Journal of Technology Innovations and Energy
https://doi.org/10.56556/jtie.v1i3.249
ISSN: 2957-8809

RESEARCH ARTICLE

Offline-Online Submission and Assessment System (OSAS) chatbot as an E-tool on retrieval of learners' outputs in Earth and Life Science during the Distance Learning

Arangote, Rona Joy C[1*], Dela Paz Teresa Abbygail M[1], Vinarao, Princess Marie G[1]

[1]San Lorenzo Ruiz Senior High School- DepEd NCR Pasig City, Philippines

Corresponding Author: Rona Joy C. Arangote, arangoteronajoy@gmail.com
Received: 20 August, 2022, Accepted: 03 September, 2022, Published: 04 September, 2022

Abstract
The COVID-19 had markedly impacted education that moved to distance learning. The Basic Education Learning Continuity Plan (BE-LCP) emphasized the fairness of learners' access to technology, gadgets, and household assistance. Besides, low-tech and no-tech approaches should consider. In response to the challenge, the researcher created Offline-Online Submission and Assessment System (OSAS) chatbot employed in the Messenger app with features on submission and assessment strategy used in Earth and Life Science core subject where both offline and online can access. The 170 participants were among the selected grade 11 senior high school learners exposed to OSAS chatbot for 6-Week. The 15-item OSAS Usability Scale was assessed, while the 3-item Open-ended Questions to analyze the learners' personal experiences made the study a mixed-method. The result of OSAS's 15-item Usability Scale in terms of (1) Convenience, (2) Applicability, (3) Accessibility, (4) Organization, and (5) Satisfaction were with all high-level interpretations. Besides, the 3-item Open-ended Questions focused on learners' experience revealed the OSAS advantages, such as Accessibility even with a low internet connection, Ease of assessment, Convenience of submission, Ability to track and monitor progress, User-friendly, No stress to use, and Lower cost. On-the-other-hand two drawbacks reported poor network signals and the pressing buttons. Overall, all learners recommended OSAS due to its convenience, ability to access even offline, less hassle on internet cost, effective aid in the teaching-learning process, and ability to track their progress personally.

Keywords: submission; assessment; chatbot education; earth and life science

Introduction

The Coronavirus Disease 2019 (COVID-19) had greatly impacted the lives of many people and caused a major health crisis that brought up a domino effect all over the world including the education process that moved to distance learning. With this, the Department of Education (2020) crafted the Basic Education Learning Continuity Plan (BE-LCP) in response to the challenges brought by the pandemic and one of the primary concerns that need to be addressed in the execution of this is fairness in terms of learners' access to technology, gadgets, and household assistance as per the United Nations (2020) and UNICEF Philippines (2020) was both emphasized, and the equity should be at the center of educational interventions stating that the Low-Tech and No-Tech Approaches should not be overlooked, particularly for those with limited access to technology.

Based on the shared practices during the School-Based Inservice Training 2020, that the main problem needs to be resolved is the assessment of learning, specifically the because of a long time uploading and submitting considering the deadlines. Additionally, in terms of submitting outputs in google drive and performing an retrieval of learners' outputs. In connection to this, the following strategies were shared during the said Inset and its disadvantages that resulted in the conduct of this study, (1) using a Facebook group where learners upload their work in the comment section but can be visible to all learners and could lead to cheating because of lack of data privacy; (2) learners send their work directly to the teacher's messenger account, but this does not provide an organized set of class submission and could lead to a flood of messages, and (3) utilizing of Google Forms to take quizzes and Google Drive to submit activities, however, this is inconvenient for those learners who have no/limited access to the internet, and as for submitting through Google Drive, other learners would be able to read and delete files of other's submission. Moreover, based on the learners' answers during the conducted pre-interview by the researchers about learners' experiences in terms of taking quizzes and submitting outputs in the previous school year 2020-2021, most of them stated that they've experienced the problem of having no/limited internet connection that affects them negatively and triggers their anxiety and stress online quiz that both require strong internet, their slow internet connection causes their delays and most of them stated that these ways of assessment are inconvenient and

costly, especially for those who underwent financial problems brought by the pandemic.

In the Philippines, Earth and Life Science is one of the core science subjects in Senior High School (DepEd, 2016). This learning area focuses on the study of general background of Earth Science and Biology. For Earth Science lessons, it includes the history of Earth's geological time scale, the Earth's structure and process, and the earth's natural hazards while for Biology lessons, it includes the basic principles in life science that covers life processes, cellular, organisms, population, and the ecosystem levels (DepEd, 2016). Hence, in spite of the pandemic crisis, the necessity to promote earth and life science education. Funa et al. (2021) cited that the lack of access that supports learning and the slow internet connection led students having difficulty in biology topics. Recent studies reported the practices and challenges in assessment and submission during this distance learning, Calixto et. al. (2021) said that poor internet connection causes a decrease in learners' motivation in learning as Rotas and Cahapay (2020) revealed that the major difficulty of Filipino learners in remote learning is their unstable internet connectivity that results in demotivation on accomplishing activities. Usually, teachers retrieved modules once or twice a month, the parents submit their son's and daughter's module at the designated drop-off points every Saturday, similar to many schools all over the country. Unfortunately, it was reported that most parents and guardians were not following the schedule of retrieval of outputs, making the teachers keep back and forth to the school and/or to the drop-off points just to face the parents and take the outputs (Melorin, n.d.). Also, teachers often receive incomplete output ("Feedback about challenges in distribution and retrieval of module" (n.d.).

Finally, the researchers are motivated enough that we've created an Offline-Online Submission and Assessment System (OSAS) chatbot as an e-tool for retrieving learners' output during this distance learning similar to the Tulong Eskwela Messenger Classroom created by AHA Learning Center (2020), which can be accessed by learners even in a Free Data featured by Facebook Messenger.

Offline-Online Submission and Assessment System (OSAS) chatbot

OSAS chatbot is a digital assistant or artificial conversation entity with specific features for retrieval of learners' output. This chatbot is employed in the Facebook messenger app. It is a free mobile messaging app used for instant messaging, sharing videos, audios, recordings, and group chats without incurring data charges and its ability to interact with users on the use of bot platforms launched in 2016 ("Messenger software," 2022). The term 'Offline' or offline internet means providing access without connection (International Federation of Library Associations and Institutions (IFLA, 2018); or in a free data mode . The system architecture of the OSAS chatbot was shown in *Figure 1 OSAS chatbot Architecture*. The learner will access the OSAS chatbot using the messenger link given by the teacher. The Facebook messenger will then connect the learner to the chatbot powered by Chatrace. Through conversational flow shown in *Figure 2 Conversational flow of OSAS workflow*, the chatbot will communicate with the learner, and vice versa to perform an assessment and/or to submit output. Finally, the teacher will have access to the learner's assessment scores and submitted outputs via a Google sheet database (E-class record).

Figure 1. OSAS chatbot Architecture

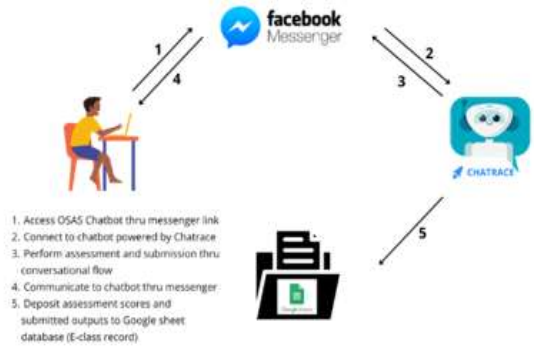
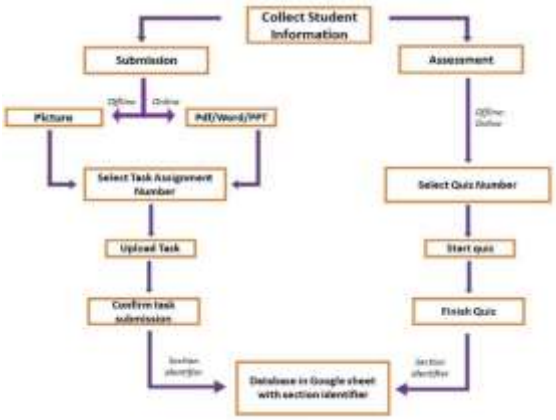


Figure 2. Conversational flow of OSAS workflow



Objectives

The main innovation, intervention, and strategies to contribute to the teaching-learning process are as follows:

- Created Offline-Online Submission and Assessment System (OSAS) chatbot on retrieval of learners' outputs during distance learning;
- The usability of the OSAS chatbot serving as an e-tool was assessed in the context of subjective and objective perspectives;
- Perform an automated database using google sheet in storing submitted task outputs and scores of quizzes; and
- Crafted low-tech approach but an interactive way for learners where they do not need strong internet connectivity to submit task activities and answer assessments.

Research questions

Specifically, the researchers investigated the following research questions:

1. What is the usability level of the Offline-Online Submission and Assessment System (OSAS) chatbot as an E-Tool on Retrieval of Learners' Outputs during Distance Learning in terms of:
1.1. Convenience,
1.2. Chatbot Applicability,
1.3. Accessibility,
1.4. Organization, and
1.5. Satisfaction?

2. What was the feedback from the learners who underwent the Offline-Online Submission and Assessment System (OSAS) chatbot in terms of retrieval of outputs during distance learning in terms of:
2.1 advantages, and
2.2. disadvantages

Method

Participants and/or other Sources of Data and Information

The study conducted at San Lorenzo Ruiz Senior High School was conveniently and purposively conducted on four sections of Grade 11 students, namely 11-HUMSS C, 11-HUMSS D, 11-ICT A, and 11-COOKERY C. The participants were heterogeneous learning modalities consisting of Blended, Text-based, and Modular students that were deemed more appropriate for the study.

Instrument Used

The instrument of this study was a Post-test Usability Evaluation questionnaire. The first part was the five-point Likert scale was used to measure the Usability level of the OSAS chatbot platform consisting of the five variables, namely (1) convenience, (2) chatbot applicability, (3) data/internet accessibility, (4) organization, and (5) satisfaction and the second part was the structured Open-ended interview questions were used to explore feedbacks of the students. This instrument underwent content validation, such as literature reviews adapted from Liu et. al. (2019), Osorio (2021), and Chao et. al. (2020), and by expert fields, and an expert panel in chatbot education.

Data Gathering Methods

The researchers obtained the letter of approval for the permit to conduct the study from the Office of Schools Division of Pasig and the school's principal. Pre-activity interview questions were made for the development of OSAS design and evaluation tool instrumentation. The instruments underwent expert validation. The researcher gathered the participants via the Zoom app for Orientation on the use of the Offline-Online Submission and Assessment System (OSAS) chatbot. The Offline-Online Submission and Assessment System (OSAS) Design chat was conducted for eight weeks covering the 1st Quarter of the first semester. During the 6-weeks intervention, the researchers recorded observations and reflections. After the intervention, the post-evaluation and interview questions were administered.

Research design process

Plan-Do-Study-Act (PDSA) process was used as the Action Research design of this study. The ***'Plan***' phase includes a pre-activity assessment survey on Students experienced in terms of Assessment and Submission during Distance Learning as the basis used for the development of the study. The ***'Do'*** phase was the implementation of the OSAS. The researchers have documented observations for secondary sources of data. After which was the ***'Study'*** phase using the Post-test Usability Evaluation Instrument and an Open-ended question interview. The Post-test Usability evaluations were analyzed using descriptive statistical tools. Then, findings and recommendations were cross-referenced with the relevant literature. On the other hand, the open-ended interview questions were analyzed using qualitative content analysis in which the researcher reads the transcript and scrutinizes them closely in identifying significant concepts and patterns from a careful reading of data (White & Marsh, 2006). The ***'Act'*** phase was the evaluation of the OSAS chatbot with careful analysis based on the findings discussed in the next section. The researchers also aimed to enhance and improve the OSAS especially based on the students' feedback specified in the *3.2.2 disadvantage.* Also, the researchers plan to add 'lesson delivery' in the OSAS features as the best factor to increase academic achievement.

Results And Discussion

Usability of OSAS

The presentation of the findings followed the sequence of the research questions namely 1) usability level of OSAS chatbot respectively to convenience, applicability, accessibility, organization, and satisfaction.

Table 1. Usability of OSAS in terms of Convenience

STATEMENT	MEAN	SD	REMARKS
1. I find the OSAS chatbot is easy to use.	4.24	1.06	Agree

2. I do not need to download an external application to use OSAS.	4.37	1.10	Agree
3. I can answer quizzes and submit task assignments using OSAS whenever needed.	4.43	1.00	Agree
Grand Mean	4.35	1.05	Agree
Interpretation		High	

It can be seen that the student-respondents agree that the OSAS chatbot is easy to use (M=4.24, SD=1.06), does not require them to download external applications (M=4.37, SD=1.10), and can be used whenever needed (M=4.43, 1.00). This implied that the OSAS chatbot is convenient to use for its design purpose.

Table 2. Usability of OSAS in terms of Chatbot Applicability

STATEMENT	MEAN	SD	REMARKS
4. I can use the OSAS chatbot via any device using FB Messenger.	4.56	0.86	Strongly Agree
5. I found out that the various functions in the OSAS chatbot are well-integrated.	4.37	0.86	Agree
6. I do not need technical skills or proficiency in using the OSAS chatbot.	4.27	1.06	Agree
Grand Mean	4.40	0.93	Agree
Interpretation		High	

The student-respondents strongly agree that the OSAS chatbot can be used via any device using FB Messenger (M=4.56, SD=0.86). It can also be seen that the student-respondents agree that the various function in the OSAS chatbot is well-integrated (M=4.37, SD=0.86) and does not need technical skills and proficiency (M=4.47, 1.06).

Table 3. Usability of OSAS in terms of Internet Accessibility

STATEMENT	MEAN	SD	REMARKS
7. I can take quizzes with or without a data/internet subscription with FB Messenger using the OSAS chatbot.	4.14	1.16	Agree
8. I can submit task activities with or without a data/internet subscription.	4.06	1.17	Agree
9. I can use the OSAS chatbot with or without a data/internet subscription.	3.99	1.16	Agree
Grand Mean	4.06	1.16	Agree
Interpretation		High	

This means that this submission and assessment system can still be properly used regardless of the strength of the data/ internet connection. The student-respondents agree that they can take quizzes, submit tasks, and use the OSAS chatbot with or without a data/internet subscription with FB Messenger (M=4.14, SD=1.16), (M=4.06, SD=1.17), (M=3.99, SD=1.16). This implied that the OSAS chatbot is accessible online (with data/internet subscription) and even offline (without load data/internet subscription).

Table 4. Usability of OSAS in terms of Organization

STATEMENT	MEAN	SD	REMARKS
10. Communicating with the OSAS chatbot is clear and easy to understand.	4.19	1.04	Agree
11. As a learner, the organization of the content of the OSAS chatbot including its features is interesting.	4.3	0.99	Agree
12. The prompt and instruction found in the OSAS are interactive.	4.21	0.99	Agree
Grand Mean	4.23	1.01	Agree
Interpretation		High	

This implied that the instructions and features of the OSAS chatbot are organized. This result is similar to what was stated in the study of Shukla V., & Verma, A., (2019), the usage of Chatbot in the learning management system can

just be done through the natural language generation and intelligent process automation on question answer, assessment, search assistant and teaching. Its features had also helped to resolve the problems/answers queries more quickly, act in a synchronized manner among all devices, and keep a record of communications.

Table 5. Usability of OSAS in terms of Satisfaction

STATEMENT	MEAN	SD	REMARKS
13. The OSAS chatbot provides a fun, interesting, and innovative way of assessing learning.	4.18	0.99	Agree
14. The OSAS chatbot is effective when used as a submission and quiz system e-tool during distance learning.	4.46	0.87	Agree
15. Overall, I would rate the user-friendliness of the OSAS chatbot.	4.38	0.90	Agree
Grand Mean	4.34	0.92	Agree
Interpretation		High	

The student-respondents agree that the OSAS chatbot provides a fun, interesting, and innovative way of assessing learning (M=4.18, SD=0.99), which is effective when used as a submission and quiz system e-tool during distance learning (M=4.46, SD=0.87) and user-friendly (M=4.38, SD=0.90). This implied that the student-respondents were satisfied with using the OSAS chatbot as a submission and assessment e-tool during distance learning.

Personal experiences

Advantages

Category 1: Accessible even with no internet connection. The most recurring advantage experienced by the students using the OSAS chatbot was the accessibility even with no internet connection. A student stated, “I can use it even though I don't have internet or data. Because sometimes our internet is not working properly.” A student also wrote, “The advantage of OSAS is we, students, can submit our assignments without load or Wi-Fi, we can use our free data to pass the said outputs.”Category 2: Ease of performing the assessment. Another was that the students can perform a quiz even with no internet connection. A student said, “If we have a quiz, I don't have a problem because I can still use it.” A student also wrote, “I'm amazed at how OSAS can collect data and answers and tell your scores immediately”. On the other hand, the student revealed that the quiz placed in the OSAS was good. A student said, “The quizzes are perfectly shown to the chatbox”. Furthermore, the given questions in OSAS during the assessment were good and responded well. A student stated, “OSAS is kind of okay because all the questions are typed right, and the options don't have any flaws”.

Category 3: Ease of submission. Using OSAS, it was easy to access and submit outputs. A student stated, “Based on my experience, using the OSAS is easy, to pass the outputs that we need to submit.” Students did not experience complicated procedures using the OSAS. A student stated, “When submitting my tasks or taking the quizzes there's no any complicated procedure.” Another advantage in terms of submission was that students could send outputs even with no internet. A student stated, “Madali itong gamitin, naipapass ko ang aking aktibidad ng hindi na kailangan pa ng data load o wifi. (It’s easy to use. I can still submit my activities without the need for data load o wifi.)”

Category 4: Track and monitor progress. While online learning can be a demotivating factor to accomplish activities because of unstable internet and limited internet data (Sari, 2020), however, OSAS chatbot can track and monitor progress. This will help students be able to keep on track even they do not have an internet connection. A student wrote, “Napadali at natulungan ako neto kung ano bang kulang ko at kahit anong oras pwede mong balikan para malaman kung ano ang kulang. (It helps me to trace easily my progress of work, especially my incomplete activities that can access anytime.)”

Category 5: User-friendly. Furthermore, the students expressed the user-friendliness of the OSAS chatbot. A student stated, “Napapadali lahat ng gawain dahil detalyado niya itong sinasabe at automatic. (It makes the students’ work easier because of its detailed instruction, also it is automatic.)” A student also mentioned that it is a better app compared to other apps used in submission.

Category 6: Less stress. The students likewise expressed advantages in OSAS chatbot for distance learning because it is less stressful and no hassle while it is more efficient when it comes to assessment and submission. A student stated, “Mas napapadali nito ang mga gawain or ang pag pasa walang hustle. (It makes the student’s work easier and in terms of submission, there’s no hustle.)”.

Disadvantages

Category 1: Network signal. The majority of the students said that there is no disadvantage to using OSAS in terms

of submission and assessment but rather expressed the positive side of it. However, few students reported on network signal issues that one must have a network signal so that Free Data will work. A student stated, "Based on my experience, there's a possibility of it not functioning if you don't have a signal in your sim card using Globe, TNT, or another network."

Category 2: Pressing chat buttons. Another reported disadvantage of the use of OSAS was the pressing of chat buttons. For instance, the student stated, "Sometimes when I made a mistake accidentally while taking a quiz or a test, I can't go back to the quiz and correct my answer." It should be noted that the OSAS chatbot has a pre-identified button that will respond automatically using the pre-identified text. When students mistakenly press the wrong button, it will go to the wrong pre-identified response as well.

Conclusion

Based on the findings of the study and the conclusion drawn, the following reflections were noted:

The use of the Offline-Online and Submission and Assessment System (OSAS) was highly suggested as one a strategic e-tool in collecting and tracking learners' outputs and taking quizzes, especially the OSAS usability level revealed high remarks of its convenient used, applicability, accessibility, organization, and satisfaction level. Furthermore, feedback from students who underwent OSAS expressed its advantages that OSAS was accessible even with no internet connection, easy in taking quizzes and submitting task activities, they can track and monitor their progress, user-friendly, less stress, lower cost on internet subscription, however, noted also its disadvantages in terms of network signals that even OSAS is accessible without internet but having slow network signal can affect its applicability, and few students cited their issues in pressing chat buttons.

Even the study concluded that the OSAS chatbot has significant results, the researchers still recommend that the OSAS chatbot specifically its features for evaluation and submission should be continuously improved to the maximum and enhanced for further significant studies. Additional features and technical improvements can also be added to the OSAS chatbot specifically to address the above-mentioned disadvantage which is the problem with pressing buttons. Parallel studies must be conducted for further comparison to evaluate and assess the result of this study.

References

AHA Learning Center (2020). *Tulong Eskwela Teacher's Guide.* Retrieved from: https://www.ahalearningcenter.com/tulong-eskwela

Calixto, D.C., Manalao, F.K., & Peralta, R., (2021) Formative assessment in online distance learning modality through the lens of Mathematics and Science Teachers. *International Multidisciplinary Research Journal*, 3 (2).

Chao, C., Lin, C.,Liu, C., Ou, Y., Wang, W., & Wu, E.H. (2020) *Advantages and Constraints of a Hybrid Model K-12 E-Learning Assistant Chatbot.* IEEE access. DOI 10.1109/ACCESS.2020.2988252,

Department of Education (2016). K to 12 Senior High School Core Curriculum – Earth and Life Science August 2016. Retrieved from https://www.deped.gov.ph/wp-content/uploads/2019/01/SHS-Core_Earth-and-Life-Science-CG_with-tagged-sci-equipment.pdf

Department of Education (2020). *Learning Opportunities Shall Be Available: The Basic Education Learning Continuity Plan in the Time of COVID-19.* Retrieved from: https://www.deped.gov.ph/wp-content/uploads/2020/07/DepEd_LCP_July3.pdf

Feedback about challenges in distribution and retrieval (n.d.). CourseHero.com. https://www.coursehero.com/file/74815844/Feedbackdocx/

International Federation of Library Associations and Institutions (2018). Retrieved from: https://www.ifla.org/news/offline-internet-providing-access-without-a-connection/

Liu, Q., Huang, J., Wu, L., Zhu, K., & Ba, S., (2019). *CBET: design and evaluation of a domain-specific chatbot for mobile learning*. Universal Access in the Information Society (2020) 19:655–673 https://doi.org/10.1007/s10209-019-00666-x

Melorin, M. (n.d.). *Module Distribution and Retrieval: A Challenge*. Schools Division Office San Juan City. https://www.depedsanjuancity.ph/single-post/module-distribution-and-retrieval-a-challenge

Messenger software. (2022) In Wikipedia. https://en.wikipedia.org/wiki/Messenger_(software)#:~:text=Freeware%2C%20proprietary-,Website,supports%20voice%20and%20video%20calling.

Osorio, J.C. (2021). *AN INTERACTIVE PEDAGOGICAL ASSESSMENT TOOL USING MESSENGER CHATBOT IN LEARNING DELIVERY*. EPRA International Journal of Research and Development, 6 (7) https://doi.org/10.36713/epra2016

Shukla V., & Verma, A., (2019) Enhancing LMS Experience through AIML Base and Retrieval Base Chatbot using R Language. International Conference on Automation, Computational and Technology Management (ICACTM). Amity University Dubai, UAE. Retrieved from https://sci-hub.st/10.1109/ICACTM.2019.8776684

Rotas, E., & Cahapay, M. (2020). *Difficulties in Remote Learning: Voices of Philippine University*

Students in the Wake of COVID-19 Crisis. Asian Journal Distance Education, 15 (2).

Funa, Aaron and Talaue, Frederick, Constructivist Learning Amid the COVID-19 Pandemic: Investigating Students' Perceptions of Biology Self-Learning Modules (March 2021). International Journal of Learning, Teaching and Educational Research, Vol. 20, No. 3, pp. 250-264, March 2021, Available at SSRN: https://ssrn.com/abstract=3868748

UNICEF Philippines (2020*). Statement Attributable to Ms. Oyunsaikhan Dendevnorov, Country Representative, UNICEF Philippines Press Release October 2, 2020*

United Nations (2020). *Policy Brief: Education During COVID-19 and Beyond*.

White, M.D., & Marsh, E.E. (2006*). Content Analysis: A Flexible Methodology. Library Trends,* 55(1), 22–45. doi:10.1353/lib.2006.0053