

CSSH and CNSM Community Involvement at Barangay Fatima North District ALS Learners: An Impact Assessment

Argene L. Arsenal, PhD and Fryan Allen M. Subong, MSc

College of Agriculture, Mindanao State University - General Santos

DOI: <https://dx.doi.org/10.47772/IJRISS.2025.903SEDU0720>

Received: 12 November 2025; Accepted: 18 November 2025; Published: 05 December 2025

ABSTRACT

This paper attempts to evaluate the impact of the CSSH and CNSM Community Involvement at Barangay Fatima North District ALS Learners extension project. This project aimed at assisting ALS learners including recruitment and enrolment. The project was implemented at Brgy. Fatima, General Santos City from 2015 to 2018, with a total of more or less 200 learners served. A qualitative study was conducted to determine the impact of the project, with data gathered using Key Informant Interview (FGD) and Focus Group Discussion (FGD). Respondents of the study involved three (3) ALS Student-participants of the program and three (3) ALS Teachers who were selected purposively. These participants had an active participation in the implementation of the project. The paper highlighted the success story of one participant who was able to obtain a college diploma and eventually became an ALS Teacher. Using the OECD DAC Network on Development Evaluation (EvalNet) Five Criteria of Evaluation, results revealed that the project was able to have a significant impact on the teachers, learners, and the community. However, problems with the adequacy of resources and sustained interest of the learners were found. These problems were manifested by the lack of resources such as buildings and supplies used for instruction activities, and the number of learners who completed the program. Hence, it is recommended to continue coordination and partnership with stakeholders for information dissemination to inform, inspire, and educate without any form of discrimination as well as sustain best practices in incorporating strategies like substantial and subsistence activity. Giving recognition is also vital in the form of awards and rewards to ignite and sustain their interests.

Keywords: Impact assessment, extension project, ALS Education, ALS Program

INTRODUCTION

The desire to uplift living conditions through education is the vision that every Filipino family has ever dreamed of. The greater premium to education in a globalized world provides the impetus for inclusive and accessible education for all. To make a toll difference as to the thought of making means to set aside difficulty in living a life or leaving for life.

The 1987 Philippine Constitution provides for the recognition and promotion of other forms of education other than formal education. Article XIV, Section 2, Paragraph (1) declares that the State shall establish, maintain, and support a complete, adequate, and integrated system of education relevant to the needs of the people and society; and paragraph (4) concisely encourages non-formal, informal and indigenous learning systems as well as self-learning, independent and out-of-school study programs particularly those that respond to community needs.

This is the only form of awakening, empowering, and transforming into a more life-reliant, productive, responsible, humane, and upright individual who can fuel the attributes of the betterment of every individual, family, community, and country.

The Governance Act for Basic Education otherwise known as the Republic Act 9155 stipulates the establishment of an Alternative Learning System (ALS) to provide out-of-school children, youth, and adult populations with basic education.

According to the Bureau of Alternative Learning System (BALS), ALS's vision is to “empower the Filipino with desirable traits, knowledge, attitudes, values and skills that will enable to think critically and creatively, act innovatively and humanely in improving the quality of life and the family, community, and country.

The Alternative Learning System (ALS) is in utmost consideration among the learning initiatives in the Philippines that provide a doable option to aid and provide second chances to those who missed the existing formal instruction.

The education system in the Philippines possessed problems and challenges in both formal and informal education. These are of equal importance for they are both essential in nation-building without compromising the same opportunity, especially those who needed second chances in several circumstances and time. By this chance in time, there are rapid and unprecedented constraints and crises in education that has an eventual shift from traditional to conventional up to online education.

Another challenge is that educational resources are inadequate and do not meet the needs of the students and teachers must outsource learning materials for them. Teachers are obliged to conduct home visitation and investigation with students concerning working adults who supported their families, as well as student-learners on their delinquencies that belong to out-of-school children and youth.

In the Alternative Learning System (ALS), learning takes on a new level. Teachers visit locations where they interact with their students, out-of-school youth, and adults, who are not currently enrolled in school and who, for various reasons, have been unable to complete their education. To get to places, teachers must walk for hours, swim across rivers, and climb hills and mountains. Some even make multi-day trips just to reach these areas. No wonder they were called mobile teachers.

This assessment elicits data from various sources to delve with a report on the impact of a conducted extension works as a supplemental aid in making education available to all. It is an initiative towards highlighting specific practices and experiences to be documented mainly for the development and creation of better understanding in taking non-formal education as a living hope to those who feel that time has already gone as to being successful in life. This initiative is done on a real-life basis that sustains, strengthens, and ensures that education is a great equalizer amidst a very demanding and extremely competitive environment brought by globalization.

This study aimed to evaluate the impact of the CSSH and CNSM Community Involvement at Barangay Fatima North District ALS Learners. It aimed to evaluate the program using the OECD DAC Network on Development Evaluation (EvalNet) Five Criteria of Evaluation.

REVIEW OF RELATED LITERATURE

In the ever-evolving landscape of education, the traditional classroom model has faced growing criticism for its inability to cater to the diverse needs and learning styles of students. As a result, alternative learning systems have emerged as a viable solution, offering more personalized and flexible approaches to education (Estrada et al., 2019)(Jando et al., 2017).

One such alternative is the personalized e-learning model, which shifts the focus from a one-size-fits-all approach to a more individualized learning experience. This model recognizes that students have varying preferences, paces, and abilities, and it aims to tailor the learning process to accommodate these differences (Jando et al., 2017)(Ghazali et al., 2015).

E-learning platforms have played a crucial role in the implementation of personalized learning, as they allow for greater flexibility, accessibility, and customization (Ghazali et al., 2015). Advancements in learning analytics, differentiated instruction, and adaptive learning have further enhanced the capabilities of personalized e-learning, enabling educators to better understand and cater to the unique needs of each student (Li & Wong, 2020).

In contrast to the traditional classroom setting, personalized e-learning empowers students to take a more active role in their own learning journey. Students are given greater choice and ownership in determining the pace, content, and methods of their learning, which has been shown to improve engagement, motivation, and academic outcomes (Li & Wong, 2020) (Li & Wong, 2019).

Aside from the e-learning platforms, students in the Alternative Learning System were also favored as there were times when the modular approach was done. A modular approach in learning allows students to focus on specific skills and competencies at their own pace, which is particularly beneficial for those who may struggle with the one-size-fits-all approach of the traditional classroom (Li & Wong, 2019). It is also useful for students who have unique learning needs or those who require more flexibility in their schedules (Jando et al., 2017) (Ghazali et al., 2015).

Students have much appreciation for the Alternative Learning System. It provides them with the opportunity to tailor their educational experience to their individual needs and preferences, leading to improved learning outcomes and a greater sense of engagement and ownership in the learning process (Li & Wong, 2020) (Li & Wong, 2019).

While alternative learning systems, such as personalized e-learning and modular approaches, have shown promising results, it is important to note that the implementation and effectiveness of these systems can be influenced by various factors, including access to technology, teacher training, and institutional support (Sayed et al., 2022) (Xie et al., 2019).

Despite the numerous benefits of alternative learning systems, their implementation is not without challenges. Ensuring the availability of necessary technological infrastructure, providing adequate teacher training, and addressing issues of equity and access are some of the key considerations that must be addressed to ensure the successful adoption of these innovative approaches to education (Sayed et al., 2022). There are ongoing efforts to address these challenges and further enhance the effectiveness of alternative learning systems in meeting the diverse needs of students.

One of the ways of addressing such concern involves the participation of various stakeholders to which the school belongs. One related study is the Pedagogical Approaches in Adaptive E-learning Systems which examines the different pedagogical approaches in distance education such as micro-conforming methods, macro accommodative approaches, and personalized adaptive learning (Al-Chalabi & Hussein, 2020). The study highlights the importance of putting the interests of students at the heart of the e-learning platform design, which not only enhances student performance but also fosters an interactive learning environment with various stakeholders.

A related study was also published by (Graf et al., 2014) which investigated the effectiveness of an advanced adaptive mechanism that extends Learning Management Systems (LMSs) with adaptive functionality to automatically provide students with courses that fit their learning styles and preferences (Younes, 2021). The study found that such adaptive AI-enabled e-learning systems can potentially improve learning outcomes, especially during the COVID-19 pandemic when face-to-face learning was limited.

Stakeholders like teachers can also play a crucial role in the successful implementation of alternative learning systems. A study of Artificial Intelligence Techniques Employed for Adaptive Educational Systems within E-

Learning highlights that teachers need to be able to accurately evaluate students' competencies, interests, and motivation levels to tailor the learning process accordingly

As the education landscape continues to evolve, alternative learning systems, such as personalized e-learning and modular approaches, have emerged as promising solutions to address the limitations of traditional classroom instruction. By tailoring the learning experience to the unique needs and preferences of each student, these alternative systems have the potential to improve engagement, motivation, and academic outcomes.

METHODOLOGY

Locale and Respondents

This study was conducted in Brgy. Fatima, General Santos City. It was conducted from June 15 to July 15, 2024.

Sampling of Respondents

Respondents of this paper were chosen purposively. In the Key Informant Interview (KII) conducted, participants included three (3) ALS Student-participants of the program and three (3) ALS Teachers who also participated in the program. All of the participants identified had active participation during the implementation of the program. In the Focus-Group Discussion (FGD) conducted, the same set of participants participated. The FGD was conducted to verify the results gathered from the KII.

Method of Data Gathering

Data needed for this paper were gathered through a Key Informant Interview (KII) and Focus Group Discussion (FGD). All participants interviewed in the KII were the same people who participated in the FGD. Data gathered

Methods of Data Analysis

Data gathered were recorded and analyzed. The analysis of the data gathered was anchored on the OECD DAC Network on Development Evaluation (EvalNet) Five Criteria of Evaluation. This includes relevance, effectiveness, efficiency, impact, and sustainability. These criteria provide a normative framework used to determine the merit or worth of an intervention (policy, strategy, program, project, or activity). They serve as the basis upon which evaluative judgments are made (Sivagnanasothy, n.d.).

Theory of Change

This theory of change posits that providing comprehensive support to ALS learners can empower them to achieve their full potential and contribute meaningfully to society. The core of this support lies in addressing the multifaceted challenges they face, including academic gaps, socioeconomic barriers, and limited access to resources. By providing tailored academic support, such as individualized learning plans, bridging programs, and skilled tutors, ALS learners can overcome learning obstacles and gain the confidence to succeed academically.

Furthermore, recognizing that educational attainment is intertwined with socioeconomic well-being, this theory emphasizes the importance of addressing the social and economic factors that hinder ALS learners' progress. This includes providing financial assistance, career counseling, and linking learners with social support networks. By alleviating financial burdens and equipping learners with essential life skills, they can focus on their education and pursue sustainable livelihoods.

Ultimately, this theory of change envisions a future where ALS learners are not defined by their past educational experiences but are empowered to create a brighter future for themselves and their communities.

By investing in their holistic development, we can foster a more inclusive and equitable society where everyone has the opportunity to thrive.

RESULTS AND DISCUSSION

CSSH and CNSM Community Involvement at Barangay Fatima North District ALS Learners

The *CSSH and CNSM Community Involvement at Barangay Fatima North District ALS Learners* is a three-year extension project of the Department of History, Mindanao State University – General Santos City in partnership with the Department of Education – ALS and LGU of Barangay Fatima. It started in June 2015 and concluded in 2018. This extension project focused on identifying the educational needs of the Out of School Children (OSC), Out of School Youth (OSY), and adult learners in the community of Barangay Fatima. This recruited and empowered OSC, OSY, and adult learners in the A&E Program through the conduct of bridging and review classes. It also looked into the statuses of the Batch 2016 passers of A&E both in the Elementary and Secondary Levels. Lastly, this project gave strength and enhancement to the extension program of the History Department.

This extension project of the History Department of MSU-GSC was undertaken to respond to the educational needs of the OSC, OSY, and adult learners in Barangay Fatima in collaboration with the DepEd ALS of North District Fatima and LGU – Barangay Fatima. It is a three-year project from June 2015 - 2018. The History Department conducted and supervised bridging classes to ALS students and coordinated with the ALS office in various activities affecting ALS learners. The department also monitored and evaluated the performances of the learners throughout the program. Whilst the ALS office helped in providing the list of learners and other pertinent documents needed to the success of the program, and cooperated with the department in planning activities in line with the program. Most of this was funded through the general appropriations for the University in terms of Extension services.

From 2016 to 2018, the department served more or less 200 ALS Learners. In the conduct of the 2017 ALS Accreditation & Equivalency (A&E) Exam in Barangay Fatima, General Santos City, data from Basense (2019) presented a total of sixty (60) 2017 ALS A&E Passers – 11 of which passed the Elementary Level, and 49 in the Secondary Level.

General Implementation of the Project

The process flow below shows the delivery of the targets in a span that includes planning during the pre-implementation phase, implementation phase, and post implementation phase that involves monitoring and evaluation of the History Department's Extension Program for CSSH and CNSM Community Involvement at Barangay Fatima North District ALS learners. In the planning phase, the initiative started with an initial meeting with DepEd ALS Fatima District Coordinator and History Department dated August 12, 2015, followed by Multi-Stakeholders Consultation by determining the needs of the beneficiaries (OSC, OSY, and Adult Learners). Benchmarking survey on the problems, needs, and resources of the beneficiaries before MOU signing with the collaborators DepEd ALS and LGU-Fatima.

The implementation and monitoring of the extension program, it all boils out through the recruitment of learners (OSC, OSY, Adult learners) followed by conducting of supplementary bridging and conducting of review classes for the learners that took the accreditation and equivalency test as a requirement for the learners to qualify for the next level. There was also a culmination activity of review classes before conferment and attended the moving-up ceremony conducted by DepEd ALS North Fatima District and LGU Fatima. Continuous benchmarking and assessment of problems encountered, other needs, and difficulty as well as leveraging with the provision of the required resources.

The final stage of the project was evaluation, where generated reports from the field by the BA History students as recruiters were consolidated, analyzed, and evaluated. Then data were subject to further assessment to conduct tracer studies on all the ALS A & E passers.

CSSH and CNSM Community Involvement at Barangay Fatima North District ALS Learners

The diagram illustrates the process of planning, implementing, monitoring, and evaluating the History Department's Extension program for CSSH and CNSM Community Involvement at Barangay Fatima North District ALS Learners. It includes steps such as:

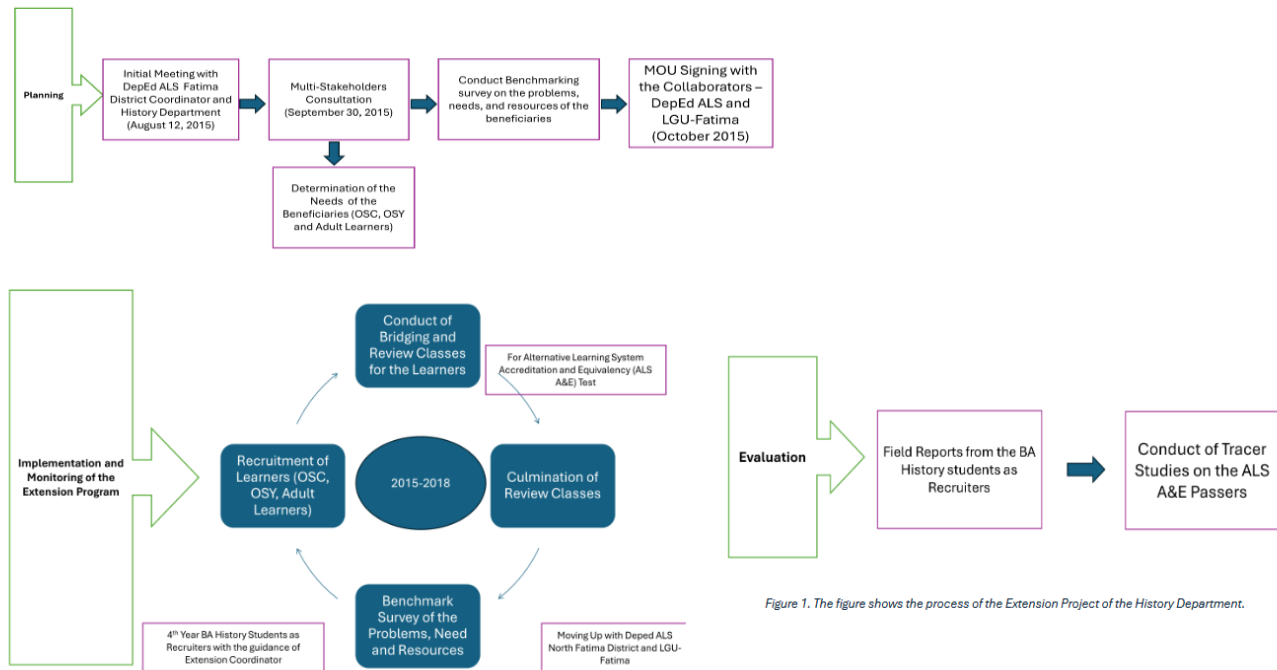


Figure 1. The figure shows the process of the Extension Project of the History Department.

Figure 1. Implementation Process

The Program Evaluation

This paper used guidelines from the Organization for Economic Co-operation and Development to evaluate the effectiveness of the *CSSH and CNSM Community Involvement at Barangay Fatima North District ALS Learners*. These guidelines provide a thorough way to assess the program's impact, looking beyond just merely implementing the project. By using the OECD's criteria, decision-makers can gain a complete understanding of the program's success. This includes how it helps ALS learners and teachers, but also how it positively influences the economy, society, and the environment, ultimately contributing to a stronger and more successful society. The OECD framework focuses on whether the program is needed, if it works well, if it's a good use of resources, its long-term effects, and if it can continue in the future.

Relevance

Relevance of the project refers to the extent to which the intervention objectives and design respond to beneficiaries, global, country, and partner/institution needs, policies, and priorities, and continue to do so if circumstances change. The objectives of the said program were to socially empower the students enrolled in the A and E program, recruit more students for the ALS, and assist and provide assistance in the conduct of the SASE-MSU review classes to the enrolled participants. According to the data gathered, the conduct of this project greatly helped the ALS program to reach other Out-of-School Youth (OSY) and Out-of-School Children (OSC) to be part of the program. According to the data, from 2016 to 2018, the department has served more or less 200 ALS Learners. As one of the participants shared:

"We thanked Ma'am Elma before because we, along with other MSUans (students of Mindanao State University), went into the community, house to house, to bring the students here. These were our 2018 learners – those who had been caught (possibly by authorities), loiterers, and those who carried icepicks. MSU's help was significant at that time."

-Evangeline Arubo, ALS Teacher

The passion of the teachers together with the willingness of the faculty and students of the CSSH and CNSM were significant to the success of the program. Feeling the impact of the project by evidently reducing OSY and OSC is critical in improving societal conditions. Furthermore, data also shows that a total notable increase in enrollees is evident from 30 learners in 2016 to 70 ALS recruits in 2018. In 2017, 60 learners were also able to pass the A&E Exam, 11 of which passed the Elementary Level, while 49 passed the Secondary Level.

Effectiveness

Effectiveness is the extent to which the intervention achieved or is expected to achieve its objectives, and its results, including any differential results across groups. One of the participants of the said project was Erma Mae G. Hormachuelas. She used to be part of the ALS Learners in their time. Being inspired by the motivation and encouragement of her teachers from ALS and the implementers of this project, she proceeded to tertiary education where she enrolled in the education program. In 2017, she took the Licensure Examination for Teachers (2017) and passed the said examination. As of the moment, she worked as an ALS Teacher where she was able to share her experiences and struggles, which she believed could motivate other learners. As she shared:

“As a former ALS learner myself, I also wanted to share my knowledge, the things I've learned, with the current ALS learners. That's why I decided to apply for a position with ALS. Now, I'm an ALS facilitator, specifically in ALS INFED. I really want to share with them the knowledge I've gained. Whatever you set your mind to, whatever you can reach for, you can achieve. Don't stop where you are, keep dreaming.”

- Erma Mae G. Hormachuelas,

ALS Student now ALS Teacher

The value she learned from the program, and the motivations she received from being exposed to the said activities encouraged her to believe in herself and pursue higher education. Ms. Hormachuelas is a living manifestation that everyone can be successful regardless of the time. Her experience in the ALS program and the extension projects broaden her perspective in life. Even after graduation, she still wanted to influence others by being a living proof of perseverance, determination, and fortitude.

Efficiency

Efficiency is the extent to which the intervention delivers, or is likely to deliver, results in an economic and timely way. In the three years of implementation, an accomplishment of 200 (more or less) learners is way too good for an average of 63 learners per year. Sustaining the attention and interests of the OSY and OSC is challenging considering that participating in the extension project is just a supplement of their ALS participation. To make these figures more relevant, a 60-passer in the A&E examination also provides a meaningful impression. The assistance and support provided by the CSSH and CNSM towards the ALS learners helped the ALS program to achieve such a high-performance rate.

Furthermore, the CSSH and CNSM faculty had also maximized their human resources. One of their best practices was the active participation of their faculty, staff, and students. The faculty was actively involved in the conduct of remedial and review classes for ALS learners, where they were able to set a participative and healthy environment. The staff were also active participants in the implementation of the project where they provided a significant amount of assistance and support to the faculty, ALS teachers, and learners. Lastly, the graduating students of the implementing department also facilitated the recruitment and enrolment of ALS learners.

However, challenges were identified in the performance of the activities associated with the project. In terms of the physical facilities such as buildings and classrooms, participants said that they usually held classes outside under the tree. This problem is truly prevalent in the schools nowadays. They have also faced difficulties in

terms of the availability of office supplies. According to them, there was an inadequate number of school supplies that were supposed to be used in their activities. Lastly, supplies needed to work on their activities on electrical, cooking and other skill-development activities were lacking. In this case, teachers usually spend money from their pockets to supplement the available resources. As shared:

“For example, if there is a need to buy ingredients for a task, the learners will not be buying it since they do not have enough money for it. Instead, the teacher will do and provide the ingredients just for them to perform the activity. The teachers will use money from their pockets. It will also offset their honorarium from their expenses.”

-Cristyl Mae E. De Tomas, ALS Teacher

Although there was no misuse of resources in the time involved, it is evident that there were insufficient resources to support the whole activities of the project.

Lastly, the problem of sustaining the interests of the ALS learners was also raised to be a major challenge in the program. ALS learners being adults and family persons, tend to develop a lesser interest as compared to the single ones. They usually spent most of their time providing food on their table. When circumstances arise when they need to choose between the ALS program and family provision, they would rather spend their time earning income. As shared by one of the participants:

“There were times when learners would not go back to school after the vacation. We, as ALS teacher, would visit them in their houses, and would find out that they need to stop because they need to spend their Saturdays for livelihood.”

-Evangeline R. Arubo, ALS Teacher

This simply shows that dealing with adult learners with different priorities is a challenging task for ALS teachers and extension project implementors.

Impact

Impact measures the significant, lasting changes - both good and bad, expected and unexpected - that happen as a result of a program or action. It looks beyond immediate outcomes to assess the broader, more profound consequences. In this project, the impact has been greatly felt by the ALS Teachers and graduates. ALS teachers felt the ease in the conduct of classes, and even in making the learners understand their lessons. Furthermore, the project also enabled them to have a greater number of ALS enrollees by increasing their recruitment and enrollees. The activity lightens the pressure on ALS teachers. According to them, they need to have at least 75 ALS enrolled to be endorsed for national pay. With the help of these extension activities, they had successfully reached the required number of enrollees. One participant shared:

“The activity had also helped the ALS teachers. Before, there used to be a lot of people just hanging around with nothing to do, but now there aren't. They've also helped us because we need 75 learners to get our national pay. We wouldn't have any learners if we just stayed here in the room. If we didn't go out into the community, we wouldn't have any learners.”

-Angelina Gallo, ALS Teacher

The project was able to hit two birds in one stone. It helped both the teachers and students under the ALS program. With this activity, all parties were able to benefit accordingly. One student-participant also said:

“The ALS program and the extension activities have really helped us, especially the community. They can go to school, and learn at the same time. Others have completed

their studies. And it helped them get a good job. The activities had really helped me, especially to my co-Blaan learners.”

-Jona D. Lumbos, Student-participant

With these statements shared by the participants, it is imperative to say that the projects conducted by the CSSH and CNSM have touched the beneficiaries. It benefited the people and the community where the participants lived.

Sustainability

Sustainability measures how well a program's positive impacts last over the long term, even after the program itself has ended or external support is reduced. In this project, the activities on recruitment among OSY and OSC were continued by the current ALS teachers. With them being able to see the future in the ALS program, they developed the passion and care towards OSC and OSY to continue their efforts in spreading the hope that the ALS program will bring. Further, with the practice of the ALS program to employ graduates produced from the said program, a sense of belongingness and accountability is fostered.

One best example is when Ms. Hermochuelas got hired and became an ALS teacher. With her being a graduate of the program, she was able to feel accountable to help other OSC and OSY to open a door for them to have a better future. According to her, she feels like she is responsible for helping other OSY and OSC by sharing her experiences, knowledge, and wisdom to help them realize that there are still opportunities that await them. As they fondly say, it is better late than never. Putting it in the context of ALS education, going to ALS at a later age is way better than having no education at all.

CONCLUSION

With the foregoing findings and discussion, it can be inferred that the CSSH and CNSM Community Involvement at Barangay Fatima North District ALS Learners has been successful in giving felt change to the community. Using the OECD DAC Network on Development Evaluation (EvalNet) Five Criteria of Evaluation, results show that the project was able to contribute significant impact to the teachers, ALS learners, and to the community. However, problems with the availability of resources were evident as manifested by the lack of buildings and materials for instruction purposes.

RECOMMENDATIONS

Further, initiatives can be drawn out from this noble activity that provided technical expertise and dedication to make this remnant more valuable and useful in developing a viable community. Here are the recommendations for future undertakings, to wit:

1. The implementor may continue to implement the program as it will not only benefit the OSY and OSC but also provide an opportunity to be more useful in the community and minimize delinquencies among these children;
2. The implementer may coordinate with another stakeholder such as Non-government organizations (NGOs), private organizations, TESDA, DOLE, or local businesses to holistically implement and expand its linkage, thus providing better access to facilities that can be used in the teaching-learning process;
3. The implementor may develop and enhance their strategies, especially for adult learners, a subsistence activity like home/container gardening, micro-enterprise workshops to support and earn a living while schooling. Another way to ignite and sustain their interests.
4. The program may also implement recognition system (awards, certificates, public acknowledgments) and a mentorship model involving ALS alumni to boost morale, increase retention, and build a more self-sustaining ALS community;
5. Regular monitoring may also be done to ensure sustainability by encouraging mentoring among

graduates of the ALS in barangay Fatima North District. Including the giving of recognitions like awards and reward, in this way, graduates of the program will feel that they are on their way to progress; and

6. Further research will be needed to evaluate the development of these ALS learners as to their social, emotional, financial, and professional aspects.

REFERENCES

1. Al-Chalabi, H K M., & Hussein, A M A. (2020, June 1). Pedagogical Approaches in Adaptive E-learning Systems. <https://doi.org/10.1109/ecai50035.2020.9223194>
2. Estrada, C A M., Nonaka, D., Gregorio, E R., Leynes, C., Castillo, R T D., Hernandez, P M R., Hayakawa, T., & Kobayashi, J. (2019, March 29). Suicidal ideation, suicidal behaviors, and attitudes towards suicide of adolescents enrolled in the Alternative Learning System in Manila, Philippines—a mixed methods study. *BioMed Central*, 47(1). <https://doi.org/10.1186/s41182-019-0149-6>
3. Ghazali, A S M., Noor, S F M., & Saad, S. (2015, August 1). Review of personalized learning approaches and methods in an e-learning environment. <https://doi.org/10.1109/iceei.2015.7352574>
4. Graf, S., Chang, T., Kersebaum, A., Rath, T., & Kurcz, J. (2014, July 1). Investigating the Effectiveness of an Advanced Adaptive Mechanism for Considering Learning Styles in Learning Management Systems. <https://doi.org/10.1109/icalt.2014.41>
5. Jando, E., Woods, P., Hidayanto, A N., Prabowo, H., Warnars, H L H S., & Sasmoko, S. (2017, November 1). Personalized E-learning Model: A systematic literature review. <https://doi.org/10.1109/icimtech.2017.8273544>
6. Li, K C., & Wong, B T M. (2019, January 1). How Learning Has Been Personalised: A Review of Literature from 2009 to 2018. *Springer Science+Business Media*, 72-81. https://doi.org/10.1007/978-3-030-21562-0_6
7. Li, K C., & Wong, B T M. (2020, August 31). Features and trends of personalised learning: a review of journal publications from 2001 to 2018. *Taylor & Francis*, 29(2), 182-195. <https://doi.org/10.1080/10494820.2020.1811735>
8. Sayed, W S., Noeman, A M., Abdellatif, A., Abdel-Razek, M., Badawy, M G., Hamed, A., & El-Tantawy, S. (2022, June 29). AI-based adaptive personalized content presentation and exercises navigation for an effective and engaging E-learning platform. *Springer Science+Business Media*, 82(3), 3303-3333. <https://doi.org/10.1007/s11042-022-13076-8>
9. Xie, H., Chu, H., Hwang, G., & Wang, C. (2019, October 1). Trends and development in technology-enhanced adaptive/personalized learning: A systematic review of journal publications from 2007 to 2017. *Elsevier BV*, 140, 103599-103599. <https://doi.org/10.1016/j.compedu.2019.103599>
10. Younes, S S. (2021, September 16). Examining the Effectiveness of Using Adaptive AI-Enabled e-Learning during the Pandemic of COVID-19. *Hindawi Publishing Corporation*, 2021, 1-14. <https://doi.org/10.1155/2021/3928326>