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Learning Mathematics with Alternative Learning System through a Lens: A Literature Review

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Abstract The Alternative Learning System (ALS) has over 4 million enrollees from 2016 to 2021 [7]. It was established in 2004 to offer basic education opportunities to out-of-school children, youth, and adults, aiming to provide all Filipinos access to and completion of basic education tailored to their unique situations and needs. However, reports [12,19,28] indicate that ALS hasn't yielded significant results in addressing these needs, particularly in terms of students' performance in mathematics. Consequently, this study was done to conduct a systematic review and synthesis of mathematics learning among ALS students. It followed the PICo (Population, Interest, Context) framework to analyze published articles on mathematics education within the ALS context.Two prominent themes emerged to describe the individuals directly involved in ALS implementation: "the diverse backgrounds of ALS students" and "Teachers - The Heroes of the ALS program." These themes shed light on the wide-ranging backgrounds of both ALS teachers and students, highlighting the challenges they encountered due to their varied foundational skills and social backgrounds. The study also unveiled noteworthy aspects of the ALS program, summarized in themes like "Unconventional Teaching Approach" and "Limited Parental Influence."Given the diversity of student backgrounds, the challenging learning environment, and the varying qualifications of ALS teachers, it becomes imperative for educators to employ flexible and adaptive teaching strategies. Furthermore, comprehending these key themes holds significant importance in crafting effective strategies, resource materials, programs, and policies aimed at improving mathematics education for ALS students, while also recognizing the invaluable dedication of ALS teachers who play a pivotal role in their education.

Keywords: *Alternative Learning System, ALS mathematics performance, problem-solving*

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1. Introduction

Education stands as a paramount factor in nurturing the human resources essential for a nation's development across all spheres. It not only elevates individuals' quality of life but also yields widespread societal benefits. Education enhances people's productivity, fosters creativity, promotes entrepreneurship, and drives technological advancements [1]. In a broader context, education serves as a pivotal component in a nation's progress by elevating the efficiency of its workforce and propelling economies beyond manual labor and simplistic production processes [2]. Improved education leads to higher individual incomes and serves as a fundamental, though not exclusive, prerequisite for sustained economic growth [3]. Education serves as a primary driver of economic growth, employment opportunities, and income distribution. Neglecting the economic dimension of education could jeopardize future generations' prosperity, with far-reaching consequences encompassing poverty, social exclusion, and the sustainability of social security systems [4]. Furthermore, education plays a pivotal role in advancing both economic and social development while enhancing income distribution [1]. However, in the Philippines, there remain individuals who lack the opportunity to attend and complete formal basic education for various reasons. Some drop out of school, while others lack access to educational institutions in their communities. According to 2017 data from the Philippine Statistics Authority, approximately nine percent or 3.53 million of the estimated 39.2 million Filipinos aged 6 to 24 were classified as Out-of-School Youths (OSYs). Among these, 83.1 percent were individuals aged 16 to 24, 11.2 percent were aged 12 to 15, and 5.7 percent were aged six to 11 [5]. With this data, common reasons cited for not attending school among OSYs included marriage or family obligations, personal disinterest, and financial constraints associated with the high cost of education. Roughly 50 percent of OSYs belonged to families in the bottom 30 percent of the income distribution, based on per capita income [6]. The Philippine government acknowledges and promotes non-formal, informal, and

indigenous learning systems, as well as self-directed, independent, and out-of-school study programs, particularly those tailored to meet community needs (as stated in the 1987 Philippine Constitution, Article XIV, Section 2). To operationalize this recognition, the government enacted the Republic Act 9155, also known as the Governance Act for Basic Education. The Alternative Learning Program (ALP) is a new educational endeavor designed to give adults and youth who are not enrolled in school the chance to further their knowledge. With the flexible scheduling options provided by ALP, students can continue their education while juggling obligations to their families or jobs. With the materials for self-instruction provided by the program, students can learn at their own pace. To improve employment and self-sufficiency, ALP customizes its curriculum with an emphasis on life skills, practical training, and core academic courses.

. ALS serves as a parallel learning system in the Philippines, providing a practical alternative to formal instruction. ALS encompasses both non-formal and informal sources of knowledge and skills, with classes conducted at Community Learning Centers (CLCs) within the city or municipality. For those wishing to pursue ALS Accreditation and Equivalency (ALS A&E), oral and written tests assess their competency. If applicants have not previously attended formal schooling, they enroll in the Basic Literacy Program, where they learn basic reading and computing skills before advancing to more advanced classes. ALS A&E classes are categorized into learning strands, including Communication Skills (English and Filipino), Problem-Solving and Critical Thinking (Science and Mathematics), Sustainable Use of Resources and Productivity, Development of Self, A Sense of Community/Value of Collaboration, and Expanding One's World Vision [7]. ALS provides a second chance at education for marginalized learners, enabling them to secure better employment opportunities and pursue further education. The program relies on highly dedicated and multi-skilled teachers who must cater to diverse learner profiles. The teachers' competence is closely tied to students' academic achievements [8]. Research also suggests that teaching experience positively correlates with students' performance [9]. However, a study by Tan (2019) profiling the competence of ALS teachers to teach specific high school math topics found that most ALS teachers lack specialization in mathematics, possess limited teaching experience, and lack mastery of mathematical content. Consequently, the majority of ALS teachers may not be adequately prepared to teach mathematics at the high school level. Assigning experienced teachers to support struggling students may yield better performance outcomes [10]. It is suggested that the teaching workforce for ALS falls short in terms of both quantity and quality, and that teachers require enhanced, ongoing professional development to strengthen the program [11]. While ALS was created to address two primary concerns - improving functional literacy rates and increasing school participation rates - reports suggest that it has not produced significant results in meeting the needs of out-of-school youth and adults [12]. Challenges include a lack of learning materials in the field to facilitate effective modular-based learning, whether at home or during face-to-face sessions. Typical ALS learning environments, often makeshift, open-air spaces or simple structures made of materials like palm tree leaves and bamboo, may not provide a conducive setting for adult learners to focus on their studies [11]. The academic performance of ALS students in mathematics varies significantly from that of their peers in formal education settings. Aron (2006) suggests that alternative education programs may be associated with learners who are "disengaged and uninterested," potentially giving the impression of lower program quality. However, ALS operates outside the formal classroom setting and provides a more flexible and adaptable structure that accommodates the unique circumstances of its learners. Classes are often held in community learning centers, barangay halls, homes, or other accessible venues. It is designed to cater to learners with diverse circumstances and educational backgrounds, some of whom may have encountered gaps or challenges in their formal education that led to dropping out. Consequently, these students may require additional support and time to catch up with their peers, especially in subjects like mathematics. Thus, it is expected that their performance may not be directly comparable to that of regular students. However, even among regular students, mathematics performance has proven to be a challenge, as reflected in international and national assessment results.

The Philippines has faced difficulties in mathematics education [13], consistently ranking lower in international assessments. In the PISA 2018 International Report, Filipino students' average score in mathematical literacy was 353 points, significantly below the Organization for Economic Cooperation and Development (OECD) average of 489 points, indicating proficiency below Level 1. Additionally, the Philippines scored 297 in mathematics in the 2019 Trends in International Mathematics and Science Study (TIMSS) conducted by the International Association for the Evaluation of Educational Achievement [14]. These results underscore the poor or unsatisfactory performance of Filipino students in mathematics, which can be declared by referencing benchmarks or comparative standards, such as the TIMSS. For instance, if Filipino students' mathematics performance consistently falls below proficiency levels set by TIMSS, this indicates poor or unsatisfactory performance. [15]. The mean percentage score in Mathematics on the National Achievement Test also fell below established standards [10].

In 2018, the Philippine Statistics Authority reported that secondary schools had an Achievement Rate with a Mean Percentage Score (MPS) of 46.83 in the school year 2012-2013, 51.94 in 2013-2014, and 47.37 in 2014-2015, all of which fell below the set standards. ALS students were also part of these assessments.

With these considerations in mind, this review article seeks to delve into ALS students' mathematics learning. It is imperative to address the underlying issues surrounding the mathematics education of ALS students to establish a solid foundation for the development of effective strategies, resource materials, programs, and policies aimed at enhancing mathematics education for this specific group of learners.

2. Methods

The importance of clarifying the objective and rationale for conducting a systematic review of reviews is emphasized right from the outset of the process, as these aspects are likely to shape the review's methodologies [16]. In this particular systematic review of published articles, the PICo (Population, Interest, Context) framework served as the guiding framework. The review aimed to investigate various aspects related to students' achievement in mathematics, factors influencing mathematics performance, and academic performance within the context of the Alternative Learning System (ALS), among other topics. To compile relevant literature, a comprehensive search strategy was employed. This strategy encompassed a Google search, utilizing specific keywords such as "ALS Academic Performance in Mathematics Problem Solving," "Alternative Learning System in the Philippines," and "Students Achievement in Mathematics." Additionally, a Google Scholar search was conducted to further enrich the dataset. The search was not limited to a specific geographical region, including studies conducted in Asia and beyond, provided they were published in peer-reviewed journals. The initial search yielded a total of 67 articles relevant to the study, spanning the years 2010 to 2022. Subsequently, a thematic approach was applied to categorize the subject matter by themes, resulting in the identification of 34 articles related to students' mathematics achievement. Further refinement and filtration, based on predefined criteria such as relevance to students' mathematics achievement, study design quality, and recency of publication, led to the selection of 15 articles for in-depth review. Ultimately, 25 articles met the established criteria and underwent comprehensive evaluation. The review primarily focused on the academic performance of ALS students in mathematics. Within this context, two overarching themes emerged to characterize the central figures involved in the ALS program: "Diverse Backgrounds of ALS Students" and "Teachers: The Heroes of the ALS Program." These themes provided insights into the multifaceted backgrounds of ALS students and highlighted the pivotal role played by ALS teachers. Additionally, two supplementary themes were identified, providing context to the ALS program's unique attributes: "Unconventional Teaching Approach" and "Limited Parental Influence." These themes collectively shed light on the complex dynamics and challenges associated with ALS education in mathematics.

3. Findings

The Actors of the ALS Programs

The diverse backgrounds of ALS students

The Alternative Learning System (ALS) serves as a Community-Based Learning Service [22], offering an educational lifeline to marginalized groups, including children, women, people with special needs, Indigenous communities, and out-of-school youth (OSY) who were unable to complete their basic education due to economic and support-related challenges. Consequently, ALS enrollees encompass a wide spectrum of age groups, skills, and backgrounds. One significant observation from Arzadon and Nato, Jr.'s research on The Philippine Alternative Learning System is that ALS teachers often find themselves instructing a highly diverse group, ranging from young children (sometimes as young as 10 years old) to elderly individuals. Typically, an ALS teacher in a community is responsible for a multi-grade class comprising approximately 50-75 students [19]. ALS educators have reported that one of the most challenging learner groups to teach consists of adult illiterates—individuals who either never attended school or had to discontinue their education early in life [12]. Among this group, there are middle-aged mothers who left school prematurely due to early marriage but now, in their 40s with grown-up children, have seized the opportunity to resume their studies. Another intriguing group of learners includes men and women within correctional institutions [12]. Among the younger population, a subset of learners presents significant challenges, commonly referred to as the "extra challenge" group. This group includes itinerant street children, among whom are members of an indigenous group from the south, often called "Bajaus" (or "Badjaos") [12].

Furthermore, there are children facing various obstacles to education, such as struggling with basic literacy skills, involvement in the criminal justice system (referred to as Children in Conflict with the Law or CICL), members of indigenous communities, survivors of abuse, and children and youth residing in high-conflict regions. This includes those whose homes and schools have been severely affected by natural disasters such as typhoons or earthquakes [12].These diverse backgrounds among ALS students have a noticeable impact on their attitudes towards mathematics, which, in turn, affects their performance in the subject. Research by Gafoor and Kurukkan (2015) highlights that students, including ALS students, often grapple with mathematics due to its abstract and cumulative nature, underscoring the critical role of a strong foundational understanding. Many students tend to perceive math as challenging, undervalue its significance, and may even avoid it. Comparative studies have revealed a direct correlation between students' attitudes towards mathematics and their academic outcomes. For instance, in a study involving elementary school pupils, a positive correlation was observed between students' attitudes and their performance in mathematics [20]. Students often approach mathematics as a procedural and rule-bound subject, limiting their exposure to the richness and versatility of mathematical concepts and problem-solving approaches [21]. These factors collectively contribute to the complexity of teaching and learning mathematics within the ALS program, where educators must address the diverse attitudes and challenges that students bring to the subject.

Teachers: The Heroes of the ALS program

The image of a mobile teacher, carrying school materials in their backpack, traversing rivers and mountains, symbolizes a profound shift in the way education is delivered. In the pursuit of inclusive education through the Alternative Learning System (ALS), the school literally goes to where the learners are. Teachers often describe their role as akin to a "search and rescue" mission [12].

ALS teachers play a pivotal role in reaching out to students, both young and adult, who face formidable barriers to accessing traditional schools. This includes remote indigenous communities where transportation challenges contribute to high dropout rates. These dedicated educators demonstrate their unwavering commitment by embarking on physically demanding journeys, such as long walks, river crossings, and ascending hills and mountains, sometimes lasting for days. They are rightfully referred to as "mobile teachers" for their adaptability and mobility in bringing education to marginalized and underserved populations [22].

Tan's 2019 investigation, conducted in Cagayan de Oro city, shed light on the educational backgrounds of ALS educators, particularly in the context of mathematics instruction. Notably, none of the educators engaged in the Alternative Learning System possessed specialized expertise in mathematics or closely related fields. A significant majority, exceeding 70%, held Bachelor of Elementary Education degrees, which provided them with a broad educational foundation. Among those with Bachelor of Secondary Education degrees, a substantial portion, constituting 40% of this subgroup, specialized in Technology and Livelihood Education. Furthermore, the research revealed that the majority of ALS teachers were relatively new to the teaching profession. This suggests that experienced and highly qualified educators may have been less inclined to pursue ALS teaching positions, likely because ALS teaching was voluntary. The ALS teaching position did not require specific subject specialization; the sole mandatory criterion was holding a valid teacher's license [9].

The Interesting Context of the ALS

Unconventional Teaching Approach

Teaching within the Alternative Learning System (ALS) framework necessitates a unique approach, one that adapts established teaching and learning theories to the non-formal education context. In the "ALS way," educators must make the most of the available resources for both teachers and learners. Teachers facilitate learning through various methods, including independent study, one-on-one tutorials, group discussions, radio/TV-based instruction, and online classes. The ALS program provides self-learning modules, radio recordings, and other resources to support these diverse teaching modalities [22].

Furthermore, when teaching mathematics in ALS, educators start by assessing students' prior knowledge and crafting individualized learning plans. They employ real-world examples, visual aids, and hands-on activities to make mathematical concepts relevant and comprehensible. Regular assessment, feedback, and goal-setting are essential tools for tracking progress and maintaining student motivation. A common practice to ensure retention is to showcase to learners what they can achieve upon completing the ALS program. Teachers often share stories and display photos of ALS graduates proudly wearing their graduation gowns or dresses [23].

The ALS program utilizes a contextualized non-formal curriculum that is substantially aligned with the K to 12 Curriculum for Basic Education within the formal school system. However, it's important to note that this non-formal curriculum is not an exact replica of the formal school curriculum; it is aligned but not identical. This curriculum takes into account the prior learning experiences of ALS students and incorporates functional literacy indicators into six interconnected learning strands namely; 1) Communication Skills (English & Filipino), 2) Scientific Literacy and Critical Thinking, 3) Mathematical and Problem-Solving Skills, 4) Life and Career Skills, 5) Understanding the Self and Society, 6) Digital Citizenship [24]. This curriculum framework acknowledges the unique needs and circumstances of ALS learners while striving to provide them with a comprehensive and relevant education.

Limited Parental Influence

The importance of parental involvement in the education of learners is underscored by Secretary Leonor Magtolis Briones, who emphasized their crucial role in the success of students. Parents not only contribute to the lessons their children learn from teachers but also provide guidance to help nurture well-rounded individuals [3]. They serve as role models and guides, encouraging their children to pursue ambitious educational goals by creating a supportive home environment with educational resources and fostering particular attitudes and values towards their children's learning [25]. It's widely recognized that parental influence on a child's performance in mathematics is of paramount importance, often superseding other factors [26]. Parents have the potential to exert a positive impact on their children's mathematical performance [27]. However, in the context of ALS students, many parents face significant challenges. They are often occupied with addressing their daily needs, and despite their desire for their children to attend classes, financial stability may be lacking, making it difficult to support and send their children to formal schools. Additionally, research conducted by Pascual et al. [28] titled "Lived-Experience of Former ALS (Alternative Learning System) Students of Nagcarlan, Laguna, Philippines" revealed that some learners abandoned the ALS program for reasons similar to those that led them to leave traditional formal education. This includes a lack of financial support and parental guidance, underscoring the complex socio-economic factors that impact ALS students and their families.

4. Conclusion

To be able to provide effective strategies, resource materials, programs, and policies to enhance mathematics education for ALS students, it is right to build a foundation of knowledge about them and their state. This systematic literature review through the PICo lens has presented the status and underlying issues concerning ALS students' learning of mathematics. There were two themes that emerged to describe the people who were directly involved in the implementation of ALS, the *"diverse backgrounds of ALS students"*, and *"Teachers-The Heroes of the ALS program"*. These themes give us the picture diverse backgrounds of both the ALS teachers and students and also the challenges they faced as a result of them being from such varied foundation skills and social backgrounds.

The study also revealed the interesting context of the

ALS program as summarized in the following themes: *"Unconventional Teaching Approach"*, and *"Limited Parental Influence"*. Because of the diverse backgrounds of the students; the challenging learning environment; and the qualification backgrounds of the teachers implementing ALS, teachers need to employ flexible and adaptive teaching strategies. These strategies should cater to the unique needs and circumstances of ALS students, recognizing the unconventional teaching approach required in this context. Additionally, addressing the limited parental influence in the ALS program is essential. It underscores the importance of creating a supportive and self-sufficient learning environment within the ALS framework, where students can thrive even with limited external support. Furthermore, understanding these key themes is crucial for developing effective strategies, resource materials, programs, and policies that can truly enhance mathematics education for ALS students and acknowledge the exceptional dedication of the ALS teachers who play a vital role in their education.

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