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Effectiveness of QR-Based Modified Strategic Intervention Materials in Improving the Academic Performance of SHS Students in Disciplines and Ideas in the Social Sciences

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Abstract

21st-century learners nowadays are at their best when their instructional materials are diverse, contextualized, and technology-based. With such intention in mind, the study determines the effectiveness of the developed QR-based modified strategic intervention materials (QR-MSIMs) in improving the academic performance of senior high school (SHS) students in the subject Disciplines and Ideas in the Social Sciences (DISS) in the Humanities and Social Sciences (HUMSS) strand in the Philippines. Using the experimental research method, specifically the one-group pretest-posttest design, 75 SHS students are pre-assessed for their academic performance in the subject focused on their least mastered competencies. After the pretest, the top three least-mastered competencies were identified, which included the topics of the MSIMs to be developed, as well as the 27 students needing intervention (treatment or experimental group). After three expert validators rated the developed QR-MSIMs, pilot testing commenced. After the implementation, a posttest is conducted to compare the academic performance of the students before and after their exposure to the intervention materials. Before the use of QR-MSIMS, SHS students performed poorly in DISS, indicating the need for remediation or intervention. Significantly, the SHS students improved their academic performance after using the QR-MSIMs, leading to the acceptance of the alternative hypothesis and further cementing the effectiveness of the treatment or intervention materials in enhancing the least-mastered competencies of the students. The study recommends further use of the QR-MSIMs in other social sciences disciplines, as well as in various learning contexts through action research, where the results can be disseminated further during in-service training (INSET) or learning action cell (LAC) sessions.

Keywords: Academic performance, QR-based strategic intervention materials, senior high school students, Social Science

1. INTRODUCTION

Self-learning materials (SLMs), including strategic intervention materials (SIMs), were practical tools for reinforcing learning. They supported distance learning and promoted self-paced, contextualized learning. During the coronavirus disease 2019 (COVID-19) pandemic and the new normal in education, SLMs, also known as alternative delivery modules (ADMs), had become widely used in Philippine

public schools under the Department of Education (DepEd). These modules were designed to be independent, interactive, and focused on specific topics, making them ideal for remote learning where teacher supervision is limited (DO No. 18, s. 2020).

SIMs were supplementary and remedial resources designed to improve learners' least mastered competencies. They included various learning cards such as guide cards, activity cards, and assessment cards. In classrooms, SIMs were used to enhance learning and performance, particularly targeting areas where students struggle the most (Tugbong, 2023; Repe, 2024; Garcia, 2022). They were effective across different types of learners, grade levels, and subjects, making them valuable for improving academic performance (Borabo & Dio, 2025; Hermogenes, 2024; Sadsad, 2022).

Research has indicated that learners benefit from SIMs, which help develop their least mastered competencies and lead to improved performance (Cordova et al., 2019). Teachers were encouraged to use SIMs to enhance academic performance, as they can be used as instructional aids, intervention materials, and instructional strategies (Acera, 2022; Duenas, 2019; Dumdumaya et al., 2024; Salviejo et al., 2014; Villar et al., 2022).

Studies have demonstrated the effectiveness of various forms of SIMs, including electronic SIMs or E-SIMs (De Leon & Justo, 2023), digitized SIMs (Suaybaguio, 2025), video lesson-based SIMs (Del Puerto, 2023), manipulative and interactive SIMs (Contreras, 2018), game-based SIMs (Lawsin et al., 2023), competency-based SIMs (Villaran et al., 2023), contextualized SIMs (Arevalo et al., 2023), and pocket SIMs (Orine et al., 2024). These SIMs had been found to improve learning outcomes, retention, and motivation among learners (Cacay, 2021; Limbago-Bastida & Bastida, 2022; Pasion, 2019).

SIMs also aimed to enhance teachers' skills in test analysis and interpretation, enabling them to develop a variety of intervention materials for remediation and enrichment (Buitre, 2023). They were considered effective instructional strategies for enhancing learner achievement and understanding concepts (Cagape et al., 2023; Gabucan & Sanchez, 2021; Sinco, 2020; Zabala, 2023). Additionally, SIMs were efficient teaching materials that assist and empower learners in enhancing their understanding of less commonly learned subjects or competencies (Acedillo et al., 2022; Buitre, 2023; Cacay, 2021; Flores & Cacho, 2020; Salviejo et al., 2014).

Most studies on SIMs have been conducted in elementary and JHS levels, particularly in Science (e.g., Acedillo et al., 2022; Acera, 2022; Dumdumaya et al., 2024; Orine et al., 2024; Sinco, 2020; Villar et al., 2022; Villaran et al., 2023) and English (e.g., Flores & Cacho, 2020). Meanwhile, studies in the junior high school (JHS) level, utilized SIMs in Mathematics (e.g., Bernido, 2023; Cagape et al., 2023; Del Puerto, 2023; Tambong & Malonisio, 2025), Science (e.g., Arevalo et al., 2023; Buitre, 2023; Cacay, 2021; Contreras, 2018; De Leon & Justo, 2023; Duenas, 2019; Gabucan & Sanchez, 2021; Pantilon, 2024; Repe, 2024; Salviejo et al., 2014; Suaybaguio, 2025), English (e.g., Cordova et al., 2019), Araling Panlipunan or Social Studies (e.g., Hermogenes, 2024; Lazo & de Guzman, 2021; Pasion, 2019), and Physical Education (e.g., Sadsad, 2022). Meanwhile, most studies at the senior high school (SHS) level have utilized SIMs in Mathematics (e.g., Zabala, 2023), Science (e.g., Limbago-Bastida & Bastida, 2022; Tugbong, 2023), and STEM (e.g., Lawsin et al., 2023). Interestingly, the study of Borabo and Dio (2025) conducted a meta-analysis on the use of SIMs in elementary, JHS, and SHS Mathematics and Science. Moreover, there were studies at the tertiary level where SIMs have been applied in Mathematics (e.g., Garcia, 2022).

Though there were a considerable number of studies conducted on using SIMs in the elementary, JHS, and SHS levels, there was a gap in the literature on the use of modified SIMs (MSIMs) in SHS Social Science, specifically the use of QR codes in the SIMs. This study aimed to fill that gap by developing QR-based MSIMs (QR-MSIMs) as remedial and supplemental materials for learners in the Disciplines and Ideas in the Social Sciences (DISS) strand under the Humanities and Social Sciences (HUMSS) track in SHS in the Philippines. An experimental study was conducted to attest the effectiveness of the intervention (QR-MSIMs) in improving the academic performance of poorly performing SHS students in DISS.

The study also emphasized the need for continuous teacher training in using various strategic interventions, learning resources, and assessment tools to promote successful learning, as outlined in several DepEd memoranda and orders (DM No. 117, s. 2005; DO No. 35, s. 2016; DO No. 8, s. 2015; DO No. 18, s. 2020). Such initiatives can lead to the promotion of locally produced teaching materials, the introduction of innovation in teaching and learning aligned with the provisions of RA No. 10533 of the K to 12 program, the introduction of innovation, strategies, and intervention for teaching and learning as prescribed in the action research projects (DO No. 43, s. 2015; DO 4, s. 2016; DO No. 16, s. 2017) and innovation projects for teachers, the development of teachers' competence in instructional delivery (DO No. 42, s. 2017), and the attainment of Sustainable Development Goal No. 4 (Quality Education) by 2030.

Considering the literature gap and the students' consistently low performance in their least-mastered competencies (performance gap) in the study site, there is a compelling need to conduct an intervention or remediation for them. Hence, the study targeted the following objectives: (i) to determine the academic performance of SHS students in DISS before and after the implementation of QR-MSIMs; and (ii) to determine the significant difference in the academic performance of SHS students in DISS before and after the implementation of QR-MSIMs.

2. METHODS

This section provided details on the research design, respondents, sampling technique, instrument, data gathering procedure, ethical considerations, and statistical treatment used in the study.

Research Design

The study utilized the experimental method of quantitative research, specifically the one-group pretest-posttest design. It was a type of experimental design in which assessment measures (tests) were conducted before and after an intervention or treatment (Choueiry, 2025), thereby establishing a cause-and-effect relationship (Budert-Waltz, 2023). As seen in Figure 1, this design was used to conduct a pretest first, which determined the least-mastered competencies of SHS students in their DISS subject.

This revealed the topics to be covered by the later-developed QR-MSIMs. Moreover, in that pretest, students who needed intervention were identified as the treatment or experimental group. After the validation and pilot testing of the developed MSIMs, they were implemented during a specific quarter, covering all the topics depicted in the least-mastered competencies. The top three least-mastered competencies of the students in DISS included the following (DepEd, 2019): (i) evaluating the person's personality using the core values of *Sikolohiyang Pilipino* [HUMSS_DIS11-IVf-3]; (ii) examining the social ideas of Filipino thinkers starting from Isabelo de los Reyes, Jose Rizal, and other Filipino intellectuals [HUMSS_DIS11-IVe-1]; and (iii) determining the relationship between gender ideology and gender inequality [HUMSS-DIS11-IVc-8].

The QR codes were generated using free web applications. A posttest was also conducted to compare the academic performance of the students before and after their exposure to the QR-MSIMs.
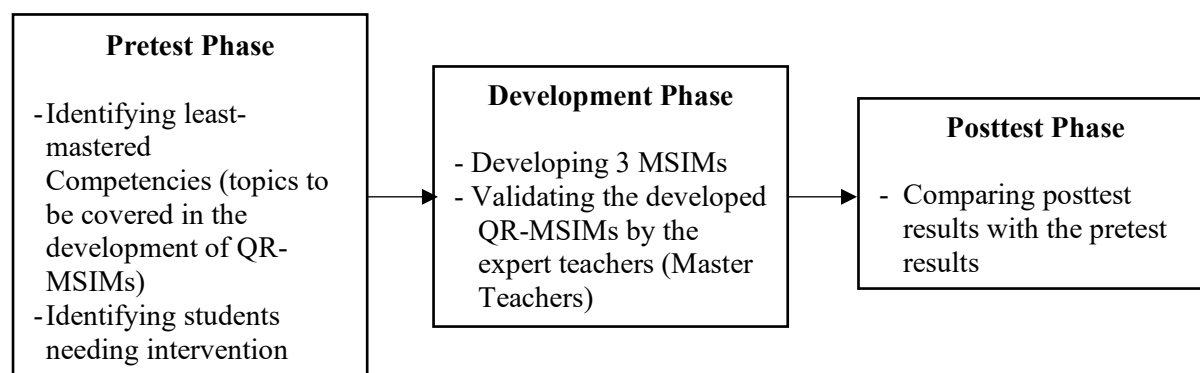
Figure 1. Paradigm of the study

Respondents

The respondents in the study consisted of select students from a public senior high school in the Philippines, who were selected using a stratified sampling technique. It was a sampling technique that divides the population into subgroups with unique or identical characteristics (Thomas, 2023). In the study, a non-random stratified sampling technique was employed, meaning that only those SHS students who did not meet expectations with an average of 74% or below during the pretest were identified as the experimental or treatment group, which subsequently underwent the use of MSIMs as a treatment or intervention. After the pretest, out of the 75 students taking DISS as their subject in the HUMSS track, 27 (36%) did not meet the expectations and were identified as needing interventions.

Instrument

The researcher utilized the pretest and posttest as instruments to gather the necessary data. The pretest was the assessment measure conducted before the treatment, while the posttest was the assessment measure conducted after the treatment (Budert-Waltz, 2023). The study utilized a 30-item pretest and posttest based on the 15 learning competencies during the last quarter of the subject DISS. The pretest and posttest were validated by three master teachers (MTs) before their administration to the students. The study hypothesized that the QR-MSIMs contribute to improvements in students' academic performance in the subject.

Data Gathering Procedure

Upon determining the least-mastered competencies, the topics where the MSIMs will be applied were identified. Three expert master teachers (MTs) validated the 30-item pretest and posttest before their actual usage. Consent forms were also obtained from the respondents, who were all 18 years of age or older. After gathering the data, these were prepared for statistical analysis.

Ethical Considerations

Consent forms were obtained from the SHS learners before the actual data collection. The researcher also ensured the anonymity of the respondents' identities and the confidentiality of the data gathered from them. The objectives of the study were carefully explained to them, outlining the extent of their participation in the research.

Statistical Treatment

The study employed descriptive statistics (i.e., frequency, percentage, mean, and standard deviation) and inferential statistics to analyze the gathered data. The frequency, percentage, and mean were used in describing the academic performance of SHS students in DISS before and after the implementation

of QR-MSIMs. Meanwhile, a paired samples t-test was used to investigate the possible significant difference in the academic performance of SHS students in DISS before and after the implementation of QR-MSIMs. If the p-value is lower than or equal to 0.05, a significant difference will be pronounced. In contrast, a non-significant difference will occur if the p-value is higher than the baseline alpha value.

3. RESULTS AND DISCUSSION

This section presents the results gathered from SHS students, depicting their academic performance before and after the implementation of QR-MSIMs in learning the subject DISS.

Academic Performance of SHS Students in DISS Before and After the Implementation of QR-MSIMs

Table 1 presents the academic performance of SHS students in DISS before and after the implementation of QR-MSIMs, disclosing the accumulated scores of the students that attest their low performance prior to using the intervention and the improvement on their scores after the intervention.

Table 1. Academic performance of SHS students in DISS before and after the implementation of QR-MSIMs

Academic Performance (Based on DO No. 8, s. 2015)	Pretest (Before Implementation)		Posttest (After Implementation)	
	Frequency	Percentage	Frequency	Percentage
90% and above (Outstanding [O])	0	0.00	4	14.81
85% - 89% (Very Satisfactory [VS])	0	0.00	15	55.56
80% - 84% (Satisfactory [S])	0	0.00	6	22.22
75% - 79% (Fairly Satisfactory [FS])	0	0.00	2	7.41
74% below (Did Not Meet Expectations [DNME])	27	100.00	0	0.00
Total	27	100.00	27	100.00
Mean	72.19 [DNME]		86.00 [VS]	

It is evident that before the implementation of QR-MSIMs in the SHS students' DISS subject, they did not meet expectations, with an academic performance of 74% or below (f=27; %=100.00). This indicates that 36% of the class in DISS needs intervention using QR-MSIMs to improve their academic performance. After the implementation of the QR-MSIMs, it becomes apparent that the performance of the SHS students has improved tremendously as 15 or 55.56% of them got a very satisfactory academic performance, 6 or 22.22% garnered a satisfactory academic performance, 4 or 14.81% of them accumulated an outstanding academic performance, while only 2 or 7.41% of them have only reasonably satisfactory academic performance. Interestingly, no students failed to meet expectations after the implementation of the QR-MSIMs, further attesting to the effectiveness of the materials or interventions in improving the academic performance of students in DISS. As attested from the results, before QR-MSIMs, all SHS students in DISS underperformed. After its implementation, most students showed significant improvement—many achieving very satisfactory or outstanding results—with no student falling below expectations, which demonstrated the effectiveness of the intervention. The said results also amplify what previous studies have identified, that the use of SIMs in general has improved the academic performance of the students when used as intervention materials (Acera, 2022; Borabo & Dio, 2025; Cordova et al., 2019; Duenas, 2019; Dumdumaya et al., 2024; Garcia, 2022; Hermogenes, 2024; Repe, 2024; Sadsad, 2022; Salviejo et al., 2014; Tugbong, 2023; Villar et al., 2022).

Comparison in the Academic Performance of SHS Students in DISS Before and After the Implementation of QR-MSIMs

Table 2 presents a comparison of the academic performance of SHS students in DISS before and after the implementation of QR-MSIMs, illustrating the pre- and post-intervention conditions of the students' academic performance.

Table 2. Comparison of the academic performance of SHS students in DISS
before and after the implementation of QR-MSIMs

Test	Phase	Mean	SD	t-value	p-value	Remarks	Decision
Pretest	Before Implementation	72.19	1.73	-24.24	0.00	Significant	Accept H_a/H_1
Posttest	After Implementation	86.00	3.37				

The results indicate a significant difference in the academic performance of SHS students in DISS before and after the implementation of QR-MSIMs (t=-24.24; p=0.00), as the p-value is lower than the 0.05 level of significance, leading to the acceptance of the alternative hypothesis. Meaning, it is the QR-MSIMs that bring significant improvement in their academic performance after their usage, as evidenced by the mean scores of 72.19 (SD=1.73) from the pretest increasing to 86.00 (SD=3.37) by the posttest. The results confirm the significant improvements in SHS students' DISS performance following the use of QR-MSIMs, strongly supporting that the intervention directly boosted their academic achievement. The evident progress from pretest to posttest highlights the effectiveness of QR-MSIMs in enhancing learning outcomes. The said results align with previous studies that attest to the significant improvement in the academic performance of SHS students after using various types of SIMs (Limbago-Bastida & Bastida, 2022) and similar self-learning materials (Pecson, 2020) in their learning areas.

4.   CONCLUSION

The findings reveal that, before the study, SHS students performed poorly in DISS, indicating a need for intervention or remediation to improve their academic performance. After the intervention, the findings attest to the effectiveness of the developed QR-MSIMs in improving the academic performance of the SHS students in DISS, making them viable alternative, supplemental, and remedial resources that the teachers can tap to provide contextualized, creative, and technology-based learning experiences, improving the least-mastered competencies of the 21st-century learners. This results in the acceptance of the alternative hypothesis that, through the use of QR-MSIMs, the academic performance of SHS students in DISS will significantly improve.

Since the effectiveness of the QR-MSIMs has been established in the study, sustainable use of such in the different disciplines of Social Sciences as well as in other learning areas is hereby recommended through the institutionalization of practicing design-based thinking among teachers in creatively developing instructional materials based on the learner needs and capabilities (Canare et al., 2024; Pecson & Romero, 2023; Pecson et al., 2024a; Pecson et al., 2024b), as well as in promoting contextualized and interactive learning materials (Pecson, 2014; Pecson, 2015) and self-paced learning materials for independent and meaningful learning (Pecson, 2020).

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