Development of Infographics on Mental Health and Nutrition to Promote Health and Wellness for Secondary School Students

Ailin Chen, Rajamangala University of Technology Thanyaburi, Thailand
Naruemon Thepnuan, Rajamangala University of Technology Thanyaburi, Thailand

The Asian Conference on Education 2024
Official Conference Proceedings

Abstract
The research objectives were to: 1) develop infographics on mental health and nutrition, 2) compare students' knowledge of infographics on mental health and nutrition, and 3) study the satisfaction of students who using infographics on mental health and nutrition. The sample of this study was 20 students in grade 8 of No. 28 Middle School in Zigong City. They were selected students convenient and appropriate from a class or group that is easily accessible and suitable for the study's objectives. The instruments consisted of infographics on mental health and nutrition, an evaluation form regarding the quality of media and contents, an achievement assessment, and a student satisfaction assessment form. Statistics used for data analysis were mean, standard deviation, and t-test for dependent samples. The results showed that: 1) the infographics on mental health and nutrition to promote health and wellness achieved quality in media at is good level with an average score of 4.43 and quality in content at is good level with an average score of 4.20, 2) the students who learned via the infographics had an average pre-test score of 38.25 points and an average and post-test score of 48.25 points, respectively, when comparing the pre-test and post-test scores, so that the post-test scores were higher than the pre-test scores with statistical significance level is .05, and 3) the students were satisfied with infographics was found to be at a highest level with the average score of 4.90.

Keywords: Infographics, Mental Health and Nutrition Promote Health and Wellness, Secondary School Students

1. Introduction

1.1 Background and Statement of the Problem

Zigong No. 28 Middle School is a middle school. In order to further understand the health status of students and explore the application value of health information graph in students' health education, this study carried out relevant investigation and analysis.

In the context of the research, we can see that with the development of society and the change of lifestyle, students' health problems have attracted more and more attention (Zheng Qing, Shen Hejun, 2019). However, many students have health problems such as insufficient exercise, mental health issues and malnutrition that need to be improved. Therefore, it is of great significance to understand students' health status and make health infographics suitable for students.

In the sense of research, we can see that the investigation and analysis of students' health status, it can provide a scientific basis for schools to formulate targeted health education measures (Beijing 24th Middle School research group, 2018). At the same time, as a data visualization tool, health infographics can convey health information intuitively and succinctly, improve students' health awareness and health literacy, and play a positive role in promoting students' health development. Therefore, the theoretical analysis and empirical research of health information graphs also have certain research value.

To sum up, some research results have been accumulated on the development of health and health information graphs for middle school students. However, there is still a need for in-depth research and discussion on the factors affecting middle school students' health, behavior habits, and the relationship with family factors (Qi Wenjuan et al., 2017). Therefore, further research and exploration are necessary in order to better understand the health status of middle school students and propose effective health promotion measures and intervention strategies.

Through the investigation and analysis of the health status of the twenty-eighth Middle School students in Zigong City, as well as the theoretical analysis and empirical research on the health information graph, this study aims to provide scientific and reasonable health education measures and health information graphs suitable for students. Through effective data visualization transmission, improve students' health awareness and health literacy, and promote students' healthy development. At the same time, the research results and evaluation results will provide reference and guidance for school health education in the future, and contribute to the healthy growth of students.

Through the analysis of the survey results of the health status of the students of No. 28 Middle School in Zigong, we can see that the student's physical education status is generally poor, there are more mental health problems, and the nutritional status is not ideal. This requires schools and families to work together and take corresponding measures to improve the health of students. In terms of the interpretation of the results, we will conduct a detailed interpretation of the survey results and an in-depth analysis of the causes and influencing factors of students' health problems. In the aspect of problem analysis, the problems existing in the investigation are analyzed, and the corresponding improvement measures and suggestions are put forward to provide a reference for students' health education.

1.2 Research of Objectives

1) To develop infographics on mental health and nutrition to promote health and wellness for secondary school students to have quality.
2) To compare students' knowledge of infographics on mental health and nutrition to promote health and wellness for secondary school students.
3) To study the satisfaction of students who use infographics on mental health and nutrition to promote health and wellness for secondary school students.

1.3 Research Hypothesis

Students who use infographics on mental health and nutrition to promote health and wellness for secondary school students know significantly higher at 0.50.

1.4 Conceptual Framework

Independent Variable: Infographics on mental health and nutrition to promote health and wellness for secondary school students

Dependent Variables: 1) Students' knowledge of infographics on mental health and nutrition to promote health and wellness for secondary school students, and 2) Satisfaction of students who use infographics on mental health and nutrition to promote health and wellness for secondary school students.

2. Research of Methodology

The population of this study was 60 students of No. 28 Middle School in Zigong City.

The sample of this study is 20 students in grade 8 of No. 28 Middle School in Zigong City.

They were selected by means of a purposeful sampling method.

2.1 Research Design

The researcher used a quantitative approach in the experimental design to conduct this study. The data was collected in a quantitative or numerical form derived from the test, and the researcher used a one-group pretest-posttest design. This design included a pretest measure followed by a treatment and a posttest for a single group. An illustration of the design is as follows:
Group: O1 x O2
O1 = Measurement of the pretest score
X = Infographics for Promoting Health and Wellness
O2 = Measurement of the Knowledge and understanding of the post-test score

2.2 Research of Methodology

Step 1: the 28th Middle School students of Zigong City filled in the questionnaire and then sent the health chart through the official WeChat account to improve the student's health knowledge. Then, the questionnaire test was conducted on the students again. Finally, the results of the two tests were compared to conclude.

This section was a closed questionnaire based on a five (5) point Likert-type scale where participants were asked to rate the degree of agreement with each statement on a scale of 1-5. The interpretation of each number is described below:

5 = Excellent
4 = Good
3 = Moderate
2 = Sufficient
1 = Improvement

Table 1: Range of Mean and Verbal Interpretation for Assessment of Quality

Range Value	Verbal Interpretation
4.50-5.00	Excellent
3.50-4.49	Good
2.50-3.49	Moderate
1.50-2.49	Sufficient
1.00-1.49	Improvement

This part is an open-ended questionnaire. Participants were asked to express their opinions and suggestions by using the WeChat public account to improve the efficiency of the students of the 28th Middle School in Zigong City.

Step 2: Before attempting the assessment, three measurement and evaluation specialists working in the field of measurement and evaluation or medicine were asked to check the appropriateness of the language used in the questionnaire. The resulting data were used to calculate the project Objective Conformance Index (IOC). Measurement and evaluation experts' evaluation of the quality of the content of the project Objective Conformance Index found that the value of the project objective conformance index was... The evaluation results are then submitted to the content expert for further evaluation, and the media quality evaluation results of the project objective conformity Index are obtained by measuring and evaluating the evaluation expert finds the project objective conformity Index value is... The results are then presented to media experts for further evaluation. The evaluation criteria are used to check consistency between test objectives and projects, as follows:

Table 2: Value of Item Objective Congruence Index and Verbal Interpretation

+1	item is considered congruent with the objectives.
0	item is considered neutral in terms of whether it was congruent with the objectives.
-1	item is considered not congruent with the objectives.

The total mean score of the Item-Objective Congruence (IOC) Index is supposed to be higher than 0.5 for acceptable data.

Step 3: The assessment will be used by experts. In order to improve the efficiency of the use of content experts by the students of the 28th Middle School of Zigong City, the quality of the content of the health charts on the Wechat public account was evaluated, and the quality of the health charts on the Wechat public account was evaluated to improve the utilization rate of the health charts by the students of the 28th Middle School of Zigong City.

2.3 The Achievement Assessment (Pretest and Posttest)

Pre-test and post-test share the same items. Both contain 28 aspects related to physical condition, lifestyle habits, diet health, exercise frequency, emotional status, study pressure perception, and how they improve sleep quality on WeChat public accounts, a total of seven aspects. Students take a pre-test before using the health scale to learn health knowledge on the WeChat public account and take a post-test after learning. The researchers went through the following steps:

Step 1: The researcher chooses the type of test to study multiple choice, fill-in-the-blank, and short-answer tests.

Step 2: The questionnaire is formulated according to the middle school students' health scale, aiming to measure students' physical health and enhance students' learning of health knowledge.

Step 3: Three measurement and evaluation specialists working in the field of measurement and evaluation or medicine are asked to check for consistency between test subjects and items. The data obtained were used to calculate the project Objective Conformance Index.
The evaluation criteria are used to check the objectives and for acceptable data, the overall average score of the project Consistency of Objectives index should be higher than 0.5.

Step 4: Pre-test and post-test were conducted on 60 students in grade 8 of No. 28 Middle School of Zigong City, but they were not samples of this study. The fifth step: Through the health chart based on WeChat, conduct pre-test and post-test with the participants to explore their health knowledge before and after learning the health scale, to enhance the health level of middle school students.

Step 5: Through the health chart based on we chat, conduct pre-test and post-test with the participants to explore their health knowledge before and after learning the health scale, to enhance the health level of middle school students.

2.4 Data Collection

Step 1: Online Learning Guide

The study of health knowledge aims to enhance students' physical fitness and stimulate their interest in health knowledge. To this end, we specially designed a series of health information graph learning resources for 20 students from Class 5, Grade 8, based on WeChat public accounts. By following the WeChat public account, students can get the latest health chart update tips for the first time, so that they can study anytime and anywhere.

Step 2: Pre-Test Evaluation

These 20 students were given a pre-test before learning the health infographic. The purpose of the pre-test is to know the student's initial level of health knowledge, so as to carry out more targeted teaching in the future. The results of the pre-test will provide valuable data support to help optimize the teaching content and methods.

Step 3: Learning with health infographics for learning activities

Based on the WeChat public account platform, a series of health information graphs have been developed, covering various health knowledge that middle school students should

master. We organized 20 students from Class 5, Grade 8, to study health infographics for one month. By constantly viewing and interpreting these charts, students can understand health knowledge more intuitively and improve their learning results.

Step 4: Post-Test and data analysis

After completing a month of study, the 20 students were given a post-test. The purpose of the post-test is to assess whether students have improved their mastery of health knowledge after a period of study. The post-test results were statistically compared with the pre-test results, and the influence of health infographic learning on students' health knowledge was objectively evaluated by means of data analysis.

2.5 Data and Statistical Analysis

In this study, mean difference, standard deviation, and T-test were used for analysis.
1) Evaluate the use of health charts through WeChat public accounts, and improve the use efficiency of students by means of mean and standard deviation.
2) The performance test before and after learning is compared with health infographics, and the T-test dependence method is adopted to improve the use efficiency of students.
3) Study students' satisfaction with health infographics using mean and standard deviation to improve students' use efficiency.

3. Research Result

3.1 Results of Evaluation of Infographics on Mental Health and Nutrition to Promote Health and Wellness for Secondary School Students to Have a Quality

Table 3: The Infographics on Mental Health and Nutrition to Promote Health and Wellness For Secondary School Students to Have a Quality From Three Media Experts

Item	$\overline{X}$	SD.	Meaning
1. Are the facts, statistics and information in the infographic accurate and reliable? Are they supported by reliable sources and evidence-based research?	4.67	0.38	Excellent
2. Is the information presented in a clear and simple way? Is it easy to understand and explain, even for those without a background in mental health and nutrition?	4.33	0.47	Good
3. How visually appealing is the infographic? Does it use color, images, and graphics effectively to attract attention and convey information?	4.33	0.58	Good
4. Does the infographic provide a balanced presentation of mental health and nutrition information? Are the two themes equally representative?	4.67	0.38	Excellent
5. Is the infographic tailored to the target audience? Does it take into account the age, interests and background of the target audience?	4.33	0.47	Good
6. Are there any interactive elements or features in the infographic that engage the reader and enhance the learning experience?	4.00	0.82	Good

Item	X̄	SD.	Meaning
7. Does the infographic always maintain consistency of information and reinforce key messages and objectives?	4.33	0.47	Good
8.Are infographics accessible to people with different disabilities, such as the visually impaired? Are there other formats or amenities available?	4.00	0.82	Good
9. Does the infographic include a clear call to action or practical steps that readers can take to improve their mental health and nutrition?	4.67	0.38	Excellent
10. Are infographics original and creative and stand out from other similar media? Does it use unique design elements or innovative approaches to convey its message?	5.00	0.00	Excellent
Total	**4.43**	**0.42**	Good

From Table 3 the overall results of the health infographic quality are good, with an average score of 4.43.

Table 4: The Infographics on Mental Health and Nutrition to Promote Health and Wellness for Secondary School Students to Have Quality From Three Content Experts

Item	X̄	SD.	Meaning
1. Is the content a comprehensive overview of mental health and nutrition, covering all aspects, theoretical and practical applications?	4.33	0.47	Good
2. Is the language clear and concise enough to understand the main ideas and arguments? Are complex terms or concepts explained?	4.67	0.38	Excellent
3. How does the content integrate the two themes of mental health and nutrition to show the interconnectedness and mutual influence between them?	4.00	0.00	Good
4. Does the content introduce any ideas, assumptions, or perspectives that contribute to the understanding of mental health and nutrition?	4.00	0.00	Good
5. Does the content provide practical strategies, recommendations, or examples that can be implemented in real-world Settings to improve mental health and nutrition?	4.67	0.38	Excellent
6. Is the content internally consistent, with no conflicting information or arguments? Does it consistently maintain a coherent narrative that ensures a smooth reading experience?	4.33	0.47	Good
7. How relevant and timely is the content in terms of current mental health and nutrition research, practice and recommendations?	3.67	0.38	Good
8. Does the content cover a broad range of topics related to mental health and nutrition, including different aspects, factors and strategies?	4.00	0.00	Good
9. Does the content have a logical flow and structure that is easy to follow and understand?	4.00	0.00	Good

10. Does the content present a balanced view, acknowledge different perspectives, and take into account the positive and negative aspects of mental health and nutrition?	4.33	0.58	Good
Total	**4.20**	**1.64**	**Good**

From Table 4 the overall results of the health infographic quality are good, with an average score of 4.20.

3.2 Results of Compare Students' Knowledge of Infographics on Mental Health and Nutrition to Promote Health and Wellness for Secondary School Students

Table 5: Compare Students' Knowledge of Infographics on Mental Health and Nutrition to Promote Health and Wellness for Secondary School Students

Items	n	$\bar{X}$	SD.	t-test	Sig. (2-tailed)
Pre-test	20	38.25	6.13	6.402	.000
Post-test	20	48.25	3.35		

**p< .05

From Table 5 the average scores of the students in the pre-test and post-test were 38.25 and 48.25 respectively. Compared with the scores of the pre-test and post-test, it is found that the post-test scores are higher than the pre-test scores, and the statistical significance level is .05.

3.3 Results of Study the Satisfaction of Students Who Using Infographics on Mental Health and Nutrition to Promote Health and Wellness for Secondary School Students

Table 6: The Satisfaction of Students Who Using Infographics on Mental Health and Nutrition to Promote Health and Wellness for Secondary School Students

Option	$\bar{X}$	SD.	Meaning
1.You are satisfied with the overall content of the health infographic.	4.90	0.31	Highest
2. The clarity and comprehensibility of information in health infographics are high.	4.90	0.31	Highest
3. Health infographics offer practical tips for improving mental health.	4.85	0.37	Highest
4. The health information map provides useful nutritional information for health promotion.	5.00	0.00	Highest
5. Health infographics make you aware of new or different ways to incorporate healthy eating into your daily life.	4.80	0.41	Highest
6. The colors, fonts, and designs in the health infographic appeal to you.	4.95	0.22	Highest
7. The data content of the health infographic is accurate and easy to understand.	4.90	0.31	Highest
8. Health infographics feature trendy and interesting health topics.	4.90	0.31	Highest
9. After using the health infographic, you feel more knowledgeable about your health.	4.90	0.31	Highest

10. You will be happy to share this health infographic with your friends and family.	4.95	0.22	Highest
	4.90	**0.94**	Highest

From Table 6 it was found that the students are overall satisfied with infographics on mental health and nutrition to promote health and wellness at the highest level with an average score of 4.90.

4. Conclusion and Discussion

4.1 Conclusion

1) Quality of Infographics: The infographics on mental health and nutrition were rated highly by both media and content experts, scoring well on design, originality, and clarity. Media experts rated the quality as good (4.43), with creativity at an excellent level (5.00), while content experts emphasized practical application and comprehensive content integration, giving an overall score of 4.20.

2) Compare students' knowledge: Student knowledge significantly improved, with post-test scores rising from 38.25 to 48.25, showing the effectiveness of the infographics in enhancing students' understanding of mental health and nutrition topics.

3) Student Satisfaction: Students expressed very high satisfaction with the infographics, particularly for their visual appeal (4.95) and usefulness of nutritional information (5.00). Overall satisfaction was rated at 4.90, indicating that the infographics were engaging, informative, and easy to understand.

4.2 Discussion

1) Quality and Design of Infographics: Health and nutrition infographics for secondary students were rated highly for quality (average 4.43) and originality (5.00). This aligns with Zhang Yimian and Wan Xuan's (2021) study, which emphasizes the importance of unique design elements and innovative methods for effective health education communication.

2) Effectiveness in Knowledge Enhancement: Post-test scores showed a statistically significant improvement over pre-test scores, demonstrating the infographic's role in enhancing students' learning efficiency and engagement. This finding is consistent with Tang Ruohan et al. (2021) and LAN Yun's (2021) research on the expansive application of infographics in visual communication, showing that well-designed visuals promote learning and retention.

3) Student Satisfaction and Engagement: Overall student satisfaction was very high (average 4.90), with particular praise for visual appeal (4.95) and practical nutrition information (5.00). This supports Zeng Yi et al.'s (2023) findings that flexible, visually engaging health information charts improve comprehension, critical thinking, and user satisfaction, encouraging positive health behaviors.

5. Recommendation

5.1. Recommendations From the Research Results

1) Due to the small number of students participating in learning health infographics and the short learning cycle, the depth and breadth of the data collected by us may be restricted to some extent, affecting the quality and quantity of data.

2) The content of the health infographic is slightly thin, the collected data information is not rich enough, and the scope of the survey is relatively narrow.

3) Due to the limitations of personal ability and experience, the health infographic currently designed still needs to be further refined and improved. At the same time, there are still many shortcomings in the content of the developed health infographic, which need to be deeply analyzed and improved to improve the quality and practicability of the graph.

5.2 Suggestions for Future Research

1) Expand the sample range for evaluating health infographics by including diverse groups in online learning studies. Feedback from learners, health experts, and educators will be used to refine infographic designs.

2) Continuously revise infographic content based on user feedback, aiming to improve learning outcomes and information delivery efficiency.

3) Regularly update infographic content in line with the latest health industry developments, using advanced information technology to align school health education with current industry needs.

References

Beijing 24th Middle School research group. (2018). Green Development and Healthy Growth -- Design and practice research of "Student Health and Development Assessment System." *Beijing Education (General Education Edition)*, *Issue 6, 2018*(CN: 11-1129/G4), 68–69. Myriad data. https://d.wanfangdata.com.cn/periodical/Ch9QZXJpb2RpY2FsQ0hJTmV3UzIwMjUwMTE2MTYzNjE0EhFiamp5LXBqYjIwMTgwNjAzMBoIeGl2NG9nYng%3D

Lan, Y. (2021). Research on Infographic and Rhetoric Expansion in Visual Communication Design in the Era of Big Data. Digital Design, Issue 23, 2021(GB/T 7714-2015), 110–113. Myriad data. https://doi.org/10.3969/j.issn.1672-9129.2021.23.smsj-shang202123031

Qi, W., Lian, Q., Mao, Y., Zuo, X., Zhang, Y., Luo, S., Zhang, S., Lou, C., Zhou, W., & Tu, X. (2017). Health risk behavior and its association with family characteristics factors among middle school students. *School Health in China*, *2017, 38 volumes, 6 issues* (GB/T 7714-2015), 812–815. Myriad data. https://doi.org/10.16835/j.cnki.1000-9817.2017.06.005

Tang, R., Xu, G., Han, T., & Wang, P. (2021). Research on interface information visualization design based on the background of smart campus. *Modern Vocational Education*, *Issue 9, 2021*(GB/T 7714-2015), 190–191. Myriad data. https://d.wanfangdata.com.cn/periodical/Ch9QZXJpb2RpY2FsQ0hJTmV3UzIwMjUwMTE2MTYzNjE0Eg94ZHp5ankyMDIxMDkwOTMaCGxhc29maGpu

Zhang, Y., & Wan, X. (2021). Research on the information graphic design method of health education for chronic diseases. *Design*, *Volume 34 Issue 1, 2021*(GB/T 7714-2015), 18–21. Myriad data. https://doi.org/10.3969/j.issn.1003-0069.2021.01.006

Zheng, Q., & Shen, H. (2019). Current situation and thinking of middle school students' health education. *Hubei Sports Science and Technology*, *Volume 38 Issue 6, 2019*(GB/T 7714-2015), 561–564. Myriad data. https://doi.org/10.3969/j.issn.1003-983X.2019.06.024

Zeng, Y., Yang, Z., Song, Q., & Qian, H. (2023). Health information needs and use habits of primary and secondary school students in Shanghai. *School Health in China*, *Volume 44 Issue 1, 2023*(GB/T 7714-2015), 56–61. Myriad data. https://doi.org/10.16835/j.cnki.1000-9817.2023.01.013

Contact emails: ai-lin_c@mail.rmutt.ac.th
naruemon_t@rmutt.ac.th