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Development and Preliminary Evaluation of an Ice-Breaking-Integrated Archival Management Module in Two Vocational High Schools

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ABSTRACT

Purpose: This study developed an ice-breaking-integrated Archival Management module and preliminarily evaluated its validity, practicality, and association with changes in students' motivation and learning outcomes. **Methods:** This ADDIE-based research and development study employed a single-group pre-experimental pretest–posttest design. Participants were 58 students from two purposively selected intact Grade XI Office Management and Business Services classes at two public vocational schools in Mamuju Regency. Product evaluation involved two content experts, two media experts, and two vocational teachers. Data were collected using expert validation sheets, student and teacher practicality questionnaires, a 20-item motivation questionnaire, and learning-outcome tests. Descriptive statistics, paired-samples *t*-tests, and N-Gain analysis were employed. **Findings:** Content and media validity reached 96.92% and 97.20%, respectively. Student and teacher practicality ratings were 89.71% and 94.00%. Motivation increased from $M = 65.93$ ($SD = 1.58$) to $M = 91.36$ ($SD = 1.85$), with a mean increase of 25.43, $t(57) = 82.49$, $p < .001$. Learning outcomes increased from $M = 53.10$ ($SD = 9.41$) to $M = 87.17$ ($SD = 8.13$), $t(57) = 24.47$, $p < .001$. The mean N-Gain was 0.73, and 96.55% of students achieved mastery. **Research Implications:** The module may support active Archival Management learning. However, purposive sampling, the two-school setting, and the absence of a comparison group prevent causal conclusions. **Originality:** Ice-breaking activities were embedded directly within the module's instructional sequence rather than implemented separately.

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INTRODUCTION

Vocational education is expected to prepare students not only with conceptual knowledge but also with technical competencies, professional attitudes, and readiness to perform workplace-related tasks. Accordingly, vocational learning should provide contextual, practical, and participatory experiences that connect subject matter with occupational practices. Student engagement is particularly important because attention, active participation, and psychological readiness influence how students acquire and apply vocational competencies. Teacher support and positive educational relationships have also been associated with stronger engagement among vocational students (Lu et al., 2022). Therefore, vocational instructional materials should function not merely as sources of information but also as structured learning resources that promote active participation and meaningful competency development.

Archival Management is an essential component of the Office Management and Business Services curriculum, developing students' competencies in storing, retrieving, maintaining, retaining, and disposing of both manual and digital records. These competencies require accuracy, systematic work, and the practical application of administrative procedures rather than the mere recall of concepts. Accordingly, previous studies have explored technology-supported approaches to archival instruction. Permansah et al. (2023), for example, examined simulation-based learning supported by e-archive technology using a quasi-experimental pretest–posttest control-group design. Similarly, Trinoviorar et al. (2024) developed an augmented-reality-based e-module to facilitate interactive archival learning and improve students' learning outcomes.

Nevertheless, a preliminary inquiry conducted on August 4, 2025, at UPTD SMK Negeri 1 Mamuju indicated a need for more varied instructional materials. The inquiry involved an observation of one Archival Management class, Grade XI MPLB A, a review of the instructional documents used in the class, and an interview with the head of the Office Management and Business Services program. The classroom observation and interview indicated that instruction remained predominantly content-oriented, the available materials provided limited interactive activities, and students' participation and enthusiasm were perceived as suboptimal. Grade XI MPLB A was subsequently involved in the product trial stages but was not included in the implementation sample, which comprised 58 students from two different intact classes at two vocational high schools. Because no student survey or quantitative baseline measurement was administered during the preliminary inquiry, these findings are presented as contextual qualitative evidence rather than estimates of the prevalence of boredom or low motivation. Nevertheless, they indicated a practical need for an instructional module that combines systematic archival content with activities designed to support students' readiness, attention, and participation.

Instructional modules organize learning objectives, content, activities, exercises, reflection, and assessment into a coherent sequence that supports guided and independent learning (Famulaqih and Lukman, 2024). Erita (2022) demonstrated that systematically developed interactive modules can meet validity and practicality criteria while supporting student-centred learning. However, previous archival modules have largely focused on digital features, simulations, product feasibility, and cognitive outcomes, while their role in systematically fostering students' motivation, engagement, and active participation remains underexplored.

Ice-breaking activities offer one possible strategy for addressing these dimensions. Previous studies have examined ice breaking in English, Arabic, and economics learning and reported associations with reduced boredom and improvements in learning readiness, motivation, concentration, and participation (Nugraha et al., 2025) However, the studies reviewed generally positioned ice breaking as a situational teaching technique, an opening activity, or a classroom energizer. They did not develop ice-breaking activities as components embedded throughout the instructional sequence of an Archival Management module. Thus, the literature provides evidence concerning the classroom use of ice breaking and, separately, the development of interactive archival learning media, but provides limited evidence concerning the systematic integration of the two approaches.

The proposed integration can be explained through affective regulation and Self-Determination Theory. The control-value theory of achievement emotions explains that boredom and enjoyment can influence students' attention, engagement, and achievement-related behaviour (Tze et al., 2022) . Brief and purposeful changes in classroom activities may interrupt monotony, reduce negative affect, and help students redirect their attention to learning tasks. Self-Determination Theory further suggests that learning environments supporting competence, autonomy, and relatedness can strengthen autonomous motivation and engagement (Bureau et al., 2022) When aligned with learning objectives, interactive ice-breaking activities may provide manageable challenges, opportunities for participation, immediate feedback, and positive peer interaction. These experiences may support students' psychological readiness and motivation, which may subsequently facilitate engagement with archival content and learning tasks. This proposed mechanism serves as a theoretical rationale rather than evidence that ice-breaking activities alone cause improvements in learning outcomes.

The research gap lies at the intersection of two bodies of research. The archival learning studies reviewed in this study developed digital applications, simulations, and interactive modules but did not explicitly embed affective-regulation activities within the modules' instructional sequences. Conversely, the ice-breaking studies reviewed generally examined stand-alone classroom activities rather than ice-breaking activities embedded within systematically developed archival teaching materials. The specific contribution of the present study is the development of an Archival Management module in which ice-breaking activities are embedded at selected instructional stages, including learning preparation, content reinforcement, and reflection. The module was evaluated for validity and practicality and preliminarily examined for within-group changes in students' learning motivation and Archival Management learning outcomes. Accordingly, this study aimed to develop and preliminarily evaluate an ice-breaking-integrated Archival Management module for vocational high schools. The study addressed the following research questions:

1. To what extent does the module meet the validity criteria based on content- and media-expert assessments?
2. To what extent is the module practical according to teachers' and students' assessments?
3. Are there significant within-group changes in students' learning motivation after using the module?
4. To what extent do students' Archival Management learning outcomes change from pretest to posttest after using the module?.

METHOD

Research Design and Sampling

This study employed a Research and Development (R&D) approach using the ADDIE model, comprising Analysis, Design, Development, Implementation, and Evaluation. The model guided the systematic development and refinement of an ice-breaking-integrated Archival Management module through needs analysis, product design, expert validation, staged product trials, classroom implementation, and evaluation. The preliminary evaluation employed a pre-experimental one-group pretest–posttest design. Students' learning motivation and Archival Management learning outcomes were measured before and after instruction using the developed module. The research design is presented in Table 1.

Table 1. One-Group Pretest–Posttest Design

Pretest	Treatment	Posttest
O_1	X	O_2

Note.
O_1, represents the pre-intervention measurement of learning motivation and Archival Management learning outcomes;
X, represents instruction using the ice-breaking-integrated Archival Management module;
O_2, represents the corresponding post-intervention measurement.

Because the design included neither random assignment nor a comparison group, the observed pre–post differences were interpreted as preliminary evidence of within-group changes rather than causal effects attributable exclusively to the module. Potential threats to internal validity, including testing, maturation, teacher-related influences, and product novelty, could not be fully controlled.

The study was conducted in the Office Management and Business Services programs at UPTD SMK Negeri 1 Mamuju and UPTD SMK Negeri 1 Tapalang during the 2025/2026 academic year. The implementation sample was determined through two stages. First, purposive sampling was used to select two intact classes based on their alignment with the research objectives and implementation requirements. The eligibility criteria at the class level included: (1) Grade XI Office Management and Business Services classes; (2) current participation in Archival Management instruction; (3) curricular learning outcomes comparable across the two schools; (4) no previous participation in the product trials; and (5) institutional and teacher support for implementation.

Based on these criteria, Grade XI MPLB B at UPTD SMK Negeri 1 Mamuju and Grade XI MPLB at UPTD SMK Negeri 1 Tapalang were selected. The former was selected because its Archival Management content, instructional schedule, and teacher availability were compatible with the implementation plan. The latter represented the same grade level and study program and followed comparable Archival Management learning outcomes.

Second, total sampling was applied within the two selected intact classes; therefore, all students in both classes were included. The implementation involved 33 students from Grade XI MPLB B at UPTD SMK Negeri 1 Mamuju and 25 students from Grade XI MPLB at UPTD SMK Negeri 1 Tapalang, resulting in a total of 58 participants, as presented in Table 2.

Table 2. Distribution of Implementation Participants

School	Class	Class- selection procedure	Participants
UPTD SMK Negeri 1 Mamuju	XI MPLB B	Purposive selection of an intact class	33
UPTD SMK Negeri 1 Tapalang	XI MPLB	Purposive selection of an intact class	25
Total			**58**

At the student level, participants were included when they: (1) were registered as active students in one of the selected classes; (2) were studying Archival Management; (3) had not participated in the preceding product trials; (4) participated in the module-based instructional activities; and (5) completed the pre- and post-intervention measurements of learning motivation and Archival Management learning outcomes. All 58 participants completed both measurement occasions; consequently, no cases were excluded because of missing data.

Participants in the preliminary evaluation were distinct from those involved in the preceding product trials. The preliminary inquiry and staged product trials were conducted in Grade XI MPLB A at UPTD SMK Negeri 1 Mamuju, whereas the preliminary evaluation involved Grade XI MPLB B at UPTD SMK Negeri 1 Mamuju and Grade XI MPLB at UPTD SMK Negeri 1 Tapalang. Thus, none of the 58 implementation participants had previously been exposed to the trial versions of the module.

Product Development and Trial Procedures

The product was developed through the five ADDIE stages. The Analysis stage identified instructional needs through classroom observation, an interview with the head of the Office Management and Business Services program, and a review of instructional documents. During the Design stage, the learning outcomes, Archival Management content, exercises, assessments, and ice-breaking activities were organized into a structured instructional sequence. In the Development stage, the initial module was reviewed by two subject-matter experts and two media experts and revised according to their recommendations before undergoing staged product trials.

The trials were conducted in Grade XI MPLB A at UPTD SMK Negeri 1 Mamuju using a selected section of the module. The class comprised 32 students, who were allocated to three mutually exclusive trial stages based on their previous achievement scores. The one-to-one trial involved three purposively selected students representing high, moderate, and low achievement levels. The small-group trial involved nine different students, and the large-group trial involved the remaining 20 students. None of these participants was included in the subsequent preliminary evaluation involving 58 students from two other classes.

The trials were completed over three weeks in seven meetings, totalling 21 instructional periods of 45 minutes each. The researcher conducted the instructional activities, while the subject teacher participated as a practitioner respondent by completing the teacher-practicality questionnaire. As the researcher implemented the instruction directly, no separate teacher training was required. An observation sheet was used to document the implementation of the module procedures and integrated ice-breaking activities. The trial procedures are summarized in Table 3.

Table 3. Staged Product-Trial Procedures

Stage	Participants	Duration	Procedure and evaluation focus
One-to-one trial	3	1 meeting (3 periods)	Module reading, exercises, one ice-breaking activity, and evaluation of clarity, readability, appearance, and ease of use
Small-group trial	9	2 meetings (6 periods)	Module-based learning, exercises, ice-breaking activities, and evaluation of initial practicality, comprehensibility, attractiveness, and usability
Large-group trial	20	4 meetings (12 periods)	Module implementation in a broader classroom setting and evaluation of overall practicality and instructional usability

After each trial, students completed a 30-item practicality questionnaire and a 20-item learning-motivation questionnaire. The practicality questionnaire covered content, language, interest, ease of use, presentation attractiveness, and perceived usefulness, with responses recorded on a five-point Likert scale ranging from 1 (*not appropriate*) to 5 (*highly appropriate*). All questionnaire responses were complete. The module was sequentially revised by incorporating case-based elements into the ice-breaking activities after the one-to-one trial, simplifying the activity instructions after the small-group trial, and adjusting the duration of the ice-breaking activities after the large-group trial.

Intervention and Implementation Procedures

The preliminary evaluation involved 58 students from two vocational high schools. The researcher delivered the instruction in both schools using the same final module, learning objectives, content, ice-breaking procedure, and research instruments. Each school received nine 45-minute instructional periods, although the meetings followed the regular schedule of each school. Implementation at UPTD SMK Negeri 1 Mamuju comprised three three-period meetings, while UPTD SMK Negeri 1 Tapalang conducted one four-period and one five-period meeting (Table 4).

Table 4. Implementation Schedule

School	Date	Duration	Main activities
UPTD SMK Negeri 1 Mamuju	March 2, 2026	3 periods	Baseline motivation questionnaire, pretest, module orientation, and introduction to Records Use
	March 6, 2026	3 periods	Module-based instruction, exercises, and integrated ice-breaking activity
	March 16, 2026	3 periods	Completion of instruction, posttest, final motivation questionnaire, and practicality questionnaires
UPTD SMK Negeri 1 Tapalang	April 6, 2026	4 periods	Baseline motivation questionnaire, pretest, module orientation, and introduction to Records Use
	April 8, 2026	5 periods	Module-based instruction, exercises, integrated ice-breaking activity, posttest, final motivation questionnaire, and practicality questionnaires

Note. One instructional period was equivalent to 45 minutes; each school received nine instructional periods.

The instructional content focused on Records Use, particularly archival equipment and supplies. The *Who Am I?* activity was embedded as a 10–20-minute reinforcement exercise after the content presentation. Students individually identified an archival tool or supply placed inside a closed box through touch without seeing it and then stated its name or function. Therefore, the activity reinforced the learning content rather than functioning merely as an unrelated classroom energizer.

The subject teachers assisted with classroom coordination, clarified questionnaire instructions when required, and completed the teacher-practicality questionnaire after implementation. Before implementation, the researcher discussed the module objectives, instructional sequence, activities, and data-collection procedures with the teachers. Because the researcher was the primary instructor in both schools, formal teacher training was not required.

Implementation consistency was supported through standardized instructional procedures, teaching schedules, and complete data-administration records. Both schools received the same researcher-led instruction, module, content, instruments, ice-breaking procedure, and total instructional time; therefore, their data were combined for the preliminary within-group analysis. Formal independent fidelity scoring was not undertaken.

Research Instruments and Measurement

Data were collected using observation sheets, product-validation instruments, student and teacher practicality questionnaires, a learning-motivation questionnaire, achievement tests, and documentation guidelines. The observation sheets were used to record the learning process and module implementation. The product-validation instruments assessed the content and media feasibility of the developed module, whereas the practicality questionnaires evaluated its usability from the perspectives of students and teachers.

The learning-motivation questionnaire consisted of 20 positively worded items measuring four dimensions: enjoyment, activeness, involvement, and enthusiasm. Each item was rated on a five-point Likert scale. The same questionnaire was administered before and after module implementation to measure students' motivation consistently across the two measurement occasions. Because all items were positively worded, reverse scoring was not required.

The achievement tests measured students' mastery of Archival Management competencies. The pretest and posttest consisted of different questions to minimize recall effects; however, both were developed from the same competency indicators and assessed comparable learning content. Students' test results were converted to a scale ranging from 0 to 100.

Before use, six data-collection instruments were independently reviewed by two instrument validators using nine assessment criteria rated on a four-point scale. The reviewed instruments included the observation sheet, media-feasibility instrument, content-feasibility instrument, practicality questionnaire, learning-motivation questionnaire, and documentation guideline. Content validity was calculated using Aiken's V:

$$V = \frac{\sum(r - l_o)}{n(c-1)}$$

The Aiken's V coefficients ranged from .852 to 1.000, with an overall coefficient of .920, indicating strong evidence of content validity. The overall validator-assessment percentage was 93.98%. All instruments were revised in accordance with the validators' comments before being used in the trial and implementation stages

Table 5. Content validity of the research instruments

Instrument	Validity (%)	Aiken's V
Observation sheet	94.44	.926
Media-feasibility instrument	91.67	.889
Content-feasibility instrument	97.22	.963
Practicality questionnaire	91.67	.889
Learning-motivation questionnaire	88.89	.852
Documentation guideline	100.00	1.000
Overall	**93.98**	**.920**

The internal consistency of the 20-item learning-motivation questionnaire was subsequently examined using responses from 20 students participating in the large-group trial. Cronbach's alpha was used to estimate internal consistency. Item-level diagnostics included corrected item–total correlations and Cronbach's alpha if item deleted. The reliability coefficient and item-diagnostic results are reported in the Results section.

Data Analysis

Descriptive statistics were used to summarize product validity, practicality, learning motivation, and achievement. Pre- and post-implementation motivation and achievement scores were compared using paired-samples *t*-tests. Before the analyses, the distributions of the paired difference scores were examined through skewness values and outlier inspection to assess the normality assumption. Achievement improvement was also evaluated using the normalized gain (N-Gain). The N-Gain score was calculated individually for each student using the following formula:

$$N\text{-Gain} = \frac{\text{posttest} - \text{pretest}}{\text{maximum score} - \text{pretest}}$$

The individual N-Gain scores were subsequently averaged to describe the overall improvement in learning achievement. Each student's N-Gain score was classified according to the criteria presented in Table 6. Scores ranging from .70 to 1.00 were categorized as high, scores from .30 to below .70 as moderate, and scores from .00 to below .30 as low.

Table 6. N-Gain Classification Criteria

N-Gain score(g)	Category
$0.70 \leq g \leq 1.00$	High
$0.30 \leq g \leq 0.70$	Moderate
$0.00 \leq g \leq 0.30$	Low

Source: Riduwan (as cited in Hendrawansyah et al., 2022).

Statistical significance was set at $\boldsymbol{p < .05}$. Because the study employed a single-group pre-experimental design without random assignment or a comparison group, statistically significant differences were interpreted as preliminary within group improvements rather than definitive evidence of causal effects**.**

Ethical Considerations

Administrative permission was obtained from both participating schools, UPTD SMK Negeri 1 Mamuju and UPTD SMK Negeri 1 Tapalang, for the research conducted from 12 February to 12 April 2026. Participants were informed about the research procedures, the voluntary nature of their participation, and the confidentiality of their data. Student identities were anonymized using identification codes, and all collected data were kept confidential and used solely for research purposes.

RESULTS

Analysis and Product Revision

The needs analysis indicated that students required more engaging and systematically structured learning materials for Archival Management. The main needs concerned clearer learning instructions, practical exercises, attractive visual presentation, and activities that could maintain students' attention. These findings guided the development of a module in which ice-breaking activities were integrated directly into the instructional sequence. Expert feedback and formative evaluation resulted in several product revisions, including clarification of the learning instructions, addition of case-based exercises, improvement of the visual presentation, and adjustment of the duration and placement of the ice-breaking activities. The individual, small-group, and large-group formative trials yielded practicality scores of 84%, 81%, and 80%, respectively. The large-group formative trial involved 20 students and was conducted before the main implementation stage. Responses from these 20 students were also used to examine the internal consistency of the 20-item learning-motivation questionnaire. The results of these formative trials informed the final revision of the module before its implementation in the two intact classes involving 58 students. Because item-level frequencies from the 15-item needs-assessment questionnaire, interview transcripts, and direct observation quotations were unavailable in the analyzed dataset, no frequencies or verbatim quotations were reported to avoid unsupported claims.

Validity and Reliability of the Research Instruments

The six data-collection instruments demonstrated strong content-validity evidence, with Aiken's V coefficients ranging from .852 to 1.000 and an overall coefficient of .920. The overall validator-assessment percentage was 93.98%. All instruments were revised based on the validators' comments before data collection. The 20-item learning-motivation questionnaire demonstrated good internal consistency in the large-group trial (n = 20), with Cronbach's α = .841. Corrected item–total correlations ranged from .003 to .700. Six items. Items 1, 3, 8, 9, 13, and 18 had corrected item–total correlations below .30 and were therefore reviewed for content and wording. Item 8 had the lowest corrected

item–total correlation (r = .003), and its deletion would slightly increase Cronbach's α to .857. Given the limited trial sample and the theoretical relevance of the items, all 20 items were retained for the implementation stage.

Product Validity

The module was evaluated by two content experts and two media experts. Content validation obtained an overall score of 96.92%, whereas media validation obtained 97.20%. Both results were classified as very valid

Table 7. Content and media validation results

Validation component and aspect	Assessors	Items	Mean	SD	Minimum	Maximum	Percentage
Content validation	2	26	4.85	0.00	4.85	4.85	96.92%
Relevance	2	10	4.70	0.14	4.60	4.80	94.00%
Completeness of presentation	2	6	5.00	0.00	5.00	5.00	100.00%
Language suitability	2	10	4.90	0.14	4.80	5.00	98.00%
Media validation	2	25	4.86	0.03	4.84	4.88	97.20%
Efficiency	2	10	4.90	0.14	4.80	5.00	98.00%
Visual appearance	2	15	4.83	0.14	4.73	4.93	96.67%

Content and media validation also produced Aiken's V coefficients of 0.962 and 0.965, respectively. Exact agreement was 76.92% between the content experts and 72.00% between the media experts. The corresponding weighted kappa coefficients were 0.114 and −0.159. The low kappa coefficients were considered together with the high exact agreement and Aiken's V values because the expert ratings were concentrated in categories 4 and 5 and most disagreements involved only one adjacent category. The validators' qualitative comments resulted in clearer instructions, improved case-based activities, refinement of visual elements, and adjustment of the duration and placement of the integrated ice-breaking activities.

Product Practicality

Following the formative trials and final product revision, the practicality of the revised module was evaluated during the main implementation stage. This evaluation involved 58 students who completed a 30-item practicality questionnaire and two vocational teachers who completed a 15-item questionnaire. The main implementation evaluation was distinct from the earlier large-group formative trial involving 20 students, which produced a preliminary practicality score of 80%. Thus, the 80% score represented formative evidence used to revise the module, whereas the results reported in Table 7 represent the practicality of the final revised module during its implementation in two intact classes. During the main implementation, the complete student responses produced a total score of 7,805 out of a maximum possible score of 8,700, corresponding to an overall practicality percentage of 89.71% and classified as very practical. The 30-item student practicality questionnaire also demonstrated acceptable internal consistency, with Cronbach's α = .724. The two teachers provided an overall practicality rating of 94.00%, which was also classified as very practical.

Table 8. Student and teacher practicality results

Respondents and aspect	n	Mean	SD	Minimum	Maximum	Percentage	Category
Students-overall	58	4.49	0.17	4.30	5.00	89.71%	Very practical
Content	58	4.79	0.34	3.60	5.00	95.79%	Very practical
Language	58	4.42	0.28	4.00	5.00	88.41%	Very practical
Attractiveness	58	4.71	0.24	3.60	5.00	94.14%	Very practical
Ease of use	58	4.02	0.34	3.60	5.00	80.41%	Practical
Presentation	58	4.37	0.48	3.60	5.00	87.45%	Very practical
Usefulness	58	4.60	0.26	4.00	5.00	92.07%	Very practical
Teachers-overall	2	4.70	0.14	4.60	4.80	94.00%	Very practical
Ease of use	2	4.70	0.14	4.60	4.80	94.00%	Very practical
Attractiveness	2	4.70	0.14	4.60	4.80	94.00%	Very practical
Usefulness	2	4.70	0.14	4.60	4.80	94.00%	Very practical

Among the student-rated aspects, content received the highest practicality rating (95.79%), followed by attractiveness (94.14%) and usefulness (92.07%). Ease of use received the lowest rating (80.41%); nevertheless, it remained within the practical category. The teacher ratings were consistently high across ease of use, attractiveness, and usefulness,

with each aspect receiving 94.00%. Overall, these findings indicate that the final revised module was considered practical by both students and teachers for use in Archival Management instruction.

Change in Learning Motivation
Learning motivation was analyzed separately from learning achievement. The mean motivation score increased from 65.93 ($SD = 1.58$) before implementation to 91.36 ($SD = 1.85$) after implementation. The mean paired increase was 25.43 points, 95% CI [24.81, 26.05].

Table 9. Pre–post change in learning motivation

n	Pretest M (SD)	Posttest M (SD)	Mean increase (95% CI)	$t(df)$	p	Cohen's d_z
58	65.93 (1.58)	91.36 (1.85)	25.43 [24.81, 26.05]	82.49 (57)	<.001	10.83

The result indicated a statistically significant increase in motivation within the studied group. However, $d_z = 10.83$ is unusually large for educational research. Therefore, this estimate must be interpreted cautiously. The original 58-student × 20-item motivation matrix should be rechecked for scoring direction, duplicated records, allowable score ranges, and score-transformation procedures before submission. The post-implementation score of approximately 91.4% describes the final motivation condition and, by itself, does not demonstrate improvement.

Change in Learning Achievement
Learning-achievement scores increased from $M = 53.10$ ($SD = 9.41$, range = 40–68) at pretest to $M = 87.17$ ($SD = 8.13$, range = 72–100) at posttest. The mean paired increase was 34.07 points ($SD_{\text{difference}} = 10.60$), 95% CI [31.28, 36.86].

Table 10. Pre–post change in learning achievement

n	Pretest M (SD)	Posttest M (SD)	Mean increase (95% CI)	$t(df)$	p	Cohen's d_z
58	53.10 (9.41)	87.17 (8.13)	34.07 [31.28, 36.86]	24.47 (57)	<.001	3.21

The paired-samples t-test showed a statistically significant increase in achievement within the studied group, $t(57) = 24.47$, $p < .001$. The paired effect size was $d_z = 3.21$, indicating a very large standardized change. The mean individual N-Gain was 0.73 ($SD = 0.18$, range = 0.25–1.00), which was categorized as high. At posttest, 56 of the 58 students (96.55%) met the minimum mastery criterion of 75.

Summary of Findings
Overall, the ice-breaking-integrated instructional module met the study criteria for validity and practicality. Content and media validity reached 96.92% and 97.20%, respectively, while student and teacher practicality reached 89.71% and 94.00%, indicating that the module was highly valid and practical. Statistically significant within-group increases were also observed in students' learning motivation and achievement. Therefore, the module can be considered feasible as an interactive teaching resource for Archival Management learning in vocational high schools. However, these findings represent preliminary within-group evidence and should not be interpreted as proof of a causal effect because the study did not include a comparison group.

DISCUSSION

The ice-breaking-integrated Archival Management module achieved high content validity (96.92%), media validity (97.20%), student-rated practicality (89.71%), and teacher-rated practicality (94.00%). Students also demonstrated substantial increases in motivation and learning achievement after implementation. However, because this study employed a single-group pretest–posttest design without randomization or a comparison group, the results should be interpreted as preliminary within-group evidence rather than proof of causal effectiveness.

Module Development and Validation
The ADDIE model provided a systematic framework for conducting needs analysis, designing the module, developing and validating the product, implementing it in classroom settings, and evaluating its quality. Its iterative structure allowed revisions to be made following expert review and formative trials. Previous studies have similarly demonstrated that systematic instructional design can support the development of coherent and adaptable learning products (Abuhassna et al., 2024; Che Mut et al., 2025).

The findings are also consistent with recent developments in vocational instructional materials. Sandi and Sutirman (2026) showed that structured electronic modules can support competency-oriented learning in Indonesian vocational schools. Such modules are particularly relevant to vocational education because they integrate conceptual explanations, practice activities, feedback, and assessment within a single learning resource.

The high expert-validation results indicate that the module was considered appropriate in terms of content coverage, language, learning organization, visual presentation, and instructional activities. Nevertheless, expert validation should not be regarded as evidence of effectiveness. A product considered valid by experts may still present difficulties when implemented with students. Therefore, validity, practicality, and learning outcomes should be evaluated as related but distinct dimensions of product quality, as also emphasized by (Lukman et al., 2023)

Interaction Among Module Components

The observed changes were probably associated with the interaction of several module components rather than the icebreakers alone. The module combined structured objectives, content explanations, contextual examples, illustrations, exercises, reflection, teacher feedback, and content-related icebreakers. Because these components were implemented simultaneously, their individual contributions could not be statistically separated.

The visual presentation may have helped students organize and understand the information. Appropriately coordinated words and illustrations can reduce unnecessary processing and support meaningful learning when the visual elements are directly connected to the instructional content (Mayer, 2024; Serevina et al. 2022) similarly demonstrated how structured visual design can be incorporated into digital learning modules.

The instructions, exercises, and reflection activities may also have encouraged students to regulate their learning. Research in vocational education shows that self-regulated learning can be promoted through structured learning environments, guided activities, and opportunities to monitor progress (Mejeh et al, 2022). Hemmler et al. 2024 further emphasize the importance of cognitive, metacognitive, motivational, and resource-management strategies. However, self-regulated learning was not measured directly in the present study and should therefore be treated only as a possible explanatory mechanism.

Integrated Icebreakers

The icebreakers were embedded within the learning sequence and connected with Archival Management content. Their purpose was to restore attention, reduce monotony, encourage participation, and reconnect students with the learning task. Previous studies suggest that ice-breaking activities can create a more positive classroom atmosphere and increase students' immediate interest and willingness to participate (Andesti et al., 2024)

Nevertheless, enjoyment and observable participation do not necessarily indicate deeper cognitive engagement. Active learning becomes educationally meaningful when students interact with the content, solve problems, communicate ideas, and apply their knowledge. Recent vocational-education studies indicate that active learning can strengthen interest and engagement when activities are closely aligned with learning objectives (Díaz-Lauzurica and Moreno-Salinas, 2025; Tan et al., 2025).

Because the present study did not compare the developed module with an identical module without icebreakers, the independent contribution of the icebreakers cannot be determined. Structured content, exercises, visual design, feedback, teacher explanations, novelty, and additional instructional attention may also have contributed. The findings therefore support the feasibility of integrating content-related icebreakers, but not the claim that the icebreakers independently caused the observed improvements.

Practicality and Classroom Use

The student and teacher practicality ratings indicate that the module was generally understandable, attractive, useful, and feasible for classroom implementation. However, ease of use received the lowest student rating (80.41%) compared with content (95.79%), attractiveness (94.14%), and usefulness (92.07%). Although still categorized as practical, this result suggests that some students needed additional explanations or assistance.The module should therefore not be described as entirely self-instructional. Its usability depends partly on teacher guidance, reading ability, instructional time, and classroom-management conditions. Students' satisfaction with vocational teaching strategies is influenced not only by the learning materials but also by how the teacher organizes and facilitates the learning process (Noguera et al., 2024).

Flexible implementation is consequently important. Teachers may need to simplify instructions, demonstrate activities, divide students into smaller groups, modify the duration of icebreakers, or provide additional examples. Effective vocational instruction also requires appropriate teacher preparation, pedagogical support, and adaptation to learners' characteristics (Siliņa-Jasjukeviča et al., 2025)

Changes in Learning Motivation

Students' motivation scores increased from $M = 65.93$ before implementation to $M = 91.36$ after implementation. This change may have resulted from the combined influence of novelty, visual presentation, structured activities, icebreakers, classroom interaction, feedback, and researcher support. Recent vocational-education research demonstrates that motivation is related to engagement, self-efficacy, learning strategies, persistence, and academic performance. Cao et al (2024) found that students' perceptions of feedback influenced learning engagement directly and indirectly through academic self-efficacy and test anxiety.

Huang et al. (2025) also identified relationships among learning motivation, self-efficacy, career planning, and educational pathways in vocational education. Motivation may also differ among students and change over time. Lee-Genzel & Bekir (2024) found variation in vocational students' academic motivation, while Held et al (2024) identified different motivational trajectories in vocational education. Eegdeman et al. (2025) further demonstrated that students' early motivational patterns were related to persistence and dropout. Therefore, the present posttest score represents an immediate motivational response and does not establish that the increase will be sustained.

The motivation analysis produced an exceptionally large statistic, $t(57) = 82.49$, $p < .001$, with an estimated Cohen's d_z of 10.83. This magnitude is unusual in educational research and may reflect highly homogeneous responses, limited score variability, a ceiling effect, scoring transformation, or socially desirable responses. Before publication, the original 58-student × 20-item response matrix should be checked for reverse-scored items, missing values, duplicate responses, allowable score ranges, total-score formulas, and score transformations.

Changes in Learning Achievement

Learning achievement increased from $M = 53.10$ (SD=9.41) at pretest to $M = 87.17$ (SD =8.13) at posttest. The paired-samples analysis produced a statistically significant within-group increase, $t(57) = 24.47$, $p < .001$, Cohen's $d_z = 3.21$, with a mean N-Gain of .73. These results demonstrate substantial within-group improvement after implementation of the complete module.

The improvement may have been associated with alignment among the learning objectives, content explanations, exercises, feedback, and test indicators. Song et al (2025) reported that vocational learning environments can support engagement when learning activities, instructional resources, and teacher support are appropriately coordinated. Zhang et al. (2024) similarly found that the relationship between technology use and student satisfaction was mediated by learning experience and engagement.

Motivation and learning strategies may also have contributed to achievement. Huang et al. (2025) found that motivation was associated with academic performance both directly and through learning strategies and psychological conditions. Reviews of online engagement similarly show that motivation, emotions, self-efficacy, self-regulation, task characteristics, collaboration, and teacher support interact in shaping students' participation (Hu & Xiao, 2025)

Although 56 of 58 students (96.55%) achieved the minimum mastery criterion, two students remained below it. This result shows that a highly valid and practical module did not produce identical outcomes for every learner. Teachers should examine the students' item-level responses and provide remedial instruction, simplified explanations, additional examples, or guided practice.

Limitations and Implications

Several alternative explanations should be acknowledged. The novelty of the module, greater instructional attention, awareness of participating in research, pretest sensitization, ordinary classroom learning, maturation, and regression to the mean may have influenced the results. Differences between the two participating schools may also have contributed because the school-specific effects were not analyzed separately. The researcher directly implemented the module in both schools. This arrangement helped maintain instructional consistency but may also have introduced researcher expectancy, enthusiasm, and additional-attention effects. Comparable results cannot automatically be expected when the module is implemented independently by regular classroom teachers.

Research on vocational engagement indicates that instructional design, learning support, interaction, technology, teaching strategies, and learner characteristics operate together (Zidi et al., 2024). Recent evidence also shows that students may display behavioral engagement without strong internal motivation, particularly in technology-supported learning environments (L. Cao et a.,2025) . Consequently, observable participation during icebreakers should not automatically be interpreted as sustained motivation or cognitive engagement.

Future studies should employ a comparison group and, if possible, cluster assignment at the class or school level. A three-group design comparing regular instruction, the module without icebreakers, and the complete ice-breaking-integrated module would help distinguish the contribution of the module structure from that of the icebreakers. Delayed posttests, classroom observations, student interviews, implementation-fidelity measures, and school-specific analyses are also recommended.

Overall, the findings provide preliminary support for the validity and practicality of the ice-breaking-integrated Archival Management module. They also demonstrate substantial immediate pre–post changes in motivation and achievement. However, the findings do not prove that the icebreakers alone caused these changes or that similar results will occur in every vocational-school setting.

CONCLUSION

This study developed an ice-breaking-integrated Archival Management module through the ADDIE stages. The product contribution lies in combining structured archival content, exercises, assessment, reflection, and content-related ice-breaking activities within a coherent instructional sequence. Expert and user evaluations indicated that the module met high validity and practicality criteria. Accordingly, the module is potentially feasible as an interactive teaching resource for Records Use material, particularly archival equipment and supplies, in Grade XI Office Management and Business Services classes with characteristics similar to those involved in this study.

Pedagogically, the module illustrates how ice-breaking activities can be embedded as content-reinforcement activities rather than used merely as unrelated classroom energizers. Its implementation nevertheless requires teacher guidance, clear instructions, appropriate time management, and adaptation to students' needs, particularly because ease of use received a lower rating than the other practicality aspects.

Empirically, implementation of the module was associated with substantial immediate within-group increases in students' learning motivation and Archival Management achievement, together with high mastery and N-Gain results. These findings provide preliminary evidence of positive change among the 58 participating students. However, they do not establish that the module, or the ice-breaking activities alone, caused the observed improvements because the study employed a single-group pretest–posttest design without randomization or a comparison group. The exceptionally large motivational change also requires verification using the original item-level response data.

These conclusions are limited to Records Use material, two purposively selected vocational schools in Mamuju Regency, the participating Grade XI students, and researcher-led implementation. Therefore, the findings should not be generalized to other schools, subjects, student populations, or teacher-led settings without further evaluation. Future studies should employ quasi-experimental or experimental designs with comparison groups, larger multisite samples, independently validated motivation and achievement instruments, school-specific and effect-size analyses, implementation-fidelity and instructional-time evaluations, and delayed posttests to assess sustained motivation and learning retention. A three-group comparison involving regular instruction, the module without icebreakers, and the complete ice-breaking-integrated module would provide stronger evidence regarding the specific contribution of the integrated ice-breaking activities.

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AUTHOR CONTRIBUTION STATEMENT

YM contributed to the conceptualization and design of the study, the development of the instructional module, data collection and analysis, and the preparation of the initial manuscript draft. HJ and AA provided academic supervision, reviewed the research design and methodology, guided the interpretation of the findings, and contributed to the revision and refinement of the manuscript. All authors approved the final version of the manuscript.

AI DISCLOSURE STATEMENT

The authors used ChatGPT (OpenAI) solely to assist with language editing,academic style refinement, and improving the clarity and coherence of the manuscript. All content was critically reviewed, revised, and verified by the authors to ensure its consistency with the research data. The research design, data collection, data analysis, interpretation of findings, and final manuscript content were conducted and are fully the responsibility of the authors.

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