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Research article

Digital education and pet care: Assessing the impact of the LAOA on pet owner knowledge across key health categories

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Abstract

The burgeoning popularity of online veterinary communication through the Line Application Official Account (LAOA) is attributed to its convenience. This study to investigate learners' perceptions of animal health infographics delivered through the LAOA; analyzed using R and R Studio. The analysis comprised descriptive statistics range, frequencies, mean, standard deviation, median, quartiles, and interquartile range, represented through boxplots, histograms, and bar plots—and inferential statistics, employing independent t-tests and one-way ANOVA to compare pre- and post-intervention scores, with Tukey's test for post hoc comparisons among different pet types. Due to data collection constraints, independent t-tests were used instead of paired tests. Significant improvements were noted in the post-intervention analysis, with scores increasing from a pre-intervention range of 42 to 85 points, median 67, to a post-intervention range of 49 to 85 points, median 70; the mean post-intervention score was 71.6 ± 0.37, significantly higher than the pre-intervention mean of 68 ± 8.24 ($p < 0.01$). The maximum scores for categories were varied, with Disease, Law, Vaccine, and Zoonoses capped at 10, Nutrients at 30, and Welfare at 15. Especially, post-intervention scores improved significantly in all categories except Vaccines, which did not show significant change ($p > 0.05$). Generation Z demonstrated the highest engagement with the LAOA, indicating a trend towards digital in pet health management. Overall, the findings suggest that LAOA effectively enhances pet owner education and highlights ongoing informational needs, particularly in Pet Health and Zoonoses, suggesting a sustained utility for this digital communication tool.

Keywords: Companion owner, Informational graphics, Line Application Official Account, Perception.

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INTRODUCTION

Thailand is at the widespread adoption and integration of digital technologies. Social media usage has become increasingly prevalent, with 78.7 % of the population actively engaging with various platforms (Techsauce, 2021). A 2022 survey by the Electronic Transactions Development Agency (ETDA) found that Thais spend an average of 7 hours and 4 minutes daily online, with Generation Y (22-41 years old) using the internet the most at 8 hours and 55 minutes. The study also revealed that women are more likely than men to review products online, influencing purchasing decisions. (Bae and Lee, 2011). Thai internet users aged 16 to 64 ranked ninth globally, spending an average of 8 hours and 44 minutes online daily, with significant time spent on social media (2 hours and 25 minutes) and news consumption (2 hours and 2 minutes). Additionally, 60.4% used QR codes monthly, 55.5% searched for brand information on social media, and notable engagement was seen with online public health services (13.80%) and educational resources (11.13%). (Electronic Transactions Development Agency, 2022).

The Internet of Things (IoT) has particularly revolutionized pet care, introducing remote applications that manage pet-related functions, such as feeding systems and animal doors, through online interfaces (Luayon et al., 2019; Quiñonez et al., 2021). The veterinary sector has similarly embraced digital technologies, enhancing the efficiency of treatment and preventive care. The introduction of telemedicine services has significantly impacted cost reduction and accessibility in animal healthcare, demonstrating the vital role of digital advancements across various life facets (Casey et al., 2017). These trends accentuate the transformative effects of the digital era on daily activities and sector-specific advancements in Thailand.

Pet owners increasingly turn to online media for information about pet care, treatment, and disease prevention (Walker et al., 2016). However, the reliability of this information can vary significantly, making it crucial for users to source their information from credible experts. This includes officials who specialize in specific types of pets, veterinarians, and veterinary specialists. The presence of misinformation and the proliferation of "fake news" online necessitate that pet owners possess strong Media Information and Digital Literacy (MIDL) skills. These skills are essential for discerning the accuracy of information amid a sea of potentially unreliable content.

Recognizing the challenges associated with navigating online information, this study introduces a notification application tool designed to improve the accuracy of information received by pet owners. This tool not only facilitates quicker access to verified information but also reduces the burden on pet owners to develop extensive MIDL skills. By integrating the LAOA system, the tool ensures that pet owners can easily connect with reliable sources, thereby enhancing the efficiency of obtaining critical information related to pet health and disease prevention. This streamlined approach not only saves time but also promotes better health outcomes by providing access to authoritative advice and reducing the risk associated with following inaccurate or harmful online advice.

MATERIALS AND METHODS

This research received ethical approval from the Human Ethics Committee at the Faculty of Veterinary Medicine, Chiang Mai University, under Approval No. HS1/2566. This endorsement highlights the study's adherence to ethical standards in conducting research that involves the collection and analysis of data concerning pet owners and their use of digital media for veterinary information.

Population and study designs

The research employed non-probability purposive sampling, specifically targeting dog and cat owners. The study used a quasi-experimental design with a one-group pre- and post-test approach to measure the effects of the intervention. It involved 400 companion animal owners determined by Taro Yamane's formula (1973) N = 400, This approach helps achieve a balance between statistical significance and practical feasibility. The sample size in the first part was n=393, after 7 people who did not answer all of the questions were excluded. Participants were required to be 18 or older, own at least one pet, live in Thailand, be proficient in Thai, and own a smartphone with the Line app installed. The inclusion criteria also required consent to participate, ability to use Line, and complete information. Exclusion criteria included those under 18, unable to read Thai, lacking smartphone access, or unwilling to install or use the LAOA. This process ensured participants could engage with the study's digital tools. As well, this approach aimed to maintain the study's reliability and validity by focusing on a targeted yet representative sample of Thai pet owners.

Data collection tools

The research utilized two main instruments to collect data from participants: Knowledge perception refers to the understanding and awareness an individual has about a pet health. It includes: Nutrients: Know of the essential nutrients found in pets; Disease: Know the name of the disease in dogs and cats that can be fatal if not prevented; Zoonoses: Know the name of the diseases that can be transmitted from animals to humans; Law: Know the laws and legal consequences for not vaccinating pets against rabies; Vaccine: Know that dogs and cats must receive vaccinations at the appropriate age; Animal Welfare: Know the penalties for mistreating dogs and cats.

Knowledge questionnaire: This questionnaire was administered both before and after the intervention to evaluate changes in participants' knowledge. It included 2 sections:

Section 1: Personal Information Questionnaire - Developed by the researcher, this section comprised 10 items designed to gather demographic and pet-related information from the participants. The data collected included age, gender, highest level of education, occupation, average monthly income, type of pet, and the age of the pet.

Section 2: Pet Health Knowledge Perception Questionnaire - This section consisted of 17 items along with one open-ended question. It was specifically crafted to assess the participants' understanding and perceptions of pet health, aiming to gauge their baseline knowledge and any shifts after the intervention. Knowledge issues (infographics): To deliver the educational content, the researcher developed six infographics through the LAOA. This content was tailored to enhance pet care knowledge. The knowledge was initially assessed via the questionnaire before any informational content was provided. The infographics were then disseminated the rough the LINE application on a fixed schedule—twice a week on Mondays and Thursdays Because it's during the week and from asking pet owners, most of them prefer to use Line more than other days. Each of the six knowledge issues was released sequentially, ensuring structured exposure to the information over the course of six weeks. After the dissemination of all issues, the impact of this knowledge transfer was evaluated by administering the post-intervention questionnaire (see Figures 1).

This methodical approach in delivering and assessing the information aimed both to enrich the participants' knowledge about pet health and to measure the effectiveness of infographics as a tool for digital education via smartphone applications.

Instrument Validation

Questionnaire

The questionnaires utilized in this study, including those assessing pet health care knowledge and satisfaction with notification applications, underwent a rigorous validation process. This involved content validity testing through the Index of Item-Objective Congruence (IOC) method, which was conducted by uncertain content, and -1 for inconsistent content. Items that achieved an IOC value ranging from 0.50 to 1.0 were considered to have sufficient content validity and were retained for the final three experts in the field. Each item within the questionnaires was evaluated based on its alignment with the research objectives. The experts assigned scores of +1 for content deemed consistent, 0 for questionnaire. This validation process ensured the relevance and accuracy of the questionnaire items in measuring the intended variables.

Knowledge Issues and Infographic Development

In response to the challenges faced by pet owners, data collection for this study was expansive, incorporating inputs from the LINE application, social media platforms, and veterinary hospitals. Moreover, focus group in veterinary clinic and hospital discussions with pet owners were conducted to identify key areas of concern. These discussions helped pinpoint six primary issues: pet nutrition, disease information, vaccination programs, zoonotic diseases, legally mandated and non-mandated vaccines, and animal welfare regulations including penalties and epidemic control.

To effectively communicate solutions and information regarding these issues, infographics were developed for each topic. The initial versions of these infographics were tested with five veterinarians, five the public, and five pet owners to gather feedback. This feedback was instrumental in refining the content, ensuring that the final infographics were not only accurate and informative but also engaging for the intended audience. This iterative process of development and refinement was crucial in enhancing the educational impact of the infographics on pet health and welfare.

Figure 1 Knowledge Issue: Nutrients (A), Disease (B), Zoonoses (C), Law (D), Vaccine (E), Animal Welfare (F)

Data collection process

The data collection process for this study was carefully structured to ensure comprehensive and ethical engagement with the participants. The sequence of steps was as follows: The entire data collection process, along with the sequence of interactions and distributions, was depicted in Figure 2 of the study documentation. This visual representation helped illustrate the flow of activities and data collection points throughout the study, providing a clear and structured overview of the research methodology.

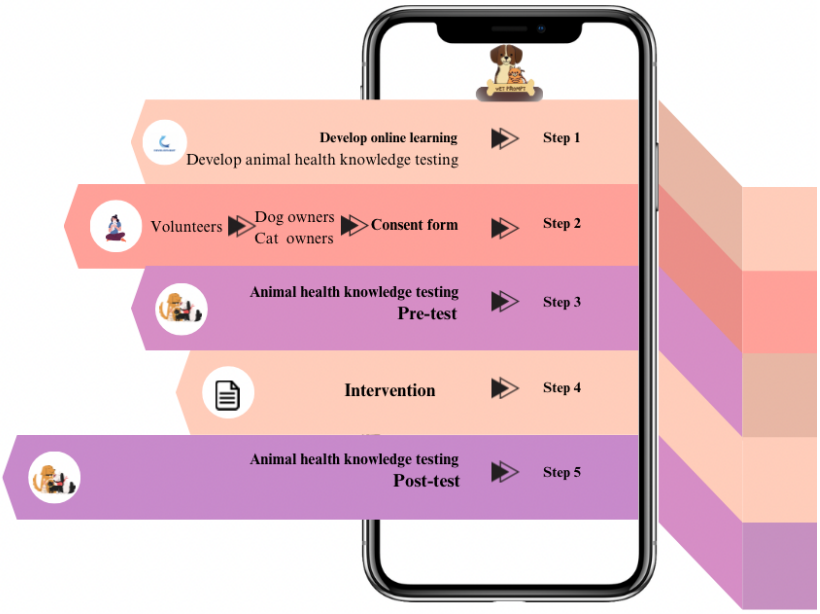

Figure 2 Illustration of the online learning process

Participant Onboarding

Eligible participants who met the predefined study criteria were initially asked to scan a QR code to join a designated LINE group. This digital platform facilitated communication and distribution of materials throughout the study.

Introduction and Consent

Once all participants had joined the LINE group, researchers provided a detailed overview of the study's purpose and procedures. This introduction also included an explanation of the ethical considerations associated with the research, delivered through the LAOA. Following this, a pre-perception online questionnaire was distributed via LAOA. This step was crucial as it served two primary purposes: it obtained participants' consent to officially join the research project and it collected baseline data through the Pre-Perception Online Questionnaire Google Form (Pre-POQGF).

Information Dissemination

After gathering initial data and securing consent, the research team distributed sets of knowledge in the form of infographics through LAOA. These infographics were designed to enhance the participants' understanding of various aspects of pet care and health.

Post-Intervention Assessment

Upon completion of the infographic distribution, a Post-Perception Online Questionnaire Google Form (Post-POQGF) was sent to all participants. This questionnaire aimed to collect data on the participants' perceptions after receiving all the knowledge sets, allowing the researchers to evaluate the effectiveness of the informational content provided.

Procedure

The research procedure was structured to systematically disseminate information in a graduated manner, from simpler to more complex topics, to ensure comprehensive understanding among participants. The researchers curated six knowledge issues, categorized by complexity and relevance, ranging from Level 1

to Level 6. These issues were scheduled for release online on a bi-weekly basis—every Monday and Thursday, as detailed in the program schedule (Table 1).

The content covered a spectrum of topics essential for pet owners:

1) Nutrients - Focused on the dietary requirements and nutritional management of pets.

2) Disease - Provided information about common pet diseases and their prevention.

3) Vaccine Programs - Outlined essential vaccination schedules and their importance.

4) Zoonoses - Discussed diseases that can be transmitted from animals to humans.

5) Law - Covered legal obligations and rights concerning pet ownership.

6) Animal Welfare - Addressed ethical treatment, welfare standards, and owner responsibilities.

Before the release of these topics, baseline data was collected to assess the initial knowledge level of the participants. This pre-intervention data collection was crucial for comparing the effectiveness of the knowledge dissemination process. Over the course of six weeks, the knowledge issues were distributed through an online platform, adhering to the predefined schedule. The content was divided into two categories for strategic release: the first three issues (1 - 3) included general information that all pet owners should know, while the last three issues (4 - 6) contained critical information that must be understood by pet owners. After the distribution of the final set of knowledge issues in week 6, post-intervention data was collected. This allowed the researchers to analyze the impact of the informational content on the participants' knowledge and awareness. The structured release and the categorization of the content were designed to maximize learning and retention, facilitating a thorough understanding of both basic and advanced topics relevant to pet care and management.

Table 1 Questionnaire and information program, issue 1: Nutrients 2: Disease 3: Vaccine program 4: Zoonoses 5: Law 6: Animal Welfare

Week	Issue	Content	Time/Week
Pre-Test			1 Saturday
1	1	Level 1	2 Monday, Wednesday
2	2	Level 2	2 Monday, Wednesday
3	3	Level 3	2 Monday, Wednesday
4	4	Level 4	2 Monday, Wednesday
5	5	Level 5	2 Monday, Wednesday
6	6	Level 6	2 Monday, Wednesday
Post-Test			1 Saturday

Statistical analysis

The statistical analysis for this study was conducted using R (version 4.4.1) and R-Studio (build 764), utilizing both descriptive and inferential methods. Descriptive analysis included calculating range, frequencies, mean, standard deviation, median, quartile, and interquartile range, with results visually presented through boxplots, histograms, and bar plots. For inferential analysis, types, followed by Tukey's Honest Significant Difference (HSD) test for post-hoc comparisons between groups. All statistical tests were considered significant at a P-value of ≤ 0.05. An independent t-test was chosen over a paired t-test due to limitations in matching pre-test and post-test data for the same individuals, ensuring the analysis remained robust despite data collection constraints.

RESULTS

Demographic Profiles

Out of 400 initial participants, 393 remained in the study after excluding 7 for incomplete questionnaire responses. The demographic breakdown revealed a distribution of 253 female and 140 male participants, with ages ranging from 18 to 71 years old. The median age of participants was 21 years, with the first quartile (Q1) at 10 years and the third quartile (Q3) at 30 years, resulting in an interquartile range (IQR=20 years). The age groups, segmented by generation, included 14 Baby Boomers (ages 58 - 76), 24 Generation X (ages 42 - 57), 103 Generation Y (ages 24 - 41), and 252 Generation Z (ages 12 - 25), as illustrated in Figures 3a and 3b.

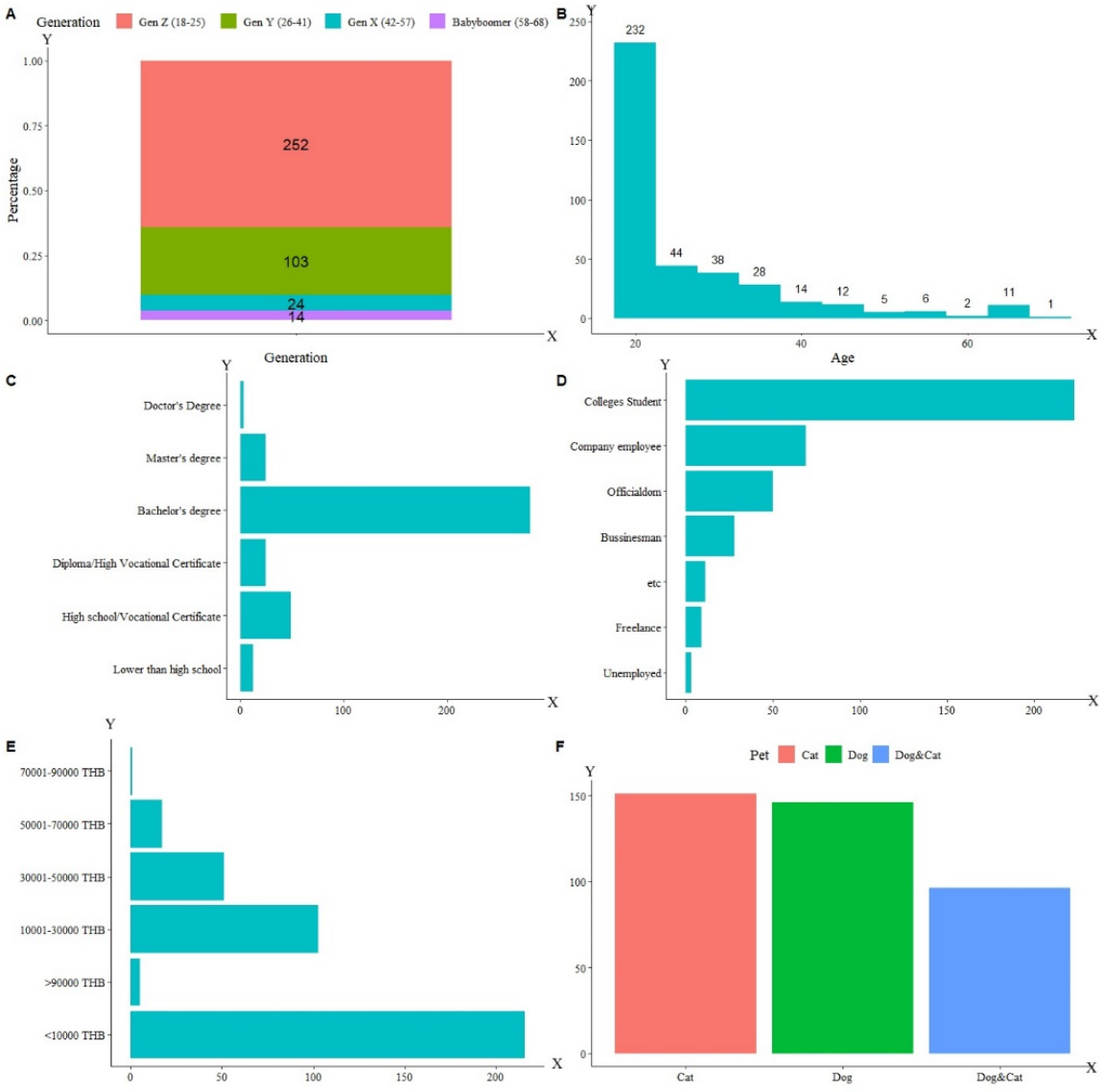

Figure 3 Demographic data of owner: (A) Participants' ages by generation; (B) Participants' ages by range; (C) The participants' educational levels; (D) The participants' occupations; (E) The participants' monthly incomes; (F) The participants' owned pets.

Educational levels among participants varied, with 12 having less than a high school education, 49 possessing a high school or vocational certificate, 24 with a diploma or high vocational certificate, 281 holding a bachelor's degree, 24 with a master's degree, and 3 with a doctoral degree, depicted in Figure 3c. The participants' employment statuses were diverse: 223 were college students, 69 company employees, 50 government officials, 28 businessmen, 9 freelancers, 3 unemployed, and 11 in other careers, as shown in Figure 3d.

Regarding income, 216 participants earned less than 10,000 THB per month, 103 earned between 10,001 and 30,000 THB, 51 earned between 30,001 and 50,000 THB, 17 earned between 50,001 and 70,000 THB, one earned between 70,001 and 90,000 THB, and 5 earned more than 90,000 THB per month, as indicated in Figure 4e. The distribution of pet ownership among the participants was as follows: 146 owned dogs, 151 owned cats, and 96 owned both dogs and cats, detailed in Figure 3f.

Participant Feedback and Interests Pre and Post Study

Before the study commenced, participant feedback indicated specific areas where more information was desired. Out of the total, 199 participants expressed a desire for more information on Pet's Health/Zoonoses from the application, followed by 97 participants interested in notifications, 28 in vaccine-related topics, 19 in nutrients, 13 in vaccines, and 9 in medication. This initial feedback highlighted a strong interest in expanding knowledge particularly in pet health and zoonoses.

After the conclusion of the study, there was a noticeable shift in the areas of interest among participants, as depicted in Figure 4. This bar plot illustrates the changes in interest for each topic before and after the study. Post-study, 235 participants indicated a heightened interest in Pet's Health/Zoonoses from the application. Interest in other areas saw a decline, with only 56 participants interested in notifications, 23 in vaccine topics, 10 in nutrients, 6 in vaccines, and 3 in medication. Moreover, 60 participants reported no further interest in any topics post-study.

This shift indicates that the study significantly heightened interest in Pet's Health/Zoonoses, emphasizing the effectiveness of the educational content delivered. The reduction in interest across other topics suggests that the information provided may have sufficiently addressed participants' initial queries or that their primary focus was overwhelmingly towards pet health and zoonotic diseases.

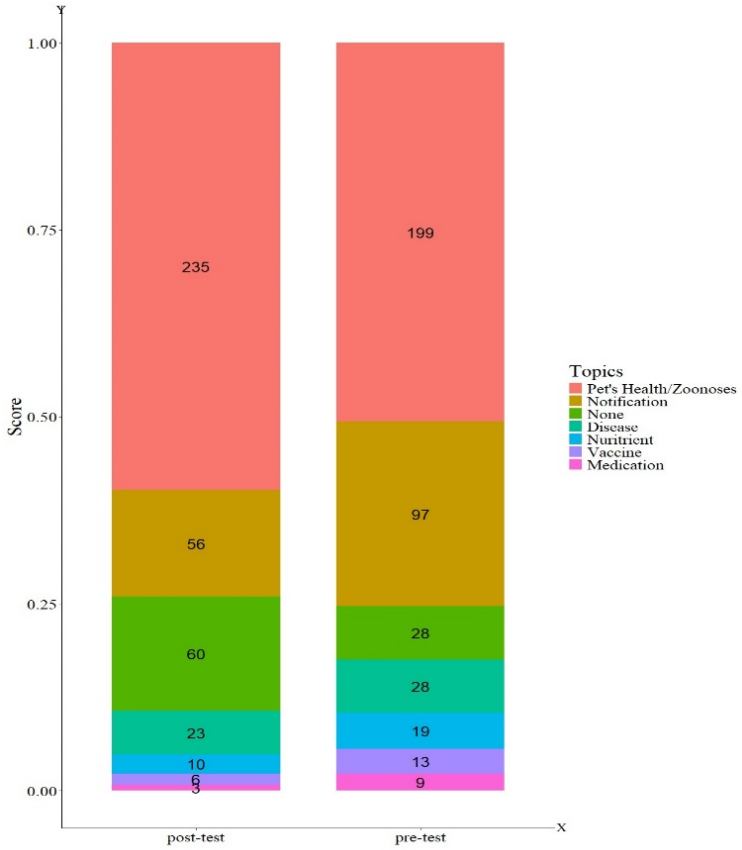

Figure 4 393 Participants' Interests

Analysis of Pre and Post Study Scores

The data analysis of the pre and post study scores provides insight into the educational impact of the study on participants. Initially, the pre-study scores ranged from 42 to 85 points, with a median score of 67. The first and third quartiles were 63 and 72, respectively, resulting in an interquartile range (IQR) of 9 points. This distribution, as illustrated in Figure 5, indicates a relatively narrow spread of scores before the intervention.

Post-study, the scores showed an increase, ranging from 49 to 85 points with a median of 70. The first and third quartiles expanded to 66 and 80, respectively, broadening the IQR to 14 points. This increase in IQR suggests a greater variability in the scores post-study, potentially indicating varying levels of responsiveness to the educational content among participants.

Significantly, the mean scores also reflected an improvement, with the post-study mean score recorded at 71.6 ± 0.37 compared to the pre-study mean of 68 ± 8.24. The statistical analysis confirms this improvement as significant with a P-value of less than 0.01. It shows that after the knowledge is given, the results are better than before the knowledge is given. This enhancement in scores post-study not only highlights the effectiveness of the intervention in increasing knowledge about pet health and related topics but also suggests that the participants were able to absorb and retain the information provided during the study.

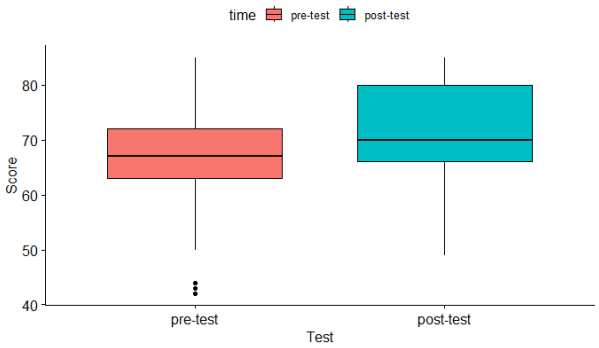

Figure 5 Pre-test and Post-test Scores.

Analysis of Scores by Category and Time

In the study, questions were organized into six specific categories: Disease, Nutrients, Law, Vaccine, Welfare, and Zoonoses, each with a predetermined maximum score. The maximum scores were set at 10 for Disease, Law, Vaccine, and Zoonoses, while Nutrients had a higher limit of 30 points and Welfare was capped at 15 points. This scoring system was designed to mirror the varying levels of complexity and educational emphasis placed on each topic. Figure 6 in the study documentation provides a comprehensive visual representation of the score distribution for each category, detailing the range, median, first quartile (Q1), third quartile (Q3), and interquartile range (IQR) for both the pre and post-study assessments. This visualization is crucial as it offers insights into the central tendencies and variability of scores within each topic area, illustrating where participants showed either consistency or significant differences in their responses over time.

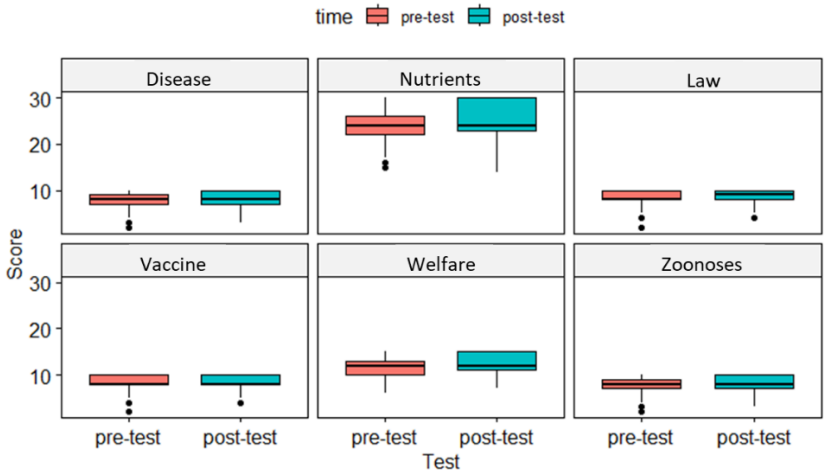

Figure 6 Scores on each topic (Pre-test and Post-test).

Further insights are provided in Table 2, which compares the scores between the pre and post-study periods for each topic. This comparative analysis is vital for evaluating the effectiveness of the educational content delivered during the study. By visually mapping out the changes in scores, it becomes easier to assess the knowledge gains in each category, highlighting which areas saw the most improvement and identifying where further educational efforts may be necessary. Overall, this detailed breakdown and analysis of scores by category and over time help to thoroughly assess the educational impact of the intervention, guiding future

improvements and tailoring of content to better meet educational goals in pet health and care.

Table 2 also presents a detailed comparison of participant scores across various topics, both before and after the intervention. Pre-study scores in the Disease category ranged from 2 to 10 with a median of 8 and an IQR of 2, which slightly widened in the post-study to a range of 3-10 with an IQR of 3. In Nutrients, pre-study scores spanned 15 to 30 with a median of 24 and an IQR of 4, increasing post-study to an IQR of 7, indicating a greater variability in responses. Law scores were consistently tight, with a pre and post-study range from 2 to 10 and an IQR maintained at 2, while the median increased from 8 to 9. Vaccine, Welfare, and Zoonoses categories also showed similar patterns of slight increases in range and IQR, with medians holding steady or slightly improving. The stack boxplot visually captures these dynamics, illustrating shifts in knowledge across topics from pre to post-study, where each question counted as one point of data. Nutrients comprised 6 questions, while Law, Vaccine, and Zoonoses included 2 each, and Welfare had 3, reflecting focused insights into specific areas of pet health education.

Table 2 Scores on each topic (Pre-test and Post-test).

Pre-test (score)	1	2	3	4	5	Post-test (score)	1	2	3	4	5
Disease	5	15	222	334	210	Disease	6	21	129	326	316
Nutrients	29	149	386	934	532	Nutrients	51	78	265	954	1046
Law	3	12	116	318	337	Law	2	4	84	309	399
Vaccine	5	13	101	368	299	Vaccine	12	15	81	332	358
Welfare	12	40	363	434	330	Welfare	7	20	179	402	392
Zoonoses	16	28	238	244	260	Zoonoses	19	7	146	254	362

The data presented in Table 2 indicates significant improvements in mean scores from pre to post-study across several topics, with the exception of vaccines. Specifically, the Disease category saw a rise from 7.85 to 8.31, Nutrients from 23.9 to 25.2, Law from 8.48 to 8.75, Welfare from 11.6 to 12.6, and Zoonoses from 7.79 to 8.3, all indicating statistically significant increases in knowledge post-intervention ($P < 0.05$). In contrast, the Vaccine topic showed only a marginal increase from 8.4 to 8.51, with a P-value of 0.262, suggesting no statistically significant improvement. This pattern suggests that the educational interventions were generally effective, particularly in enhancing understanding of pet diseases, nutrition, legal issues, welfare, and zoonotic diseases, while the minimal change in vaccine-related scores might imply a pre-existing high level of knowledge or lesser impact of the educational content provided in that area.

Table 3 Mean ± SD, difference, P-value between pre-test and post-test in each topic.

Topic	Pre-test (Mean ± SD)	Post-test (Mean ± SD)	Difference	P-value
Disease	7.85 ± 1.47	8.31 ± 1.5	0.46	≤ 0.05
Nutrients	23.9 ± 3.29	25.2 ± 3.73	1.3	≤ 0.05
Law	8.48 ± 1.41	8.75 ± 1.29	0.27	≤ 0.05
Vaccine	8.4 ± 1.38	8.51 ± 1.42	0.11	> 0.05
Welfare	11.6 ± 2.2	12.6 ± 2.14	1	≤ 0.05
Zoonoses	7.79 ± 1.51	8.3 ± 1.5	0.51	≤ 0.05

The analysis of median scores across different pet owner groups—dog owners, cat owners, and those owning both dogs and cats—reveals closely aligned results, indicating a uniform impact of the educational intervention irrespective of the type of pet owned. Specifically, dog owners had a median score of 69, with the

first and third quartiles at 65 and 77 respectively, resulting in an interquartile range (IQR) of 12. Cat owners showed a slightly lower median score of 68, with quartiles at 63 and 74 and an IQR of 11. Participants owning both dogs and cats also had a median score of 68, but with a slightly wider spread between quartiles at 64 and 78, leading to an IQR of 14. Despite these slight variations in quartile spreads, Table 3 indicates that there is no statistically significant difference in scores between any of the groups. This suggests that the educational content delivered was broadly effective across all groups, ensuring a consistent level of knowledge acquisition regardless of pet ownership type.

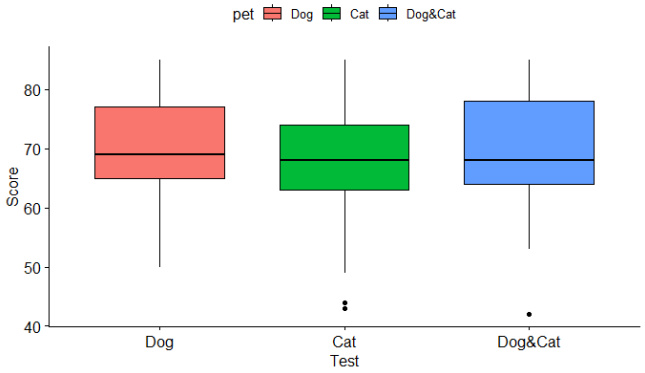

Figure 8 Scores based on different types of owned pets.

The statistical analysis of the scores from participants owning different types of pets shows significant improvements from the pre-study to the post-study phase for all animal owner groups, as illustrated in Figure 8. Specifically, dog owners exhibited an increase in their mean scores from 68.6±8.43 in the pre-study to 72.4±9.56 in the post-study. Cat owners saw their mean scores rise from 67.1±8.01 to 70.5±9.41. Similarly, participants who own both dogs and cats experienced an improvement in their mean scores from 68.5±8.26 to 72.3±8.93. The P-values for these increases are less than 0.01, indicating that these differences are statistically significant. This data demonstrates that the educational intervention effectively enhanced the understanding and knowledge of pet health care across all types of pet owners, with substantial gains observed irrespective of the specific animals owned.

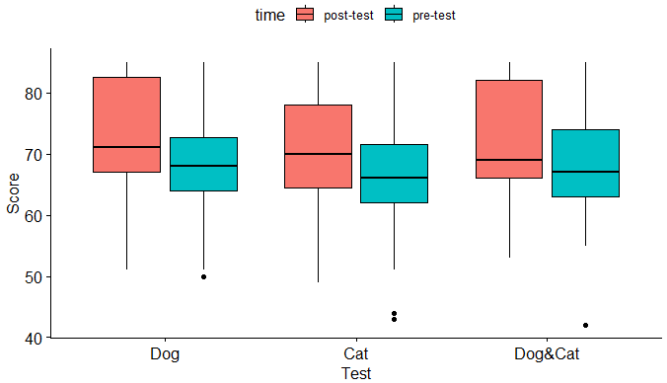

Figure 9 Scores for each topic (Pre-test and Post-test).

DISCUSSION

The results from this study, utilizing the LAOA to disseminate knowledge, demonstrated significant improvements in post-study scores across multiple topics including Disease, Nutrition, Law, Welfare, and Zoonoses. This finding is in line with Alyahya (2023), who observed improved perceptions of infographics among learners at Princess Nourah bint Abdurrahman University (PNU) in Saudi Arabia, suggesting that infographics are an effective medium for conveying information. Relatedly, Patel et al. (2020) reported that 87 % of medical professionals found infographics to be a medically useful and effective channel for health information dissemination. However, the study noted no significant change in vaccine awareness scores. The study aligned with Tunpongjaroen (2003), which examined two sessions where pharmacists provided information on disease and medication. It found that the second session improved the average knowledge score compared to before the sessions. However, even with the second session of knowledge provision, there was no significant difference between the knowledge scores from the first and second sessions, indicating that the patients already had a high level of knowledge before the second session, which likely contributed to the lack of significant improvement in their scores. This could be attributed to existing extensive public health campaigns. It was found that using infographics helps make learning more accessible and convenient, and also more interesting. (Özdal et al.,2017). In Thailand, ongoing government initiatives to encourage pet vaccination, particularly against rabies, may have already established a high level of awareness among pet owners. This is supported by the fact that vaccination remains the primary prevention method against rabies, as noted by Cleaveland et al. (2006). Consistent with Kiratitana-Olan et al. (2022) work that found that the control of zoonotic diseases, especially rabies, the One Health approach, which involves agencies, is important to emphasize the public's awareness of the One Health concept. Furthermore, Thai residents have access to vaccine information through annual free rabies vaccination programs and regular updates on the spread of rabies via various platforms (Kongkaew et al., 2004; Thai Rabies Net., 2024), reinforcing the existing knowledge base. Veterinarians should also pay attention to issues related to pet feeding practices in order to reduce the risk of malnutrition in animals. It is essential to provide pet owners with appropriate knowledge about pet nutrition and feeding behavior to enhance the health and well-being of pets (Petison and Lekcharoensuk, 2019).

Research conducted by Leelahapongsathon et al. (2023) highlighted that rabies continued to be detected between 2013 and 2020, underscoring the efficacy of various awareness-raising methods, including the LAOA system, in enhancing public knowledge about the transmission of rabies from animals to humans. Altheimer et al. (2020) also emphasized the importance of educating pet owners and the general Thai population about Leptospirosis, another significant zoonotic disease present in Thailand. These findings align with those of Awuni et al. (2019), which revealed that 57.7 % of dog owners had vaccinated their dogs, indicating a proactive stance towards vaccination compared to those who had not. Furthermore, the study uncovered a gender disparity in pet ownership, with 61.2 % of pet owners being male and 38.8 % female. Budge et al. (1996) complemented this demographic insight by noting gender preferences among students, where females favored dogs over cats, whereas males preferred cats over dogs, highlighting the influence of gender on pet preference and ownership dynamics in educational settings.

The study indicated that Generation Z (aged 18 - 25 years) showed the highest engagement and interest in receiving pet care knowledge through online platforms, particularly noticeable when they participated in activities such as pre- and post-perception questionnaires. This trend is corroborated by Charmaraman et al. (2020), who observed the highest online usage rates among teenagers, and further supported by Baxter et al. (2021), who noted widespread access to online

platforms across various demographics, establishing them as popular tools for communication. The inclination towards digital platforms is increasingly prevalent in public health as well, a point highlighted by Shanthi and Desti (2015), who noted the rising popularity of customer perceptions being shaped through online interactions. Moreover, a study by Coe et al. (2008) found that pet owners often faced challenges in receiving clear and timely communication from veterinarians, which has further propelled the shift towards online information seeking. This shift indicates a broader trend where digital platforms are not only preferred for their convenience but also for their ability to bridge the communication gaps experienced in traditional veterinary settings. The number of sessions in which knowledge is provided significantly influences patients' perceptions. In Sukkhasem's study (2006), pharmacists conducted three sessions to provide knowledge, covering general information and guidance. The study found that the percentage of knowledge scores in categories such as general disease knowledge, treatment, chemotherapy drugs, and side effects showed statistically significant differences. Sessions 0, 1, and 2 enhanced patient perception and knowledge.

CONCLUSIONS

The study thoroughly evaluated the effectiveness of the LAOA system in enhancing pet care knowledge, with a particular focus on vaccine information. It was observed that while the overall knowledge scores did not show significant improvement post-utilization of the LAOA system, the Generation Z demographic, specifically those aged 18 - 25 years, demonstrated the highest level of engagement and interest in using this online platform. This age group's preference for digital communication may explain their greater interaction with the system. Pet owners reported a strong preference for receiving information on pet health and zoonoses through the LAOA system, highlighting a clear demand for trustworthy, easily accessible online resources in these areas. Notifications, vaccine-related information, veterinarian-prescribed medications, and pet nutrition were also among the topics that users were keen on exploring further through the system. Despite the mixed results in knowledge enhancement, the study confirms the potential of digital platforms like LAOA in meeting the informational needs of younger pet owners and enriching their understanding of important pet care issues.

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