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Factors Associated the Perceived Effectiveness of Seven-Jumps Problem with Based Learning Tutorials among Nursing Students: A Mixed-Methods Study

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Abstract

Background: Seven-Jumps Problem-Based Learning (PBL) tutorials are commonly implemented in nursing education to foster active learning, critical reasoning, and collaborative problem-solving. However, evidence on factors influencing students' perceptions of tutorial effectiveness remains limited in Indonesian nursing education.

Methods: An explanatory sequential mixed-methods design was employed. The quantitative phase included 70 fourth-semester undergraduate nursing students and utilized the Tutorial Group Effectiveness Instrument developed by Dolmans and colleagues. Data analysis was conducted using Partial Least Squares Structural Equation Modeling. Subsequently, eight students were purposively selected for semi-structured interviews to elaborate on the quantitative findings. Qualitative data were analyzed thematically.

Result: Cognitive engagement ($\beta = 1.098$; $t = 11.047$; $p < 0.001$), academic motivation ($\beta = 1.269$; $t = 9.380$; $p < 0.001$), and demotivational experiences ($\beta = 1.125$; $t = 9.262$; $p < 0.001$) were significantly associated with perceived tutorial effectiveness. Collectively, these predictors accounted for 89.5% of the variance. Qualitative findings highlighted independent learning, increased confidence, critical analysis, and collaborative discussion, as well as challenges such as unequal participation, anxiety, prolonged discussion, difficulty accessing scientific references, and dependence on the facilitator.

Conclusion: Cognitive and motivational engagement, along with experiences of demotivating conditions, were closely associated with perceived tutorial effectiveness. Given the cross-sectional and self-report design, these findings should not be interpreted as evidence of causal educational effectiveness. Enhancing tutor facilitation, promoting equitable

participation, supporting information literacy, and fostering psychological safety may improve tutorial experiences.

Keywords: Problem Based Learning, Seven Jumps, Nursing Education, Tutorial Learning.

BACKGROUND

Nursing education must prepare graduates who can integrate theoretical knowledge, clinical reasoning, communication, teamwork, and evidence-informed decision-making in complex healthcare situations. These capabilities are unlikely to develop through passive acquisition of factual knowledge alone. Students must learn to identify relevant information, interpret clinical problems, generate and evaluate explanations, and collaboratively justify appropriate actions. Consequently, nursing programs increasingly use student-centered approaches that position learners as active participants in constructing and applying knowledge (1, 2).

Problem-Based Learning (PBL) is one of the most established student-centered approaches in health professions education. Learning begins with an authentic or simulated problem rather than direct transmission of disciplinary content. Students work in small groups to clarify the problem, activate prior knowledge, identify knowledge gaps, formulate learning objectives, search for evidence, and apply newly acquired knowledge. A tutor facilitates the process without replacing students' responsibility for inquiry. PBL is therefore intended to support knowledge integration, self-directed learning, collaboration, problem-solving, and critical reasoning(2, 3). PBL is particularly relevant to nursing because professional practice routinely involves incomplete, uncertain, and context-dependent information. Nursing students must learn not only what to know, but also how to prioritize, reason, communicate, and defend decisions. Previous research has linked PBL to critical thinking, problem-solving, self-directed learning, confidence, and communication (4–7). Nevertheless, outcomes vary across settings, groups, facilitators, scenarios, and implementation formats. The presence of a PBL curriculum alone does not ensure that students engage deeply or experience the tutorial as productive(3, 8).

One structured PBL format is the Seven-Jumps approach. Its stages generally include clarification of unfamiliar terms, definition of the problem, brainstorming of possible explanations, analysis and organization of explanations, formulation of learning objectives, independent study, and synthesis of acquired information. This structure guides students from the initial representation of the problem to the collaborative integration of independently located evidence. In nursing education, the process may help learners organize clinical information, connect signs and symptoms, compare alternative explanations, and communicate reasoning to peers (9–12).

International and Indonesian studies have reported favorable student responses to Seven-Jumps tutorials, including improved participation, conceptual understanding, confidence, learning independence, and problem analysis. Indonesian studies have also examined online and blended adaptations. However, much of the available evidence is descriptive, focuses on satisfaction or learning achievement, or treats tutorial effectiveness as a direct consequence of the instructional model. Less attention has been given to the cognitive and motivational conditions associated with how students evaluate their tutorial experiences (9–12).

Cognitive engagement refers to purposeful mental investment in understanding, organizing, elaborating, and applying knowledge. It differs from mere attendance or verbal participation(13,14). In Seven-Jumps tutorials, cognitive engagement is reflected in problem representation, activation of prior knowledge, hypothesis generation, recognition of knowledge gaps, critical searching, evaluation of

evidence, and synthesis(3, 15). Students who engage deeply in these activities may experience the tutorial as clearer, more meaningful, and more useful. However, cognitive engagement cannot be assumed: students may reproduce information, rely on dominant peers, or wait for the tutor to provide answers(3, 16).

Academic motivation concerns the processes that initiate, direct, and sustain learning behavior. It includes perceptions of competence, task value, interest, and autonomy, as well as reasons for investing effort (17, 18). Motivation is central to PBL because students must prepare independently, locate evidence, explain reasoning, respond to peers, and persist when problems are uncertain. Students who value the task and believe they can contribute are more likely to prepare and participate meaningfully(19–21). At the same time, an engaging and well-facilitated tutorial may itself strengthen motivation, suggesting a potentially reciprocal relationship (18,22).

Demotivation refers to experiences or conditions that reduce willingness, confidence, persistence, or active participation. It is not necessarily the exact opposite of motivation(17, 23). A student may appreciate the relevance of a tutorial while simultaneously experiencing anxiety, unequal participation, fatigue, difficulty locating sources, or uncertainty caused by inadequate facilitation. Group dominance, social loafing, fear of error, limited information literacy, workload, and tutor behavior may all weaken meaningful engagement (3, 8, 11, 23). Therefore, motivation and demotivation should be examined as related but distinct dimensions of the tutorial experience (17, 22).

The conceptual framework of this study proposes that perceived tutorial effectiveness is associated with cognitive engagement, academic motivation, and demotivational experiences. Cognitive engagement represents the mental work invested in problem analysis and knowledge integration (13). Academic motivation represents the interest, value, confidence, and persistence that sustain participation(17, 18). Demotivational experiences encompass personal, interpersonal, and contextual conditions that may hinder participation (3, 23). Perceived tutorial effectiveness is treated as students' appraisal of whether the tutorial supports meaningful learning, participation, collaboration, and the achievement of learning objectives, rather than as an objective causal effect of exposure to Seven-Jumps (16).

Several research gaps informed this study. First, many PBL studies focus on test performance or general satisfaction rather than factors associated with students' appraisal of tutorial effectiveness. Second, cognitive engagement, motivation, and demotivation are often examined separately even though they jointly shape tutorial participation. Third, statistical associations alone cannot explain how these factors are experienced in group discussions. Fourth, mixed-methods evidence integrating structural modeling and student accounts remains limited in Indonesian nursing education (3, 12, 24, 25).

This study therefore aimed to examine factors associated with nursing students' perceived effectiveness of Seven-Jumps PBL tutorials and to explore students' experiences of the tutorial process. The quantitative phase examined associations between cognitive engagement, academic motivation, demotivational experiences, and perceived tutorial effectiveness. The qualitative phase explored learning benefits, motivational experiences, group dynamics, and implementation barriers. Integration of both phases was intended to produce a contextually grounded understanding of how Seven-Jumps tutorials are perceived and how their implementation may be strengthened.

METHODS

Study Design

An explanatory sequential mixed-methods design was employed, beginning with a quantitative cross-sectional survey followed by a qualitative phase to explain and contextualize the quantitative findings (26). This approach was chosen because quantitative associations alone could not fully capture

students' experiences of cognitive engagement, academic motivation, demotivational experiences, and tutorial processes during Seven-Jumps tutorials. The quantitative cross-sectional component was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement (27), while the overall mixed-methods study adhered to the Good Reporting of a Mixed Methods Study (GRAMMS) framework (28).

Participants /Sample

The research was conducted in the Undergraduate Nursing Study Program, Faculty of Health Sciences, Universitas Sains Al-Qur'an, Wonosobo, Indonesia, during the 2024/2025 academic year. Seven-Jumps tutorials were implemented in small groups facilitated by tutors and followed the standard stages of clarification, problem definition, brainstorming, analysis, formulation of learning objectives, independent study, and synthesis (9–12).

The accessible population included all 70 fourth-semester undergraduate nursing students enrolled during the study period. Total population sampling was employed due to the relatively small eligible population. Eligibility criteria required enrollment in the fourth semester, participation in Seven-Jumps tutorials, and provision of informed consent. Incomplete questionnaires were predefined as an exclusion criterion; however, all 70 eligible students completed the questionnaire and were included in the quantitative analysis.

The qualitative phase included a subset of participants from the quantitative survey. After survey completion, eight students were purposively selected from the 70 respondents using maximum-variation sampling to participate in semi-structured interviews, consistent with the connecting logic of explanatory sequential mixed-methods designs (26). Detailed participant selection procedures are provided in the qualitative data collection section. The sample size was determined by the size of the accessible population, with all eligible students included through total population sampling. Partial Least Squares Structural Equation Modeling (PLS-SEM) was selected due to the prediction-oriented nature of the study and the relatively small sample. The structural model comprised three exogenous constructs predicting one endogenous construct. The sample size was deemed adequate given the model complexity and current recommendations for PLS-SEM, although the single-site sample limits generalizability (29,30). Therefore, findings should be interpreted as representative of the accessible study population rather than the broader population of undergraduate nursing students.

Instruments

Students' perceptions were measured using the Tutorial Group Effectiveness Instrument (TGEI) developed by Dolmans and colleagues. This instrument assessed cognitive engagement, academic motivation, demotivational experiences, and perceived tutorial effectiveness. The analyzed version included 20 indicators: seven cognitive, seven motivation, five demotivation-related, and one global indicator of perceived tutorial effectiveness. Items were rated on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree) (16).

The Indonesian version was reviewed for linguistic clarity, content relevance, and contextual appropriateness prior to administration. Construct validity and internal consistency were subsequently evaluated within the PLS-SEM measurement model. As perceived tutorial effectiveness was represented by a single global item, its internal consistency could not be assessed in the same manner as multi-item constructs. Values fixed at 1.000 for a single-item construct were not interpreted as evidence of perfect reliability or validity (29, 31).

Data Collection

After the quantitative phase was completed, eight students were purposively selected from the survey respondents using maximum-variation sampling. Selection was based on variation in questionnaire responses and willingness to participate, aiming to represent students with high, moderate, and lower tutorial experiences. This connecting strategy ensured that the qualitative phase was directly informed by the quantitative findings (26). Semi-structured interviews explored students' perceptions of cognitive engagement, learning motivation, demotivating experiences, tutor facilitation, group interaction, independent learning, learning resources, perceived learning benefits, and recommendations for improving Seven-Jumps tutorials. The interview guide was developed based on statistically significant and conceptually meaningful quantitative findings, particularly those requiring further explanation (32).

Each interview lasted approximately 20–30 minutes, was audio-recorded with participants' permission, transcribed verbatim, and anonymized prior to analysis. Recruitment continued until the interview data provided sufficient depth to explain the principal quantitative findings and no new substantive insights emerged (33).

Data Analysis

Quantitative data were analyzed using Smart PLS version 4. The reflective measurement model was assessed using outer loadings, Cronbach's alpha, composite reliability, average variance extracted, Fornell-Larcker criteria, and the heterotrait-monotrait ratio. The structural model was evaluated using inner variance inflation factors, path coefficients, R^2, f^2, Q^2_predict, and SRMR. Statistical significance was determined through bootstrapping with 5,000 resamples and $p < 0.05$ (29,31). As the study was cross-sectional, path estimates were interpreted as associations rather than causal effects.

Interview transcripts were analyzed using reflexive thematic analysis. The research team familiarized themselves with the data, generated initial codes, grouped related codes, developed candidate themes, reviewed themes against the dataset, and defined and named the final themes. Coding decisions and theme interpretations were discussed collaboratively. Credibility was enhanced through the comparison of themes with quantitative findings, the use of representative quotations, the maintenance of an audit trail of analytic decisions, and attention to both convergent and divergent evidence (34).

Data Integration

Integration was achieved through connecting, building, and merging. Quantitative findings informed the purposive selection of interview participants, while statistically significant and conceptually ambiguous findings guided the development of the interview guide. Quantitative and qualitative findings were integrated during interpretation using narrative weaving, consistent with established mixed-methods integration strategies (26, 32). The qualitative phase specifically aimed to explain cognitive and motivational associations and to clarify the positive coefficient observed for the construct labeled "demotivational experiences".

Ethical Consideration

Ethical approval was obtained from the Research Ethics Committee of the Institute for Research, Publication, and Community Service (LP3M), Universitas Sains Al-Qur'an, Wonosobo, Indonesia. No. 032/EC/LP3M-UNSIQ/VI/2024. All participants received information about the study, confidentiality, voluntary participation, and the right to withdraw without academic consequences. Written informed consent was obtained. Identifiers were removed before analysis, and qualitative quotations were de-identified.

RESULT AND DISCUSSION

RESULT

Demographic Characteristics of Responde

All 70 eligible students participated, table 1 including sex, level education and age.

Table 1. characteristics of participants
(N = 70)

Characteristic	n	%
Female	58	82.86
Male	12	17.14
Age 18–20 years	48	68.57
Age 21–25 years	22	31.43
Islamic senior high school	19	27.14
General senior high school	36	51.43
Vocational high school	15	21.43

Note. *N* = 70 participants; *n* = frequency; % = percentage. Percentages were calculated based on the total number of participants. Gender, age group, and educational background are presented as mutually exclusive categories within each characteristic.

Table 2. Qualitative Respondents' characteristic

No	Initial name	Age	Sex	Respondents' code
1.	TW	20	Female	R 1
2.	WTU	20	Female	R 2
3.	DS	21	Female	R 3
4.	AA	21	Female	R 4
5.	DR	19	Female	R 5
6.	DKC	19	Male	R 6
7.	TB	20	Male	R 7
8.	MA	20	Male	R 8

Note. *N* = 8 participants; R = respondent. Participants were identified using coded labels (R1–R8) to maintain confidentiality and anonymity. Age is presented in years, and sex is categorized as female or male.

Measurement Model (Outer Model)

All multi-item indicators demonstrated outer loadings exceeding 0.70. Cognitive engagement exhibited loadings ranging from 0.719 to 0.820, a Cronbach's alpha of 0.705, composite reliability of 0.802, and an average variance extracted (AVE) of 0.584. Academic motivation displayed loadings between 0.704 and 0.824, an alpha of 0.822, composite reliability of 0.868, and an AVE of 0.689. Demotivational experiences presented loadings from 0.813 to 0.956, an alpha of 0.916, composite reliability of 0.938, and an AVE of 0.751. These results support indicator reliability, internal consistency, and convergent validity for the multi-item constructs, consistent with established PLS-SEM criteria (28,30). Perceived tutorial effectiveness was measured by a single global indicator and was therefore not assessed using internal-consistency coefficients.

Table 3. Evaluation of Measurement Model (Outer Model)

Construct	Items	Loading range	Cronbach α	CR	AVE
Cognitive engagement	7	0.719–0.820	0.705	0.802	0.584
Academic motivation	7	0.704–0.824	0.822	0.868	0.689
Demotivational experiences	5	0.813–0.956	0.916	0.938	0.751
Perceived tutorial effectiveness	1	1.000	—	—	—

Note. CR = composite reliability; AVE = average variance extracted; α = Cronbach's alpha.

Structural Model

The model accounted for 89.5% of the variance in perceived tutorial effectiveness ($R^2 = 0.895$; adjusted $R^2 = 0.895$). Q^2_predict was 0.939, with RMSE at 0.498 and MAE at 0.492. Reported f^2 values were 0.968 for cognitive engagement, 1.145 for academic motivation, and 1.327 for demotivational experiences. Interpret these unusually large effect sizes and path coefficients above 1.00 with caution. Please verify collinearity, construct overlap, and item coding.

Bootstrapping showed statistically significant positive associations for cognitive engagement (β = 1.098; SE = 0.099; t = 11.047; p < 0.001), academic motivation (β = 1.269; SE = 0.135; t = 9.380; p < 0.001), and demotivational experiences (β = 1.125; SE = 0.121; t = 9.262; p < 0.001). The positive coefficient for demotivation should not be interpreted as evidence that greater demotivation improves tutorial effectiveness. Please check its direction against item wording, reverse coding, and collinearity diagnostics. In relation to commonly used PLS-SEM criteria (28,30)

Table 4. Evaluation of Structural Model (Outer Model)

Path	β	SE	t	p	f^2
Cognitive engagement → perceived effectiveness	1.098	0.099	11.047	<0.001	0.968
Academic motivation → perceived effectiveness	1.269	0.135	9.380	<0.001	1.145
Demotivational experiences → perceived effectiveness	1.125	0.121	9.262	<0.001	1.327

Note. β = standardized path coefficient; SE = standard error; *t* = t-statistic; *p* = significance value; f^2 = effect size. Statistical significance was determined at $p < 0.05$. The f^2 values indicate the magnitude of each predictor's contribution to perceived tutorial effectiveness.

Qualitative Finding

The thematic analysis generated five interrelated themes. These themes explain how participants experienced cognitive and motivational processes and identify conditions that strengthened or weakened tutorial participation.

Table 5. Thematic analysis

Theme	Subtheme	Description	Representative quotation
Independent Learning and Confidence	Active participation	Students actively contributed ideas during tutorials	*"This method encourages students who are usually passive to contribute."* (R 2)
	Confidence in expressing idea	Students independently searched for learning resources and Learning responsibility	*"With these seven jumps, I have become more confident in expressing my opinions and have become more active in learning, and I enjoy reading articles and books more."* (R1)
Cognitive Engagement through Critical Analysis	Critical thinking	Tutorials encouraged students to prepare before discussion	*"In my opinion, implementing the seven jumps method is very beneficial because it trains critical thinking."* (R3)
	Analyze cases	Tutorial as useful when it required systematic analysis of clinical cases, formulation of explanations, and evaluation of information.	*"With seven jumps, students' ability to analyze cases has improved."* (R4)
Collaborative Group Learning	Collaborative learning	Small-group discussion enabled exchange of ideas, peer learning, and group cohesion.	*"It is easier to understand and builds camaraderie in group work."* (R8)

Theme	Subtheme	Description	Representative quotation
	Benefit of discussion	Students noted that discussion could make complex material easier to understand and provide opportunities to speak.	*"In my opinion, the Seven Jumps method fosters active student engagement and facilitates understanding, as it involves a process of independent analysis*." (R4)
Positive Motivation Coexisting with Anxiety	Anxiety during discussion	Students felt reluctant to speak because of fear of making mistakes	*"It is enjoyable and increases individuals' desire to learn and explore the material in depth, but it can sometimes be anxiety-inducing, with fear of giving the wrong answer."* (R1)
	Unequal participation	Some group members dominated the discussion	*"Unfortunately, it often happens that only two of the nine members are the backbone of the group."* (R5)
Barriers to Equitable and Productive Participation	Learning resources	difficulty locating scientific references	*"The downsides are that it is difficult to find relevant journals for discussion materials*) (R7)
	Time demands and facilitator dependency	prolonged discussion and dependence on tutor competence were identified as barriers	..... *this method requires a long time and relies on a competent facilitator."* (R3

Note. R = respondent. Participant identifiers (R1–R8) were used to maintain confidentiality. Themes and subthemes were developed from the qualitative data, and representative quotations were selected to illustrate participants' experiences and perceptions regarding the Seven Jumps tutorial method.

Mixed-Methods Integration

The qualitative findings brought the cognitive-engagement link to life through students' vivid stories of analyzing cases, thinking critically, and seeking out information. Motivation came alive in their expressions of curiosity, growing confidence, genuine enjoyment, and energetic participation. However, the data did not suggest that more demotivation led to better perceived effectiveness. Instead, students described obstacles such as anxiety, a few voices dominating the group, limited resources, time pressures, and reliance on facilitators. This contrast highlights the need to clarify and confirm how demotivation is defined and measured before drawing final conclusions.

DISCUSSION

Principal Finding

This study identified associations between cognitive engagement, academic motivation, and the construct labeled demotivational experiences with nursing students' perceived effectiveness of Seven-Jumps tutorials. The quantitative model accounted for a substantial proportion of variance, while the qualitative phase revealed that students valued independent learning, critical analysis, confidence, and collaborative discussion. The qualitative data also highlighted challenges such as unequal participation, anxiety, limited access to references, prolonged discussions, and tutor dependence. These findings pertain to perceived tutorial effectiveness and should not be interpreted as evidence that Seven-Jumps tutorials directly improve objective learning outcomes.

Cognitive Engagement

The observed association between cognitive engagement and perceived effectiveness aligns with the structure of Seven-Jumps problem-based learning (PBL). The stages of clarification, problem

definition, brainstorming, learning-objective formulation, independent inquiry, and synthesis require elaboration and integration rather than passive recall (3). Students' descriptions of critical thinking and case analysis further support this association. However, as perceived engagement was measured through self-report, objective assessments are necessary to determine whether positive perceptions correspond with measurable improvements in reasoning or academic performance (5, 34, 35).

Academic Motivation

Academic motivation was strongly associated with perceived effectiveness. PBL requires students to prepare, locate evidence, explain reasoning, and persist in the face of uncertainty(16, 17). The qualitative findings suggest that meaningful problems, autonomy in inquiry, peer interaction, and opportunities to express ideas may increase curiosity and confidence. The relationship may be reciprocal: motivated students may rate tutorials more favorably, while well-designed tutorials may strengthen motivation (17,19–21). The cross-sectional design cannot establish temporal direction.

Demotivational Experiences

The positive path coefficient for demotivational experiences contradicts both the qualitative evidence and the theoretical expectation that anxiety, unequal participation, resource barriers, and facilitator dependence hinder engagement (3, 22). Possible explanations include reverse-worded items, scoring in which higher values represent fewer demotivating experiences, construct mislabelling, collinearity, or a suppression effect. Given that the coefficients exceeded 1.00 and R^2 was unusually high, further examination of item coding, inner variance inflation factor (VIF), discriminant validity, and construct overlap is warranted (15, 28, 30). Until these issues are resolved, the manuscript should refrain from asserting that demotivation positively influences tutorial effectiveness.

Group Dynamics and Facilitation

The interviews demonstrated that perceived tutorial effectiveness was partly a group-level and contextual phenomenon. When discussion was inclusive, students reported peer learning and cohesion. When one or two students dominated, other members had fewer opportunities to articulate and test their understanding. Tutors must therefore balance non-directive facilitation with sufficient guidance(3, 14). Faculty development should address questioning strategies, management of dominant and silent members, feedback, psychological safety, and maintenance of the Seven-Jumps sequence (14, 36).

Resources and Time

Independent inquiry presupposes that students can locate and evaluate credible scientific information. Limited access to relevant journals may undermine self-directed learning and increase reliance on tutors. Therefore, database access, librarian-supported searching, and information-literacy training are essential implementation supports (37). Clearly defined time allocation for each tutorial stage may also minimize repetition while maintaining depth (3,7,10).

Mixed-Methods Contribution

The explanatory sequential design added interpretive value. Quantitative analysis identified the focal associations, while interviews showed how participants experienced those associations. The divergence surrounding demotivation is particularly important because it exposed a measurement or interpretation issue that would have been obscured in a purely quantitative report (25,31)

Strengths and Limitations

Strengths include the inclusion of the entire accessible cohort and the integration of quantitative and qualitative evidence. Limitations include the cross-sectional, single-site design; reliance on self-report; a single-item outcome; a small qualitative sample; and potential common-method bias. The unusually high R^2, large f^2 values, and coefficients exceeding 1.00 require further statistical verification (28,30). Future multicentre and longitudinal studies should incorporate objective learning outcomes, validated multi-item effectiveness measures, observed tutorial processes, and tests of mediation or moderation.

CONCLUSION

This study found that cognitive engagement, academic motivation, and experiences of demotivation were closely linked to nursing students' perceptions of the effectiveness of Seven-Jumps PBL tutorials. The qualitative results showed that these tutorials helped students learn independently, build confidence, think critically, and work together in discussions. However, students also faced challenges such as uneven participation, time pressure, trouble finding references, anxiety, and relying too much on facilitators. Based on these findings, it is important to provide structured tutor training focused on non-directive guidance and fair participation. Using rotating group roles and clear expectations can help prevent some students from dominating or withdrawing. Teaching students how to search for literature and evaluate evidence is also valuable. Creating a safe environment where mistakes are seen as learning opportunities, and combining student feedback with objective measures of reasoning, performance, and participation, can further improve tutorials. Since this study used a cross-sectional self-report design, it cannot show that Seven-Jumps tutorials directly improved learning outcomes. The results suggest that students' engagement and how the tutorials are run are strongly linked to how effective students think they are. To confirm whether the Seven-Jumps approach truly improves education, future research should use controlled or long-term studies with objective measures.

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AUTHOR'S CONTRIBUTION STATEMENT

IP: Conceptualization, Writing- Original Draft, Review & Editing. CDR, IP: Conceptualization, Methodology, Manuscript review. AER: Supervision. AER, IP: Formal analysis, Writing -Original draft, Manuscript review. IP, CDR, AER: Validation, and Approved final version of the manuscript review.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

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DATA AVAILABILITY

The dataset generated and analyzed during the current study is available from the corresponding author upon request.

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