
Development of Computer-Assisted Instruction to Create Cybersecurity Awareness for Thai Students' Online Information Searching

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Abstract

This research aimed to study how to raise awareness among Thai students on safe cyber information search, as using the Internet in the present era is unavoidable, and accessing unsafe online information may affect users' privacy and security. The research used a survey and interview method of first-year students in the Computer Studies program, Thepsatri Rajabhat University, Lopburi Province, to study their behavior and awareness level in online information search. It was found that most students had little experience in information search (79.00 percent) and had little knowledge of cyber threats (91.75 percent), but had the highest level of awareness of cyber threats and crimes ($\bar{x} = 4.37$, $SD = 0.51$). It was also found that age and work experience were related to the level of awareness of cyber threats. In response to this problem, a Computer-Assisted Instruction (CAI) lesson was developed to promote knowledge and raise awareness about safe information search, using research instruments including pre-test and post-test and in-depth interviews. The results of the experiment using the lesson with 39 sample students found that the average score before learning was 3.41 points, during learning was 17.97 points, and after learning was 17.41 points. In addition, the effectiveness of the lesson was 89.85/87.05, which is higher than the standard criteria of 80/80, indicating that the lesson is effective in enhancing knowledge and awareness of cybersecurity. The research results indicate the necessity of designing learning that is appropriate for the behavior of current internet users, especially students, in order to be aware of and protect themselves from cyber threats effectively. This research can be used as a guideline for developing policies or curricula related to cybersecurity in educational institutions appropriately.

Keywords: Cybersecurity, Awareness, Safe Information Search, Thai Students, Computer-Assisted Instruction (CAI)

1. Introduction

In the digital age where internet usage plays a vital role in daily life, searching for information in the cyber world has become unavoidable, especially for Thai students who need to use internet data for education and research purposes. However, accessing information in the cyber world carries numerous risks. Without sufficient awareness and self-protection, students may fall

victim to cyber threats such as personal data theft, internet fraud, or malware attacks (Christensson, 2022; Kaspersky, 2021; Symantec, 2020). Creating awareness about cybersecurity is therefore crucial and must be done continuously by providing knowledge and understanding about self-protection methods for internet information searching, including the optimal use of available tools and technologies.

This research aims to survey and create awareness among Thai students about safe information searching in the cyber world, which will help reduce the risk of encountering cyber threats and promote efficient technology use (Ponemon Institute, 2019; Srisuk, 2021). Computer-assisted instruction is a tool that can be designed to be engaging and interactive, helping students learn effectively and enjoyably. Using modern teaching media and easily accessible technology will enhance learning experiences and create motivation for learning about cybersecurity. The development of computer-assisted instruction for creating cyber awareness among Thai students will include comprehensive content and diverse teaching methods, such as providing basic information about cybersecurity, presenting potential scenario examples, recommending self-protection methods, and evaluating learning outcomes through tests and various activities. Awareness and understanding of cybersecurity are essential skills for Thai students in facing challenges and opportunities in the digital world. Developing computer-assisted instruction focusing on creating awareness in this area will be highly beneficial in preparing students for safe and confident living and working in the digital era. This research is significant in several aspects that may positively impact Thai students' education and life. In education, students who learn through computer-assisted instruction will gain increased knowledge and skills in protecting themselves from cyber threats, enabling them to use technology confidently and safely. Furthermore, the research contributes to the development of educational curricula in institutions by using study results to improve and develop content and teaching methods appropriate for the current era and effectively respond to student needs. Socially, this research can create broader awareness of cybersecurity, enabling general users to better understand how to protect themselves from cyber threats. This will help reduce the number of cyber-attack victims and increase safety in people's daily use of technology. Moreover, the research impacts the development of national cybersecurity policies, as study results may lead to the development of measures and policies that promote safe internet usage and build public confidence in using technology. Economically, increased cybersecurity knowledge and understanding among students and the general public will help reduce the risk of financial problems arising from cyber-attacks, such as financial data theft and internet fraud, leading to greater economic stability. Additionally, promoting safe technology use supports the growth of digital businesses and the development of new innovations in the country. Therefore, developing computer-assisted instruction for creating awareness about safe information searching in the cyber world is not only beneficial for education but also has positive impacts on society and the economy as a whole. This research is thus important and valuable for developing and preparing Thai students and the general public for safe and confident living and working in the digital era.

2. Computer Assisted Instruction

Computer Assisted Instruction (CAI) plays a vital role in promoting learning in the digital age by using technology as a medium for teaching and learning. This makes learning content more accessible and diverse. CAI programs are designed to allow learners to interact effectively with learning content by integrating various media types such as text, images, audio, video, and learning activities that enhance student engagement. This interactive design provides immediate feedback, which is crucial in promoting deeper understanding and learning (Alessi & Trollip, 2001; Mayer, 2009).

A key principle of CAI is making learning interactive by emphasizing student participation in the learning process through exercises, simulations, and tests that provide immediate feedback. This helps learners instantly improve their understanding and makes learning more continuous and engaging (Clark & Mayer, 2016). Research both in Thailand and internationally demonstrates CAI's high potential in improving learning efficiency. For example, a study by Boonlue (2020) in Thailand showed that using CAI in mathematics teaching significantly improved student achievement and promoted learning motivation. Additionally, CAI plays a role in promoting personalized learning, as CAI programs can flexibly adjust content and learning activities to match individual learners' abilities and needs. This means learners can learn at their own pace and focus on content they want to improve without solely relying on teachers (Mödrtscher, 2006). This form of learning not only promotes better content understanding but also increases learners' confidence in handling difficult or complex material.

Access to Learning Materials is another important benefit of CAI. CAI programs allow learners to access learning content anywhere, anytime, not just in the classroom. This supports lifelong learning, which is a crucial concept in the digital age. Khan's (2005) study emphasizes that CAI promotes flexible learning and allows learners to continuously develop their knowledge and skills, preparing them to adapt effectively to changes in today's world. CAI also helps reduce Teacher's Workload. CAI programs reduce teachers' workload in many areas, including content preparation, assessment, and feedback, giving teachers more time to support and guide individual learners. Research by Yusuf and Al-Banawi (2013) indicates that using CAI in teaching improves teachers' time and resource management, allowing them to focus on deeper student development. Furthermore, CAI helps develop learners' technological skills, which are essential in the digital age. Research by Rosen and Salomon (2007) found that using technology in teaching helps learners develop necessary skills for a technology-centered society. Additionally, CAI makes learning more Motivational and Engaging through multimedia presentation, making learning content more diverse and engaging. Mayer's (2009) study found that using multimedia in learning significantly improves learners' understanding and retention. CAI's assessment system is accurate and provides immediate feedback, helping learners recognize their learning progress and make immediate improvements (Gagné, 1985).

3. Building Cybersecurity Awareness through Computer Assisted Instruction

In the digital age where cybersecurity has become crucial, CAI plays an important role in building awareness and developing skills for self-protection against cyber threats. CAI's ability to present diverse content through multimedia and create interactive learning experiences enables learners to understand and apply cybersecurity knowledge effectively (Clark & Mayer, 2016). International research shows that using CAI to teach cybersecurity can significantly increase learners' understanding and awareness. For example, a study by Wang et al. (2018) found that students using CAI to learn about cyber threats had better understanding and could identify risks better than students learning through regular lectures. A U.S. study by Schreck et al. (2020) also indicated that CAI could reduce cybersecurity knowledge gaps among high school students, especially regarding protection against phishing attacks and malware.

In Thailand, building cybersecurity awareness remains a challenge as education on this topic is not yet widespread. However, a study by Srisuk (2020) focusing on using CAI to teach cybersecurity in higher education found that students using computer-assisted instruction gained more knowledge and skills in cyber threat protection compared to those not using CAI, demonstrating CAI's potential in building awareness and developing necessary skills for the digital age. Furthermore, CAI can be designed to align with each country's context and culture, increasing learning relevance and effectiveness. Research by Alotaibi (2021) in Saudi Arabia showed that using CAI adapted to local context was more effective in increasing students' cybersecurity understanding. Additionally, a study in Malaysia by Zakaria et al. (2019) found that CAI using real-life situation simulations could help students develop a deeper understanding of self-protection against cyber threats.

CAI focused on building cybersecurity awareness can be adapted for various target groups, such as students, university students, and general users, through diverse learning media and user-friendly design. By creating simulations related to cyber threats and assessments that provide immediate feedback, learners can learn to protect themselves and truly understand the importance of cybersecurity (Mayer, 2009; Gagné, 1985). Using CAI to build cybersecurity awareness is a highly potential method for preparing learners to face challenges in the digital world and promotes lifelong learning, which is crucial for developing individual potential in an era of rapid technological change (Yusuf & Al-Banawi, 2013; Schreck et al., 2020).

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5. Research Methodology

5.1. Sample Group

In the research on developing computer-assisted instruction to enhance awareness of internet search safety for Thai students, the researcher employed purposive sampling due to the need to select a sample group with direct qualifications and relationships to the study topic, in order to obtain in-depth results that align with the research objectives. The sample group in this study consisted of 39 Computer Education students who possess knowledge and skills in information technology, including internet searching, which directly relates to the study context. The use of purposive sampling in this research had three main reasons: First, the appropriateness of the target group, as Computer Education students are familiar with and skilled in internet usage, enabling effective assessment and testing of learning about search safety. Second, the importance of information searching in

the cyber world - these students not only use the internet for studying but also have the opportunity to transfer knowledge about information searching in the future, making safety awareness crucial for broader impact. Finally, the specificity in sample group qualifications, focusing on selecting groups with relevant technology background and knowledge to enable in-depth study and analysis of information searching behavior in the cyber world.

5.2. Research Tools

The research tools and objectives for developing computer-assisted instruction to create awareness among Thai students about safe information searching in the cyber world include:

5.2.1. Computer-Assisted Instruction (CAI)

Objective: To provide knowledge and create awareness about safe information searching in the cyber world, covering online threat prevention techniques and safe search guidelines. This lesson is designed to assess students' knowledge and skills during learning and promote participatory learning.

5.2.2. Pre-test and Post-test

Pre-test Objective: To assess students' knowledge level and awareness about cyber information searching before starting the lesson, which will serve as baseline data for comparison with post-learning results.

Post-test Objective: To measure changes in knowledge level and awareness after students have learned through computer-assisted instruction, helping researchers see the lesson's impact on knowledge and skill enhancement.

5.2.3. In-depth Interviews

Objective: To delve into students' opinions about their learning experience through computer-assisted instruction. The interviews will help researchers obtain qualitative data about the lessons' advantages and limitations, including useful suggestions for future lesson improvements.

5.3. Tool Creation and Verification

The test creation process includes the following steps:

Study related documents and research to create computer-assisted instruction on creating awareness among Thai students about safe cyber information searching, and tools for measuring test scores and learner satisfaction with the created CAI.

Create tests and evaluate their effectiveness according to measurement and evaluation standards, to be used as pre-tests and post-tests in the computer-assisted instruction.

Submit the created tests to three experts for content validity verification using the IOC (Index of Item-Objective Congruence) index with the following scoring:

If consistent, score +1

If uncertain, score 0

If inconsistent, score -1

Implement the tests that have been corrected and improved by experts with the sample group.

The verification of tools and CAI teaching materials involves several steps that should be as follows.

5.4. Design of Computer-Assisted Instruction

The design process for computer-assisted instruction for research on creating awareness among Thai students about safe cyber information searching, using PowerPoint and Canva, includes the following steps:

1. Analyze the Content: Identify teaching content about safe information searching in the cyber world, such as cyberthreat prevention, methods for selecting reliable sources, and online security settings.

Learning Objectives: Clearly specify what learners will learn from the lessons, such as wanting students to identify cyber protection methods or correctly use basic security tools.

2. Develop Lesson Structure: Divide content into sub-lessons or topics related to cyber safety

Chapter 1: Introduction to Cyber Information Searching

- Objective: To help students understand the basics of internet searching and the importance of safety awareness

- Content:

- o Definition of information searching

- o Types of internet information sources

- o Risks associated with information searching

Chapter 2: Online Information Search Risks

- Objective: To help students understand risks from careless information searching

- Content:

- o Scams and phishing

- o Malware and viruses

- o Privacy violations

Chapter 3: Source Evaluation

- Objective: To enable students to evaluate the credibility of online sources

- Content:

- o Website credibility verification

- o Content and author analysis

- o Reference checking

Chapter 4: Personal Data Protection in Information Searching

- Objective: To teach students methods of protecting personal data while searching online

- Content:

- o Importance of personal data

- o Using secure passwords

- o Browser security settings

Chapter 5: Effective Information Search Techniques

- Objective: To enable students to search for information quickly and efficiently

- Content:

- o Using appropriate search terms

- o Using specialized search tools

- o Information filtering and categorization

Chapter 6: Social Media Safety

- Objective: To help students understand safety in social media use

- Content:

- o Social-media privacy settings

- o Avoiding sensitive information sharing

- o Recognizing social media scams

Chapter 7: VPN Usage and Privacy Protection

- Objective: To teach students how to use VPNs for enhanced search safety

- Content:

- o What is VPN and how it works

- o Benefits of using VPN

- o How to choose and install VPN

Chapter 8: Handling Dangerous Information

- Objective: To help students understand how to deal with potentially dangerous information

- Content:

- o Identifying dangerous information

- o Reporting unsafe websites or information

- o Using antivirus programs

Chapter 9: Laws and Regulations on Cyber Safety

- Objective: To help students understand laws and regulations related to safe internet use

- Content:

- o Computer Act

- o Privacy laws

- o Copyright and intellectual property infringement laws

Chapter 10: Summary and Application of Safe Information Search Knowledge

- Objective: To help students summarize knowledge and apply it to safe online searching

- Content:

- o Review of all content

- o Case studies and practice

- o Student knowledge assessment

3. Create Storyboard: Plan content presentation in each slide, including topic arrangement, information explanation methods, illustration usage, and content flow.

4. Design Graphics and Illustrations: Use Canva to design images and graphics supporting learning content, such as cyber protection icons, infographics showing protection steps, or illustrations showing search scenarios.

Use Canva Templates: Select templates appropriate for lesson topics and objectives, using modern graphics and attractive colors.

5. Create PowerPoint Slides: Use PowerPoint to create slides, starting with the designed structure as a guide.

Include clear and concise content with graphics and illustrations designed in Canva to support learning.

Create slides with readable fonts and meaningful colors, such as green for safety and red for warnings.

Use appropriate transitions and animations to avoid overwhelming content.

Insert Tests: May add tests in each lesson for students to evaluate understanding of each topic.

6. Add Videos: If necessary, add videos explaining more about safe information searching. These videos can be created in Canva or used from reliable sources.

Create Interactive Elements: In PowerPoint, insert link buttons or commands for learners to easily click and connect to next slides or lessons.

7. Test Lessons: Test lesson usage with sample groups, such as target students, to see if the CAI works smoothly.

8. Gather Feedback: Collect suggestions from users and students about content clarity, information understanding, and media interest.

Improve Lessons: Improve slides, graphics, and content based on received feedback to maximize lesson effectiveness and enhance student understanding.

6. Data Collection

The data collection process for the CAI on creating awareness among Thai students about safe cyber information searching was conducted with assistance from Ajarn Kitti Phosompapwong as a co-user of the CAI, with the following steps:

- Pre-test with 20 questions about creating awareness of safe cyber information searching among Thai students, administered to first-year Computer Education students at Thepsatri Rajabhat University, selected by purposive sampling.
- Conduct teaching using the CAI on creating awareness of safe cyber information searching among Thai students to first-year Computer Education students at Thepsatri Rajabhat University.
- Have students complete end-of-lesson exercises.
- After completing the CAI lessons, administer 20 post-test questions, then collect student scores by checking each student individually.
- Have students complete a satisfaction survey about the CAI, allowing 5 minutes, then collect all 39 questionnaires.

7. Data Analysis

In research on developing computer-assisted instruction to create awareness among Thai students about safe cyber information searching, the analysis can be divided into 2 main types: Quantitative Data Analysis and Qualitative Data Analysis. Both types will be used to obtain comprehensive and complete data for this research.

7. 1. Quantitative Data Analysis

The quantitative data analysis in this research will use data from pre-test and post-test, which will be processed through statistical analysis software to examine data changes and relationships. The details of quantitative analysis are as follows:

T-test Analysis: This test will be used to compare the mean scores of pre-test and post-test of students to see if there are changes in knowledge and awareness about cyber information searching after using computer-assisted instruction. This t-test analysis will help confirm whether learning through the lessons actually results in increased knowledge and skills.

Calculation of Mean and Standard Deviation: Used to summarize data from satisfaction questionnaires and test scores to see how the responses and scores are distributed. This data will help provide an overview of student responses to the lessons.

Multiple Regression Analysis (if additional data is collected): May be used to examine relationships between various factors such as technology usage behavior and learning outcomes from the lessons.

7. 2. Qualitative Data Analysis

Qualitative data will be analyzed from in-depth interviews and observation notes using Content Analysis to identify key issues and trends in student behavior and opinions. This analysis will provide in-depth information that supports quantitative results. The analysis details are as follows:

Content Analysis: Used to process data obtained from interviews and observation notes by identifying key issues related to students' experiences using computer-assisted instruction, suggestions, satisfaction, and problems encountered. This information will help improve the content and structure of future lessons.

Thematic Analysis: Used to classify and group data emerging from opinions and observations, focusing on identifying main topics or themes that reflect students' attitudes toward awareness in cyber information searching.

7. 3. Analysis Process Steps

Data Preparation: After collecting data from tests, questionnaires, observations, and interviews, all data will be verified and formatted for analysis.

Quantitative Data Analysis: Data from pre-test and post-test will be input into statistical software such as SPSS to calculate means, standard deviations, and test differences using t-test.

Qualitative Data Analysis: Data from interviews and observations will be analyzed using Content Analysis techniques to extract insights and key issues.

Conclusion: Combine quantitative and qualitative analysis results for interpretation to show how effectively computer-assisted instruction can create awareness and increase understanding about safe cyber information searching.

7. 4. Tools Used in Data Analysis

SPSS Software or other statistical programs: For quantitative data analysis such as calculating means, conducting t-tests, and multiple regression analysis

Content Analysis: Used for analyzing qualitative data obtained from interviews and observations

8. Data Analysis Results

The researcher conducted data analysis in the following order. This research aims to develop and determine the effectiveness of computer-assisted instruction on creating awareness among Thai students about safe cyber information searching for Computer Education students. The researcher presents the data analysis as follows:

- Results of developing computer-assisted instruction on creating awareness among Thai students about safe cyber information searching for first-year Computer Education students at Thepsatri Rajabhat University
- Results of effectiveness evaluation of computer-assisted instruction on creating awareness among Thai students about safe cyber information searching for first-year Computer Education students at Thepsatri Rajabhat University

The front page of the computer-assisted instruction on creating awareness among Thai students about safe cyber information searching is shown in Figure 1.



Figure 1. Front Page of the Lesson

The main menu section of the computer-assisted instruction on creating awareness among Thai students about safe cyber information searching is shown in Figure 2.



Figure 2. Main Menu Page of Computer-Assisted Instruction

The content section of computer-assisted instruction on creating awareness among Thai students about safe cyber information searching is shown in Figure 3.



Figure 3. Pre-Test Page of Computer-Assisted Instruction

The post-test section of computer-assisted instruction on creating awareness among Thai students about safe cyber information searching is shown in Figure 4.



Figure 4. Post-Test Page of Computer-Assisted Instruction

The content section of computer-assisted instruction on creating awareness among Thai students about safe cyber information searching is shown in Figure 5.

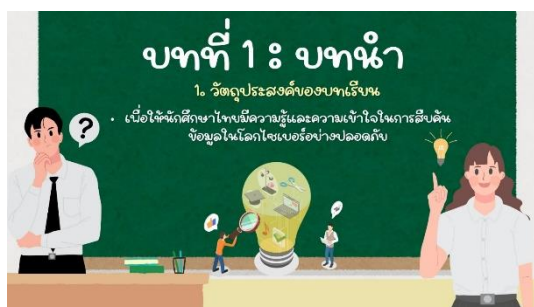


Figure 5. Content Page of Computer-Assisted Instruction

8.1. Results of Data Analysis to Compare Learning Achievement on Creating Awareness Among Thai Students About Safe Cyber Information Searching

Table 1. Score Results from Data Analysis to Determine the Effectiveness of Computer-Assisted Instruction on Creating Awareness among Thai Students About Safe Cyber Information Searching from Trials with the Sample Group

Student	Scores		
	Pre-test (10)	During lesson (20)	Post-test (20)
\bar{x}	3.41	17.97	17.41
S.D.	0.49	0.24	0.29

From Table 1, it was found that the pre-test and post-test scores of students learning through computer-assisted instruction for first-year Computer Education students at Thepsatri Rajabhat University had an average pre-test score of 3.54, during-lesson score of 17.97, and post-test score of 17.41.

8.2. Results of Data Analysis to Determine the Effectiveness of Computer-Assisted Instruction on Safe Information Searching and Internet Usage

Table 2. Results of Data Analysis to Determine the Effectiveness of Computer-Assisted Instruction on Creating Awareness Among Thai Students about Safe Cyber Information Searching from Trials with the Sample Group

Sample Group	Effectiveness of Computer-Assisted Instruction		Evaluation Criteria
39	Process)E ₁ (Output)E ₂ (80/80
	89.85	87.05	

From Table 2, when testing the computer-assisted instruction with the sample group, the average process score (E1) was 89.85 and the average output score (E2) was 87.05, with an effectiveness of 89.85/87.05, which is higher than the criteria. This indicates that this computer-assisted instruction can be used for learning.

9. Conclusion

From the development of learning achievement and effectiveness evaluation of the computer-assisted instruction model, it was found to meet the set criteria of 80/80. This is because the development process followed the ADDIE Model, which can be effectively used for learning achievement development. This aligns with the research of Sitthiwat Robru et al. (2013: 60), which found that the effectiveness of the instructional model following the ADDIE Model helps make computer-assisted instruction effective.

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