

Educational Approaches and Retention of Breast-Health Learning Among School-Aged Adolescents: A Systematic Literature Review

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ABSTRACT

Breast-health education can help school-aged adolescents recognise unusual breast changes and seek appropriate advice. Improvement immediately after teaching, though, does not indicate whether students retain what they have learned. This review examined the educational approaches used to teach breast health and whether changes in knowledge, attitudes or breast self-examination learning remained for at least four weeks. PubMed, ERIC, CINAHL Complete and Academic Search Ultimate were searched for English-language studies published between January 2015 and August 2026. Open Dissertations and the reference lists of relevant articles were searched for additional evidence. Eligible studies involved school-aged adolescents, evaluated a breast-health educational intervention and included an assessment conducted at least four weeks after education. Study selection followed PRISMA 2020, and methodological quality was assessed using the revised JBI critical appraisal tool for quasi-experimental studies. The searches identified 264 records. After duplicates and records outside the publication period were removed, 236 records were screened and 10 studies met the eligibility criteria. Follow-up periods ranged from four weeks to 12 months. Educational approaches included lectures, demonstrations, drama, printed materials, podcasts, online teaching, augmented reality and repeated activities. Most studies reported that knowledge remained higher than baseline, though some decline occurred between three and six months. Positive follow-up findings were frequently reported in programmes involving student participation, practical guidance or repeated learning activities. The evidence remains limited by differences in programme content, measurement tools and study quality. Several studies lacked comparison groups, relied on self-reported practice or involved a single school or location. Evidence from Malaysia and other ASEAN countries was particularly limited. School programmes may benefit from age-appropriate content, guided activities, refresher sessions and follow-up assessment. Further multi-school studies with longer follow-up and direct assessment of practical skills are needed.

Keywords: adolescents, breast-health education, breast self-examination, learning retention, systematic literature review

INTRODUCTION

Breast-health education during adolescence can help girls understand normal breast development, recognise unusual changes and learn when to seek professional advice. Breast self-examination (BSE) is often included in these programmes. It should be taught as part of breast awareness rather than as a method for diagnosing or excluding cancer.

Limited breast-health knowledge has been reported among adolescents. A Malaysian study found that many secondary-school girls had poor knowledge of BSE [1]. This finding indicates a need for breast-health education that is clear and suitable for the students' age.

Schools have used various approaches to deliver breast-health education. These include classroom lessons, demonstrations, discussions, printed materials, podcasts, online learning and augmented reality [2-4]. Many programmes reported better knowledge immediately after teaching. An immediate result, though, does not show whether students can recall or apply the information several weeks or months later.

Longer retention matters when education is intended to develop lasting awareness and suitable health practices. Students may benefit from active participation, practical guidance and refresher activities rather than receiving a single lesson.

This review examined:

1. Educational approaches used to teach breast health to school-aged adolescents.
2. Changes in knowledge, attitudes and reported practice.
3. Whether these improvements remained for at least 4 weeks.
4. Limitations in the available evidence.

The findings may support the development of clear, age-appropriate breast-health education for secondary schools, particularly in Malaysia and other Asian countries.

METHODS

Review Design

This systematic literature review examined educational approaches used to teach breast health to school-aged adolescents and the retention of learning for at least four weeks after the intervention. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidance [5]. Because the included studies differed in their educational approaches, outcome measures and follow-up periods, the findings were synthesised narratively rather than combined through meta-analysis.

Information Sources and Search Strategy

PubMed, ERIC, CINAHL Complete and Academic Search Ultimate were searched for English-language studies published between January 2015 and 25 August 2026. PubMed was selected for biomedical and public-health literature, ERIC for educational research, CINAHL Complete for nursing and school-health literature, and Academic Search Ultimate for broader multidisciplinary coverage. Open Dissertations was searched for relevant grey literature, and the reference lists of eligible and closely related articles were checked for additional studies. The final searches were conducted on 25 August 2026.

The search strategy combined three main concepts: the adolescent population, breast health or breast self-examination, and educational intervention. Population terms included “adolescent,” “teen,” “youth,” “young people,” “schoolgirl,” “secondary school student” and “high school student.” Breast-health terms included “breast health,” “breast awareness,” “breast self-examination” and “breast cancer awareness.” Intervention terms included “education,” “intervention,” “teaching,” “training,” “programme,” “lesson,” “campaign” and “workshop.” Truncation and database-specific subject headings were used where appropriate.

In PubMed, Medical Subject Headings and title or abstract terms were combined. The search included “Adolescent”[Mesh], “Breast Self-Examination”[Mesh] and “Health Education”[Mesh], together with corresponding free-text terms. In the EBSCOhost databases, population, breast-health and intervention terms were searched within the title and abstract fields and combined using the Boolean operators AND and OR. The search syntax was adapted to the requirements of each database.

Searches were limited to English-language records published within the specified period. Full-text availability and peer-review status were not applied as search restrictions. Where a database did not apply the publication-date limit directly, the date criterion was applied during record screening. All retrieved records were exported, combined and checked for duplicates using DOI and title matching.

Eligibility Criteria

Studies were included if they:

1. Were published in English between January 2015 and August 2026.
2. Involved school-aged adolescents aged approximately 10-19 years.
3. Evaluated a breast-health or BSE educational programme.
4. Reported outcomes related to knowledge, awareness, attitudes, confidence or practice.
5. Conducted a follow-up assessment at least four weeks after the programme.

Studies involving both adolescents and adults were included only when the adolescent findings were reported separately.

Studies were excluded when they:

1. Reported a survey without an educational programme.
2. Involved only adults or university students.
3. Reported only an immediate post-test, a follow-up assessment conducted less than four weeks after the programme, or no clear follow-up period.
4. Were reviews, protocols, conference abstracts or incomplete reports.
5. Did not report a relevant educational outcome.

Study Selection

Records retrieved from the databases and supplementary sources were combined and checked for duplicates using DOI and title matching. Records published outside the specified review period were removed before title and abstract screening. Titles and abstracts were screened against the eligibility criteria. Records were excluded at this stage when they clearly involved an ineligible population, did not evaluate an educational intervention, reported an unrelated outcome, or were reviews, protocols, conference abstracts or incomplete reports.

Full texts were obtained for records that appeared eligible or did not provide enough information in the title and abstract. During full-text assessment, particular attention was given to the timing of the outcome assessment. A study was considered to report learning retention only when an assessment was conducted at least four weeks after the educational intervention. Studies reporting only an immediate post-test, a follow-up period shorter than four weeks or no clear assessment time were excluded. Reasons for full-text exclusion were recorded.

The study-selection process followed PRISMA 2020 [5] and is presented in Figure 1.

Data Extraction

The following information was recorded from each study:

1. Author and publication year.
2. Country and study setting.
3. Number and age of participants.
4. Study design.
5. Educational approach.
6. Outcomes and assessment periods.
7. Main findings.
8. Study limitations.

Immediate and follow-up findings were recorded separately. Learning was considered to be retained only when the study included an assessment conducted at least four weeks after the educational programme.

Quality Assessment

The methodological quality of each study was assessed using the revised JBI critical appraisal tool for quasi-experimental studies [6]. The assessment considered how clearly the intervention was described, whether the participant groups were comparable, whether a comparison group was included, the reliability of the outcome measures, the completeness of follow-up and the suitability of the analysis. Each item was rated as “yes,” “no,” “unclear” or “not applicable.” Studies were not excluded solely because methodological limitations were identified. Instead, these limitations were considered when interpreting the findings.

Data Analysis

The included studies differed in their teaching methods, assessment tools and follow-up periods. For this reason, their numerical findings were not combined. Instead, the findings were summarised narratively and compared across four broad educational approaches:

1. Classroom and printed education.
2. Drama, discussion and practical guidance.
3. Digital and multimedia education.
4. Awareness campaigns and repeated activities.

The outcomes were grouped into knowledge, awareness, attitudes, confidence, reported practice, demonstrated skills and learning retention.

RESULTS

Study Selection

The searches identified 264 records: 213 from PubMed, 23 from CINAHL Complete, 23 from Academic Search Ultimate, 3 from ERIC, 1 from Open Dissertations and 1 through reference-list searching. After 27 duplicate records were removed, 1 dissertation published outside the specified review period was excluded before screening. The titles and abstracts of 236 records were screened, and 193 records were excluded because they did not meet the population, intervention, outcome or publication-type criteria.

The full texts of 43 articles were assessed for eligibility. Thirty-three articles were excluded: 20 did not meet the required study-design, population, intervention or report-type criteria; 9 had a follow-up period of less than four weeks after the intervention; and 4 did not clearly report the timing of the follow-up assessment. Ten

studies met the eligibility criteria and were included in the review. Figure 1 presents the study-selection process.

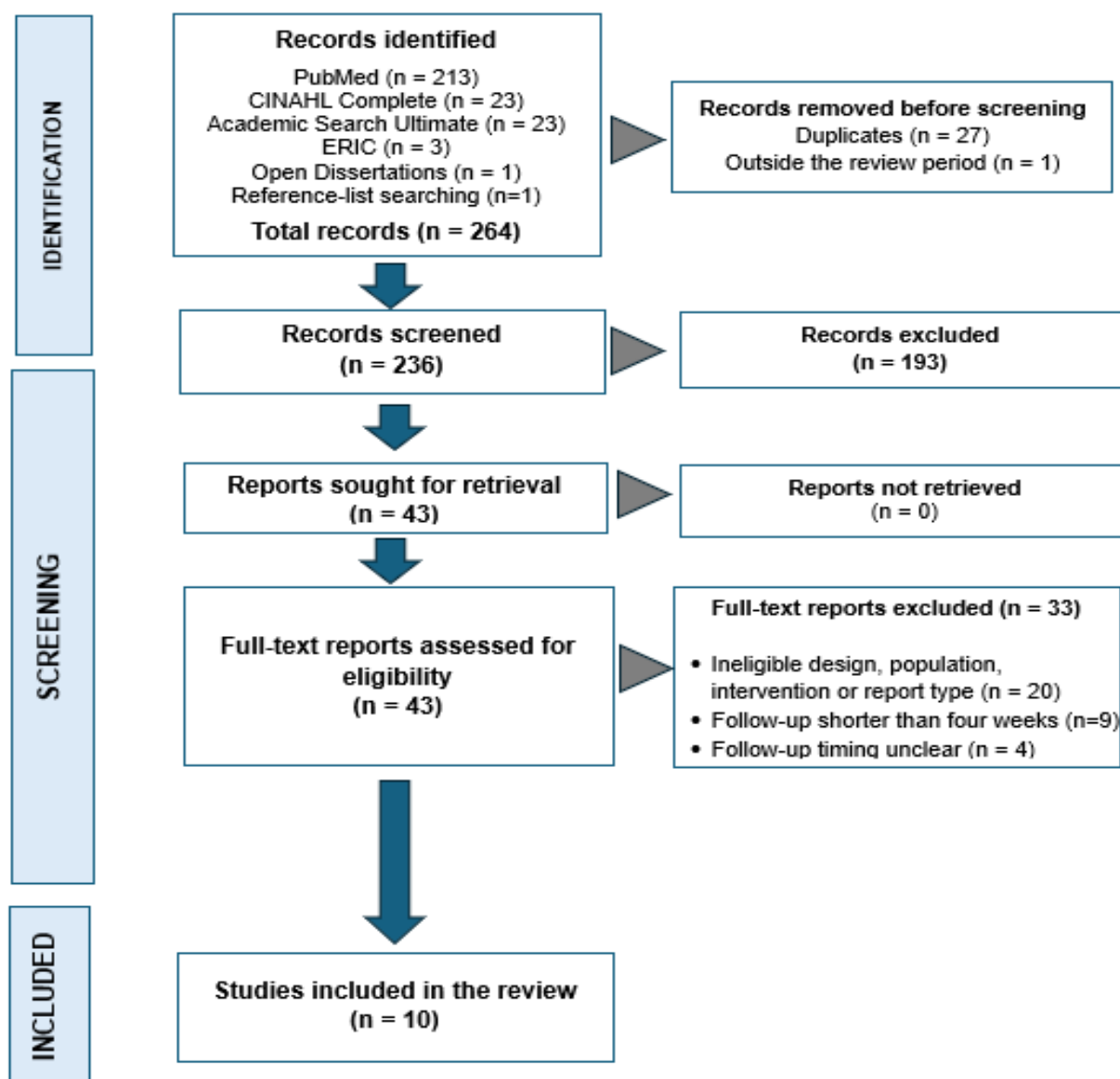


Figure 1. PRISMA flow diagram of the study-selection process

Study Characteristics

The review included 10 studies from 8 countries across Africa, Asia, Europe and Latin America. Three studies were conducted in Nigeria, while Malaysia, Indonesia, India, Ghana, Oman, Mexico and the United Kingdom each contributed 1 study. Most participants were female students attending secondary or high schools. Sample sizes ranged from 60 participants in the Malaysian study to more than 2,000 responses across repeated assessments in 1 Nigerian study.

The studies used a range of methodological designs. Four included a comparison group, while the remaining studies used single-group, repeated-assessment or cohort designs. Most assessed the same participants over time, although some compared different groups of students at baseline and follow-up or experienced substantial loss to follow-up. These differences limited the extent to which the reported changes could be attributed to the educational programmes.

Follow-up periods ranged from 4 weeks to 12 months. The educational approaches included classroom lessons, demonstrations, drama, guided discussions, printed materials, podcasts, online teaching, multimedia, active

learning, awareness campaigns and augmented reality. Several programmes combined two or more components, while others used a single teaching method. Outcomes included knowledge, awareness, attitudes, confidence, reported BSE practice, perceived barriers and engagement with positive breast-health habits. Few studies directly observed students' practical skills.

Table 1 presents the characteristics, educational approaches and main findings of the included studies.

Table 1. Main characteristics and findings of the included studies

Study	Country	Participants	Educational approach	Assessment time	Main findings
Soto-Perez-de-Celis et al. (2017) [7]	Mexico	126 female middle-school students	School lesson and take-home activity	4 months	Knowledge increased from 63% to 82%.
Ifediora and Azuike (2019) [8]	Nigeria	432 female high-school students	Breast-awareness campaign	6 months	Improvements in awareness and knowledge were maintained.
Omrani et al. (2020) [2]	United Kingdom	787 girls: 375 intervention and 412 control	A 50-minute breast-health lesson with active learning	3 and 6 months	Knowledge and attitudes remained above baseline, although some scores declined.
Nsaful et al. (2022) [9]	Ghana	1,043 students at pre-test and 1,274 students at three-month post-test	Drama, lecture, discussion and leaflet	3 months	Knowledge was higher in the post-programme student group than in the pre-programme group, increasing from 17.2% to 59.4%.
Al-Hosni et al. (2023) [10]	Oman	1,106 female students: 559 intervention and 547 control	Structured breast-cancer awareness programme	4 weeks	Knowledge of breast-cancer risks and symptoms improved.
Ogunmodede et al. (2024) [3]	Nigeria	276 girls: 161 lecture and 115 podcast	Lecture compared with a BSE podcast	6 weeks	Knowledge and practice improved in both groups. The podcast group recorded higher scores.
Nordin et al. (2025) [11]	Malaysia	60 girls aged 13–16 years	Online session, multimedia and pamphlet	4 weeks	Knowledge, attitudes and reported BSE practice improved.
Ifediora et al. (2025) [12]	Nigeria	Male and female high-school students: 2,685 responses at baseline, 2,814 at one month and 500 at 12 months	Repeated teaching with engagement activities	1 and 12 months	BSE knowledge and reported preventive practices increased after 12 months.
Bodhare et al. (2026) [13]	India	250 female students from Classes 9-12	Structured breast- and cervical-cancer education	3 months	Breast-cancer knowledge and attitudes improved. Some students promoted BSE after the programme.
Khasanah et al. (2026) [4]	Indonesia	140 girls: 70 augmented-reality and 70 control	Augmented-reality BSE education compared with lectures, posters and leaflets	3 months	The augmented-reality group recorded higher knowledge and fewer perceived barriers.

Quality of the Included Studies

Methodological quality varied across the 10 studies. Al-Hosni et al. [10] and Omrani et al. [2] provided comparatively stronger evidence because they included comparison groups, followed the same participants over time and reported adequate follow-up. Ogunmodede et al. [3] compared 2 educational approaches and assessed the same participants, but the absence of a non-intervention control group limited the interpretation of the findings. Khasanah et al. [4] included a comparison group but used a post-test-only design, which prevented the assessment of change from baseline.

Several single-group studies clearly described their interventions and reported complete follow-up. Still, without a comparison group, it was difficult to separate the effects of the programme from other influences during the study period. Nsaful et al. [9] assessed different groups of students before and after the programme, while Ifediora et al. [12] reported a substantial reduction in responses at the 12-month assessment. These limitations reduced confidence that the reported findings represented sustained changes among the same participants.

Outcome measurement was another common concern. Most studies assessed knowledge and attitudes using questionnaires, while BSE practice was often based on students' reported responses rather than direct observation. Few studies provided detailed evidence that students could perform the procedure correctly at follow-up. No study was excluded solely because of methodological limitations. These limitations were considered when interpreting the findings. Table 2 summarises the main JBI appraisal areas for each study.

Table 2. Summary of the methodological quality of the included studies

Study	Comparison group	Same participants	Follow-up	Overall assessment
Al-Hosni et al. [10]	Yes	Yes	Complete	Stronger
Bodhare et al. [13]	No	Yes	Complete	Moderate
Ifediora and Azuike [8]	No	Unclear	Incomplete	Cautious
Ifediora et al. [12]	No	Unclear	Incomplete	Cautious
Khasanah et al. [4]	Yes	N/A	Complete	Moderate
Nordin et al. [11]	No	Yes	Complete	Moderate
Nsaful et al. [9]	No	No	N/A	Cautious
Ogunmodede et al. [3]	Yes	Yes	Complete	Moderate
Omrani et al. [2]	Yes	Yes	Complete	Stronger
Soto-Perez-de-Celis et al. [7]	No	Yes	Unclear	Moderate

Note: N/A = not applicable. "Cautious" indicates that the findings require careful interpretation because of limitations in study design, participant follow-up or outcome measurement. The overall assessment reflects the main JBI appraisal areas and was not calculated as a numerical score.

Educational Approaches

The 10 studies used a range of educational approaches, and most programmes combined several components. Common elements included verbal explanations, visual materials, student participation, practical guidance, take-home resources and repeated exposure. Classroom lectures or structured explanations were used in most programmes, often alongside another method that encouraged participation or supported later recall.

The Ghanaian programme combined drama, a lecture, discussion and a leaflet [9]. The Malaysian study used an online session supported by multimedia and a pamphlet [11]. In the United Kingdom, students took part in active learning about breast development, breast awareness, breast support and physical activity [2]. These approaches gave students opportunities to discuss and engage with the content rather than only listen to an explanation.

Digital and visual approaches included podcasts, online teaching, multimedia and augmented reality. Ogunmodede et al. [3] compared a podcast with a lecture, while Khasanah et al. [4] compared augmented-reality education with lectures, posters and leaflets. The Nigerian awareness programmes used campaigns, printed materials and repeated educational activities [8,12]. Programmes in Mexico and Oman combined structured teaching with breast-awareness activities and resources that students could review after the lesson [7,10].

Several programmes included elements that could support retention, such as repeated activities, student discussion, practical guidance and materials for later review. The studies rarely assessed these elements separately, so the effect of any single component could not be distinguished from that of the wider programme.

Programmes that involved active participation reported positive findings at follow-up, although the strength of the evidence varied. The United Kingdom programme used active learning, and knowledge and attitudes remained above baseline at three and six months, with some decline over time [2]. The Ghanaian programme combined drama, discussion and printed information and reported higher knowledge after three months [9]. Different groups of students were assessed before and after the Ghanaian programme, so the findings could not show retention among individual students.

Digital approaches also produced encouraging findings. In Nigeria, the podcast group recorded higher knowledge and practice scores than the lecture group after six weeks [3]. In Indonesia, the augmented-reality group reported higher knowledge and fewer perceived barriers than the group that received lectures, posters and leaflets after three months [4]. The Indonesian study did not include a baseline assessment, so it was unclear whether augmented reality alone explained the difference.

Repeated exposure may help students retain learning for longer. The Nigerian programme involving repeated teaching and student engagement reported positive outcomes at 12 months [12], but the large reduction in responses at follow-up weakened this finding. Several programmes provided take-home materials, including leaflets, pamphlets and guided activities [7–11], but their separate effects were not assessed.

Across the studies, no single component consistently produced better retention in every setting. Positive follow-up findings were often reported in programmes that combined clear explanations, active student involvement, accessible visual or digital materials and opportunities to revisit the content. This was a descriptive pattern and does not show that any individual component caused longer retention.

Retention of Learning

Follow-up periods ranged from four weeks to 12 months. At shorter follow-up periods, Al-Hosni et al. [10] reported improved knowledge of breast-cancer risk factors and symptoms after four weeks. The Malaysian programme reported better knowledge, attitudes and BSE practice at the four-week assessment [11]. In Nigeria, both the lecture and podcast groups showed improved BSE knowledge and practice after six weeks, with higher scores in the podcast group [3].

Positive findings were also reported between three and six months. Knowledge in the Ghanaian study increased from 17.2% before the programme to 59.4% after three months [9]. Since different groups of students participated in the two assessments, this finding reflects a group-level difference rather than retention among the same individuals. The Indian programme reported better breast-cancer knowledge and attitudes after three months [13]. In Indonesia, students receiving augmented-reality education had higher knowledge and fewer perceived barriers than those receiving lectures, posters and leaflets at the three-month assessment [4]. The post-test-only design did not permit measurement of change from baseline.

Soto-Perez-de-Celis et al. [7] reported an increase in knowledge from 63% at baseline to 82% after four months. Omrani et al. [2] found that knowledge and attitudes remained above baseline at three and six months, though some scores declined between the assessments. This decline suggests that gains following a single programme may weaken over time.

The longest follow-up was reported by Ifediora et al. [12], who found better BSE knowledge and reported preventive practices after 12 months. The number of responses fell considerably at the final assessment, and the students assessed at each time point were not clearly matched. These limitations reduced confidence in the evidence of long-term retention.

Taken together, the studies suggest that some breast-health learning may remain beyond the immediate lesson. Confidence in this conclusion is reduced by the absence of comparison groups, variation in measurement tools, incomplete follow-up and frequent reliance on self-reported practice. The available findings support assessment beyond the immediate post-test and suggest that refresher activities may be useful between three and six months.

DISCUSSION

This review found that breast-health education was followed by improvements in adolescents' knowledge, awareness, attitudes and reported practices. Positive findings were reported from four weeks to 12 months after education, suggesting that some learning may remain beyond the immediate lesson. The strength of this conclusion differed across studies because of variations in design, follow-up, participant retention and outcome measurement.

Programmes using discussion, practical guidance, multimedia, podcasts, augmented reality and repeated activities reported encouraging outcomes. The podcast group in Nigeria achieved higher knowledge and practice scores than the lecture group after six weeks [3], while the augmented-reality group in Indonesia reported higher knowledge and fewer perceived barriers after three months [4]. These comparisons suggest that interactive or visually engaging methods may support learning. The studies do not establish that digital methods are consistently better than classroom teaching, since programme content, comparison conditions and measurement approaches differed.

Retention was not equally strong across time or outcomes. Omrani et al. [2] reported that some knowledge and attitude scores declined between three and six months. Ifediora et al. [12] reported positive outcomes at 12 months, but substantial loss of responses reduced confidence in the long-term finding. These results indicate that an initial educational session may produce improvement, but continued retention cannot be assumed. Planned refresher activities and repeated assessment may be needed when programmes aim to develop lasting breast-health awareness.

Theoretical Interpretation

The findings can be interpreted using established health-education theories, although few included studies explicitly tested a theoretical mechanism. The Health Belief Model proposes that health behaviour may be influenced by perceived susceptibility, perceived severity, expected benefits, perceived barriers, cues to action and self-efficacy [14]. Programmes in this review commonly addressed signs, risk factors, benefits of breast awareness and barriers to seeking help. Leaflets, pamphlets, reminders and repeated activities may function as cues to revisit the information. Programmes that reduced perceived barriers or increased confidence may support students' readiness to use what they learned.

Social Cognitive Theory gives further attention to observational learning, guided practice, confidence and reinforcement [15]. Demonstrations, drama, peer activity, model-based practice and audiovisual materials allow students to observe a behaviour before attempting or discussing it. Repeated activities and take-home resources may reinforce learning after the original lesson. These theoretical links offer a possible explanation for the encouraging outcomes observed in programmes that combined explanation with participation and opportunities for review.

These interpretations remain tentative. Most studies evaluated a complete programme rather than testing individual theoretical components. Few measured whether changes in self-efficacy, perceived barriers or cues to action explained the retention of knowledge or practice. Future studies should state the theory guiding

programme development and measure the proposed pathway between educational components and retained outcomes.

Implementation Challenges and Programme Fidelity

The included studies provided limited information about implementation challenges and programme fidelity. Most described the educational content and assessment schedule but gave little detail about educator training, consistency of delivery, student attendance, use of teaching materials or whether every planned activity was completed. This limits understanding of whether differences in outcomes resulted from the educational approach or from the way the programme was delivered.

Delivery in schools requires suitable preparation. Teachers, school nurses or visiting healthcare staff need clear guidance on breast-health content, age-appropriate communication and responses to sensitive questions. Programmes involving demonstrations or practical guidance require suitable teaching materials and a private, respectful setting. Differences in educator experience, lesson duration and opportunities for student participation may affect how students understand and retain the content.

Resource requirements vary across delivery methods. Printed materials and classroom discussions may be easier to provide in schools with limited digital facilities. Online learning, podcasts, multimedia and augmented reality require devices, internet access, technical support and sufficient digital literacy. These requirements may create unequal access between schools. Digital resources should be usable on commonly available devices and should not replace opportunities for students to ask questions.

Cultural sensitivity is particularly relevant when discussing breast development and examination with adolescents. Students may experience embarrassment, discomfort or concern about privacy. Programme planning should consider language, local beliefs, parental expectations and school policies. Female educators or healthcare staff may be preferred in some settings, and students should be given a private method for asking questions.

Programme fidelity should be assessed in future studies. Researchers should report educator preparation, lesson duration, student attendance, components delivered, use of learning materials and any changes made during implementation. A brief fidelity checklist could help distinguish whether limited outcomes arise from the programme content or incomplete delivery. Such reporting would support replication across schools and improve interpretation of differences between studies.

Implications for Practice

Breast-health education should be age appropriate, culturally sensitive and focused on practical understanding. Lessons should explain normal breast development, changes that require attention and where students can seek help. Students should understand that breast self-examination is part of breast awareness and is not a test for diagnosing or excluding cancer.

A school programme could combine a short classroom explanation with visual materials, guided discussion and practical demonstration using an appropriate model. Students should have access to printed or digital materials for later review and a private method for asking sensitive questions. A brief refresher session may be provided within three to six months, followed by an assessment of knowledge, confidence and understanding of the correct sequence.

In Malaysia, breast-health education could be incorporated into existing school-health or adolescent-health activities rather than introduced as a separate examination-focused subject. Delivery could involve trained teachers, school nurses or healthcare professionals. A standard module should specify learning outcomes, suitable language, core breast-warning signs, help-seeking guidance, teaching activities and referral information. Educator training should cover both content and communication with adolescents.

Implementation may begin through a small number of schools before wider introduction. Evaluation should examine student participation, acceptability, knowledge retention, confidence, practical understanding and

educator adherence to the planned module. Differences by age, previous exposure and school resources should be examined so that the programme does not widen existing educational gaps.

Across ASEAN countries, a shared core framework could be adapted to local language, culture, school systems and available resources. Printed materials and classroom activities may suit schools with limited internet access, while online or multimedia resources may support schools with stronger digital facilities. Findings from Malaysia and Indonesia indicate that digital approaches can be used with adolescents [4,11], but wider implementation requires further evaluation across different school settings.

Any school programme should include a clear help-seeking pathway. Students who notice an unusual or persistent breast change should be encouraged to speak with a trusted adult and seek assessment from a healthcare professional. Education should promote awareness and timely help-seeking without creating fear or suggesting that students are responsible for diagnosing disease themselves.

RECOMMENDATIONS FOR FUTURE RESEARCH

Future studies should recruit students from several schools and include a comparison group where feasible. Sample-size calculations, participant recruitment and loss to follow-up should be reported clearly. Assessing the same students at each time point would provide stronger evidence of individual retention than comparing different groups at baseline and follow-up.

Assessments at three, six and 12 months would help identify when learning begins to decline and when refresher education may be needed. Knowledge and attitudes should be measured using suitable and reliable instruments. Reported BSE practice should be supplemented with direct observation or sequencing tasks, since questionnaire responses may not show whether students understand each step correctly.

Programme development should be guided by an appropriate health-education theory. Studies could measure self-efficacy, perceived benefits, perceived barriers, cues to action or behavioural intentions to examine how education influences retained learning and practice. The proposed theoretical pathway should be stated before data collection and tested during analysis.

Research should examine the contribution of specific educational components. Comparative studies could evaluate classroom explanation alone against combinations involving demonstration, discussion, peer activity, digital media, take-home materials or refresher sessions. This would help determine whether particular components add meaningful benefit beyond the basic lesson.

Subgroup analysis should examine whether outcomes differ by age, grade level, previous breast-health education, baseline knowledge, school setting and socioeconomic background. Such analysis requires adequate sample sizes and should be planned before data collection. Findings could help identify students who require additional support without assuming that one programme will work equally well in every school.

Implementation and fidelity should be assessed alongside educational outcomes. Researchers should document educator training, lesson duration, student attendance, components delivered, use of materials and any changes made during the programme. Student and educator feedback could identify cultural, practical or privacy concerns that affect participation.

More multi-school research is needed in Malaysia and neighbouring ASEAN countries. Future studies should assess whether a common core module can be adapted across urban, rural, boarding and day-school settings. Prospective registration of review protocols and publication of complete study findings, including non-significant outcomes, would improve transparency and reduce reporting bias in the evidence base.

LIMITATIONS

This review included English-language studies published between January 2015 and August 2026. PubMed, ERIC, CINAHL Complete and Academic Search Ultimate were searched, together with Open Dissertations

and reference lists. Scopus and Web of Science were not searched, so relevant studies indexed only in those databases may have been missed. Studies published in languages other than English were not included.

Open Dissertations was searched to identify grey literature, but no record published within the specified review period met the eligibility criteria. Other grey-literature sources, unpublished programme evaluations and institutional reports were not systematically searched. Publication bias was not formally assessed. Studies reporting positive educational outcomes may have been more likely to reach publication than studies reporting small, negative or non-significant findings.

The review protocol was not prospectively registered in PROSPERO. Although the eligibility criteria, search concepts, data-extraction items and quality-appraisal approach were defined before completion of the supplementary searches, the absence of prospective registration limits independent verification of whether any methods changed during the review.

Meta-analysis was not appropriate because the 10 studies differed in educational content, study design, outcome measures and follow-up periods. The narrative synthesis could identify recurring patterns but could not estimate a pooled effect or determine the independent contribution of a particular educational component.

Limitations within the included studies affected the review findings. Several studies lacked comparison groups, assessed different participants at baseline and follow-up or lost participants during later assessments. Knowledge, attitudes and BSE practice were commonly measured through questionnaires, and direct observation of practical skills was uncommon. Evidence from Southeast Asia was limited to 1 study from Malaysia and 1 from Indonesia, reducing the applicability of the findings across Malaysia and the wider ASEAN region.

The explanations offered in this review were based on the programme features reported in the included studies. Most studies did not examine individual components or test the proposed mechanisms directly. These explanations should be viewed as possible interpretations rather than confirmed causal relationships.

CONCLUSION

Breast-health educational programmes were followed by improvements in adolescents' knowledge, awareness, attitudes and reported practices from four weeks to 12 months after education. Programmes combining clear explanation with discussion, practical guidance, visual or digital materials and opportunities to revisit the content reported encouraging follow-up findings. The available evidence does not establish that any single educational method produces better retention than the others.

Confidence in the findings is limited by differences in programme content, outcome measures and follow-up periods. Several studies lacked comparison groups, assessed different students across time, experienced substantial loss to follow-up or relied on self-reported practice. The contribution of individual educational components and theoretical mechanisms could not be confirmed.

School-based breast-health education should focus on age-appropriate awareness, recognition of unusual breast changes and timely help-seeking. BSE may be included as part of breast awareness but should not be presented as a method for diagnosing or excluding cancer. Refresher activities and follow-up assessment may support longer retention.

Evidence from Malaysia and other ASEAN countries remains limited. Multi-school studies with theory-informed programmes, direct assessment of practical understanding, fidelity monitoring and longer follow-up are needed before broad curriculum implementation. Such research could support the development of a consistent breast-health education framework that can be adapted to local school settings and cultural needs.

Ethical Approval

Ethical approval was not required because this review used information from published studies and did not involve direct contact with human participants, animals or the collection of personal data.

Conflict of Interest

The authors declare no conflict of interest.

Data Availability

All data used in this review were obtained from the published studies and database records described in the manuscript. The extracted study information supporting the narrative synthesis is presented in the review tables.

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