# MICRO Intervention for Developing Macro Skills of Students from Non-Formal Education Settings

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## Abstract

This study evaluates the pedagogical efficacy of the MICRO intervention in fostering macro skill development among non-formal education (NFE) learners in the Philippines. Conceptualized as a Motivational, Individualized, Contextualized, Resilience-building, and Outcome-oriented framework, the MICRO intervention was systematically designed to address the heterogeneous learning needs of NFE students. Seven priority macro skills were delineated through stakeholder-engaged focus group discussions and embedded within the instructional design. A quasi-experimental pre-test/post-test methodology was employed with a cohort of 240 NFE learners, with the intervention delivered over the 2023–2024 academic year. Statistical analyses indicated significant gains across all targeted macro skills, with digital literacy exhibiting the largest effect size. Thematic examination of learner trajectories identified active participation and ownership, competence and confidence consolidation, and future-oriented goal setting as salient mediators of skill acquisition. These findings substantiate the utility of the MICRO model as a contextually responsive strategy for NFE, while underscoring the need for longitudinal investigations to examine its sustainability and scalability across diverse learning ecologies.

**Keywords:** macro skills; MICRO intervention; non-formal education

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## 1. Introduction

Education, a cornerstone of societal progress, exists in diverse forms, including formal and non-formal settings. While formal education follows structured curricula and certification, non-formal education (NFE) caters to learners with varied backgrounds, often lacking traditional classroom structures. These learners face unique challenges in acquiring essential skills necessary for personal and societal development.

NFE programs have emerged as crucial platforms for reaching marginalized populations, including out-of-school youth, adult learners, and individuals with limited access to formal schooling. These programs offer flexible learning opportunities and address diverse needs, such as literacy, numeracy, vocational skills, and life skills [1].

In the Philippines, the Alternative Learning System (ALS) was formalized through Republic Act No. 11510 as the country's NFE framework. It offers flexible learning opportunities for out-of-school children, youth, and adults to acquire knowledge, values, life skills, and competencies necessary for higher education, employment, or entrepreneurship [2]. The ALS effectively combines non-formal and indigenous education to cater to the diverse needs and circumstances of its learners [3].

However, NFE learners frequently encounter obstacles that hinder their acquisition of macro skills, defined as broader competencies essential for success in various life domains [4]. Macro skills encompass a range of abilities, including critical thinking, problem-solving, communication, collaboration, creativity, and digital literacy. These skills are vital for navigating complex challenges, adapting to changing environments, and contributing meaningfully to society [5]. Unfortunately, traditional NFE approaches often prioritize basic literacy and numeracy, neglecting the development of these crucial macro skills [6].

Despite the growing recognition of the importance of macro skills, there is a dearth of evidence-based interventions specifically designed to cultivate these skills among NFE learners. Existing studies predominantly focus on the development of basic literacy

and numeracy, leaving a significant gap in understanding how to effectively foster macro skills in this population.

Moreover, the challenges faced by NFE learners, such as limited educational backgrounds, diverse learning styles, and socio-economic barriers, necessitate innovative and tailored approaches. There is a pressing need to develop interventions that are responsive to the unique needs and contexts of NFE learners while effectively addressing the development of macro skills.

To bridge this knowledge gap, this study proposes the MICRO intervention as a potential solution. MICRO, an acronym for Motivational, Individualized, Contextualized, Resilience-building, and Outcome-oriented, represents a holistic approach to skill development in NFE settings. By incorporating these five key components, the MICRO intervention aims to create a supportive and empowering learning environment that fosters the acquisition of macro skills.

*1.1 The MICRO Intervention*

1.1.1 Motivational component

The motivational component of MICRO emphasizes the importance of intrinsic and extrinsic factors in stimulating learners' engagement and persistence. Research shows that tailoring learning experiences to individual interests and goals significantly enhances motivation and learning outcomes [7]. The intervention seeks to create a learning environment that is personally relevant and inspiring by understanding learners' aspirations, interests, and challenges [8].

1.1.2 Individualized component

Recognizing the diverse needs and learning styles of NFE learners, the individualized component of MICRO focuses on tailoring instruction and support to meet each learner's unique requirements. This includes providing differentiated learning materials, flexible pacing, and personalized feedback. Research shows that individualized instruction significantly improves learning outcomes, especially for learners with diverse backgrounds and needs [9,10].

1.1.3 Contextualized component

The contextualized component of MICRO emphasizes the relevance of learning to learners' lives and communities. Research shows that contextualized learning enhances motivation, knowledge retention, and the ability to apply learned skills to real-world situations [11]. The intervention aims to make learning meaningful and applicable to learners' everyday challenges and opportunities through integrating real-world experiences and local knowledge [12].

1.1.4 Resilience-building component

Building resilience is a critical aspect of the MICRO intervention. Research shows that resilience is a strong predictor of academic and life success, mental health, and overall well-being [13]. The intervention aims to enhance learners' ability to overcome obstacles and persevere in the face of adversity through equipping them with coping strategies, problem-solving skills, and a growth mindset [14].

1.1.5 Outcome-oriented component

The outcome-oriented component of MICRO focuses on setting clear learning goals and measuring progress. Research shows that clear and attainable goals, combined with regular feedback, significantly enhance learner motivation, performance, and overall learning outcomes [15]. The intervention aims to promote a sense of accomplishment and motivation for continued learning by tracking their achievements and providing regular feedback [16].

*1.2 Research Questions*

The study addressed the following research questions:

- How does the MICRO intervention influence the development of macro skills among NFE learners?
- What are the specific mechanisms through which the MICRO intervention impacts macro skills development?

## 2. Methodology

This study explored three pathways of non-formal education (NFE) in the Philippines: higher education, entrepreneurship, and employment. We identified essential macro skills for each pathway based on a pilot focus-group discussion (FGD) with 15 participants: 5 NFE teachers, 5 entrepreneurs who were NFE graduates, and 5 employers who hire NFE graduates.

The FGD identified seven macro skills necessary for success in all three pathways: critical thinking, problem-solving, communication, collaboration, digital literacy, lifelong learning, and socio-emotional skills.

Following the identification of macro skills, the MICRO intervention was designed. This intervention focuses on Motivational, Individualized, Contextualized, Resilience-building, and Outcome-oriented instruction. Another pilot FGD was conducted with 5 NFE supervisors and 10 NFE teachers to develop teaching and learning strategies specifically aimed at fostering these seven macro skills. These strategies are detailed in Table 1.

To ensure successful implementation of the MICRO intervention, 12 NFE teachers underwent comprehensive training on the program's theoretical underpinnings, instructional strategies, and assessment methods. The study was conducted in Davao Region, Philippines, which encompasses five provinces (Davao de Oro, Davao del Norte, Davao Oriental, Davao del Sur, Davao Occidental) and one highly-urbanized city (Davao City). Two NFE teachers were recruited from each province and the city, resulting in a total of 12 participants.

A pre-test/post-test design was employed. Prior to the pre-test, desired measurement criteria for each macro skill were established and integrated into the lesson plans (Table 2). All assessments utilized a consistent scoring system with 0 as the lowest and 100 as the highest score. To ensure validity, three NFE supervisors reviewed the assessment methods for alignment with the targeted competencies and macro skills. The assessments were also pilot-tested on 30 NFE students, achieving Cronbach's alpha values between 0.82 and 0.90, indicating excellent reliability.

A total of 240 NFE students participated in the pre-test. The MICRO intervention program was then implemented throughout the 2023-2024 school year (August 2023 – May 2024). Due to student attrition, only 145 students participated in the post-test. Ten of these students were subsequently selected for a follow-up FGD to explore how the MICRO intervention impacted their macro skill development. A separate FGD was conducted with the 12 participating teachers to gather similar insights.

Table 1: Teaching-learning strategies utilized and macro skills supported per MICRO component.

| MICRO Component | Strategies | Macro Skills Supported |
|---|---|---|
| Motivational | Storytelling, group discussions, hands-on activities, community-based projects, peer mentoring, use of interactive multimedia, gamification, online communities | Critical thinking, problem-solving, socio-emotional, digital literacy |
| Individualized | Peer tutoring, differentiated learning materials, observation-based assessment, learning contracts | Critical thinking, problem-solving, lifelong learning |
| Contextualized | Community mapping, role-playing, simulations, field trips, indigenous knowledge integration | Critical thinking, problem-solving, communication, collaboration |
| Resilience-Building | Coping skills training, group counselling, mentorship, community support networks | Critical thinking, problem-solving, communication, collaboration, socio-emotional |
| Outcome-Oriented | Performance-based assessment, portfolio development, self and peer assessment | Critical thinking, problem-solving, lifelong learning |

Table 2: Assessment methods used for each macro skill.

| Macro Skill | Objective Assessment |
|---|---|
| Critical Thinking | Problem-solving scenarios and case studies with multiple-choice questions to assess analytical and evaluative skills. |
| Problem-Solving | Decision-making tasks with criteria for evaluating solutions. |
| Communication | Oral and written communication tasks with rubrics to assess clarity, coherence, and effectiveness. |
| Collaboration | Group projects with individual and group assessments to evaluate teamwork and cooperation. |
| Digital Literacy | Basic computer skills assessment on online safety and digital citizenship. |
| Lifelong Learning | Self-assessment questionnaire to assess learners' attitudes toward continued learning. |
| Socio-Emotional Skills | Social skills inventory to assess interpersonal skills and emotional regulation. |

Mean scores were used to describe student performance on pre- and post-intervention assessments. Paired-samples t-tests were employed to determine if statistically significant differences existed between pre-test and post-test scores. A p-value of less than 0.05 was considered statistically significant. Data analysis was conducted using SPSS Version 23. Textual data from the focus groups were analyzed using the six-step thematic analysis approach.

## 3. Results and Discussion

*3.1 Influence of MICRO Intervention on the Development of Macro Skills*

The MICRO intervention led to significant improvements ($p<0.05$) in all seven macro skills tested (Table 3). Digital literacy showed the greatest gain, followed by socio-emotional skills and communication. While all areas improved, critical thinking showed the least gain.

This finding offers significant insights for the field of non-formal education. The MICRO intervention's success in significantly improving ($p<0.05$) all seven macro skills tested in NFE students is a testament to its potential for this specific student population.

The most notable gain in digital literacy skills is particularly relevant for NFE students. These students often lack access to traditional educational structures, and the MICRO intervention's effectiveness in this area suggests its ability to bridge the digital divide for this population. Equipping NFE students with strong digital literacy skills empowers them to access information, participate in online communities, and potentially enhance their employability.

This finding corroborates previous research that emphasizes the importance of digital literacy in NFE settings. Digital literacy is a fundamental skill in the 21st century, particularly for marginalized populations who often do not have access to formal education systems [17]. The MICRO intervention's success aligns with evidence that enhancing digital literacy through targeted interventions can significantly improve learning outcomes for disadvantaged students in NFE settings [18]. Moreover, digital literacy directly impacts employability, underscoring that interventions like MICRO can play a crucial role in bridging the skills gap and facilitating better opportunities for NFE learners [19].

The positive impact on socio-emotional skills is equally valuable for non-formal learners. These skills are crucial for navigating challenges, overcoming obstacles, and achieving personal goals – all of which are particularly important for individuals pursuing education outside of formal structures.

These findings support existing literature emphasizing the critical role of socio-emotional competencies in NFE. Socio-emotional skills, such as resilience, self-regulation, and emotional intelligence, are key determinants of success in education and the workforce [20]. In the context of NFE, learners often face greater challenges and uncertainties, making these skills even more vital [21]. Furthermore, socio-emotional skills contribute to both personal and social development, enabling learners to navigate challenges, form meaningful relationships, and achieve long-term goals [22]. The

Table 3: Significant difference in the test scores per macro skill assessed.

| Macro Skill | Pre-Test | Post-Test | Difference | p-value |
|---|---|---|---|---|
| Critical Thinking | 67.2 | 84.0 | 16.8 | 0.000 |
| Problem-Solving | 65.2 | 86.5 | 21.3 | 0.000 |
| Communication | 53.8 | 77.6 | 23.8 | 0.000 |
| Collaboration | 66.2 | 88.8 | 22.6 | 0.000 |
| Digital Literacy | 56.5 | 88.9 | 32.4 | 0.000 |
| Lifelong Learning | 56.0 | 76.0 | 20.0 | 0.000 |
| Socio-Emotional Skills | 51.5 | 76.1 | 24.6 | 0.000 |

MICRO intervention's success in fostering these competencies is especially important for individuals outside formal structures, as these skills can significantly enhance their ability to overcome obstacles and pursue educational and personal aspirations.

The observed improvement in communication skills aligns with the need for effective communication in various non-formal learning environments, such as workshops, community groups, or online learning platforms. By fostering strong communication skills, the MICRO intervention empowers non-formal learners to actively participate, collaborate, and share knowledge with others.

The observed improvement in communication skills aligns with existing research emphasizing the importance of effective communication in NFE environments. Communication is a vital skill for engagement in diverse settings such as workshops, community groups, and online learning platforms, where collaborative learning and knowledge sharing are key [23]. Strong communication skills enhance learners' ability to engage actively, fostering deeper connections and mutual learning within these contexts [24]. Social constructivist theory highlights the critical role of communication in collaborative learning, underscoring how interventions like MICRO can create opportunities for NFE learners to participate more fully in knowledge exchanges [25]. By fostering these skills, the MICRO intervention not only enhances individual growth but also strengthens the learning communities in which these learners operate, ultimately empowering them to contribute meaningfully and engage effectively in various educational and social environments.

While critical thinking showed improvement, its smaller gain compared to other macro skills warrants further investigation. Perhaps the intervention needs adjustments or additional components specifically tailored to non-formal learners' needs and learning styles. Future research could explore this aspect.

This finding aligns with previous studies that emphasize the complexity of developing critical thinking skills, particularly in NFE contexts where learners may have diverse backgrounds and learning styles. The MICRO intervention may require adjustments or the incorporation of additional components that are specifically tailored to the needs and learning preferences of NFE learners. Critical thinking can be more effectively fostered through reflective practices and problem-based learning, which may need greater emphasis in future iterations of the intervention [26,27]. Future research could explore these approaches, assessing how targeted strategies might enhance critical thinking development and address the specific challenges faced by NFE learners in acquiring this essential skill.

*3.2 Specific Mechanisms through which the MICRO Intervention Impacts Macro Skills Development*

**Theme 1: Engagement through Active Participation and Ownership**

The intervention increased student engagement by promoting active participation and a sense of ownership through hands-on activities, collaborative projects, self-directed learning, and reflective practices. NFE teachers often observed that hands-on activities capture students' interest and maintain their involvement in the learning process. They also observed that collaborative projects foster teamwork and a sense of shared responsibility, which is essential in NFE settings. One teacher shared:

> *"The hands-on activities really capture their [students] attention, and they remain engaged throughout the lessons. Collaborative projects have taught them to work together and support each other. The emphasis on self-directed learning and reflective practices empowers them to take control of their learning and make continuous improvements based on their reflections." (NFE Teacher 1)*

This aligns with research indicating that active learning strategies, such as hands-on activities, enhance student interest and involvement in the learning process [28]. NFE teachers frequently observed that these activities not only capture students' attention but also sustain their engagement. Collaborative projects foster teamwork and a sense of shared responsibility, which is critical in NFE settings where community-based and cooperative learning is emphasized [29]. Creating opportunities for students to work together while taking ownership of their learning enhances their commitment and success in NFE environments, consistent with findings on adult learners and self-directed education [30].

Meanwhile, NFE students often found that hands-on activities make learning fun and interesting, allowing for a better understanding of the material. Working on collaborative projects with peers helped them in learning how to work as a team and share responsibility for learning outcomes. Being encouraged to take charge of one's own learning through self-directed activities made

education more relevant to their personal interests and goals. A student verbalized:

> *"Learning has become much more interesting with the MICRO intervention. Reflecting on what has been learned helps see the progress made and identify areas for improvement. Overall, this approach has made learning more exciting and motivating."(NFE Student 3)*

This supports findings emphasizing the value of experiential learning in promoting deeper comprehension through active involvement [31]. Working on collaborative projects helped students develop teamwork skills and share responsibility for learning outcomes, reflecting the importance of peer collaboration in cognitive development [25]. The opportunity to engage in self-directed activities allowed students to take ownership of their education, making it more relevant to their personal interests and goals, which is particularly empowering for adult learners as it fosters autonomy and motivation while aligning educational experiences with individual aspirations [32]. This combination of active, collaborative, and self-directed learning proved to be highly effective in the NFE context.

**Theme 2: Competence and Confidence Building through Skill Mastery and Support**

The introduced lessons build students' confidence and competence, ensuring they feel capable and supported in their educational journey. NFE teachers observed clear skill acquisition milestones that structure progress tracking, while applied learning bridged theory and practice. One teacher mentioned:

> *"The intervention enhances student outcomes through competency-based learning, applied learning, positive reinforcement, and mentorship, providing clear benchmarks, practical application, and personalized guidance." (NFE Teacher 3)*

This finding corroborates existing research on the importance of confidence-building and applied learning in educational settings, particularly in NFE. Learners' confidence in their abilities directly impacts their motivation and performance [33]. Providing clear skill acquisition milestones aligns with findings that structured progress tracking enhances learners' self-regulation and goal-setting abilities [34]. Applied learning, which bridges theory and practice, is supported by the view that connecting classroom learning with real-world application enhances comprehension, retention, and practical skill development [35,36]. This approach makes lessons not only more engaging but also more effective in fostering long-term competency.

Students met specific competency milestones, enhancing self-efficacy and motivation, and benefit from real-world application, deepening understanding and practical skills. Positive reinforcement acknowledges achievements and fosters a supportive learning environment, while mentorship provides personalized guidance, addressing individual needs and challenges, boosting confidence and competence. One student highlighted:

> *"It helps me meet competency milestones, apply knowledge in real-world scenarios, receive positive reinforcement, and gain confidence through mentorship." (NFE Student 4)*

Students met specific competency milestones, which enhanced their self-efficacy and motivation. Achieving these milestones contributes to learners' belief in their capabilities, which in turn boosts their motivation and performance [33]. The real-world application of learned concepts deepens understanding and develops practical skills, making the learning experience more relevant and impactful [35]. Positive reinforcement, which acknowledges achievements, helps to create a supportive learning environment and fosters engagement and persistence [37]. Mentorship provides personalized guidance that addresses individual needs and challenges, further boosting confidence and competence, consistent with the importance of tailored support in learning [38].

**Theme 3: Future-Oriented Development through Career and Life Skills Training**

The intervention also prepared students for future success by providing workplace simulations, aligning skills with industry needs, and offering comprehensive life skills training in areas such as financial literacy and decision-making. NFE teachers observed that workplace simulations give students practical experience, while skills aligned with industry needs enhance employability. One teacher expressed:

> *"The MICRO intervention effectively bridges classroom learning with real-world application through workplace simulations and relevant skill training, making students job-ready."(NFE Teacher 7)*

This approach supports research emphasizing the effectiveness of experiential learning in preparing students for real-world challenges [39]. Workplace simulations offer practical experience that closely mirrors actual job scenarios, which is essential for bridging the gap between education and employment [40]. Aligning skills with industry needs directly contributes to increased employability, highlighting the importance of contextualized learning in enhancing career readiness [41]. Comprehensive life skills training equips students with essential competencies for personal and professional success [42]. NFE teachers' observations align with these findings, demonstrating the effectiveness of these strategies in fostering practical skills and enhancing students' future career prospects.

NFE students found these simulations to provide valuable insights, equipping them to manage personal and professional challenges through life skills training. A student commented:

> *"Experiencing workplace scenarios and learning practical skills through the MICRO program has been incredibly valuable, preparing me well for future career challenges and everyday decision-making." (NFE Student 9)*

NFE students found these simulations to provide valuable insights, equipping them to manage personal and professional challenges through life skills training. Experiential learning theory emphasizes that simulations offer hands-on experiences that enhance practical skills and problem-solving abilities [43]. Life skills training, including financial literacy and decision-making, significantly impacts individuals' capacity to handle various challenges effectively [44]. Integrating these elements aligns with the principles of applied learning, which foster greater self-efficacy and preparedness for both personal and professional contexts [45]. This approach not only provides NFE students with actionable insights but also strengthens their ability to navigate complex situations with confidence and competence.

## 4. Conclusions

The MICRO intervention has demonstrated a significant positive impact on the development of macro skills among NFE learners. This is evident in the notable improvements observed across all seven tested skills, with digital literacy, socio-emotional skills, and communication showing the most substantial gains. While critical thinking exhibited the least improvement, it still experienced a positive shift.

The intervention's effectiveness can be attributed to several key mechanisms. Firstly, the MICRO approach fosters engagement through active participation and ownership, empowering learners to take an active role in their own learning. This engagement is crucial for skill development and retention. Secondly, the intervention builds competence and confidence by providing opportunities for skill mastery and support. As learners acquire new skills and receive encouragement, their self-belief and ability to tackle challenges increase. Finally, the MICRO intervention promotes future-oriented development by incorporating career and life skills training. This equips learners with the necessary tools to navigate their personal and professional journeys.

While the MICRO intervention has shown promising results, it is important to acknowledge the study's limitations. The relatively low participation rate in the post-test due to student attrition limits the generalizability of the findings. Additionally, the study's focus on a single region of the Philippines prevents the results from being applied to the entire country. Future research should address these limitations by conducting more comprehensive studies with larger sample sizes and broader geographic coverage. Furthermore, investigations into the validity of the specific MICRO strategies and assessment tools will contribute to a deeper understanding of the intervention's effectiveness. Quantitative studies examining the relationship between each MICRO strategy and the development of individual macro skills will also provide valuable insights.

Despite these limitations, the MICRO intervention represents a pioneering study in the field of NFE. Its positive outcomes and identified mechanisms offer valuable guidance for educators and policymakers seeking to enhance the skills of NFE learners. As future research builds upon these findings, the MICRO approach has the potential to become a valuable tool for promoting lifelong learning and empowering individuals from marginalized communities.

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## Conflict of Interest Statement

The authors declare no conflict of interest.

## Author Contributions

All authors have contributed equally. They have read and agreed to the published version of the manuscript.

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