

Strengthening Academic Information Literacy (SAIL) and Information Literacy of Research Students

Mario B. Cagitla¹, Sheila E. Balid-Bordado²

¹Faculty, Hospitality Management Department, Mariners' Polytechnic Colleges, Inc., Naga City, Camarines Sur, Philippines

²Vice President, Digital Transformation/Director, Quality Assurance Office, Naga College Foundation, Inc., Naga City, Camarines Sur, Philippines

Abstract

Information literacy (IL) is an essential skill in this fast-paced and technology-driven era. Understanding students' IL status and how they identify, access, evaluate, and use information can help identify the support they need for their academic success. However, research on IL-focused modules for research students remains limited. This study developed the Strengthening Academic Information Literacy (SAIL) module to assist BSHM research students at Mariners Polytechnic Colleges, Inc., in improving their information-seeking skills. The study employed a descriptive-comparative method to analyze and interpret the collected data and utilized the ADDIE model for module development. Data were collected from 120 students using a researcher-made test for assessment and a researcher-made checklist for validation of the panel of experts. Statistical analysis included mean, weighted mean, standard deviation, proficiency level, paired t-test, and Cohen's D effect size. Findings revealed that the intervention module possessed a high curricular validity. Pre-test results indicated students' information literacy is at an approaching proficiency level with $M = 21.88$, $SD = 5.85$. Following the intervention, post-test scores ($M = 29.80$, $SD = 6.00$) demonstrated a statistically significant improvement on the students' IL, $t(119) = 23.10$, $p < .001$. The SAIL module proved highly effective, yielding a large effect size ($d = 1.34$) in enhancing the information literacy skills of the BSHM research students. The study concluded that structured, ADDIE-based interventions are essential in bridging academic information literacy in higher education.

Keywords: information literacy, academic intervention, research students

INTRODUCTION

Education plays an important role in nation building and individual well-being. As the global economy grows, competition in various industries becomes stronger, hence, education becomes a key source of competitive advantage in economic growth. In this particular context, the integration of technology and information literacy is crucial for students to survive in a tech-driven and knowledge-based economy. The 20th century marked and witnessed the extraordinary progress in technology, where the rapid growth in the use of information and communication technology offers various and advanced tools that support students' learning process. This shift is reflected in the Sustainable Development Goal 4 (SDG 4) of the United Nations, which aims to ensure inclusive and equitable quality education and promote lifelong

learning opportunities for all.

In the Philippines, the integration of technology into educational settings has become increasingly apparent, particularly with the rise of digital platforms. The transition to online learning and use of digital platforms in education highlighted the critical dependence of its users on the internet in acquiring necessary information for their learning. National initiatives like the Commission on Higher Education in collaboration with the Department of Education's integration of Media Information Literacy in the curriculum that aligns with the Republic Act No. 10929, the Free Internet Access in Public Places Act that supports equitable information access and digital inclusion, underscore the country's commitment to digital inclusion. Furthermore, as revealed in the 2023 Instructure survey, 83% of student participants primarily use generative AI for research and writing, which highlights the importance and the need for information literacy, specifically in the proficient and ethical use of such tools.

In spite of all these efforts, institutional challenges persist. Assessment in ICT classes at Mariners' Polytechnic Colleges, Inc. revealed a number of problems including difficulties in finding reliable sources, judging information credibility, synthesizing data, and creating coherent arguments. This lack of proficiency not only hampers their academic performance but also diminishes the students' readiness to the demands of the hospitality industry. While literature (Ngozi, 2024; Mokhtar et al., 2023; Ferrer, 2024) suggests that IL is an important determinant of academic success, there is a need for targeted, module-based interventions. This study addresses this gap by designing, developing, and implementing the Strengthening Academic Information Literacy (SAIL) module, a structured learning intervention designed to enhance information literacy skills that supports academic success and lifelong learning.

Research Objectives

This study determined the effect of the SAIL module on the information literacy of research students at Mariners' Polytechnic Colleges, Inc. Specifically, this study was guided by the following objectives: (1) Determine the status of information literacy in terms of identifying, accessing, evaluating, and using information. (2) Develop the SAIL module using the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). (3) Measure the level of students' information literacy after the intervention. (4) Determine the significant difference between literacy levels before and after the module. (5) Assess the overall effectiveness of the SAIL module in enhancing students' level of information literacy.

METHODOLOGY

This study employed a descriptive-comparative method. The descriptive method was used to profile the students' current research competencies (Syam and Ermawati, 2024), this was used to present the level of students' information literacy along with the identification, access, evaluation, and use of information. A comparative approach was applied to determine the significant difference between the learners' level of information literacy before and after the conduct of the Strengthening Academic Information Literacy (SAIL) module and to examine its effectiveness on the information literacy of BSHM research students. This comparative analysis served as the evaluation phase of the ADDIE model, measuring overall intervention effectiveness (Spatioti et al., 2022). The study used total enumeration, involving the entire population of Mariners' Polytechnic Colleges, Inc. BSHM research students ($N=120$), officially enrolled for academic year 2024-2025. This method allowed a thorough examination and analysis of the entire population, providing accurate estimates and averages for various parameters. To ensure instructional quality, the module was developed using the ADDIE Framework (Analysis, Design, Development,

Implement, Evaluate). Data were collected using a 40-item researcher-made test; validated for reliability (KR21 = 0.85) and curricular validity ($v=0.95$), and a Likert-scale evaluation checklist verified by a panel of experts.

Ethical Considerations

In the conduct of the study, the researcher was guided by the following ethical considerations:

Informed Consent. Participation was entirely voluntary. Participants were assured that all the data collected will be solely used for the purpose of the study and nothing more and were informed of their right to withdraw anytime without penalty.

Confidentiality and Anonymity. To protect student participants, all data were anonymized to ensure confidentiality and that no identifying details were disclosed in the final report. Access to raw data was restricted exclusively to the researcher and the statistician. All data, both physical and digital, was scheduled to be discarded through shredding upon the final completion of the study.

Respect for Persons. All student participants were treated fairly with dignity and respect regardless of their socioeconomic status, age, gender, or background.

Use of AI. The researcher used AI tools solely to refine grammar, organize contents, and summarize data. Moreover, no identifiable data was entered in the AI systems. All outputs were reviewed carefully to maintain the accuracy and non-bias of the results.

Compliance with Institutional Requirements. The research followed and complied with the institutional requirements to ensure the responsible conduct of the study.

RESULTS AND DISCUSSIONS

Status of Information Literacy among Research Students

As shown in table 2, the overall IL status of research students is at Approaching Proficiency level with a mean score of 21.88 and a proficiency level of 54.69.

Table 1: Status of Information Literacy of Research Students

Aspects	No. of Items	Mean	SD	PL	Int
Identifying information	10	5.84	2.05	58.42	AP
Accessing information	10	5.82	2.15	58.17	AP
Evaluating information	10	5.15	1.95	51.5	AP
Use of information	10	5.07	1.73	50.67	AP
Overall	40	21.88	5.85	54.69	Approaching Proficiency

Note. *M* = Mean; *SD* = Standard Deviation; PL = Proficiency Level (%); Int = Interpretation. Proficiency levels are based on the following scale: 75.0–100 (Proficient; P); 50.0–74.9 (Approaching Proficiency; AP); 25.0–49.9 (Developing; D); and 0.0–24.9 (Beginning; B).

The baseline data reveals a consistent approaching proficiency across all domains: identifying, accessing, evaluating, and using information, with an overall mean score of 21.88 with a corresponding proficiency level of 54.69, and a standard deviation of 5.85. This indicates that while students possess foundational skills, a noticeable gap is found when transitioning to more advance tasks and higher-order critical appli-

cation.

Identifying and Accessing Information. Students obtained the highest scores in identifying ($M=5.84$, $SD=2.05$, $PL=58.42\%$) and accessing ($M=5.82$, $PL=58.17\%$) information. These results suggest that students possess a surface-level familiarity with recognizing research needs. Krubu (2017) emphasized that identifying information needs is a primary attribute of literacy, in this area, students showed an approaching proficiency level, indicating that the students are developing this important attribute. However, the data contrast with the findings that students exhibit overconfidence in finding information, posing adequate competency in IL (Mercer et al., 2020; Michalak and Rysavy, 2016); instead, these students remain in Kuhlthau's Model of Information Search Process, emphasizing the principle of uncertainty, which occurs in the initial phase, limiting students' progress (Buba, 2021).

Furthermore, while students can navigate search engines, their variety remains limited. The reliance on convenience over quality (Hosier, 2015; Stebbing et al., 2019) indicates that students are more likely to favor the use of Google than accessing journals or scholarly databases; this may be due to their struggle with using Boolean operators, organizing literature, and locating appropriate sources of information (Bury, 2016; Maurer et al., 2017). From the perspective of Lillis and Scott's Information Literacy Identity Theory, students demonstrate weak information identity, suggesting a need for guidance in developing systematic search queries (Kiviluoto, 2015).

Evaluating and Using Information. Compared to the first two domains, a significant decline in student performances is evident. Evaluating Information ($M=5.15$, $SD= 1.95$, $PL=51.50\%$) and Using Information ($M=5.07$, $SD= 1.73$, $PL=50.67\%$) recorded the lowest scores among all the domains assessed. This deficiency hinders students' ability to verify information's reliability and accuracy. The data supports Geary (2021), who noted the lack of proficiency of college students in critical information literacy.

Using information was ranked as the lowest among all the aspects, indicating the difficulty in organizing and integrating various sources in their academic tasks. Moreover, data suggest that students struggle in synthesizing information ethically. This struggle leads to academic risks such as plagiarism or poor engagement in scholarly conversation (Mercado-Sierra & Northam, 2023); this reflects a lack of information efficacy, where students can identify and locate information but fail to integrate it in their own academic work.

With the presented findings, the consistent approaching proficiency status of students' IL across the four aspects points for structured and behavioral reinforcement. Thorndike's S-R Theory underscored the importance of refining students' information-seeking behavior through positive and consistent reinforcement within a structured module. Additionally, Bandura's Social Learning Theory suggests that this gap can be bridged through mentoring and modeling, where students can observe experts' information behaviors.

Strengthening Academic Information Literacy (SAIL)

Module as Intervention for Research Students

The development of the SAIL module followed key phases: Analysis, Design, Development, Implementation, and Evaluation.

Analysis Phase

This stage involved assessing and understanding the current level of information literacy among the BSHM research students. Identifying the gaps between what the students already know and what they should know was done in this stage. By conducting students' need assessment, through a pre-test, the

researcher identified a critical gap in the information literacy of the students. While they are approaching proficiency, the lowest score in using information suggested the need for more practical content. From the student performance analysis, the deficits of the students were identified and served as the basis for tailoring targeted intervention to be implemented.

Design Phase

Based on the pre-test results, SMART (Specific, Measurable, Attainable, Relevant, and Time-bound) objectives were developed for each competency targeted in the module. Each objective was directly mapped to a specific performance deficit to ensure a targeted intervention. The module was designed in a hierarchical and sequential manner, following a logical progression and ensuring that lessons and activities go from foundational concepts to advanced application. The module was divided into four distinct units, for each lesson, the specific content structure was defined. It includes introductory materials, core concepts, examples, practice activities, and formative assessments. The final evaluation instrument, moreover, was designed to see the learning gain of the students after completing the module.

Development Phase

This phase involved the actual creation of what has been outlined in the design phase, it is where the blueprint transitioned into a tangible learning material. It also ensures that the concepts and ideas do not just remain conceptual but be able to be implemented to drive learning.

- 1. Expert Validation.** To ensure quality, the module was subjected to a rigorous validation process. The panel of experts who evaluated the module includes the program chair, research instructors, and ICT teachers. As shown in Table 2, the overall curricular validity of the module obtained an average weighted mean of 3.72, interpreted as Very High Valid (VHV).

Table 2: Curricular Validity of SAIL Module

Aspects	Average WM	Int
Face	3.81	VHV
Construct	3.69	VHV
Content	3.65	VHV
Overall Average Weighted Mean	3.72	VHV

Note. WM = Average Weighted Mean. VHV = Very High Valid. Validation was conducted by a panel of experts, including the program chair, research instructors, and ICT teachers.

2. Evaluation of Curricular Dimensions

Face Validity. This was ranked the highest among all the curriculum validity, obtaining an average weighted mean of 3.81. It confirms the module’s clarity and structural appeal. This face validity is aligned with Bandura’s Social Learning Theory, noting that an instrument with high face validity can boost the individual’s self-efficacy in completing the task. Conversely, as noted by Ruijter et al. (2025), relevance and understandability are vital for instrument acceptance.

Construct Validity. This aspect obtained a mean score of 3.69, which corresponds to a very high valid interpretation. This indicates that the module effectively connects to real-life situations using clear and simple language. This aligns with Lillis and Scott’s Information Literacy Identity Theory, which suggests that curricula must build students’ confidence and self-perception as capable information users. Strong

construct validity ensures that the instrument genuinely assesses the construct it aims to measure (Sang et al., 2025; Stone, 2019).

Content Validity. The content validity of the SAIL module obtained an average weighted mean of 3.65, interpreted as Very Highly Valid. While indicators for Higher-Order Thinking Skills (HOTS) were rated lower with, 3.20 rating, they remain highly valid. According to Bhandari (2023), valid content must possess three key characteristics: relevance, depth, and breadth. Furthermore, Thorndike’s S-R Theory emphasized that content must reinforce foundational learning behaviors to further enhance the four aspects of information literacy.

Implementation Phase

The implementation phase marks the transition of the fully developed and tested SAIL Module from the development environment to a setting where the target BSHM research students would engage with it, bridging the gap between Approaching Proficiency and Proficient by providing a structured and self-paced learning environment. Following Thorndike’s S-R Theory, the SAIL module served as a controlled stimulus designed to bring out specific literacy behaviors. Students engaged with the hierarchical units, moving from basic to identification to complex ethical usage of information. Moreover, the instructor involvement is supported by Bandura’s Social Learning Theory where students learn through observation and modelling. This phase ensured that the students’ weak information identity identified in the analysis phase began to transition into a more academically confident persona.

Evaluation Phase

The evaluation phase is the culmination of the development process. This focused on the measurement of the impact of the SAIL module on the information literacy of the BSHM research students. This phase addressed the fundamental research question about the effectiveness of the targeted intervention.

Information Literacy of Research Students after the Conduct of the Intervention

Presented in table 3, the post-test result revealed a significant shift in the student’ information literacy. The overall mean score rose to 29.8 with a corresponding proficiency level of 74.5%. indicating that students are now in the threshold of full proficiency.

Table 3: Status of Information Literacy of Research Students after the Intervention

Aspect	Ni	Mean	SD	PL	Int
Identifying information	10	7.6	1.97	76	P
Accessing information	10	7.53	1.87	75.25	P
Use of information	10	7.44	1.86	74.42	AP
Evaluating information	10	7.23	1.82	72.33	AP
Overall	40	29.8	6	74.5	AP

Note. M = Mean; SD = Standard Deviation; PL = Proficiency Level. The interpretation codes P and AP likely correspond to Proficient and Approaching Proficiency, respectively.

Identifying and Accessing Information. Identifying Information obtained a mean score of 7.6, an SD of 1.97 and a 76 proficiency level, while Accessing Information yielded a mean score of 7.53, 75.25

proficiency level, and a standard deviation of 1.87. These emerged as the strongest competencies and successfully transitioned to full proficiency. This gain suggests that the SAIL module’s emphasis on clarifying research needs and search and retrieval strategies was effective. These findings align with ACRL (2015) and Krubu (2017), confirming that information literate students know how to recognize when the information is needed.

The significant improvement in accessing information indicates that students have moved beyond convenience-based searching and developed more systematic searching strategies, such as using Boolean operators and academic repositories (Bramer et. al, 2018). Furthermore, Shen (2016) and Meena (2024) observed the improvement in students’ accessing abilities from different sources following the implementation of library IL programs. These can be traced through Bandura’s Social Learning Theory, that this proficiency in accessing information resulted from the module’s modeling of expert search behaviors, which replaced the basic search habits with a more scholarly navigating skill.

Evaluating and Using Information. Although these two domains remain in the approaching proficiency status, a significant improvement in students’ post-test scores was recorded. Evaluating information yielded a 7.23 mean score and a proficiency level of 73.33, while using information obtained a mean score of 7.44, a proficiency level of 72.33. The evaluation of information although scored the lowest, benefitted from the introduction of CRAAP and SIFT methods, closely bridging the gap in critical assessment. This continued challenge reflects the findings of McGrew et. al, (2018) and Gracia et. al, (2020) that even after the intervention, students still struggle in evaluating information, highlighting the importance of consistent and effective intervention.

Moreover, using information scores suggests that students are nearing proficiency but still demonstrate minor inconsistencies. According to Thorndike’s S-R Theory, to be able to achieve full proficiency, it requires continued behavior reinforcement and repeated stimuli. As Lillis and Scott’s Identity Theory posits, these students are currently integrating their scholarly identity; they are no longer casual users but are still refining the confidence needed to synthesize complex arguments (Bacarrisas, 2023).

Strengthening Academic Information Literacy (SAIL) as Information Literacy Intervention for Students

The paired t-test was used to determine a difference between the level of information literacy of the students before and after the conduct of the developed strengthening academic information literacy (SAIL) module. Reflected in table 5 was the result of the t-test on the difference between the students’ level of information literacy before and after the conduct of the designed material. The overall weighted mean, t-statistic value, and verbal interpretation are also reflected in Table 5. The significance level applied in the t-test is 5% for the two-tailed test.

Table 4: Significant Difference between Level of Information Literacy Skills before and after the conduct of SAIL Module

Assessments	Items	Mean	SD	t-Statistic	df	p	Interpretation
Pre-test	40	21.88	5.85	23.103	119	<.001	Significant
Post-test	40	29.8	6				

Note. N=120. The t-statistic represents the comparison between pre-test and post-test means. Test of significance was performed at the $\alpha=.05$ level.

The results in table 5 show the pre-test recorded a mean score of the students at 21.88 and subsequently increased to a 29.80 mean score in the post-test. A computed t-statistics of 23.103 corresponds to a $p < .001$ which is substantially lower at the significance level of alpha 0.05. This confirms a significant difference between pre-test and post-test scores. The data suggests that the improvement is not due to chance but the direct effect of the intervention provided.

These findings are consistent with the work of Fredy et. al (2020) who emphasized the value of structured IL modules for developing students' IL skills and for carrying out academic milestones such as research proposals and theses. Additionally, the significant improvement observed mirrors the reports of Zhang et al. (2015) and Juhela et al. (2019), modular and problem-based IL modules improve the practical IL usage. Furthermore, positive outcomes seen in various information literacy instructional formats ranging from integrated courses (Lockhart, 2015; Jessy et al., 2016; Shamsaee et al., 2021) to asynchronous IL intervention (Wegener, 2021).

Given the results, it can be inferred that the module is a valuable tool for developing the critical information skills. Furthermore, this result supports the principles of Stimulus-Response Theory by Thorndike. The SAIL Module acted as the stimulus designed to encourage change in behavior of the students in terms of identifying, accessing, evaluating, and using information, and the increase in the scores represents the response to the stimulus, showing that contains specific learning objectives, content, activities, and assessment that addressed the needs of the students and offered clear feedback. Furthermore, the SAIL module posed authentic academic tasks and served as a tool to nurture the academic identity and information literacy of the students which is consistent with the idea of Lillis and Scott's Information Literacy Identity Theory. Additionally, the integration of collaborative activities reflects Bandura's Social Learning Theory, where shared knowledge and peer modeling are vital in reinforcing the learning process.

Effectiveness of the Intervention to the Information Literacy of Research Students

To determine its extent of influence on the level of information literacy among students using Cohen's d. As shown in table 5, the difference in the overall mean scores, from a pre-test mean score of 21.88 to a post-test mean of 29.8, yielded an effect size of 1.34, interpreted as a large size.

Table 5: Level of Effectiveness of SAIL Module in Enhancing the Information Literacy of Students

Assessments	Items	Mean	SD	Cohen's D Effect Size	Interpretation
Pre-test	40	21.88	5.85	1.34	Large Effect
Post-test	40	29.8	6		

Note. N=120. Effect size interpretation is based on Cohen's d ranges: ≥ 0.80 (Large), 0.50–0.79 (Medium), 0.20–0.49 (Small), and 0.00–0.19 (Trivial).

The large effect size indicates that the SAIL module did not just improve test scores, but it enhanced the students' information literacy. The findings are consistent to the works of Zhao et al. (2023) and Hebert et al. (2022), who observed that students with information literacy trainings not only scored higher in their tests but also immediately applied their skills and knowledge in their professional coursework. Furthermore, Bonnet et al. (2018) highlighted the significant improvement in the students' post-test scores

after using active learning techniques in information literacy instructions. This result highlights the effectiveness of information literacy training to enhance students' IL skills.

The shift from basic searching to in-depth database exploration, which was facilitated by the module is echoed by Amsberry and Behler (2024). The transition from a casual user to a systematic researcher was supported by Maulidiyah et al. (2024), who described e-modules as an efficient tool for improving the understanding of informatics materials, developing computational thinking skills, and improving the student's digital literacy, including the ability to access, evaluate, and use information in digital form.

The significant increase in the students' mean scores observed in the results demonstrates the efficacy of the module. The large effect size strongly validates the principles of Thorndike's Stimulus-Response Theory, suggesting that the module as a stimulus possesses an instructional design that provides consistent and positive reinforcement to foster positive behaviors in the aspects of information literacy. Additionally, aligned with Lillis and Scott's Information Literacy Identity Theory, effective interventions help students develop confidence in finding needed information and perceive themselves as capable information users. This development can be enhanced further when the intervention is coupled with activities that foster collaboration, observations, and peer learning, like the ideas in Bandura's Social Learning Theory.

CONCLUSIONS

1. The overall assessment of the results indicates that the information literacy skills of the research students are under the approaching proficiency level.
2. Developed using the ADDIE model, the learning module proved to be statistically valid and effective for enhancing students' IL. While design and evaluation obtained high curricular validity, post-implementation revealed that students excelled in identifying and accessing information but struggled in evaluating and using information. The intervention marked improvement in the student's literacy, demonstrating that an ADDIE-aligned approach effectively addresses key instructional gaps.
3. The study confirms the significant difference between the students' level of information literacy before and after the conduct of the intervention. Thus, the hypothesis was accepted.
4. The intervention obtained a large effect size, indicating high effectiveness. Cohen's D size, considered large, supports the hypothesis that the intervention positively influences information literacy.

RECOMMENDATIONS

1. To move students from approaching to full proficiency, strategies like developing targeted learning and training modules, integrating information literacy across the curriculum, and promoting and enhancing library resources and services shall be implemented.
2. The Strengthening Academic Information Literacy (SAIL) module may be adopted as supplementary material in enhancing the students' information literacy. Teachers are encouraged to improve and develop their own version of this tool to meet the specific needs of their learners.
3. Priority should be given to strengthening the abilities of the students in critically evaluating and effectively utilizing information. This can be achieved through specialized workshops, specialized sessions, practical exercises, peer-mentoring and consistent feedback focused specifically in higher-order thinking skills.
4. Given the significant improvement observed, this intervention should be institutionalized as a core component of the research curriculum. Making it a standard requirement will ensure all research students benefit from improved literacy outcomes.

5. Because the intervention exhibited a substantial effect size, it warrants continued implementation and potential expansion. Further research was essential to comprehensively evaluate the long-term impacts of this intervention and identify specific areas where refinements could further enhance its effectiveness and ensure its sustainability.

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