



Educational innovation, infographic media development

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ABSTRACT

This research aimed to (1) develop infographic media publications, (2) evaluate the efficiency of the developed infographic media, and (3) assess student satisfaction with the infographic publications regarding the impact of improper garbage disposal at Wat Sawang Arom School. The instruments used included evaluation forms and questionnaires, and data were analyzed using descriptive statistics, including mean and standard deviation. The sample consisted of 120 students from Wat Sawang Arom School, Nakhon Ratchasima Primary Educational Service Area Office 1, Semester 1, Academic Year 2023, selected through purposive sampling. The results indicated that (1) the infographic publications were created as posters using image editing programs such as Photoshop and Canva, combining graphics, symbols, text, and images to illustrate school waste issues and their negative effects, thereby raising students' awareness and sense of responsibility; (2) the efficiency of the infographic media was rated at a very good level across all aspects, particularly in design; and (3) student satisfaction was high, with the media being easy to understand and engaging.

Origin and significance of the issue

Various technologies have increasingly influenced daily life, including education. Today, acquiring knowledge is no longer limited to printed materials; learners can access information through electronic media or e-learning in diverse presentation formats (Albassuny, Ismael, & Alkady, 2022).

Infographics have emerged as a popular medium for presenting complex information through static or animated visuals, allowing rapid comprehension. The word "infographic" comes from the words "information" and "graphics." It means data or knowledge that is shown as static or moving images that are easy to understand, like lines, symbols, graphs, charts, diagrams, or maps (Priyanti, Razak, Rahim, Shaharom, & Baharuldin, 2020). Infographics effectively convey meaning quickly without requiring extensive verbal explanation (Bhat & Alyahya, 2023).

Advances in information technology have made creating and utilizing graphics increasingly accessible. Multimedia presentations often employ visuals to communicate complex or text-heavy

information efficiently. Infographics facilitate understanding and enhance visual appeal, engaging learners through images and sounds (Sayed, Mustafa, & Abdel Razek, 2022). At Wat Sawang Arom School, improper waste disposal has resulted in garbage accumulation across various areas. Some waste remains unnoticed, while other items are blown around the school by the wind, creating an unsightly and unhygienic environment (Worapongpat & Arunyakanon, 2025). Furthermore, waste dumped into canals or drains blocks water flow, contaminates water sources, and becomes a breeding ground for disease-carrying insects and rodents (Sidiq, Lukitoyo, & Manalu, 2022).

For these reasons, this study focuses on educational innovation through the development of infographic media. Infographics were used to visually communicate the negative impacts of improper garbage disposal, helping students understand their responsibility and fostering awareness of environmental cleanliness. This research addresses a gap in the literature, as few studies in Thai primary schools have applied infographic-based media to raise awareness of proper waste management.

Objective

1. To develop infographic-style printed materials on the “Impacts of Improper Garbage Disposal” for Wat Sawang Arom School.
2. To evaluate the efficiency of the developed infographic media on the “Impacts of Improper Garbage Disposal” for Wat Sawang Arom School.
3. To assess student satisfaction with the infographic-style print media regarding the effects of improper garbage disposal at Wat Sawang Arom School.

Literature review

Educational innovation and infographic media development

Educational innovation refers to the development and implementation of new methods, tools, and processes aimed at improving learning outcomes and responding to evolving educational needs (Ozdamli & Ozdal, 2018). Among emerging instructional innovations, infographic media has gained prominence as an effective, learner-centered communication tool that supports comprehension, retention, and engagement (Worapongpat, Cai, & Wongsawad, 2024).

Theoretical Framework of Educational Innovation

Educational innovation is grounded in constructivist and cognitive learning theories, which emphasize active learner participation, the use of visual learning aids, and meaningful engagement with content (Kristiana, 2024). Media and technological innovations are increasingly integrated into educational settings to enhance accessibility and learning effectiveness (Worapongpat & Bhasabutr, 2024).

Infographic Media: Definition and Characteristics

Infographics are graphic visual representations of information, data, or knowledge, designed to present complex content clearly and efficiently (Tianshu & Worapongpat, 2023). They combine text, images, and design elements to guide learners' attention and improve understanding through: Clarity: Visual appeal: Retention:

Development Process of Infographic Media

Instructional design models such as ADDIE (Analysis, Design, Development, Implementation, Evaluation) are widely used to structure infographic media development (Nafi'ah, Suprpta, Ayundasari, & Renalia, 2022; Worapongpat, 2024). Effective development involves needs analysis, applying appropriate design principles (e.g., color theory, typography, visual hierarchy), iterative prototyping, and expert validation to ensure media effectiveness (Worapongpat, Wongkumchai, & Anuwatpreecha, 2024).

Gaps in existing research

While empirical studies support infographic media's effectiveness in improving knowledge acquisition, fostering creativity, and maintaining high learner satisfaction, few studies in Thai primary schools have investigated infographic-based interventions specifically for raising awareness of proper

waste management. This research addresses that gap by applying infographic media to environmental education at Wat Sawang Arom School.

Conceptual framework

Infographic media enables users to access and understand large amounts of information through a single, well-structured diagram. By creatively presenting information, small stories can be expanded into larger narratives with a modern, visually appealing perspective. Infographics combine engaging graphics with concise text, attracting the attention of readers who may not enjoy long passages, thereby reducing cognitive overload and boredom. They are also effective for educational news presentations and can visually communicate the consequences of certain actions, promoting behavioral change (Worapongpat, 2025; Worapongpat, Dookarn, Boonmee, Thavisin, & Chanphong, 2025).

Based on this rationale, the researcher designed infographic media to convey knowledge about littering and its consequences within Wat Sawang Arom School. The aim is to help students understand the effects of improper garbage disposal and foster responsible behavior in maintaining school cleanliness.

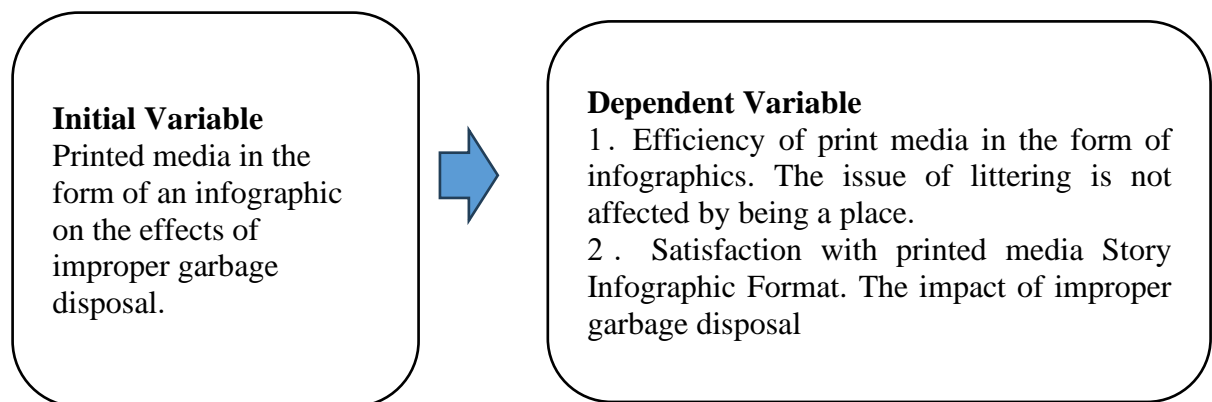


Figure 1 Conceptual framework

Methods

This study is a developmental research project aimed at creating infographic print media and evaluating its efficiency and student satisfaction regarding the effects of improper garbage disposal at Wat Sawang Arom School. The study was conducted in Semester 1, Academic Year 2023, under the Nakhon Ratchasima Primary Educational Service Area Office 1. The population consisted of 667 students, with a sample of 120 students selected through purposive sampling.

1. Population and Sample

1.1 Population: Students of Wat Sawang Arom School (N = 667).

1.2 Sample: 120 students selected via purposive sampling. (Note: Consider justifying purposive sampling or using probability sampling to enhance representativeness.)

2. Research Instruments

Infographic print media on the impacts of improper garbage disposal.

Expert evaluation forms assessing media effectiveness.

Student satisfaction questionnaires.

3. Development Procedure Using ADDIE Model

Analysis: Defined research objectives and collected relevant information from articles, books, and prior studies.

Analyzed content to ensure that infographics addressed the impacts of improper garbage disposal and summarized key points effectively for the target group.

Design: Studied infographic design principles, including visual hierarchy, color theory, typography, and layout suitable for the student audience.

Planned content presentation to maximize clarity, engagement, and comprehension.

Development: Created infographic media using Canva, Photoshop, and Illustrator.

Designed engaging headlines, organized content in Z-pattern layouts, limited color palettes to three dominant colors, and followed visual design principles for readability and appeal.

Conducted expert evaluation of content, design, and technical quality using a 5-point rating scale.

Implementation:

Displayed infographics in eight classroom locations across grades for two weeks. Students observed and interacted with the materials, after which satisfaction surveys were administered.

Evaluation:

Analyzed expert and student assessment data to determine efficiency and satisfaction.

4. Data Collection

Experts evaluated the infographic media on content, design, and technical aspects. Students (N = 667) completed satisfaction surveys regarding the infographic's content and design.

5. Data Analysis

Data were analyzed using descriptive statistics, including mean (M) and standard deviation (SD). Evaluation criteria and interpretation guidelines were specified for each aspect.

Results

Objective 1 Development of infographic media

The researcher developed an infographic-style publication on the effects of improper garbage disposal at Wat Sawang Arom School. The content addresses the causes of waste generation in schools, mainly due to student carelessness, and highlights the consequences of not disposing of garbage properly, such as unhygienic conditions and negative visual impact, as illustrated in Figure 2.

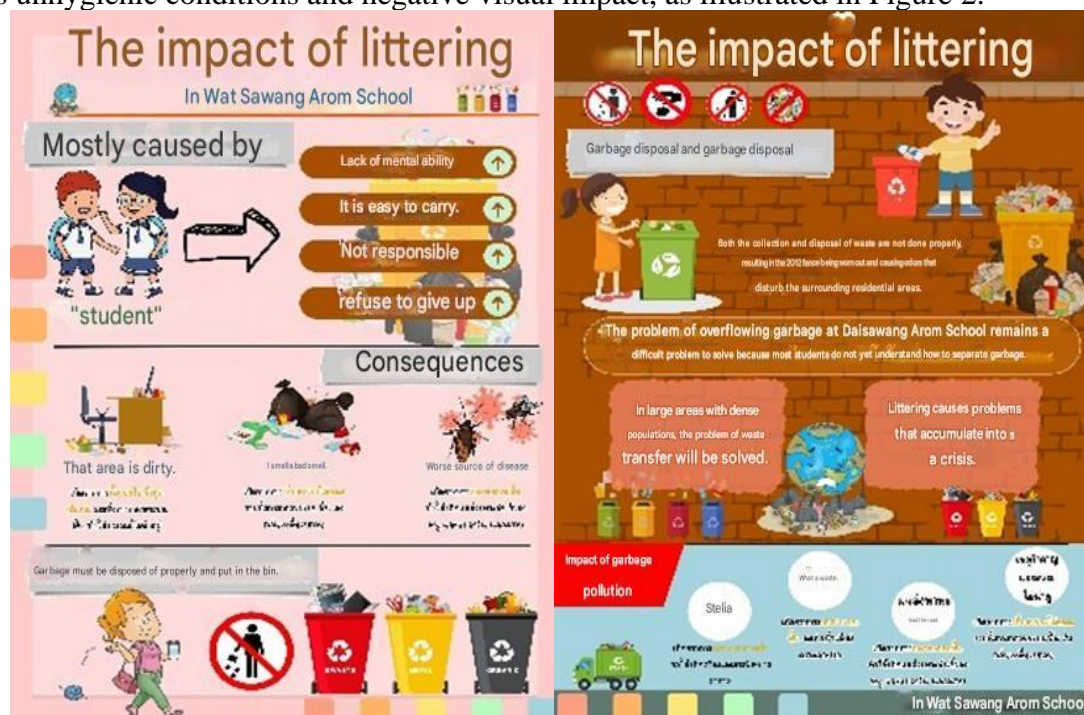


Figure 2: Printed media in the form of an infographic on the effects of improper garbage disposal.

Objective 2 Efficiency of infographic media

The effectiveness of the infographic print media was evaluated with a sample of 120 students during Semester 1, Academic Year 2023. The results are shown in Table 1.

Number of Participants	Exercise/Practice Full Score	Exercise/Practice Average Score	Post-test Full Score	Post-test Average Score	Efficiency (E1/E2)
120	20	16.02	20	17.34	80.1 / 86.7

The efficiency scores of 80.1 and 86.7 meet the standard 80/80 criteria, indicating that the infographic media is effective in promoting learning about improper garbage disposal.

Three experts evaluated the infographic media for content, design, and technical quality. The results are summarized in Table 2.

Assessment Topics	Mean (X)	SD	Evaluation Level
Content	4.33	0.56	Good
1.1 Accuracy of content	4.67	0.47	Very good
1.2 Clarity of content	4.33	0.47	Good
1.3 Insightfulness	4.00	0.82	Good
1.4 Consistency with symbols	4.33	0.47	Very good
Design of side frame	4.67	0.24	Very good
2.1 Color usage	4.33	0.47	Good
2.2 Typography	4.33	0.47	Good
2.3 Graphics	5.00	0.00	Very good
2.4 Modern/interesting design	5.00	0.00	Very good
Overall	4.54	0.40	Very good

The overall evaluation was rated “very good,” with graphics and design aspects receiving the highest scores, indicating that the media is appropriate and visually appealing.

Objective 3: Student satisfaction

Student satisfaction with the infographic media was assessed using a questionnaire. The results are presented in Table 3.

Assessment Topic	Mean (X)	SD	Satisfaction Level
Graphic design is beautiful	4.51	0.61	Highest
Colorful infographic design	4.48	0.67	High
Content is interesting and thought-provoking	4.30	0.67	High

Assessment Topic	Mean (X)	SD	Satisfaction Level
Content is easy to understand	4.55	0.62	Highest
Font style is clear	4.47	0.65	High
Awareness of improper disposal issues	4.52	0.60	Highest
Overall	4.47	0.64	High

Students reported high satisfaction with the infographic media. The highest satisfaction was noted for content clarity, graphic design, and awareness-raising regarding improper garbage disposal. Based on evaluation criteria (mean > 3.50, SD < 1.00), the media is appropriate and suitable for use.

Comments for Author (Methods & Results)

- **Ethical Concerns:** Some sections may closely mirror previous publications or exhibit AI-generated phrasing. Rewriting in your own words and disclosing AI use is advised.
- **Methodology:** Consider justifying the use of purposive sampling or using probability sampling. Provide evidence of instrument validity and reliability. Include detailed statistical formulas and evaluation criteria rather than only mean and SD.
- **Results Interpretation:** Avoid overstating findings; clearly define categories (e.g., “High,” “Very high”) and contextualize scores.

Discussion

Objective 1: Development of Infographic Media The researcher created infographic print media as a special publication in poster format, designed using image editing programs such as Photoshop and Canva. The poster incorporated graphics, symbols, text, and images to illustrate school waste problems and their negative impacts. The purpose was to enhance students’ awareness of the consequences of improper garbage disposal and foster personal responsibility. Infographic media effectively attracts attention through symbolic visuals, allowing students to grasp the content without additional explanation. This approach aligns with Worapongpat, Purisuttamo, Phrakhrudombodhivides (Narong Uttamavangso Sendaranath), Arunyakanon, and Dookarn (2024), who highlighted the advantages of infographics in presenting concise, engaging, and easily comprehensible information. The design process involved reviewing relevant literature and resources to identify key elements of effective design, emphasizing modernity, simplicity, and clarity, reflecting typical school contexts. Expert evaluation was conducted prior to implementation to ensure quality.

Objective 2: Efficiency of Infographic Media The effectiveness of the infographic media was assessed by experts using established criteria, and results indicated a very good level of efficiency. Revisions were made based on expert feedback on content and design, including layout adjustments and enhancement of visual elements. These revisions contributed to the final media achieving high evaluation scores. This finding is consistent with prior studies by Worapongpat, Chaiwiwat, Thavisin, and Sun (2025) and Worapongpat, Thavisin, and Viphoouparakhot (2024), which demonstrated that printed infographics effectively engage readers through graphics, images, and symbols, reducing reliance on large amounts of text and enhancing comprehension while minimizing reader fatigue.

Objective 3: Student Satisfaction Student satisfaction with the infographic media was high, particularly regarding the ease of understanding, content clarity, and visual appeal. The well-designed symbols, appropriate color schemes, and clear typography contributed to this positive response. These results align with findings by Worapongpat (2025) and Worapongpat, Deepimay, and Kangpheng (2025), confirming that well-designed infographic media can effectively communicate information and engage learners. Overall, the infographic media successfully conveyed the consequences of littering, met students’

expectations, and fostered awareness of proper waste disposal practices.

Suggestions

Applications of Research Results

Infographic print media can be used as a teaching tool by designing content according to subject matter. This allows students to understand complex steps through visual illustrations and facilitates analysis of its effectiveness and suitability for each subject.

Infographics serve as an accessible learning medium that summarizes knowledge on complex topics in a concise, visually appealing manner, helping students comprehend information without being overwhelmed by lengthy text.

Infographic print media can be further developed into motion graphics or video infographics, incorporating animation, music, or audio narration to increase engagement and appeal in teaching contexts.

Suggestions for Future Research

Infographics can be adapted into animated presentations or short clips for dissemination through social media platforms such as TikTok, Facebook, or YouTube, expanding learning opportunities beyond the classroom.

Infographic media can continue to be used to simplify complex knowledge and present it in a visually attractive format, promoting better understanding and reducing student fatigue from dense text.

Based on the high satisfaction of students at Wat Sawang Arom School, future research can explore involving students in designing their own infographic media. This encourages creativity, improves learning engagement, and ensures content is tailored to students' interests and comprehension levels.

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