engage themselves in learning the concepts presented in the modules and LAS. They develop a sense of responsibility in accomplishing the tasks provided in the module which opens them to become a responsible individual. With little or no assistance from others, the learners develop and increases progress on their own. They are learning how to learn on their own; they are empowered.

Significant Difference in the Perception of the Respondents toward the Learning Activity Sheets as Alternative Learning Materials when grouped according to their Profile

As reflected in the table, it is disclosed that the perception of the respondents toward the learning activity sheets as alternative materials for learning has no significant difference with their profile since the established p-values are greater than the critical value signifying the acceptance of the null hypothesis at 0.05 level of significance.

This simply means that regardless of the age, sex, location or place of residence, and the educational attainment of the family members who help the learners explain the content of the LAS, they perceived that they were able to practice independent learning; they were motivated in studying their lessons using the learning activity sheets; they feel more comfortable in studying; they improved their study habits; they found their subjects more interesting; they can concentrate better in studying their lessons; they prefer learning activity sheets more than any other alternative materials for learning; they learned knowledge that last longer; and they feel less/no pressure in studying their lessons.

This finding contradicts what Vergara (2017) had found out that there were significant differences between modular and traditional in general comprehension of students. Findings reported significant gender difference in general comprehension of male and female students where male students performed significantly better than female students on general comprehension-based test.

Table 3. Significant Difference in the Perception of the Respondents toward the Learning Activity Sheets as Alternative Learning Materials when grouped according to their Profile

Variables	Groups	Mean	SD	N	DF	t	P	Decision	Interpretation
Age	14 & below	3.86	0.53	65	129	0.25	0.80	Accept Ho	No significant difference
	15 & above	3.88	0.50	69					
Sex	Female	3.89	0.51	70	130	0.57	0.57	Accept Ho	No significant difference
	Male	3.84	0.52	64					
Location	1 & 2	3.90	0.56	22	28	0.29	0.77	Accept Ho	No significant difference
	3 & 4	3.86	0.51	112					
Family Member	None	3.95	0.45	68	124	0.18	0.08	Accept Ho	No significant difference
	With family members	3.79	0.57	66					
Educational Background of the Family Members	No degree	3.49	0.45	69	121	1.74	0.09	Accept Ho	No significant difference
	with degree	3.79	0.57	65					
	With specialization	3.81	0.53	15					

Effects/Benefits Derived by the Respondents in the Learning Activity Sheets as Alternative Materials in Learning

It is disclosed in table 4 that the respondents agreed on the effects and benefits they derived in using the learning activity sheets as an alternative materials of learning as reflected in the overall mean of 4.10. They agreed that they are benefited in a way that they improve their reading and comprehension skills; they can check and review their own progress in particular topic; they are given the chance to explore and discover freely in order to solve the given problems or activities; they allow them to identify their strengths and weaknesses in learning; they save school materials since the LAS are multipurpose since it serve as a book,

Table 4. Effects/Benefits Derived by the Respondents in the Learning Activity Sheets as Alternative Materials in Learning

Statements	Mean	Description
Learning Activity Sheets allow me to proceed with my lessons at my own pace.	4.08	Agree
Learning Activity Sheets give me the opportunity to choose my own learning style.	4.20	Agree
Learning Activity Sheets allow me to identify my strengths and weaknesses in learning.	4.17	Agree
Learning Activity Sheets improve my reading and comprehension skills.	4.31	Agree
Learning Activity Sheets give me the chance to explore and discover freely in order to solve given problems or activities.	4.12	Agree
Learning Activity Sheets allow me to check and review my own progress in a particular subject and topic.	4.20	Agree
Learning Activity Sheets give my family the chance to keep track with my academic activities.	3.99	Agree
Learning Activity Sheets establish a system of assessment rather than marks or grades.	4.03	Agree
Learning Activity Sheets gives me the freedom to study without disturbing my usual household duties and responsibilities.	3.85	Agree
Learning Activity Sheets are multipurpose, it serve as a book, as a notebook, and as activity sheet.	4.11	Agree
Overall Mean	4.10	Agree

1.00-1.49-Completely Disagree 1.5-2.49-Disagree 2.50-3.49- Neither agree or Disagree 3.50-4.49-Agree 4.50-5.00- Strongly Agree

as a notebook, and as activity sheet; they are allowed to proceed with their lessons at their own pace; they establish a system of assessment rather than marks or grades; their families are given the chance to keep track with their academic activities; and it give them the freedom to study without disturbing their usual household duties and responsibilities. This finding proves the benefits of using the learning activity sheets as mentioned by Sepjal, (2013), that learners can set their own schedule in accomplishing the tasks or activities given, learners have their own way learning or acquiring the necessary knowledge that would work for them, and students learn to have a sense of responsibility since the accomplishment of tasks is self-paced.

Problems Encountered by the Respondents in the Learning Activity Sheets as Alternative Materials for Learning

As shown in table 5, the respondents perceived the enumerated encountered problems as moderately serious as reflected in the overall mean of 3.03. They found a serious problem on the statement “pictures/figures appear blurry and undefined in the learning activity sheets. However, the following problems were moderately serious: family member who would help them understand the content of the learning activity sheets is knowledgeable enough with certain topics; they have a hard time adapting and adjusting to new learning modality, particularly modular distance learning with the use of learning activity sheets; the given range of time to study a set of learning activity sheets is not achievable; there are terminologies that are not suitable to the age of the learners; clarifications regarding the content of the learning activity sheets is not

given response immediately; submission; lessons and activities cannot easily understood because the directions were difficult and unclear; language used are too general and too difficult to understand; they have a hard time adapting and adjusting to new learning modality, particularly modular distance learning with the use of learning activity sheets; learnings are not properly collated, pages are rumbled; and font style and size used in the learning activity sheets are not appropriate and user-friendly.

Table 5. Problems Encountered by the Respondents in the Learning Activity Sheets as Alternative Materials for Learning

Statements	Mean	Description
Clarifications regarding the content of the Learning Activity Sheets is not given response immediately.	3.09	Moderately Serious
Instructions in the Learning Activity Sheets are not clearly stated.	2.99	Moderately Serious
Pictures/Figures appear blurry and undefined in the Learning Activity Sheets.	3.53	Serious
Font style and size used in the Learning Activity Sheets are not appropriate and user-friendly.	2.80	Moderately Serious
Learning Activity Sheets are delivered earlier or later than the scheduled distribution.	2.98	Moderately Serious
Learning Activity Sheets are collected earlier or later than the scheduled submission.	2.98	Moderately Serious
My family member who would help me understand the content of the Learning Activity Sheets is knowledgeable enough with certain topics.	3.32	Moderately Serious
The given range of time to study a set of Learning Activity Sheets is not achievable.	3.16	Moderately Serious
There are times that Learning Activity Sheets are not delivered due to the location of my place/residence	2.87	Moderately Serious
I have a hard time adapting and adjusting to new learning modality, particularly modular distance learning with the use of Learning Activity Sheets	3.17	Moderately Serious
There are terminologies that are not suitable to the age of the learners	3.10	Moderately Serious
The language used are too general and too difficult to understand	2.91	Moderately Serious
The learnings are not properly collated, pages are rumbled	2.82	Moderately Serious
The contents of the learning activity sheets are not based on the most essential learning competencies	2.77	Moderately Serious
The lessons and activities cannot easily understood because the directions were difficult and unclear.	2.94	Moderately Serious
Overall Mean	3.03	Moderately Serious

1.00-1.49-Not Serious 1.5-2.49-Less Serious 2.50-3.49- Moderately Serious
 3.50-4.49-Serious 4.50-5.00- Very Serious

Proposed Intervention Activities to Resolve the Problems Encountered by the Respondents

It is disclosed in table 6 that the respondents agreed on the proposed intervention activities to resolve the problems encountered by the student-respondents as revealed in the overall mean of 4.07. They agreed that instructions in the learning activity sheets must be clearly stated; parents/guardians must consistently guide and regularly check the academic matters of their child/children; teachers and other school personnel should make an interventions to learners who fail to answer the activities; LAS should include encouragement notes and activities for students to study their lesson well; correct students’ misconceptions; activities must be attainable and promote the consistency of various skill application; LAS should specifically designed to integrate theory and develop different skills; learning-to-learn skills should be taught and mastered before learners start learning through learning activity sheets; LAS constructing and designing must have adequate time to ensure the quality of the activity sheets; and LAS constructing and designing must consider the background of the students.

Table 6. Proposed Intervention Activities to Resolve the Problems Encountered by the Respondents

Statements	Mean	Description
Learning-to-learn skills should be taught and mastered before learners start learning through Learning Activity Sheets.	3.95	Agree
LAS constructing and designing must have adequate time to ensure the quality of the activity sheets.	3.86	Agree
LAS constructing and designing must consider the background (e.g. workplace context) of the students.	3.85	Agree
LAS should specifically designed to integrate theory and develop different skills.	4.02	Agree
Instructions in the Learning Activity Sheets must be clearly stated.	4.25	Agree
Activities must be attainable and promote the consistency of various skill application.	4.11	Agree
Teacher's feedback must be given as soon as possible to right students' misconceptions.	4.12	Agree
LAS should include encouragement notes and activities for students to study their lesson well.	4.13	Agree
Parents/Guardians must consistently guide and regularly check the academic matters of their child/children.	4.22	Agree
Teachers and other school personnel should make an interventions to learners who fail to answer the activities in their LAS.	4.13	Agree
Overall Mean	4.07	Agree

*1.00-1.49-Completely Disagree 1.5-2.49-Disagree 2.50-3.49- Neither agree or Disagree
3.50-4.49-Agree 4.50-5.00- Strongly Agree*

CONCLUSIONS

Based on the findings, the following conclusions were drawn:

1. Majority of the respondents were 15-16 years old; females and residents in the nearby barangays of the school, do not have any family members who helped them explain the content of their learning activity sheets, and majority of the family members who helped the student-respondents explain the content of the learning activity sheets finished high school.
2. All statement-indicators were agreed under the perceptions of the student-respondents toward the learning activity sheets as alternative learning materials.
3. The perception of the respondents toward the learning activity sheets as alternative learning materials has no significant difference with their profile variables such as age, sex, location or place of residence, family members who helped them explain the content of the LAS, and the educational attainment of the family members who helped the learners signifying the acceptance of the null hypothesis.
4. The respondents agreed on the effects and benefits they derived in using the learning activity sheets as an alternative materials of learning.
5. The respondents perceived the enumerated encountered problems as moderately serious and they found a serious problem on pictures/figures that appeared blurry and undefined in the Learning Activity Sheets.
6. The respondents agreed on the proposed intervention activities to resolve the problems encountered by stating instructions clear, checking and guiding students' academic matters, formulating interventions, including encouraging feedbacks and notes, addressing misconceptions, formulating attainable activities, designing and integrating theory that develop different skills, learning-to-learn skills before giving the LAS, and considering students' background in constructing and designing the learning activity sheets.

RECOMMENDATIONS

In the light of the findings and conclusions, the researcher recommends the following:

1. Students should continue looking at the positive effect and benefits derived from the learning activity sheets in their academic undertakings as an alternative in acquiring the necessary knowledge and skills

- in the new normal way of transferring education in this time of pandemic.
2. Teachers should immediately address the problems and difficulties encountered by the learners particularly the pictures, figures, and other concerns in the distributed learning activity sheets that may affect and distract their focus through sending them the e-copy of the learning materials. Also, teachers may include positive feedbacks and encouraging words in the learning activity sheets to inspire the learners in accomplishing their activities and performance tasks.
 3. Parents and other members of the family must continue helping their children or siblings in accomplishing their activities and performances. Through this, learners may enjoy accomplishing their activities and performances and they may feel and realize the significant role of the family in their growth and development including the acquisition of learnings in the absence of their teachers.
 4. School heads and administrators must provide quality school materials and equipment that can be used in reproducing quality learning activity sheets and other learning materials to ensure and attain the ultimate goal of the department of education which is producing quality learners amidst the pandemic.
 5. School administrators must collaborate with the local government unit, the barangay officials and other stakeholders to address the issue on late distribution and early retrieval of the learning activity sheets.
 6. Future researchers may conduct similar study that may test the effectiveness of using the learning activity sheets and be correlated to other variables and the results will serve as bases in crafting a simpler, contextualized and localized learning materials that may cater the needs and interest of the learners.

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EFFECTIVENESS OF RADIO-BASED INSTRUCTION AS LEARNING MODALITY IN THE ENGLISH LEARNING PROCESS OF GRADE 9 LEARNERS

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ABSTRACT

This study used mixed method of research which include the descriptive survey and quasi-experimental to determine the effectiveness of radio-based instruction as learning modality based from the results of the pre-test, post-test and the survey. The respondents of this study were the 35 Grade 9 special program in journalism (SPJ) students in Doña Aurora National High School, Aurora, Isabela for school year 2020-2021. The following conclusions were derived from the findings: 1) There is a difference in the pre-test and post-test scores of the respondents when radio-based instruction is utilized as a mode of learning; 2) There is a difference in the pre-test and post-test scores of the students without using any learning modality such as the radio-based instruction; 3) The respondents who did not use the radio-based instruction as modality of learning did not differ significantly with their pre-test and post-test scores. However, the students who utilized the radio-based instruction positively affected their post-test scores; 4) The respondents agreed on their attitudes toward the radio-based instruction as learning modality; 5) The respondents agreed on the benefits that can be derived in the radio-based instruction as learning modality; 6) Radio-based instruction is an effective modality in the learning process of the respondents; 7) The respondents encountered problems in using the radio-based instructions in the learning processes; and 8) The respondents agreed on the proposed possible solutions in addressing the problems encountered in the radio-based instruction as learning modality in the learning process.

Keywords: attitudes; benefits/effects; effectiveness; learning modality; radio-based instruction; special program in journalism

INTRODUCTION

At this time, the world is facing one of the greatest crises brought by the novel human coronavirus causing COVID-19, subsequently named as SARS-CoV-2. According to World Health Organization (WHO), most of the infected people only suffer mild flu-like symptoms such as dry cough and fever. In seldom cases, usually in older individuals and those who have current medical conditions, the infection may fall into a severe case of pneumonia that can be deadly. Evidences at hand prove that the transmission of the virus is through close contact with the infected person (via mouth and nose secretion), and even through contaminated surfaces or objects.

Various parts of the nation were declared under different levels of community quarantine because of the chain of infection and deaths. It caused not only health crisis, but also economic crisis in the country – education is not much of an exception. The expected one month of lockdown in Metro Manila from March 15 to April 14 as announced by President Rodrigo Duterte, ordering the schools to be closed and mass gatherings to be banned, and temporary interruptions of transportation operations were not met. Instead, as the situation got worse, the subjected areas to community quarantine expanded, additional rules and regulations were imposed, and the allotted time extended.

Institutions that were unable to finish the school year 2019-2020 because of the pandemic were left no choice but to undergo distance learning without enough preparation or conclude the school year on their own ways. As for the opening of the school year 2020-2021, Department of Education (DepEd) announced the decision of the President to push the school opening from August 24, 2020 to October 5, 2020, as suggested by the Secretary of Education considering the imposition of the Modified Enhanced Community Quarantine (MECQ) in Metro Manila and other provinces considered high risk places with COVID-19. This is pursuant to Republic Act No. 11480, which directly amended Republic Act No. 7797, given that the current president, upon the endorsement of the Education Secretary, may fixed a date far ahead than the

31st of August for the beginning of the school year, either the whole country or selected parts of that in the midst of a state of emergency or state of calamity. The DepEd added that they trust the final decision regarding its final opening. Albeit the MECQ, they will continue to make every bits of the allotted time to fulfill the needed adjustments and to make sure that all the preparations are done well enough for the school year 2020 to 2021.

The remote learning modalities that was once disapproved by the community across different parts of the country, finally approved. DepEd is set to implement a blended learning approach, since face-to-face classes are still prohibited, with television and radio-based instruction being one of the three main set-ups besides modular and online learning as the other two options (DepEd, 2020).

With an estimated 90 percent of all students unable to attend school in person because of the COVID-19 pandemic, many countries are using distance learning methodologies to reach all their students. Interactive audio instruction (IAI), a technology pioneered by Education Development Center, is one such method.

Based from the data collected of Education Development Center (2020) regarding RBI from education experts, they come up with the idea that radio may be the best tool to reach students while traditional lectures are still prohibited. Moreover, World Bank, (2020) gathered information of different countries within the month of March to June 2020 with regards to the plans and steps they have to expand their education amidst the health condition in their homeland brought by the pandemic. And many of this nations includes Radio-Based Instruction as an alternative way to deliver lessons and activities to their learners because they consider the readily available materials.

Interactive Radio-based Instruction (IRI) methodology is a method that engages both the teacher and students in a more active traditional lectures. This is the backbone of RBI whereas the interaction part was not entirely included. Just like any other methods, IRI was proven to include advantages, but drawbacks as well.

However, RBI is not yet widely proven as an effective mode of teaching-learning process considering the teachers and students are still used with the traditional learning process, and this type of instruction is not frequently practice within the nation. Like how the country's under preparedness of the COVID-19 onslaught, it is also not very much equipped to face the new normal which comprised huge adjustments that every individual has to go through in the different aspects of the day-to-day living, including education.

From the above viewpoints and observations of the researcher as an educator, the study was conceptualized in order to determine the effectiveness of radio-based instruction as learning modality in the learning process of the Grade 9 special program in journalism (SPJ) learners of Doña Aurora National High School. Other than this, the researcher considered Doña Aurora National High School to be the locale of the study for some reasons. This secondary school is located in a highly agricultural area of Aurora, Isabela. Whereas, the residential houses are also surrounded by agricultural lands, and the mobile phone signals at every household are not entirely ensured due to its geographical location. Moreover, various types of students are enrolled in this school facility, thus, there is a high possibility that some learners could not afford online learning. Furthermore, Dona Aurora National High School is one of the schools chosen by the department of education to pilot and conduct the radio-based instruction as one of the learning modalities to be utilized that can help students learn not only to their students but all throughout the students in the division. Hence, RBI (radio are said to be universally available/accessible) is somewhat the most considerable modality to be used during this pandemic.

STATEMENT OF THE PROBLEM

This study aimed to determine the effectiveness of radio-based instruction as learning modality in the English learning process of the Grade 9 students of Doña Aurora National High School, Aurora, Isabela.

Specifically, the study sought to answer the following questions:

1. What is the pre-test and post-test scores of the student-respondents?
2. Is there a significant difference in the pre-test and post-test scores of the student-respondents before and after giving radio-based instructions?

3. What is the attitude of the learners toward the radio-based instruction as learning modality in the learning process?
4. What are the benefits derived by the student-respondents in the radio-based instruction as learning modality in the learning process?
5. What is the level of effectiveness of the radio-based instruction as learning modality in the learning process of the student-learners of Doña Aurora National High School?
6. What are the problems encountered by the student-respondents in the radio-based instruction as learning modality in the learning process?
7. What possible solutions can be done to address the problems encountered in the radio-based instruction as learning modality in the learning process?

REVIEW OF LITERATURE

Radio-based Instruction (RBI) is one of the frequent topics these days on educational researches. One of the eminent issues is the effects of radio-based instruction to the students, whether it increases their learnings or it discourages them. It also talks about how the government supports this. This program is designed to help the students cope with the lessons they need to take due to pandemic. Teachers have the responsibility to create effective homework, activity and other strategies that will cover all the subjects that the students need to take to better instill knowledge.

Kapoor, (2019), radio is a powerful mass medium that informs, educates, is inclusive, preserves the local identity of communities and helps reach out and empower marginalized sectors of the society. In developing countries, it can add value in several ways, particularly in areas where information, knowledge and technology come at a cost. It has the potential to fill the gap that exists in schools by providing quality education, vocational and skill training to disadvantaged students.

Jamison and McAnany (1978) had proven that radio-based instructions have been provided to students in various subjects show a positive result. The educational uses of radio fell into three broad categories: improving educational quality and relevance; lowering educational costs; and improving access to education, particularly in rural areas. (As cited by Olakuhelin, 2016)

Olakuhelin, (2016) observed that the students who underwent RBI used their intellectual ability in the teaching and learning process. Students who normally do not participate in class can express their views and concerns by radio-broadcasting. As they are not in a classroom environment, without being noticed or judged, quieter students feel more comfortable engaging in class discussion. In turn, this can boost the average class scores.

Radio-based instructions improved student attendance rates, student improvement on evaluations of their functioning, high percentages of students reporting that they are encouraged to pursue in life and that their journey under the ALS program gave progress in their personal lives, as well as and parental fulfillment (Quinn and Poirier, 2006).

Acido et al., (2014), RBI produces significant educational results and can make a significant difference in family literacy skills and practices if its design, topic plotting, and content are carefully planned and utilized along the lines of literacy support for parents of young learners.

Despite of these positive impacts, RBI have also negative effects both to the teachers and students. Using radio-based, teachers have showed negative attitudes concerning the delivery of this instruction which include various factors like availability of resources which affect their performances. However, the pupils are enthusing with the RBI program, since it improved their listening skills. Though the pupils valued the program, their academic performances differs from school-to-school. In a more general view of the radio-based instruction from several studies, these are the following findings about its negative impact: Learners have no control on the pacing of broadcasts and absence of visuals might be problematic; Usually, there is a lack of capable professionals to produce quality instructional radio segments; Educational radio is basically a one-way method without interactivity; Radio airing is limited to the auditory element of knowledge; Radio program follow a specified schedule, whereas students have to adjust; Due to the absence of explicit response from learners, it is challenging to judge the effectiveness of the program; and Teachers are stuck with inadequate time to aid each learner's academic troubles (Elliot and Lashley, 2017).

METHODOLOGY

The mixed method of research which include the descriptive survey and quasi-experimental was used to determine the effectiveness of radio-based instruction as learning modality in the English learning process based from the results of the pre-test, post-test and the survey. The respondents of this study were the 35 Grade 9 special program in journalism (SPJ) students in Doña Aurora National High School, Aurora, Isabela for school year 2020-2021. Total enumeration was employed in the selection of the respondents.

The Instrument of the Study

A multiple-choice type pre-test and post-test and a survey questionnaire for students were developed by the researcher for the purpose of this study.

The multiple-choice type pre-test and post-test were developed based on the Most Essential Learning Competencies provided by the Department of Education. These self-made tests focused on the second quarter lessons as identified in the MELCs.

The survey questionnaire for students consisted of five parts which include the attitude of the learners toward the radio-based instruction; benefits and effectiveness derived in RBI; the problems encountered and the possible solutions to address the problems encountered in the radio-based instruction as learning modality in the learning process.

To establish the content validity of the developed pre-test and post-test and the survey questionnaires, the experts in the field of radio broadcasting such as the school heads, head teachers, master teachers, and journalism advisers validated them. The experts' suggestions were well taken and incorporated in the finalized questionnaire.

The research instruments were administered first to 30 students to gather data for the reliability test. Its reliability was assessed through computing Cronbach's alpha, which showed the reliability value 0.88 indicating the high consistency of the responses in the items which were indicated in the questionnaire.

Statistical Tools

Frequency Counts and Percentages were used to determine the pre-test and post-test results of the respondents; Weighted Mean was utilized to determine the attitude of the learners toward the radio-based instruction; benefits and effectiveness derived in RBI; the problems encountered and the possible solutions to address the problems encountered in the radio-based instruction as learning modality in the learning process; and T-Test was used to determine the significant difference in the pre-test and post-test scores of the students before and after giving radio-based instruction.

FINDINGS

Pre-test and Post-test Scores of the Respondents with the use of Radio-Based Instruction

It is disclosed in table 1 that 7 or 38.89% respondents got a fairly satisfactory scores of 11-20; there were 10 or 55.56% got a satisfactory and very satisfactory scores of 21-40; and one of the 18 students scored 1-10 with a description of "did not meet expectation" in their pre-test before using the radio-based instruction as mode of learning. On the other hand, 7 or 38.89% respondents got a satisfactory scores of 21-30; 6 or 33.33% of them got a very satisfactory scores of 31-40; and there were 5 or 27.78% who got an outstanding scores of 41-50 in their post-test after having their radio-based instruction.

It can be noted that there is a difference in the pre-test and post-test scores of the students when radio-based instructions is implemented as a mode of learning as reflected in the over-all mean of the two tests.

Table 1. Pre-Test and Post-Test Scores of the Respondents with the Use of Radio-Based Instruction

Scores	Description	Pre-test		Post-test	
		<i>f</i>	%	<i>f</i>	%
1-10	Did not Meet Expectation	1	5.56		
11-20	Fairly Satisfactory	7	38.89		
21-30	Satisfactory	5	27.78	7	38.89

31-40	Very Satisfactory	5	27.78	6	33.33
41-50	Outstanding			5	27.78
Total		18	100.00	18	100.00
Mean Score		23.00		35.00	

Pre-test and Post-test Scores of the Respondents without the Use of Radio-Based Instruction

As reflected in table 2, majority of the respondents who did not use the radio-based instruction scored 21-30 in their pre-test which described as satisfactory; 4 or 25.00% of them got a very satisfactory scores of 31-40; 2 or 12.50% students scored 11-20; and a sole student got an outstanding score of 41-50. However, there were 12 or 75.00% students who got a satisfactory and very satisfactory scores of 21-40 in their post-test; and 4 or 25.00% got a fairly satisfactory scores of 11-20 and outstanding scores of 41-50.

It can be observed that there is a difference in the pre-test and post-test scores of the students without using any learning modality such as the radio-based instructions as reflected in the over-all mean of the two tests.

Table 2. Pre-Test and Post-Test Scores of the Respondents without the Use of Radio-Based Instruction

Scores	Description	Pre-test		Post-test	
		f	%	f	%
11-20	Fairly Satisfactory	2	12.50	2	12.50
21-30	Satisfactory	9	56.25	6	37.50
31-40	Very Satisfactory	4	25.00	6	37.50
41-50	Outstanding	1	6.25	2	12.50
Total		16	100.00	16	100.00
Mean Score		29.00		31.00	

Significant Difference between the Pre-test and Post-test Scores of the Respondents without the Use of Radio-Based Instruction

As gleaned in table 3, the respondents who did not use the radio-based instruction as modality of learning did not differ significantly with their pre-test and post-test scores since the established p-value ($0.05 \leq 0.53$) is greater than the critical value signifying the acceptance of the null hypothesis at 0.05 level of significance. However, the students who utilized the radio-based instruction positively affected their post-test scores since the recorded p-values ($0.05 \geq 0.00$) is less than the critical value leading to the rejection of the null hypothesis at 0.05 level of significance. This assumes that radio-based instructions is an effective learning modality to improve not only the post-test scores of students but also their other academic endeavors and performances.

This findings agree to what Olakuhelin (2016) have discovered in his study that learners who were imparted knowledge through educational radio attained higher scores in Computer Adaptive Test than those with the scores of learners who received face-to-face lecture.

Table 3. Significant Difference between the Pre-Test and Post-Test Scores of the Respondents without the Use of Radio-Based Instruction

Groups	Tests	Mean	SD	N	df	t	p	Decision	Interpretation
With RBI	Pretest	23.39	9.33	18	32	4.08	.00	reject Ho	sig. difference
	Posttest	34.94	7.57	18					
Without RBI	Pretest	28.81	7.59	16	29	0.63	.53	accept Ho	no sig. difference
	Posttest	30.69	9.14	16					

Attitudes of the Respondents toward the Radio-Based Instruction as Learning Modality in the English Learning Process

As reflected in table 4, the respondents agreed on their attitudes toward the radio-based instruction as learning modality in the English learning process as reflected in the over-all mean of 3.58. They particularly agreed that they were able to practice independency in learning; they need more time to get used with the RBI learning modality; they like learning their subjects through radio-based instruction; they enjoy the lec-

tures during radio-based instruction; they enjoy the lectures during radio-based instruction; and they find their subjects more interesting to learn through RBI. On the other hand, they neither agree nor disagree that they improved their study habits using the radio-based instruction; they prefer RBI more than any other types of learning modality; they feel less/no pressure in their study by RBI; and they can concentrate better in studying their lessons through RBI; they become more independent in studying; they easily operate the radio.

This finding is somewhat similar to what Olakuhelin (2016) had observed in his study that the students who underwent radio-based instruction used their intellectual ability in the teaching and learning process.

Table 4. Attitudes of the Student-Respondents toward the Radio-Based Instruction as Learning Modality in the English Learning Process

Statements	Mean	Description
1. I like learning my subjects through Radio-Based Instruction (RBI).	3.80	Agree
2. I enjoy the lectures during Radio-Based Instruction.	3.69	Agree
3. I find my subjects more interesting to learn through RBI.	3.51	Agree
4. I enjoy the lectures during Radio-Based Instruction.	3.63	Agree
5. I prefer RBI more than any other types of learning modality.	3.40	Neither Agree or Disagree
6. I improved my study habit using the Radio-Based Instruction.	3.46	Neither Agree or Disagree
7. I am able to practice independency in learning.	3.83	Agree
8. I can concentrate better in studying my lessons through RBI.	3.26	Neither Agree or Disagree
9. I feel less/no pressure in my study by RBI.	3.37	Neither Agree or Disagree
10. I need more time to get used with the RBI learning modality.	3.83	Agree
Overall mean	3.58	Agree

1.00-1.50- Completely Disagree 1.50-2.49-Disagree 2.50-3.49- Neither Agree or Disagree 3.50-4.49-Agree 4.50-5.00-Strongly Agree

Benefits Derived by the Respondents in the RBI as Learning Modality in the Learning Process

Table 5 disclosed that the respondents agreed on the benefits that can be derived in the Radio-Based Instruction as learning modality in the English learning process as reflected in the over-all mean of 3.79. They agreed that RBI is economical/inexpensive unlike other learning modalities that require internet access and high energy consumptions; RBI improves their imagination capacity; they can access the channel/station easily regardless of their location; their parents (family members) can keep track with their academic activities and progress; and they can have access with the broadcast lessons with or without electricity.

This finding gives a connection to what Ho and Thukral (2009) had concluded in their study that in remote learning, the utilization of excellent radio programs/segments is an efficacious medium on extending education access with unwavering quality. The use of radio is also beneficial to instruct students especially those who are not able to join formal school, just like orphans, ones who are struggling due to personal issues, who live in regions where most social systems is poor or does not even exist, who received the least support, and most inhibited learners who are deprived to education access.

Table 5. Benefits Derived by the Respondents in the RBI as Learning Modality in the English Learning Process

Statements	Mean	Description
1. I easily operate the radio.	3.77	Agree
2. I can have access with the broadcast lessons with or without electricity.	3.51	Agree
3. I can access the channel/station easily regardless of my location.	3.71	Agree
4. I become more independent in studying.	3.83	Agree
5. My parents (family members) can keep track with my academic activities and progress.	3.71	Agree

6. RBI is economical/inexpensive unlike other learning modalities that require internet access and high energy consumptions.	4.09	Agree
7. RBI improves my imagination capacity.	3.89	Agree
Overall mean	3.79	Agree

1.00-1.50- Completely Disagree 1.50-2.49-Disagree 2.50-3.49- Neither Agree or Disagree 3.50-4.49- Agree 4.50-5.00-Strongly Agree

Level of Effectiveness of the Radio-Based Instruction as Learning Modality in the English Learning Process

It is revealed in table 6 that radio-based instruction is an effective modality in the English learning process of the respondents as reflected in the over-all mean of 3.87. They perceived it as effective since RBI helped them become more independent in studying; it advanced their listening and understanding skills; it helped them easily understand the lessons since RBI uses simple and familiar words; they were able to check, review, and assess their own academic accomplishments; it gave them the chance to digest one concept before jumping to another with the right amount of pacing that they can keep up; it improved their vocabulary, proper intonation, pronunciation, and formalities of speech; they became more motivated, interested, and committed to study; and they helped them record the live broadcast and use the recording when they have a hard time on taking notes and following the lectures.

This finding is somewhat parallel to what Elliot and Lashley (2017) had found out where radio-based instruction is effective in improving the listening skills of the learners. In addition it emphasizes the major benefit and effect of radio learning in school as what Litherland (n.d) had stated that radio learning teaches students a new and possibly job-related skill and also help students (and even teachers) create better ways of learning.

Table 6. Level of Effectiveness of the Radio-Based Instruction as Learning Modality in the Learning Process

Statements	Mean	Description
1. I am more motivated, interested, and committed to study through Radio-Based Instruction (RBI).	3.71	Effective
2. I become more independent in studying.	4.09	Effective
3. I am able to check, review, and assess my own academic accomplishments.	3.89	Effective
4. I can record the live broadcast and use the recording when I have a hard time on taking notes and following the lecture.	3.66	Effective
5. RBI improves my vocabulary, proper intonation, pronunciation, and formalities of speech.	3.71	Effective
6. RBI advances my listening and understanding skills.	4.09	Effective
7. RBI used simple and familiar words which helps me easily understand the lessons.	4.06	Effective
8. RBI gives me the chance to digest one concept before jumping to another with the right amount of pacing that I can keep up.	3.77	Effective
Overall mean	3.87	Effective

1.00-1.50-Completely Ineffective 1.50-2.49-Ineffective 2.50-3.49- Fair 3.50-4.49-Effective 4.50-5.00-Very Effective

Problems Encountered by the Respondents in the RBI as Learning Modality in the English Learning Process

It is disclosed in table 7 that the respondents encountered problems in using the radio-based instruction in the English learning process as reflected in the over-all mean of 3.11 with a description of “sometimes”. They sometimes encountered problems on the following: having a hard time taking notes because of uncertainty with the spelling of a mentioned unfamiliar word or the structure of a given formula; they were not able to listen to the instructions clearly because of the distractive noise around them; they prefer visual learning style rather than verbal learning style; having a hard time adapting and adjusting to new learning modality; they cannot grasp the lesson being delivered due to the fast pacing of the lecture; they cannot ask their teacher over the radio to clarify certain points of the lesson; they cannot hear their teacher’s voice

clearly due to the weak or unstable signal in their area; they are distracted by the advertisements or flash reports being played before, during, or after the broadcast of the lesson; and they experienced hearing loss that makes it hard for them to keep up with the lecture.

This finding agrees the problems enumerated by Elliot and Lashley (2017) where learners have no control on the pacing of broadcasts and absence of visuals might be problematic; there is a lack of capable professionals to produce quality instructional radio segments; educational radio is basically a one-way method without interactivity; radio airing are limited to the auditory element of knowledge; radio program follow a specified schedule, whereas students have to adjust; due to the absence of explicit response from learners, it is challenging to judge the effectiveness of the program; and teachers are stuck with inadequate time to aid each learner’s academic troubles.

Table 7. Problems Encountered by the Respondents in the RBI as Learning Modality in the English Learning Process

Statements	Mean	Description
1. I cannot ask my teacher over the radio to clarify certain points of the lesson.	3.14	Sometimes
2. I cannot grasp the lesson being delivered due to the fast pacing of the lecture.	3.26	Sometimes
3. I am not able to listen to the instruction clearly because of the distractive noise around me.	3.29	Sometimes
4. I cannot hear my teacher’s voice clearly due to the weak/unstable signal in my area.	3.14	Sometimes
5. I am not able to attend my lectures at the exact time because the broadcasts sometimes airs earlier or later than the agreed schedule.	2.89	Sometimes
6. I have a hard time taking notes because of uncertainty with the spelling of a mentioned unfamiliar word or the structure of a given formula.	3.46	Sometimes
7. I am distracted by the advertisements or flash reports being played before, during, or after the broadcast of the lesson.	2.69	Sometimes
8. I prefer visual learning style rather than verbal learning style.	3.31	Sometimes
9. I am experiencing hearing loss that makes it hard for me to keep up with the lecture.	2.66	Sometimes
10. I have a hard time adapting and adjusting to new learning modality, particularly RBI.	3.29	Sometimes
Overall mean	3.11	Sometimes

1.00-1.50-Never 1.50-2.49-Seldom 2.50-3.49- Sometimes 3.50-4.49-Ofien 4.50-5.00-Very Often

Possible Solutions to Address the Problems Encountered in the Radio-Based Instruction as Learning Modality in the English Learning Process

It is revealed in table 8 that the respondents agreed on the proposed possible solutions in addressing the problems encountered in the radio-based instruction as learning modality in the learning process as reflected in the over-all mean of 3.94. They agreed that broadcasting of lectures must be on a fixed schedule to ensure that students would be able to listen from the start to end; unfamiliar words and long formulas must be spelled out thoroughly during lectures; students with hearing loss must be given more attention and guidance by parents/guardian during lectures; radio stations used for broadcasting lectures must be made widely available in the areas where students are currently living; parents must adjust on their household chores and give a quiet space for their child to study during lectures; advertisements before the broadcasting of lectures must be academic-related to prepare students focus on the lecture and advertisements after the broadcasting of lectures must make the students relax; teachers must be able to deliver the lecture effectively to students with different learning preferences; lectures on a particular topic must be delivered twice a day/week; and ongoing trainings for teachers on radio-based instruction must be conducted.

Table 8. Possible Solutions to Address the Problems Encountered in the Radio-Based Instruction as Learning Modality in the Learning Process

Statements	Mean	Description
1. Radio stations used for broadcasting lectures must be made widely available in the areas where students are currently living.	3.97	Agree
2. Ongoing trainings for teachers on radio-based instruction must be conducted.	3.69	Agree
3. Parents must adjust on their household chores and give a quiet space for their child to study during lectures.	3.97	Agree

4. Broadcasting of lectures must be on a fixed schedule to ensure that students would be able to listen from the start to end.	4.09	Agree
5. Unfamiliar words and long formulas must be spelled out thoroughly during lectures.	4.06	Agree
6. Advertisements before the broadcasting of lectures must be academic-related to prepare students focus on the lecture.	3.94	Agree
7. Advertisements after the broadcasting of lectures must make the students relax.	3.94	Agree
8. Teachers must be able to deliver the lecture effectively to students with different learning preferences.	3.94	Agree
9. Students with hearing loss must be given more attention and guidance by parents/guardian during lectures.	4.00	Agree
10. Lectures on a particular topic must be delivered twice a day/week.	3.83	Agree
Overall Mean	3.94	Agree

1.00-1.50- Completely Disagree 1.50-2.49-Disagree 2.50-3.49- Neither Agree or Disagree 3.50-4.49-Agree 4.50-5.00-Strongly Agree

CONCLUSIONS

The following conclusions were derived from the findings:

1. There is a difference in the pre-test and post-test scores of the students when radio-based instruction is utilized as a mode of learning and there is also difference in the pre-test and post-test scores of the students without using any learning modality.
2. The respondents who did not use the radio-based instruction as modality of learning did not differ significantly with their pre-test and post-test scores. However, the students who utilized the radio-based instruction positively affected their post-test scores.
3. The respondents agreed on their attitudes toward the radio-based instruction as learning modality in the English learning process.
4. The respondents agreed on the benefits that can be derived in the radio-based instruction as learning modality in the English learning process.
5. Radio-based instruction is an effective modality in the English learning process of the respondents.
6. The respondents encountered problems in using the radio-based instructions in the English learning process.
7. The respondents agreed on the proposed possible solutions in addressing the problems encountered in the radio-based instruction as learning modality in the English learning process.

RECOMMENDATIONS

In the light of the summary of findings and conclusion, the researcher recommends the following:

1. Learners should consider and apply the positive effect and advantages of using the radio-based instructions in their academic endeavors as an alternative in acquiring the necessary skills and knowledge in the new normal way of transferring quality education.
2. Teachers should immediately address the problems and difficulties encountered by the learners particularly in explaining well the unfamiliar words by giving examples. Lectures should be delivered in a moderate pacing with a fixed schedule to ensure that students would be able to listen from the start to the end and advertisements should not be in between radio episodes.
3. Parents and other members of the family must help and assist their children especially those who have hearing problems, and parents must adjust on their household chores and give a quiet space for their children to study during lectures. Through this, learners may feel and realize the important role of the family in their growth and development including the acquisition of learnings in the absence of their teachers.
4. School heads and administrators in collaboration with the language teachers and radio broadcasting advisers must initiate a school-based workshop or seminar in radio-broadcasting for the purpose of producing quality radio episodes to ensure and attain the ultimate goal of the department of education which is producing quality learners amidst the pandemic.
5. DepEd personnel and local government officials through the committee on education and other schools' stakeholders should collaborate and work as one to extend help to those learners who have problems on signals due to their location by providing alternatives to access the radio-based classes.
6. Future researchers may conduct deeper study that may test the various effects of using the radio-based instruction and be correlated to other variables.

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ISCOF-PASS: A CAMPUS MONITORING SYSTEM AGAINST COVID-19

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ABSTRACT

Since the outset of the pandemic in the Philippines, many establishments, including educational institutions, have used pen-and-paper-based logbooks to track and monitor every person who enters and exits their premises for contact tracing purposes. However, this approach has some disadvantages, such as long lines at the entrance/exit gates and data privacy issues, to name a few. In this study, the researchers developed an Android-based campus monitoring system called "ISCOF-Pass" that tracks the time-in/time-out and temperature readings of the Iloilo State College of Fisheries (ISCOF) employees, students, and visitors as they enter and leave the campus, and generate a daily monitoring report to support sound judgment by the school management. The researchers used the Agile Software Development Methodology to develop the system and employed the Android Studio IDE and Google Firebase components as the development tools. The system runs on Android mobile devices with a minimum Android operating system version of Lollipop (5.0). The ISCOF employees, students, visitors, and IT experts evaluated the system using ISO 25010 software quality evaluation instrument. Overall, the ISCOF-Pass campus monitoring system achieved a mean of 4.45, indicating an "excellent" rating. The results indicated that the system has conformed to the ISO standards for creating quality software. It is recommended that the system be utilized primarily at the ISCOF Barotac Nuevo Campus and eventually on other ISCOF campuses. Additionally, enhancements to the system's current features and capabilities were suggested for the system to be used in a larger environment.

Keywords: Covid-19, contact tracing, monitoring system, Android, QR-code

INTRODUCTION

Due to the COVID-19 pandemic, many schools in the Philippines have temporarily closed to limit the spread of the virus. However, as the country adjusts to the new normal, most schools are gradually reopening, and school employees are returning to their jobs, albeit with some changes to the work environments. Students and visitors are now allowed to enter the school grounds but by appointment only. Moreover, to ensure the school environments' safety against the virus, health and safety measures [1] are regularly observed, and contact tracing is continually conducted. Contact tracing is a method of identifying, assessing, and monitoring individuals exposed to an infected person to prevent onward transmission of the virus [2,3]. Subsequently, mobile applications have been an effective tool to support contact tracing to quickly track and alert people via contact tracing apps [4]. Several organizations have made every effort to track and monitor each person who enters their establishments using pen-and-paper-based logbooks that can be used for contact tracing since the outset of the pandemic. However, this raises several concerns, including long lines at the entrance/exit gates and data privacy concerns, among others. As a result, ICT and digital technologies were used to solve these problems [5].

In this paper, the researchers introduce ISCOF-Pass, an Android-based campus monitoring system that tracks, monitors, and keeps logs of the school employees, students, and visitors who enter and exit the campus premises, initially at the Iloilo State College of Fisheries Barotac Nuevo campus. ISCOF-Pass uses Quick Response (QR) code, a two-dimensional matrix barcode technology, to store relevant information about the clients that could be scanned using a QR code scanner.

This research aims to develop a cloud and android-based campus monitoring system called "ISCOF-Pass" that could be used for ISCOF campus travel history tracking for contact tracing purposes and daily monitoring to support top management's sound judgment.

Specifically, this study aims to:

1. develop an Android application for the client that encrypts the name, ID number, temperature, time-in/time-out, birthdate, address, and contact number of school employees, students, and visitors in the form of a QR code and displays the client's travel history from the ISCOF Barotac Nuevo campus.
2. develop a campus QR-code scanner android application that decrypts the QR code from the client app and sends it to the real-time database.
3. develop a system that tracks, monitors, and keep logs everyone who enters the school premises where the accumulated data can be downloaded in the form of PDF, CSV or XLSX format
4. evaluate the system using ISO 25010 software engineering quality standard in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability.

RELATED LITERATURE

Several related works are found in the literature about the mobile contact tracing and monitoring system concerning the Covid-19 pandemic. A study by Orallo et al. [6] found that mobile contact tracing, when combined with other lenient measures such as physical distancing, can be effective in controlling the disease; however, contacts must be traced quickly, and a large percentage of the population must use the contact tracing app.

The work in [7] proposes a crowd monitoring service against covid-19 that allows its users to know in advance the crowdedness state of the places they intend to visit, allowing them to plan their trips based on the app's information can provide. In this system, QR-code technology was used, and the QR-code tag was displayed near the entrance and exit of monitored locations, which the user would need to scan to check-in/check-out. As a result, the application can track how many visitors are present at a given location.

Muladi et al. [8] developed a personnel monitoring system that uses Bluetooth detection on smartphones to detect the user's location and other people's presence. In this system, user data is stored and processed in a real-time database hosted on a cloud server and accessible via the app on the user's smartphone. The database also contains information about Covid19 patients and where they live. When the user is in a crowd, the app alerts them and notifies them of the region's status.

In the Philippines, a travel management system called "S-pass" [9] has been implemented nationwide to monitor travelers' locations and track their travel history. The system is based on QR-code technology, and travelers will be tracked by scanning their unique S-PaSS QR Code whenever they visit a business or office. The system will then automatically record data on its e-LogBook for recording and monitoring purposes, obviating the need for pen and paper or logbooks.

METHODOLOGY

System Overview

The proposed monitoring system has two main components, the ISCOF-Pass Client App and the QR-code Scanner app, as shown in Fig. 1. The mobile client application is designed to be used by the ISCOF employees, students, and visitors to track their travel history at ISCOF BN Campus. The client's app generates a QR code tag as the client creates an account to the system that encrypts the client's name, ID number, temperature, time-in/time-out, birthdate, address, and contact number. The client can then see his/her travel history to the campus in the My History section below the generated QR code.

The authorized personnel (e.g., school security guard) will scan

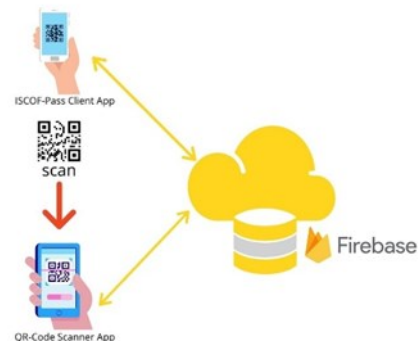


Figure 1 - Workflow of the ISCOF-Pass system using Firebase Cloud server

this QR code tag using the QR code scanner app to inputs the client's temperature and for the system to record the time-in/time-out of the ISCOF employees, students, and visitors at ISCOF BN Campus. The data is then sent to the firebase cloud server and stored in the real-time database. The recorded time-in/time-out and temperature will be displayed in the client's app history section. The scanner app also allows the authorized personnel to view the travel history of the client.

The app can eventually generate a daily monitoring report in pdf or csv format that could be submitted to the School Management for tracking and monitoring or even to the Public Health Unit in case of contact tracing. All system components require internet connectivity in order to function.

Software Tools

Android Studio was used as the Integrated Development Environment (IDE) for the system's development with XML as the mark-up language for designing the user interface and Java as the programming language for the development of the apps, Firebase Cloud Firestore as the backend database, and Firebase Cloud Functions to perform the backend logic and security mechanism of the system which are some of the features offered by Firebase Cloud Server. Android OS 5.0 (Lollipop) was selected as the minimum android operating system version for the two android applications.

Project Development

The researchers used Agile Software Development Methodology as the software development methodology for this study [10]. Cockburn defines Agile Methods as techniques that allow a team to rapidly track changes in people, technology, and business. Agile methods are flexible to change and are based on changing requirements and preferences [11]. The scrum model approach was used particularly as this is one of the most popular Agile methodology approaches. The scrum model follows an iterative and incremental software development execution, thus making it suitable for the project's development as changes are easier to perform [12].

Testing and Validation Tools

Unit tests were implemented to validate the correctness of the methods that were developed using the Log-Cat and the associated Log class provided by Android. Also, an ISO 25010 software quality evaluation was conducted to verify the quality of the android applications with users

Project Evaluation

The evaluation was then conducted to determine the effectiveness and usefulness of the system. The evaluation was performed using the ISO 25010 software quality mode [13], the standard for software evaluation. This tool evaluates functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability. The data gathering procedure was done through Google forms sent through an online messaging app and paper-based questionnaires to the respective participants. The evaluations took place at the Iloilo State College of Fisheries Barotac Nuevo campus.

Participants

The participants for this evaluation were ten (10) students of ISCOF BN Campus, ten (10) ISCOF employees, five (5) Visitors/Clients, five (5) IT experts. The researcher used purposive sampling in determining the participants of the study. These participants were determined as they were the system's intended users and could operate and evaluate it correctly.

Evaluation Method

The system's evaluation was conducted using two Android devices where the ISCOF-Pass client's app and QR code scanner were separately installed. The researchers first simulated the activities to be performed through the mobile apps, then later provides written instructions that the participants should follow. This document includes a brief description of the tasks to be completed and the execution procedure steps for both the client and the personnel's roles. The participants' main tasks in the client's app include completing the sign-in, disclaimer, and profile sections, viewing the daily travel history by clicking any day on the calendar feature, and updating the client's account. Following that, the participants must scan the QR code tag using the QR code scanner app from the client's app, enter a dummy temperature on time in and time portions, and view the client's travel history by scanning the tag again in the client's app. The participants were then asked to rate the system using the ISO 25010 evaluation tool questionnaire. The answer varies from 1 to 5 following the Likert Scale (1-Very poor, 2-Poor, 3-Fair, 4-Very Good, 5-Excellent). All statistical computation was calculated with the use of Statistical Package for Social Science (SPSS) software.

RESULTS AND DISCUSSION

This section covers the result of the study after the system’s development and evaluation.

ISCOF-Pass Monitoring System

The ISCOF-Pass Monitoring System comprises of two mobile applications: The ISCOF-Pass client app and the QR code scanner app. The two mobile applications' user interfaces are designed to be user-friendly and straightforward as possible.

ISCOF-Pass Client App

The client's app has four distinct User Interfaces (UIs): sign-in, disclaimer, profile, main, and update. This mobile application is for the ISCOF employees, students, and visitors to track their travel history at ISCOF BN Campus.

The sign-in UI is the first screen the client can see after launching the app, as shown in Figure 1. The background animation depicts the ISCOF main campus. In the lower part of the UI, a sign-in clickable button is visible, and the client's Google Account is required to sign in to the app. After the client successfully signed in, a disclaimer UI will be shown (Fig. 2). The disclaimer is displayed as for compliance with the RA 10173 or Data Privacy Act of 2012. The administrators' email addresses are also displayed to be contacted in case of any concerns or feedback. The client would need to click the 'I Agree and Understand' button to proceed to the next activity the shows the profile UI. An option to change the email address is also provided (Fig. 3). The next button should be clicked to continue to the profile requirements.

In the Profile section, the client has the option to select their corresponding category (i.e., ISCOF employees, students, and visitors) and input relevant information such as date of birth, Address (Fig. 4a), Employee/Student ID, Campus, College/Department (Fig. 4d), and Contact Number (Fig. 4b). The client should click the following button to proceed to the main screen.

The main screen displays the unique QR code, Calendar, and Travel History of the user. The upper part of the main screen is the generated QR code that encrypts the client's name, ID number, temperature, time-in/ time-out, birthdate, address, and contact number (Fig. 5a). An option to update the account, see the disclaimer, and sign-out is also shown. The lower part of the main screen shows the Calendar on which if the client clicks any date, the travel history on that particular date will be shown in the My History section below (Fig. 5b).

When the client clicks the Account option in the main UI, the initial inputted data from the profile section can then be changed and updated by the client (Fig 6). The updated portions will be updated in the real-time database, and then the changes can then be viewed on the main screen.

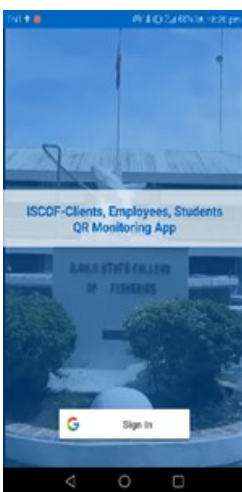


Figure 1 – Sign-In



Figure 2 – Disclaimer

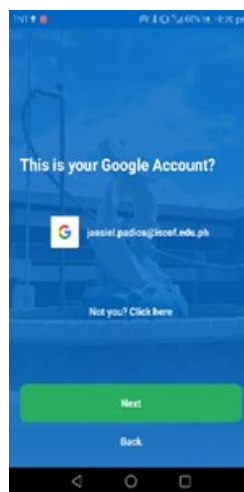


Figure 3 – Change Google Account

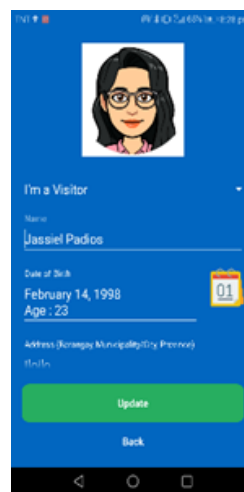


Figure 4 – Update Account

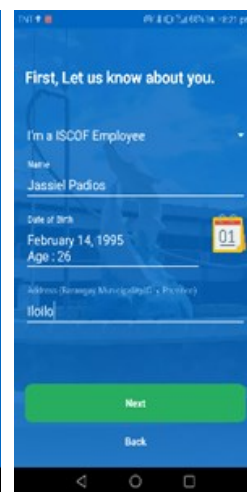


Figure 5a – Profile (a)

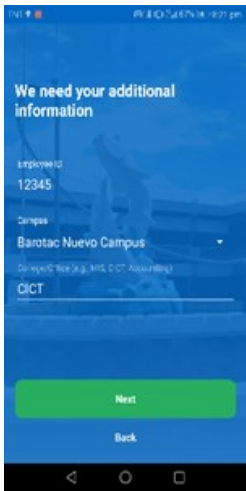


Figure 5b – Profile (b)

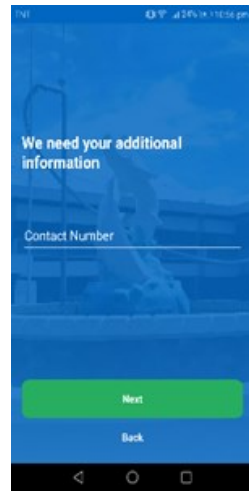


Figure 5c – Profile (c)

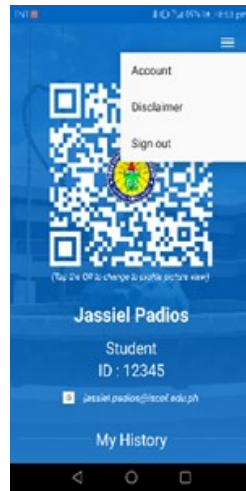


Figure 6a – Main Screen(a)

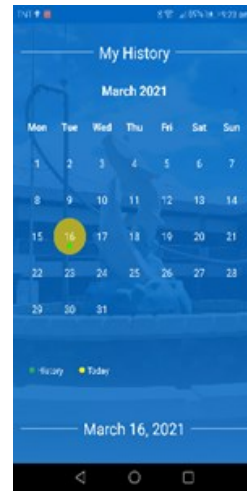


Figure 6b – Main Screen(b)

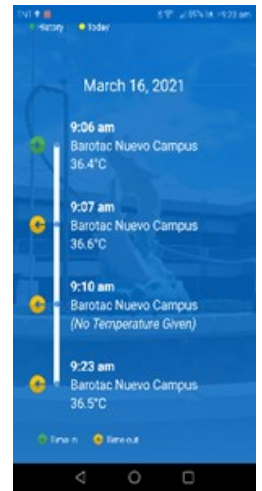


Figure 6c – Main Screen(c)

QR Code Scanner App

The sign-in UI is the first screen the campus authorized personnel sees after launching the QR code scanner app, as shown in Figure 7. When the personnel clicked the sign-in button at the lower part of the screen, an 'Activate your Account' request will be shown (Fig. 8). The personnel should contact the system administrator to activate the account. Only the campus authorized personnel will be allowed to use the scanner app. Once the administrator successfully activated the account, the personnel can eventually use the app to scan the ISCOF employees, students, and visitor's QR code tag to monitor their time in/time out and temperature as they enter and leave the campus.

In the Main screen, the primary buttons that could be seen are time in, time out, and scan user history log (Fig 9a). When the time in button is clicked, the device camera is enabled, and the personnel can now scan the QR code tag of the ISCOF-Pass client's app user (Fig. 10). The client's profile information is displayed, and a button to input the client's temperature is visible (Fig. 11), where the personnel should click and input the client's current temperature (Fig. 12). The recent information will be shown in the Scanned History on the app's lower section (Fig. 13). The exact process also occurs if the time-out button is clicked on the main screen. When the Scan User History Log button is clicked, the personnel can then scan the client's QR code tag to show the client's profile, and a calendar button is also shown on which, when clicked the Travel history of the client will be displayed (Fig. 14).

The QR code scanner can also generate a pdf or csv file containing all the scanned history reports that could be used for contact tracing purposes and monitoring to support the sound judgment by the top management.

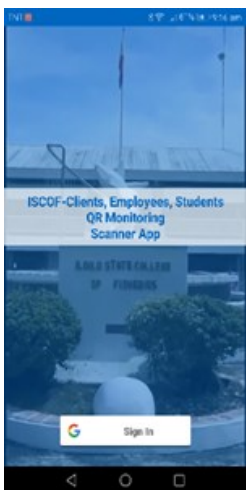


Figure 7 – Sign-in

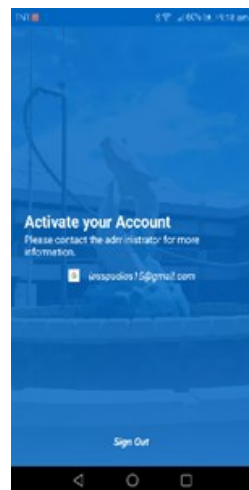


Figure 8 – Activate Account



Figure 9a – Main Screen

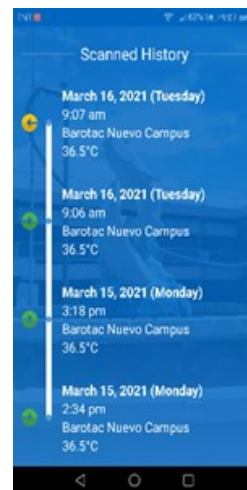


Figure 9b – Main Screen



Figure 10 – Camera



Figure 11 – Time-in btn result

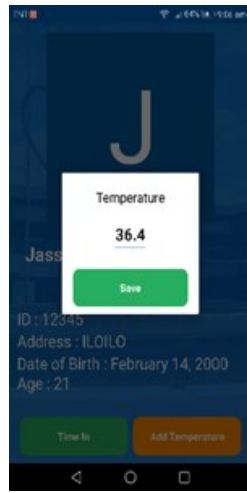


Figure 12 – Temp. Input

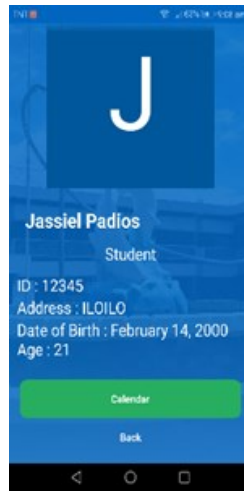


Figure 13 – Scanned Log btn result

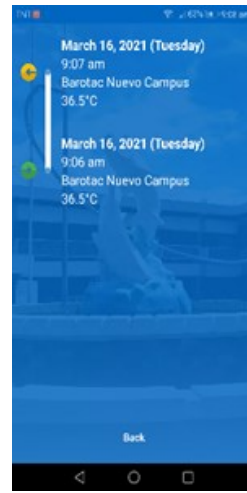


Figure 14 – Calendar btn result

Evaluation Results

The results obtained during the evaluation process are presented in the tables below.

Table 1 - Functional Suitability

Functional Suitability	Students		Faculties		Visitors		IT Experts		Grand Total Mean	
	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc
Functional completeness	4.40	Exc	4.20	Exc	4.60	Exc	4.33	Exc	4.38	Exc
Functional correctness.	4.60	Exc	4.10	Exc	4.60	Exc	4.33	Exc	4.41	Exc
Functional appropriateness	4.60	Exc	4.50	Exc	4.60	Exc	4.67	Exc	4.59	Exc
Total Mean	4.53	Exc	4.27	Exc	4.60	Exc	4.44	Exc	4.46	Exc

In terms of functional suitability, the ISCOF-Pass campus monitoring system received an overall rating of 4.46 ("excellent") from the participants, as shown in Table 1. The results show that the system is highly functional and that the desired features and operations have been implemented.

Table 2 - Performance Efficiency

Performance Efficiency	Students		Faculties		Visitors		IT Experts		Grand Total Mean	
	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc
Time-Behavior	4.70	Exc	4.20	Exc	4.60	Exc	4.33	Exc	4.46	Exc
Resource Utilization	4.40	Exc	4.70	Exc	4.40	Exc	4.33	Exc	4.46	Exc
Capacity	4.70	Exc	4.30	Exc	4.20	Exc	4.33	Exc	4.38	Exc
Total Mean	4.60	Exc	4.40	Exc	4.40	Exc	4.33	Exc	4.43	Exc

Table 2 shows that the system was rated "excellent" by the participants in terms of overall performance efficiency, with a score of 4.43. As a result, the system is highly efficient in terms of performance, requiring only a few resources to perform its function.

Table 3 - Compatibility

Compatibility	Students		Faculties		Visitors		IT Experts		Grand Total Mean	
	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc
Co-existence	4.40	Exc	3.90	VG	4.80	Exc	4.00	VG	4.28	Exc
Interoperability	4.70	Exc	4.10	Exc	4.80	Exc	4.67	Exc	4.57	Exc
Total Mean	4.55	Exc	4.00	Exc	4.80	Exc	4.33	Exc	4.42	Exc

In terms of overall compatibility, the system obtained an overall compatibility rating of 4.42 ("excellent"), as shown in Table 3. The results show that the system has high compatibility features, allowing it to run on various Android platform versions with no known issues.

Table 4 - Usability

Usability	Students		Faculties		Visitors		IT Experts		Grand Total Mean	
	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc
Appropriate Recognizability	4.50	Exc	4.60	Exc	4.60	Exc	4.67	Exc	4.59	Exc
Learnability	4.40	Exc	4.50	Exc	4.60	Exc	4.67	Exc	4.54	Exc
Operability	4.40	Exc	4.50	Exc	4.80	Exc	4.67	Exc	4.59	Exc
User error protection	4.40	Exc	4.50	Exc	4.60	Exc	4.00	VG	4.38	Exc
User interface aesthetics	4.50	Exc	4.70	Exc	4.20	Exc	4.33	Exc	4.43	Exc
Accessibility	4.40	Exc	4.50	Exc	4.60	Exc	4.67	Exc	4.54	Exc
Total Mean	4.43	Exc	4.55	Exc	4.57	Exc	4.50	Exc	4.51	Exc

Table 4 shows that the system had an "excellent" usability feature, with an overall rating of 4.51 from the participants. The result implies that the system is user-friendly and convenient to use.

Table 5 - Reliability

Reliability	Students		Faculties		Visitors		IT Experts		Grand Total Mean	
	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc
Maturity	4.40	Exc	4.00	VG	4.60	Exc	4.33	Exc	4.33	Exc
Availability	4.60	Exc	4.00	VG	4.40	Exc	4.67	Exc	4.42	Exc
Fault Tolerance	4.70	Exc	4.10	Exc	4.40	Exc	4.67	Exc	4.47	Exc
Recoverability	4.40	Exc	4.10	Exc	4.60	Exc	4.67	Exc	4.44	Exc
Total Mean	4.53	Exc	4.05	Exc	4.50	Exc	4.58	Exc	4.41	Exc

Table 5 shows that the participants rated the campus monitoring system's reliability as "excellent," with a value of 4.41. The result indicates that the system provides a high level of reliability in terms of software functions, as it can still restore the system's desired state when an interruption occurs.

Table 6 - Security

Security	Students		Faculties		Visitors		IT Experts		Grand Total Mean	
	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc
Confidentiality	4.56	Exc	4.30	Exc	4.40	Exc	4.67	Exc	4.48	Exc
Integrity	4.44	Exc	4.30	Exc	4.60	Exc	4.67	Exc	4.50	Exc

Non-repudiation	4.22	Exc	4.40	Exc	4.00	VG	4.67	Exc	4.32	Exc
Accountability	4.22	Exc	4.10	Exc	4.40	Exc	4.67	Exc	4.35	Exc
Total Mean	4.36	Exc	4.28	Exc	4.35	Exc	4.67	Exc	4.41	Exc

Table 6 shows that the system obtained an "excellent" rating from the participants in terms of security, with a value of 4.41. The result indicates that the system is secure and prevents unauthorized modification of the program or data.

Table 7 - Maintainability

Maintainability	Students		Faculties		Visitors		IT Experts		Grand Total Mean	
	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc
Modularity	4.44	Exc	4.40	Exc	4.40	Exc	4.67	Exc	4.48	Exc
Reusability	4.44	Exc	4.10	Exc	4.60	Exc	4.67	Exc	4.45	Exc
Analyzability	4.67	Exc	4.20	Exc	4.40	Exc	4.67	Exc	4.48	Exc
Modifiability	4.56	Exc	4.30	Exc	4.00	VG	4.67	Exc	4.38	Exc
Testability	4.44	Exc	4.80	Exc	4.40	Exc	4.33	Exc	4.49	Exc
Total Mean	4.51	Exc	4.36	Exc	4.36	Exc	4.60	Exc	4.46	Exc

Table 7 shows that the participants rated the campus monitoring system as "excellent" in terms of maintainability, with a value of 4.46. The result implies that the system can be easily updated, modified, and maintained for state-of-the-art emerging technologies.

Table 8 - Portability

Portability	Students		Faculties		Visitors		IT Experts		Grand Total Mean	
	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc	Mean	Desc
Adaptability	4.44	Exc	4.00	VG	4.60	Exc	4.67	Exc	4.43	Exc
Installability	4.22	Exc	4.50	Exc	4.40	Exc	4.67	Exc	4.45	Exc
Replaceability	4.22	Exc	4.20	Exc	4.60	Exc	4.67	Exc	4.42	Exc
Total Mean	4.30	Exc	4.23	Exc	4.53	Exc	4.67	Exc	4.43	Exc

In terms of portability, table 8 shows that the system has achieved an "excellent" rating with a value of 4.43 as rated by the participants indicating that the system can efficiently work in different android device hardware or software and can be easily installed and uninstalled in android phones.

The overall results of the ISO 25010: software quality model evaluation, with a rating of 4.45, indicate that the system complied with the ISO International Quality Standards for computer systems.

CONCLUSION

This paper has introduced a monitoring system that tracks and monitors the ISCOF employees, students, and visitors' travel history at Iloilo State College of Fisheries Barotac Nuevo Campus. The system used QR code technologies to store significant information about the client, such as the client's profile and travel history at ISCOF that a dedicated QR code scanner app could only scan. The system's prototype has been developed, tested, and evaluated. Future work will include improving the system's capabilities and features to be implemented in a larger environment. Overall, our project was able to accomplish its objectives based on the result of the evaluation.

RECOMMENDATIONS

The results and suggestions after the evaluation proposed some improvements in the system in the future.

- The system should also be available to other operating systems (e.g., iOS).
- The features and capabilities of the system should be enhanced for it to be implemented in a larger environment.
- The system can be helpful to all ISCOF campuses.

Overall, the system has obtained favorable comments from the participants.

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