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คุณภาพสูงเพื่อการตีพิมพ์เผยแพร่ระดับชาติและนานาชาติ



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Section ภาย

Education:

- ❑ B.Ed, & M.Ed, Khon Kaen University, Thailand
- ❑ Ph.D., Mahidol University, Thailand
- ❑ Visiting Scholar @ Department of Chemistry and Biochemistry, University of Northern Colorado (UNCO), USA.
- ❑ Visiting Research Fellow @ School of Education, University of Hull (UoH), UK.
- ❑ Visiting Research Fellow @ University of York Jakarta (UNY), Indonesia.

Specialization & Records:

- ❑ H-index (SCOPUS) 16; H-index (web of science) 13
- ❑ Digital STEM Education; TPACK



Editorial Board:

- International Journal of Mobile Learning and Organisation (IJMLO) — indexed by **Scopus (Q1-2021)**
- Computers and Education: Artificial Intelligence (CAEAI) — indexed by **Scopus**



Associate Editor:

- Heliyon — indexed by **Scopus (Q1-2022)**
- Frontiers in Education — indexed by **Scopus (Q2-2022)**
- Frontiers in Psychology — indexed by **Scopus (Q1-2022)**



Guest Editor:

- Journal of Computers in Education (JCE), A special issue on "Emerging Pedagogies for Computer-based Learning" — indexed by **ISI & Scopus**
- IJMLO, A special issue on "Pedagogical Applications of Mobile Technology and Environment in STEM Disciplines", indexed by **Scopus**
- IJMLO, A special issue on "Research Trends and Future Developments in Personalised/Adaptive Ubiquitous Learning", indexed by **Scopus**



Reviewer:



❑ 2021 National Outstanding Educational Researcher Award, Thailand Council of Deans of Faculty of Education

❑ 2017 TRF-OHEC-Scopus Young Researcher Award in Humanities and Social Sciences



❑ 2021 Outstanding Research Award and 2021 Outstanding Invention Award, National Research Council of Thailand



❑ 2021 GOLD medal Researcher Award, Khon Kaen University
❑ 2020 SILVER medal Researcher Award, Khon Kaen University



❑ 2020 Outstanding Graduate School Alumni Award, Khon Kaen University

❑ 2022 Outstanding Alumni Award, Faculty of Education, Khon Kaen University

❑ 2021, 2020 High-calibre Educational Researcher Award
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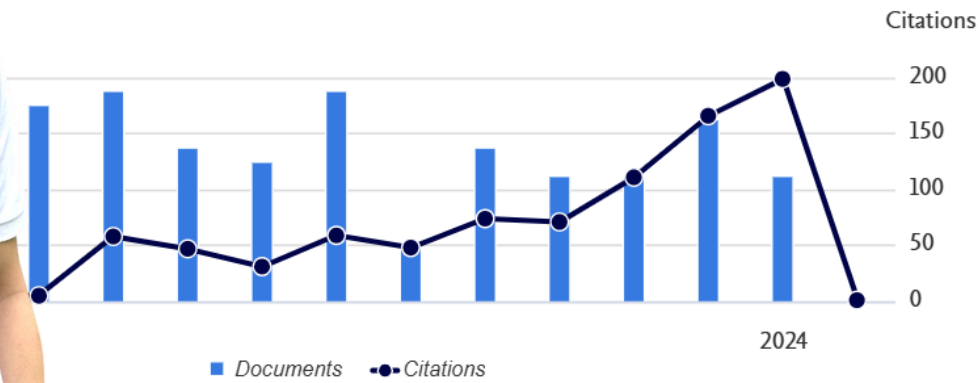
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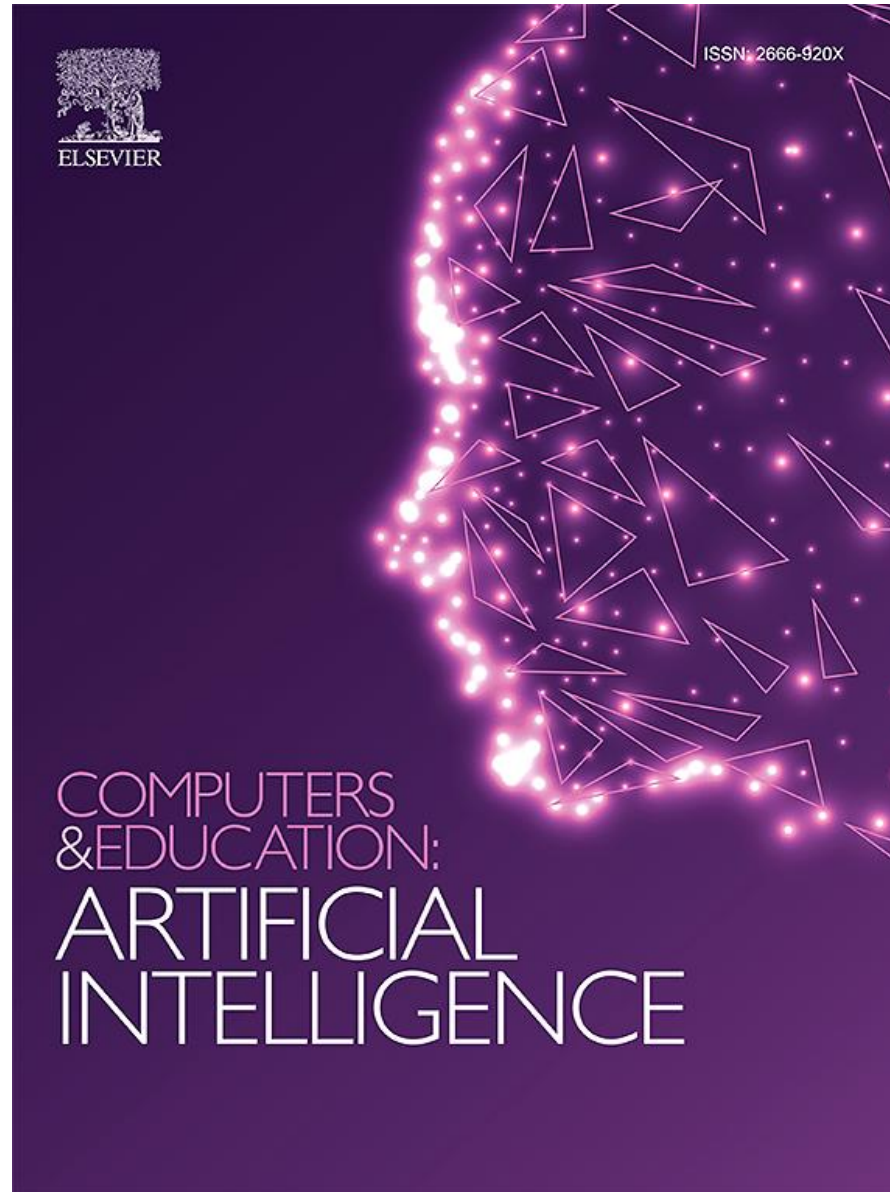
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Science Education, Teacher Education, Learning Sciences



Computers and Education: Artificial Intelligence

Volume 3, 2022, 100086



Computers and Education: Artificial Intelligence

Volume 3, 2022, 100064



The use of a personalized learning approach to implementing self-regulated online learning

Thanyaluck Ingkavara ^a, Patcharin Panjaburee ^{a b}, Niwat Srisawasdi ^b, Suthiporn Sajjanaroj ^a

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Highlights

- A personalized learning system was used to support self-regulated online learning.
- The proposed learning was compared to conventional self-regulated



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A personalized learning system-supported professional training model for teachers' TPACK development

Pawat Chaipidech ^a, Niwat Srisawasdi ^a, Tanachai Kajornmanee ^b, Kornchawal Chaipah ^a

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Highlights

- A teacher professional development intervention program promoting TPACK was designed and evaluated.
- Proposing a new model for integrating andragogical principles

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International Journal of Mobile Learning and Organisation (IJMLO)

- Scopus Q1 in Education (Percentile #91st, 2022)
- Scopus Q2 in Computer Science Applications (Percentile #74th, 2022)

Artificial Intelligence (AI)- supported Adaptive and Self-regulated Learning in the Mobile Era



Submission Deadline

September 30th, 2024

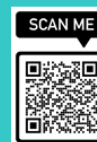
Notification of Acceptance

November 30th, 2024

Final Version

May 30th, 2025

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https://doi.org/10.17718/ijmlo.v2i1.17177

International Journal of Mobile Learning and Organisation

This journal also publishes Open Access articles



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Prof. Gow-Jen Hwang

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IJ 0.65

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The cutting-edge generative AI enables to transformation of the learning process by gathering and analyzing students' learning information, personalizing their learning experience, and facilitating effective collaboration!

This special issue discusses the effectiveness of AI-supported adaptive and self-regulated learning in the mobile era. We aimed to provide various teaching evidence findings and provide educators with more specific guidelines for empowering AI-supported mobile learning contexts. We also welcome authors from all disciplinary backgrounds to share their success cases and experiences. This special issue will enhance our understanding of applying AI-supported mobile learning by sharing adaptive and self-regulated learning strategies in the learning context. Together, we will move towards teaching in the AI era.

Guest Editors:



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We encourage scholars around the world to submit articles on the following topics.

- Adaptive/self-regulated learning theories and models of AI-supported mobile learning
- Adaptive/self-regulated learning strategies integrated in AI-supported mobile learning
- Applications and effectiveness of integrated AI in mobile-based adaptive/self-regulated learning in school settings
- Applications and effectiveness of the combination of AI technology and adaptive/self-regulated learning in professional training
- Innovative research focuses on using AI in mobile learning settings
- Mobile-based AI applications for interdisciplinary education
- Effects of roles of AI on students' mobile learning performances
- Fusion of various AI tools for mobile-based adaptive/self-regulated learning

"Publication in this special issue is FREE of charge for the accepted papers."

• **Srisawasdi, Niwat, Khon Kaen University, Thailand**



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ARTICLE



Development of Pre-service Chemistry Teachers' Knowledge of Technological Integration in Inquiry-based Learning to Promote Chemistry Core Competencies

Received 00th January 20xx,
Accepted 00th January 20xx

DOI: 10.1039/0rx0xx00000x

The Technological Pedagogical and Content Knowledge (TPACK) framework is a cornerstone in teacher education, equipping educators with the skills to effectively integrate technology into their teaching practices. However, there is a noticeable research gap in the specific application of TPACK training to enhance chemistry core competencies (CCCs). This study, a collaborative effort with 32 Indonesian pre-service chemistry teachers (28 females and four males) from a public university, sets out to fill this gap by exploring the development of their knowledge of technological integration, with a focus on promoting core competencies in chemistry. We designed and implemented a TPACK-CCCs training intervention, a beacon of hope in teacher education, to foster both declarative and procedural knowledge in a technology-infused inquiry learning environment in chemistry. A mixed-methods approach was employed, involving pre- and post-intervention assessments to measure changes in declarative and procedural knowledge framed with TPACK through a multiple-choice TPACK test and chemistry competencies lesson plan design. The results brought about significant improvements in the pre-service teachers' specific and overall TPACK. These findings paint a promising picture, suggesting that the TPACK-CCCs training intervention can effectively prepare pre-service teachers to incorporate digital technology in ways that enrich inquiry-based chemistry education and foster CCCs. The implications for teacher education programs and future research directions are discussed in a positive light.

Keyword Technological Pedagogical and Content Knowledge (TPACK), chemistry core competencies, digital technology, pre-service teachers, teacher education

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FIRST Chapter >>>

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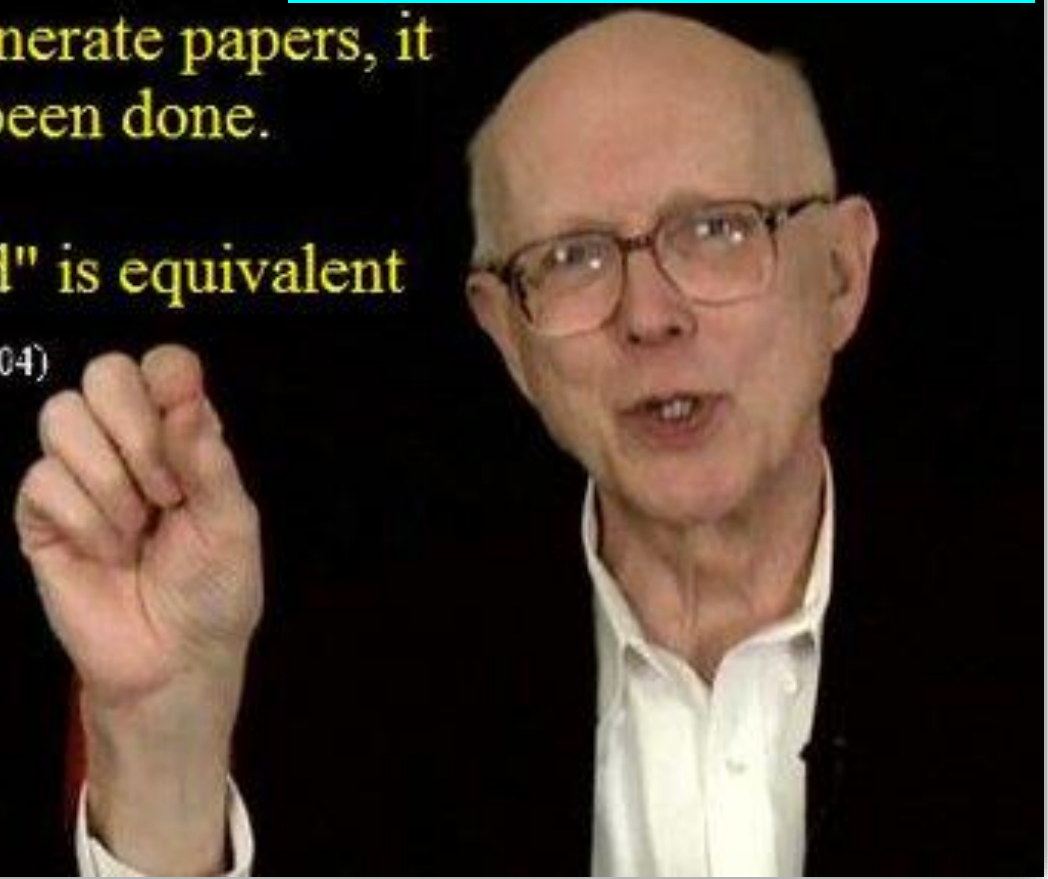
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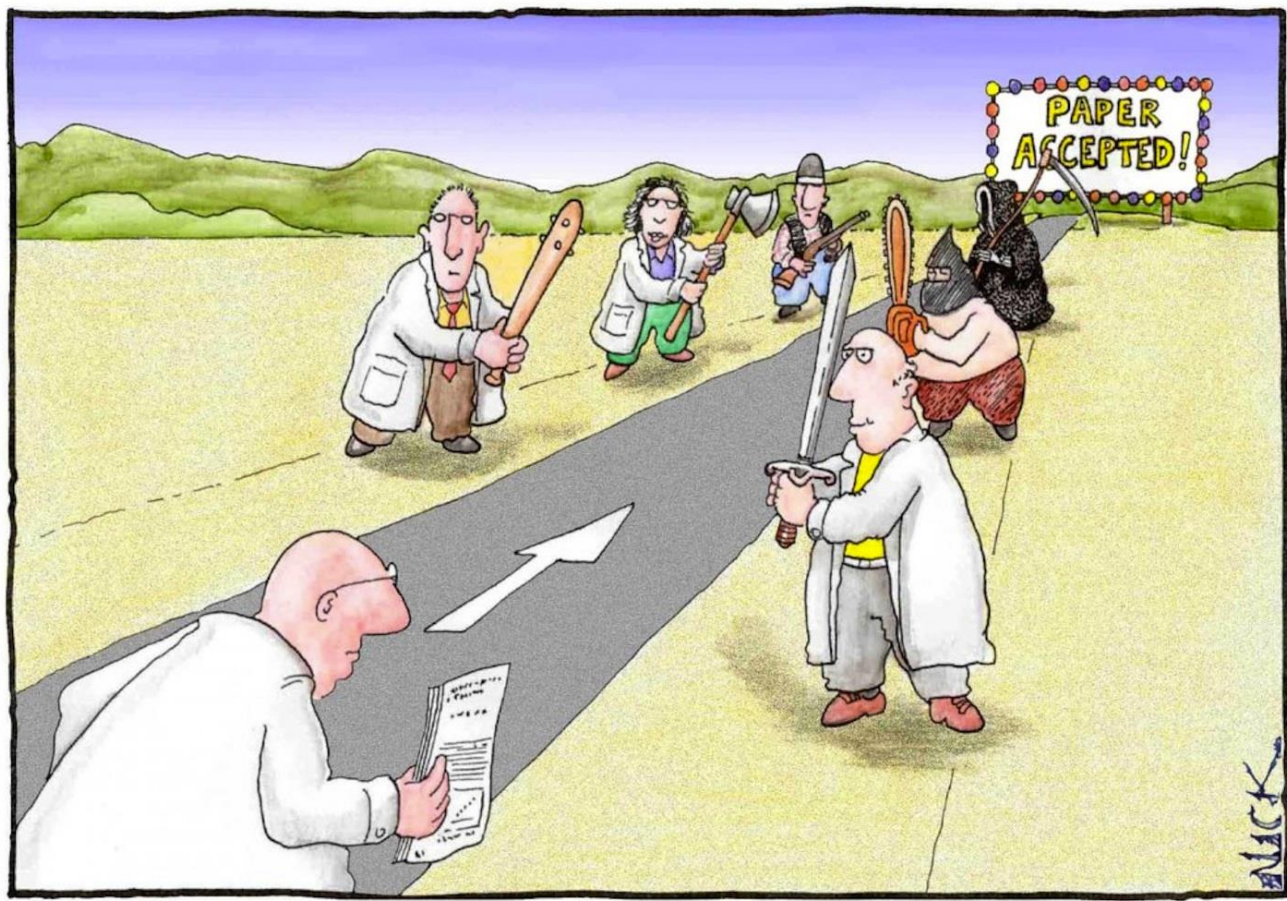
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- Association of North America Higher **Education** International (ANAHEI)
- Athens Institute for **Education** and Research (ATINER)
- Bioscience Research & **Educational** Institute [Link dead as of 2012-11-14]
- Canadian Center of Science and **Education**
- "East West" Association For Advanced Studies and Higher **Education**
- ERM Publications (**Educational** Research Multimedia & Publications)
- European Center for Science **Education** and Research (EUSER)
- European Journals of **Education** Studies
- Focus in Research & **Education** (FIRE, Firepubs)
- Global Institute for Research and **Education**
- Global International Scientific Analytical Project (GISAP), see International Academy of Science and Higher **Education**
- GRABS **Education**at Charitable Trust
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- International Academy for Science & Technology **Education** and Research (IASTER)
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- International Association for Engineering and Management **Education** (IAEME)
- International Association of Technology **Education** & Industry
- International **Education** Research Foundation (IERF)
- International Foundation for Modern **Education** and Scientific Research (INFOMESR)
- International Institute for Science, Technology and **Education** (IISTE) (International Knowledge Sharing)

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Annotation:

Художественный совет сегодня на перепутье. Как в Британии, так и в Китае его роль была изменена и на сегодняшний день он выполняет функции не стратега, внедряющего решения, а лица, выполняющего принятые решения. Тем не менее, Совет по делам искусств Англии и Совет по делам искусств Китая по-разному видят свое будущее. Первый работает в рамках развернутой культурной политики и выполняет свои новые функции в качестве национального агентства по развитию, активно исследуя расширенное понимание культуры. Последний видит свое будущее в самоорганизации политики в области искусства и минимизации влияния нехудожественных факторов.

The Arts Council is at a crossroad today. In both Britain and South Korea, its role has been reduced from the self-organized "policymaker" to "policy taker," and it now adopts a broad, relativist understanding of culture. Yet, Arts Council England and Arts Council Korea are envisaging their future differently. The former works within the explicated cultural policy framework and embraces its new roles as a national developmental agency, keenly exploring the broadened understanding of culture. The latter is desperately seeking its future in reinforcing self-organization of arts policy and minimizing the influences by non-artistic factors.

Arts & Humanities Citation Index; Social Sciences Citation Index

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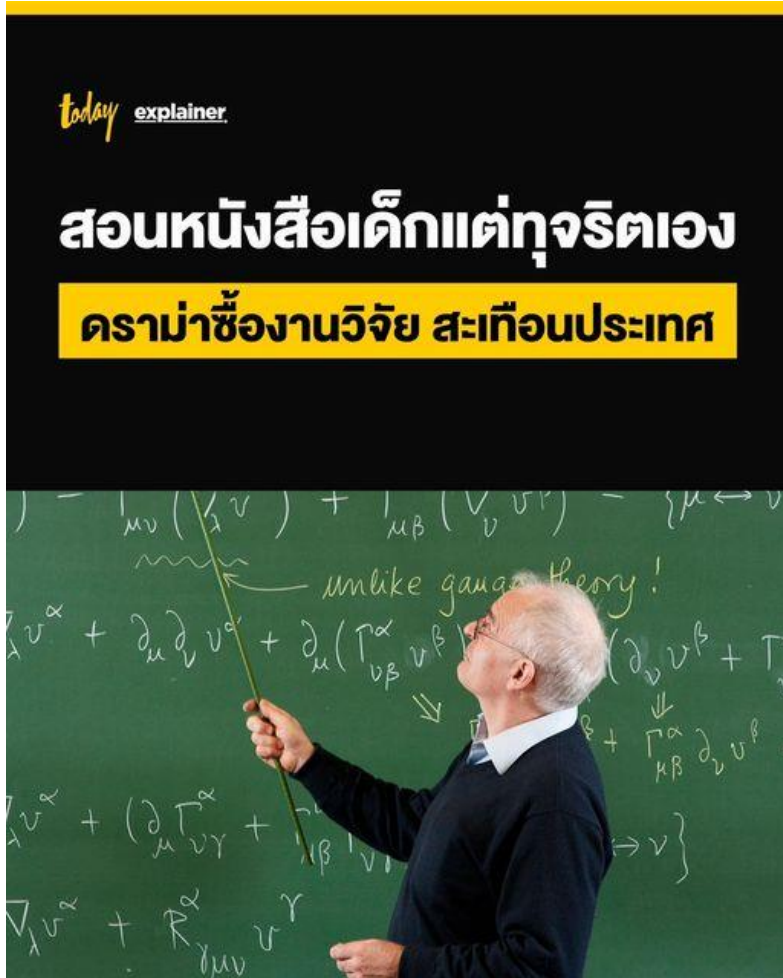
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>> ให้ได้รู้จำแนกและสืบค้นฐานข้อมูลและ
สำนักพิมพ์ ตามวิธีแหล่งสารสนเทศวิชาการ
มาตรฐานสากล



ฐานข้อมูลที่เป็นแหล่งรวบรวมวารสารวิชาการ ในเวทีสากลที่หลากหลาย:



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- ครอบคลุมทุกแขนงวิชาชีพ แต่โดยส่วนใหญ่นำเน้นวิทยาศาสตร์และเทคโนโลยี
- แทบจะไม่มีแหล่งวารสารที่ไม่มีคุณภาพเข้าไปรวมด้วย (ประสบการณ์ตนเอง)
- ระดับคุณภาพถูกระบุไว้ในรูปแบบของ Impact Factor, Quartile 1-4 (> 75%, 50%, 25%, > 25% in percentile)

- ฐานข้อมูลของวารสารวิชาการที่เป็นที่ยอมรับโดยสากล
- ครอบคลุมทุกแขนงวิชาชีพตั้งแต่มนุษยศาสตร์สังคมศาสตร์จนถึงศาสตร์ทางวิทยาศาสตร์การแพทย์
- อาจมีทั้งแหล่งวารสารที่มีคุณภาพสูงและวารสารที่อาจไม่มีคุณภาพที่เป็นที่ยอมรับตามมาตรฐานวิชาการ (เช่น วารสารที่ติดใน Beall's List) รวมอยู่ด้วย
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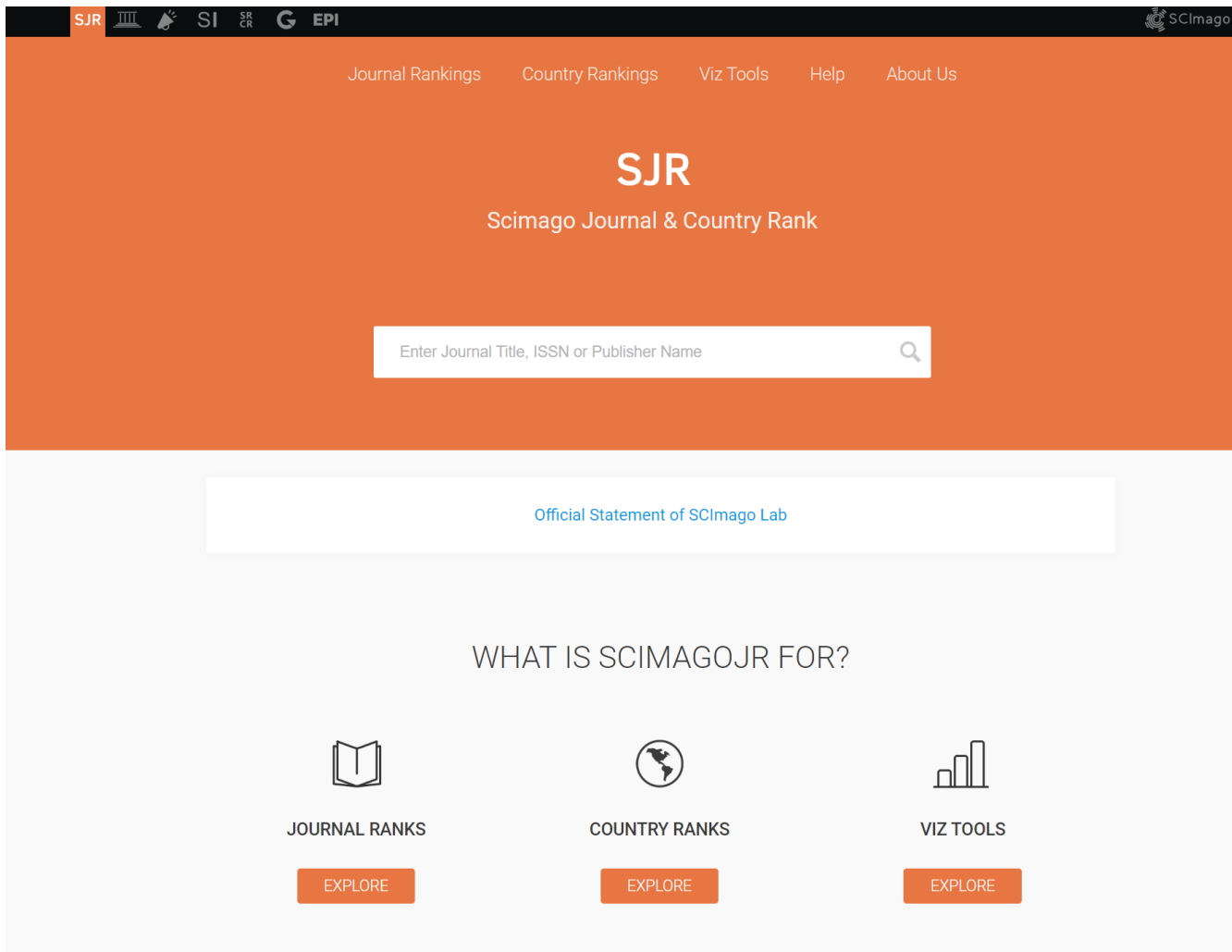
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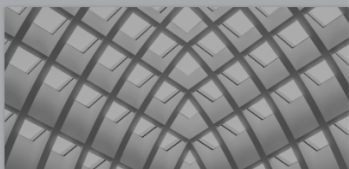
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Plastic Detective: A Citizen Inquiry Mobile App for Promoting Chemistry Learning about the Circular Plastic Economy
 Niwat Srisawasdi, Tassana Charin, Saengjai Thongyong, Pichaiwan Pichayaporn
 Faculty of Education, Khon Kaen University, 103 Mile 16 Thungmuang, Khon Kaen 40002, Thailand
 Digital Education and Learning Engineering Association, 45/15 Mile 8 Lohas, Bang Bua Thong, Saraburi 31112, Thailand
 Laboratory of Educational Research, 244 Mile 8 Lohas Bui, Lohas Bui District, Buai Rai 31170, Thailand

ABSTRACT
 Real-world applications can be great tools in chemistry teaching, offering highly practical learning for students. By involving students in real-world phenomena, we present our other learning concepts of chemistry that also address social dimensions: competencies, preparing them for the future as scientists and citizens. In this report, we introduce the "Plastic Detective," a citizen inquiry mobile app specifically designed to promote chemistry learning about plastic waste management. The app was developed using a user-centered design approach, focuses on engaging young people in environmental science through online inquiry-based chemistry learning. The app offers users to participate in the investigation and monitoring of plastic waste, offering an interactive platform for data collection, analysis, and sharing. Its intended features include a responsive interface accessible on various devices, GPS-enabled geographical data mapping, photo evidence collection, and social media integration for data sharing and dissemination. The findings of our study reveal that students of all educational levels responded positively to the app, with a significant improvement in their attitudes towards chemistry. This underscores the demand for and interest in such accessible technology: Our experience highlights practical, real-life chemistry learning opportunities and fosters a deeper understanding of circular plastic economy concepts.

Journal of Chemical Education 91(5) 2022 Page 1 of 14

GRAPHICAL ABSTRACT



KEYWORDS
 Chemistry, Inquiry-Based / Discovery Learning, Elementary / Middle School Science, High School / Introductory Chemistry, First-Year Undergraduate / Doctoral

Introduction
 Since the late 20th century, citizen science (CS) has emerged as a popular route for many citizen-led participatory research activities across various scientific fields. The CS has grown in popularity worldwide over the last two decades to an addressable approach for long-term monitoring of local and global environmental change (1). CS broadly encompasses activities that involve the inclusion of the scientific process into real-world problems, which can range from neighborhood to international issues for data collection, processing, and analysis (2). With the increasing availability of smartphones and other internet-enabled devices, citizen science has become more accessible, allowing for the accumulation and sharing of observational data on a global scale (3). In recent years, digital citizen science projects have flourished, offering mobile platforms and devices to engage people in observing environmental and social phenomena, such as disease outbreaks, air pollution, and the COVID-19 pandemic. These projects leverage mobile technology to engage individuals to collect, classify, and transmit data related to various scientific inquiries. Most digital citizen science platforms

Journal of Chemical Education 91(5) 2022 Page 2 of 14

support user-generated data and empowere evidence collection through mobile devices, enhancing public participation and data accuracy (4).
 Youth participation in citizen science has been recognized as an educational opportunity to learn about scientific processes and methods. Engaging young people in citizen science activities can foster their scientific inquiry skills and responsible behavior. The concept of citizen inquiry or CI, which refers to inquiry-based learning within the citizen science framework, has been proposed to reduce complexity and increase user learning opportunities for young people (5). This innovative approach allows nonprofessionals to engage in practical scientific activities, according to the risk of self-regulated activities in informal learning contexts (6). The circular economy for plastics emphasizes the sustainable management of plastic materials through recycling and reuse, reducing the environmental impact of plastic waste. Understanding the quantity, distribution, and composition of plastic waste is crucial for creating effective management strategies aimed at mitigating ecological and environmental harm (7). In this context, the Plastic Detective mobile app was developed to train students in investigating the circular plastic economy. The app provides an interactive platform for data collection, analysis, and sharing, facilitating a pedagogic learning environment through inquiry-based citizen science learning tools.
 The Plastic Detective app is designed with a responsive interface accessible on various devices, allowing users to engage in plastic waste investigations in real-world settings. The app addresses user engagement and promotes collaborative learning by incorporating features such as GPS-enabled geographical data mapping, photo evidence collection, and social media integration. This multiplatform approach not only increases awareness about plastic pollution but also supports the development of scientific competencies and digital literacy among young learners (8). Through iterative writing and feedback from diverse educational levels, the app has been refined to increase its usability and effectiveness in fostering meaningful scientific inquiry and environmental stewardship (9).
Objective
 The Plastic Detective mobile app aims to engage young people, such as school students at all levels, in understanding the circular economy for plastics through a CI approach. Students are introduced to

Journal of Chemical Education 91(5) 2022 Page 3 of 14

the concepts of plastic waste management and the importance of recycling and reuse early in their curriculum. They are familiarized with traditional methods of environmental monitoring, such as field surveys and data collection using various tools. The Plastic Detective app addresses these methods by providing a digital platform for real-time data collection, analysis, and sharing.
Methods of Development
 This section details the development, deployment, and use features of the Plastic Detective mobile application. **Design** assigned a structure a circular economy for plastics and plastic waste citizen science learning in real-world settings.
App Development
 The Plastic Detective mobile app was developed using a user-centered design (UCD) approach, integrating the life cycle model proposed by (9) and the multi-user-centered design (MUCD) strategy by (10). The development process consisted of three iterative phases, each involving distinct user groups: elementary school students, secondary school students, and university students. The life cycle model was applied to each phase to refine the app's design and functionality based on user feedback. During Phase 1, testing was conducted with elementary school students to gather initial insights on usability issues. Phase 2 involved secondary school students, focusing on enhancing the app's data collection and sharing features. Finally, Phase 3 engaged university students to evaluate the overall effectiveness and usability of the app's features as a real-world setting.
 The Plastic Detective app features a responsive interface accessible on smartphones, tablets, laptops, and desktop devices. It includes functionalities for GPS-enabled geographical data mapping, photo evidence collection, and social media integration for data sharing and dissemination. These features were iteratively refined through user involvement, focus groups, and iterative usability testing, ensuring the app met the needs and preferences of its young users. The key features of the app are presented in the next section.
App Deployment and Data Treatment
 The Plastic Detective app was deployed in three phases, each involving a different educational level to assess local usability and effectiveness. In each phase, participants were provided with access to the app and were instructed to conduct investigations on plastic waste in their local settings.

Journal of Chemical Education 91(5) 2022 Page 4 of 14

Participants collected data on plastic waste, including type, quantity, and distribution, using the app's GPS-enabled mapping and photo collection features. This data was uploaded to an online platform where it was accessible to all users for analysis and dissemination. Participants could use the collected data for educational purposes, further investigations, and community-building activities. At each phase, semi-structured interviews and focus groups were conducted to gather qualitative data on user experience and app usability. Additionally, log data of app usage were analyzed to quantify engagement and identify patterns in user interactions. The Technology Acceptance Model (TAM) (11) was employed to assess participants' perceived usefulness, ease of use, and attitudes toward the app, leading to iterative improvements based on feedback.
 Overall, the deployment strategy ensured that the Plastic Detective app was tested and refined across a diverse range of educational contexts, resulting in a robust tool for promoting online, mobile science learning about the circular plastic economy.

Key Features of the App
 The Plastic Detective app includes several key features designed to enhance user engagement and support scientific inquiry:

- **Responsive interface**: The app is accessible on various devices, including smartphones, tablets, and computers, ensuring flexibility and convenience for users in different settings.
- **Automatic contextual information recording**: This feature automatically logs relevant contextual data, such as time, date, and location information, during data collection. This provides a comprehensive database for analysis, allowing users to examine plastic waste findings within environmental factors, as shown in Figure 2 (left).
- **Geographical data mapping**: Users can collect and share data on plastic waste using GPS-enabled location mapping. This feature allows for real-time tracking and visualization of plastic pollution in the local environment, as shown in Figure 2 (left).
- **Photo evidence collection**: The app enables users to capture and upload photos of plastic waste, providing visual evidence to support their data collection efforts, as shown in Figure 2 (right).
- **Dissemination data and mapping**: Investigative activities in citizen science involve users not only record other ecological data, such as the types of plastics observed in the area, the types of land used, and their social understanding of the circular economy concepts. This data-driven approach to data collection helps users understand the broader environmental impact of

Journal of Chemical Education 91(5) 2022 Page 5 of 14

plastic pollution and fosters a deeper connection with their scientific understanding, as shown in Figure 2 (right).



Figure 2 Illustrative screens of the Plastic Detective mobile app: an automatic contextual information recording and geographical data mapping (left), and the photo evidence collection and Ecological data and contextual information recording (right).

- **Contextual information recording**: The app leverages the power of environmental logging users to contribute and record data on plastic pollution. This reflects effort enhance the database's richness and accuracy, enabling users to analyze and disseminate their findings within environmental contexts, as shown in Figure 2.

Journal of Chemical Education 91(5) 2022 Page 6 of 14

Figure 2 Illustrative screens of the user records and statistics in the Plastic Detective mobile app: list of users who are available (left) and statistical records of users (right).

- **User records and statistics**: The app maintains detailed records and statistics of each user's activities, including the number of investigations conducted, data points collected, and user search. This feature not only helps users track their progress but also encourages a sense of accomplishment and ongoing participation, as shown in Figure 2.

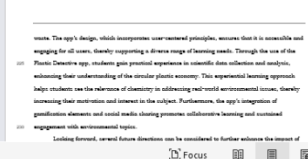
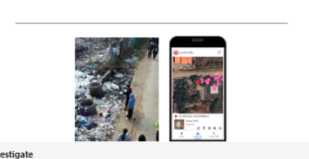
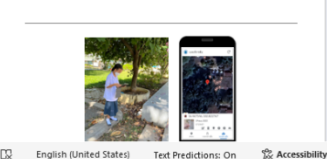


Journal of Chemical Education 91(5) 2022 Page 7 of 14

Case Studies
 This section presents three case studies illustrating the use of the Plastic Detective mobile app by different groups of young people: elementary school students, secondary school students, and university students. Each case study highlights how the app was utilized, the activities conducted, and the outcomes observed.

Case Study 1: Elementary School Students
 In the first phase of the app's development, the Plastic Detective app was tested with a group of 14 elementary school students aged 10-12 years. The primary focus was on introducing the basic functionality of the app and assessing its usability for younger users. The students were guided through a series of activities using the app to identify and document plastic waste in their local environment. They used the app's photo evidence collection feature to capture images of plastic waste and recorded the location using the GPS-enabled mapping feature. These activities were conducted during their science class as part of a lesson on plastic material and environmental concepts. Figure 4 displays the ease of implementation used by elementary school students in a user-friendly school setting in the northeastern region of Thailand.

Journal of Chemical Education 91(5) 2022 Page 8 of 14



Plastic Detective: A Citizen Inquiry Mobile App for Promoting Chemistry Learning about the Circular Plastic Economy

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ABSTRACT

10 Real-world applications can be potent tools in chemistry teaching, fostering highly beneficial learning
for students. By involving students in real-world phenomena, we cannot only alter their perceptions of
chemistry but also cultivate crucial chemistry competencies, preparing them for the future as
scientists and citizens. In this report, we introduce the “Plastic Detective,” a citizen inquiry mobile app
specifically designed to promote chemistry learning about the circular plastic economy. This app,
15 developed using a user-centered design approach, focuses on engaging young people in environmental
science through active inquiry-based chemistry learning. The app allows users to participate in the
investigation and monitoring of plastic waste, offering an interactive platform for data collection,
analysis, and sharing. Its standout features include a responsive interface accessible on various
devices, GPS-enabled geographical data mapping, photo evidence collection, and social media
20 integration for data sharing and discussion. The findings of our study reveal that students of all
educational levels responded positively to the app, with a significant improvement in their attitudes
towards chemistry. This underscores the demand for and interest in such accessible technology. Our
approach facilitates practical, real-life chemistry learning experiences and fosters a deeper
understanding of circular plastic economy concepts.

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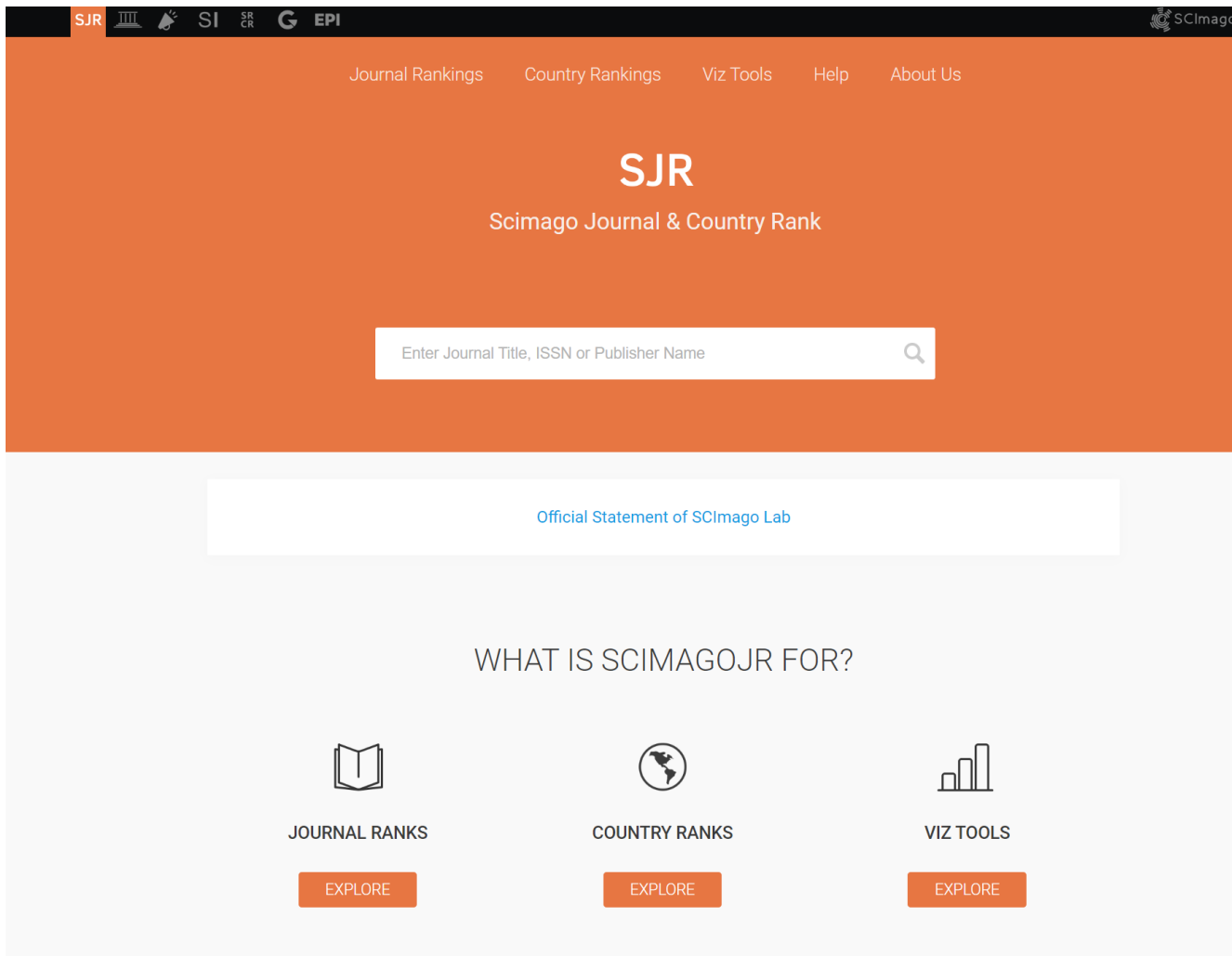
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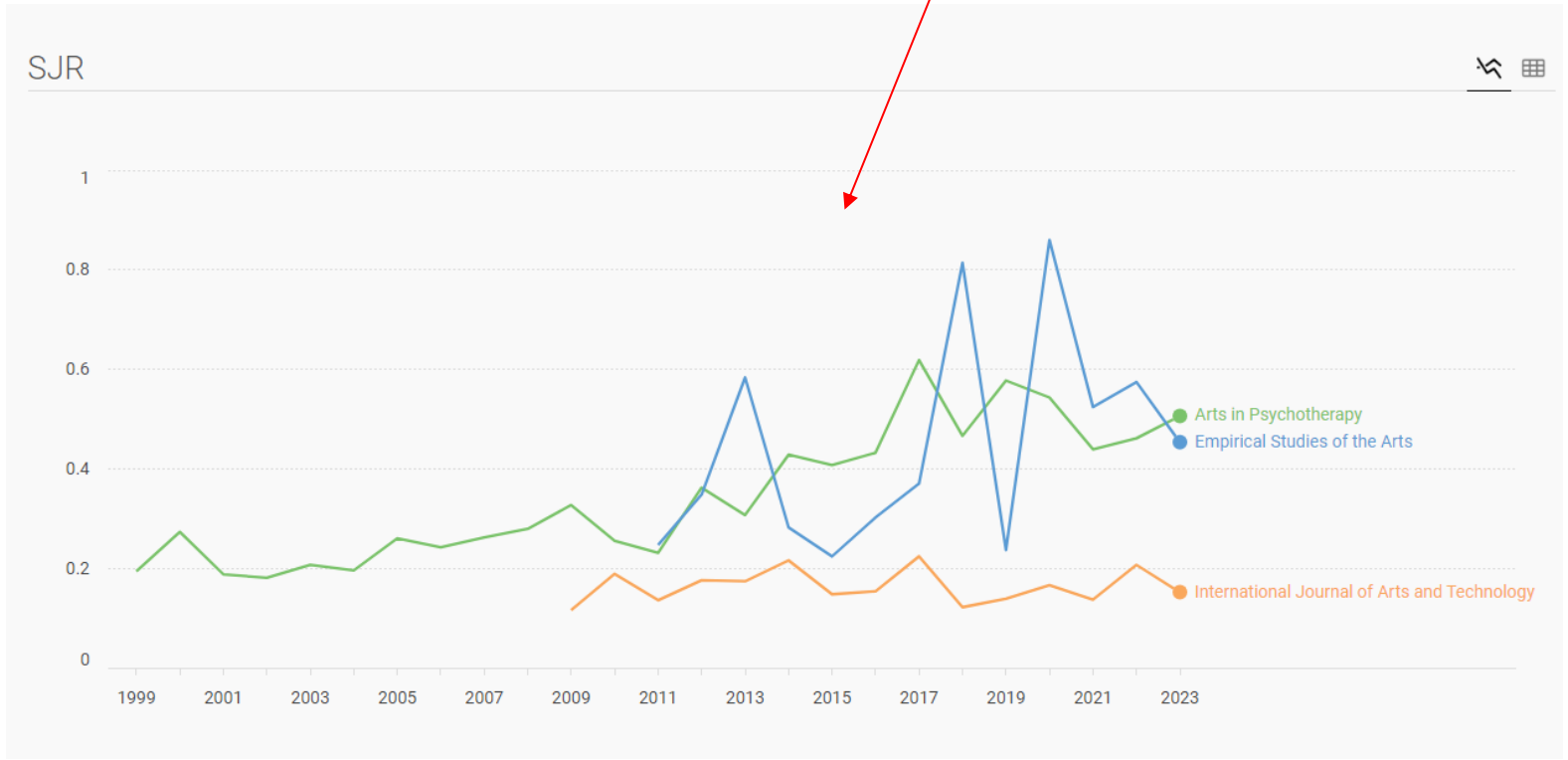
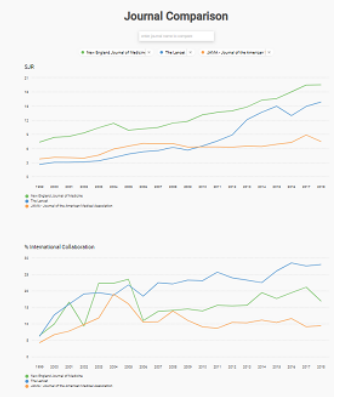
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(เป็นวารสารวิชาการนานาชาติในฐานข้อมูล Scopus)

ภารกิจที่ 2:

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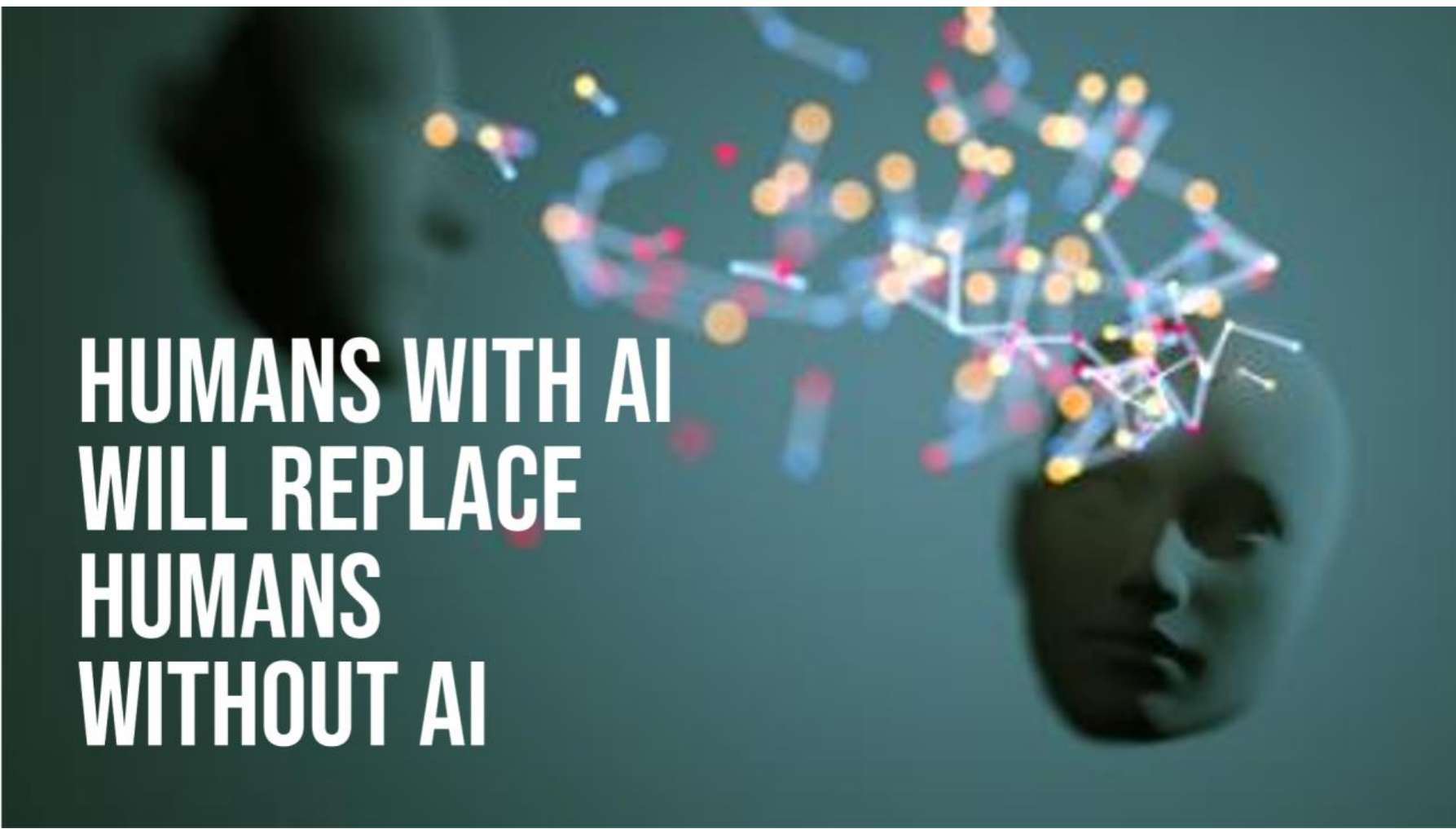
(จากวารสารที่ตนเองเลือกไว้ในภารกิจที่ 1)

THIRD Chapter >>>

คุยกับ **Generative AI** ให้แม่นยำผ่าน **Prompt:**

การประยุกต์ใช้ **ChatGPT** ในงานการวิจัย





**HUMANS WITH AI
WILL REPLACE
HUMANS
WITHOUT AI**

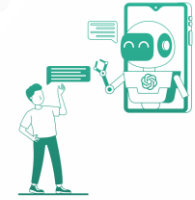
ความรู้พื้นฐานเกี่ยวกับ "Open AI" และ "ChatGPT"

OpenAI คืออะไร?

- OpenAI เป็นองค์กรวิจัยด้านปัญญาประดิษฐ์ (AI) ที่มุ่งมั่นในการสร้างและส่งเสริมปัญญาประดิษฐ์ที่มีประโยชน์และปลอดภัยสำหรับทุกคน
- ก่อตั้งโดย Elon Musk, Sam Altman และกลุ่มผู้นำด้านเทคโนโลยี โดยมีเป้าหมายเพื่อสนับสนุนการวิจัยและพัฒนา AI อย่างเป็นสาธารณะ



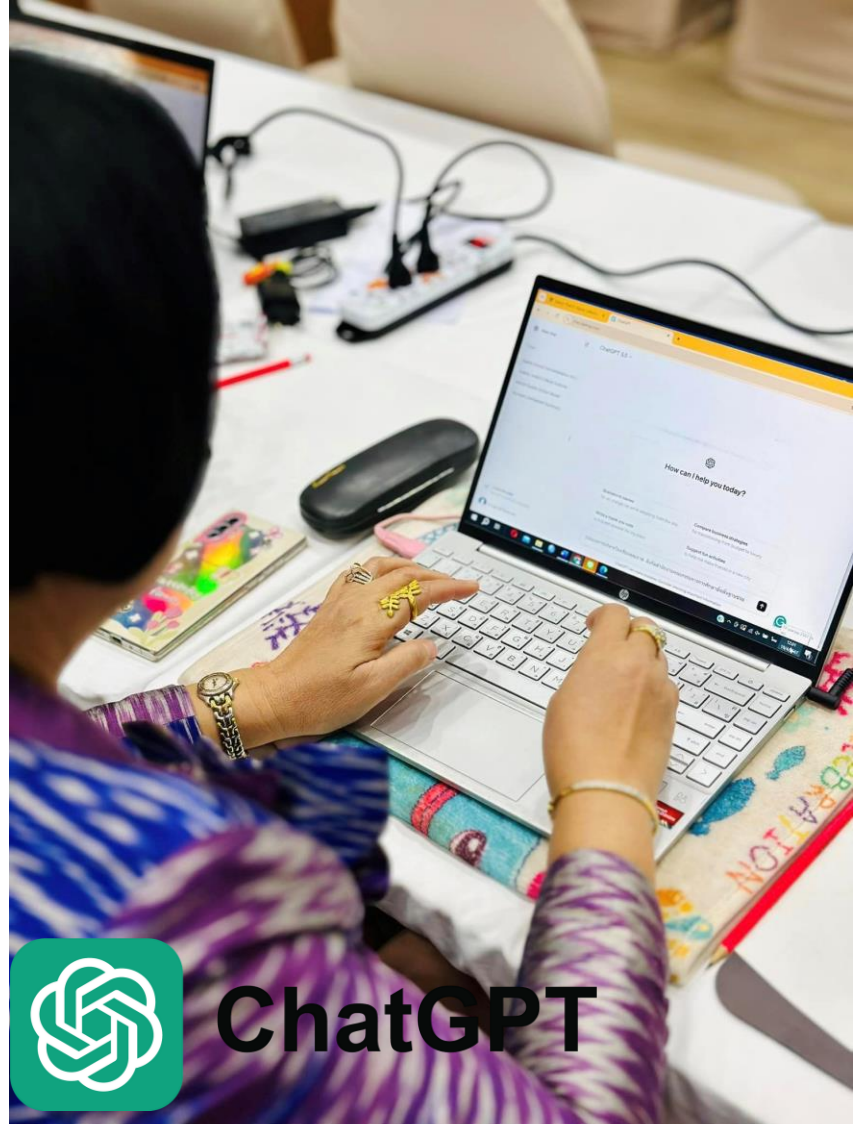
OpenAI
ChatGPT 4.0



ChatGPT คืออะไร?

- ChatGPT เป็นโมเดลปัญญาประดิษฐ์ที่ถูกฝึกฝนมาเพื่อตอบสนองและสื่อสารกับผู้ใช้งานผ่านการสนทนาที่เข้าใจง่าย
- พัฒนาโดยองค์กร OpenAI โดยได้รับการออกแบบมาโดยใช้เทคโนโลยีการเรียนรู้เชิงลึก (deep learning) และการประมวลผลภาษาธรรมชาติ (NLP) เพื่อทำความเข้าใจและสร้างคำตอบที่เหมาะสมตามบริบทของการสนทนาที่ผู้ใช้งานอย่างเป็นธรรมชาติ
- ChatGPT ยังถูกออกแบบมาเพื่อปรับปรุงตัวเองอย่างต่อเนื่องผ่านการใช้งานจริง ซึ่งช่วยให้แก้ไขข้อผิดพลาดและเรียนรู้จากปฏิสัมพันธ์กับผู้ใช้ โดยการฝึกฝน ChatGPT นั้นดำเนินการบนชุดข้อมูลขนาดใหญ่จากอินเทอร์เน็ตที่ประกอบไปด้วยข้อความและจากบทสนทนาที่ผู้ใช้งานเพื่อเรียนรู้วิธีการสื่อสารที่ธรรมชาติและมีประสิทธิภาพจากคำบอกงานป้อนเข้าโดยผู้ใช้
- สำหรับบริบทด้านการศึกษา นั้น ChatGPT ใช้อำนวยความสะดวก




“ChatGPT” ช่วยงาน การวิจัยอย่างไร?



ChatGPT



ส. 00:19 น.

-  วันนี้ทำสรุปแบบสลับภาษา draft 1 เสร็จ โดยใช้ความรู้จากการอบรม ChatGPT และจะนำไป ร้อยเรียงใหม่ เพื่อจะได้ตั้งกระทู้คำถามได้ต่อไปค่ะ
-  หากไม่เข้าอบรม คงจะหนักใจมาก ๆ เลยค่ะ ขอบคุณอาจารย์และทีมมาก ๆ ค่ะ
-  ช่วยได้มากจริง ๆ



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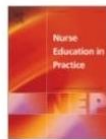
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“ChatGPT” ช่วยงานทางการศึกษาอย่างไร?



Nurse Education in Practice

Volume 66, January 2023, 103537



Editorial

Open artificial intelligence platforms in nursing education: Tools for academic progress or abuse?

Siobhan O'Connor^{a 1}, ChatGPT^b

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Research Perspective

Rapamycin in the context of Pascal's Wager: generative pre-trained transformer perspective

ChatGPT Generative Pre-trained Transformer² and Alex Zhavoronkov¹

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Keywords: artificial intelligence; Rapamycin; philosophy; longevity medicine; Pascal's Wager

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Towards Artificial Intelligence-Based Cybersecurity: The Practices and ChatGPT Generated Ways to Combat Cybercrime

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ABSTRACT: Today, cybersecurity is considered one of the most noteworthy topics that are circulated frequently among companies in order to protect their data from hacking operations. The emergence of cyberspace contributed to the growth of electronic systems. It is a virtual digital space through which interconnection is established between computers and smartphones connected within the Internet of Things environment. This space is critical in building a safe digital environment free of threats and cybercrime. It is only possible to make a digital environment with the presence of cyberspace, which contains modern technologies that make this environment safe and far from unauthorized individuals. Cybersecurity has a wide range of challenges and obstacles in performance, and it is



ChatGPT

The use of generative AI and AI-assisted technologies in writing for Elsevier

Last updated 18 August 2023

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AI "OF" Research

- Summative action
- แนวทางนี้เน้น การใช้เพื่อช่วยประเมินผลลัพธ์สุดท้ายหรือผลกระทบของกิจกรรมในกระบวนการงานการวิจัย อย่างเชิงลึก โดยสรุปอิงกับวรรณกรรมและผลงานวิจัยก่อนหน้า

1

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- Formative action
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2

AI "AS" Research

- Metacognitive action
- แนวทางนี้เน้น การออกแบบ พัฒนา และปรับปรุงเทคโนโลยีปัญญาประดิษฐ์ผ่านการประเมินประสิทธิภาพและประสิทธิผล โดยให้กระบวนการงานการวิจัย

3

AI "WITH" Research

- Collaborative action
- ลักษณะเป็น การออกแบบการใช้ความเป็นปัญญาประดิษฐ์ (AI) อย่างร่วมผล สานกันกับมุมมองปัญญาของมนุษย์ (HI) เพื่อการไปค้นพบคำตอบผ่านกระบวนการงานการวิจัย

4



An Emerging Framework:

กรอบแนวคิดเกี่ยวกับการประยุกต์ใช้เทคโนโลยีเอไอเพื่องานการวิจัยทางการศึกษา >>>

AI "OF" Research

- Summative action
- แนวทางนี้เน้น การใช้เพื่อช่วยประเมินผลลัพธ์สุดท้ายหรือผลกระทบของกิจกรรมในกระบวนการงานการวิจัย อย่างเชิงลึก โดยสรุปอิงกับวรรณกรรมและผลงานวิจัยก่อนหน้า



1

- ใช้เอไอสำหรับการ ประเมินผลงานการวิจัยที่ตีพิมพ์แล้ว โดยวิเคราะห์ชุดข้อมูลขนาดใหญ่ของบทความวิจัย หรือ ประเมินความใหม่ของงานวิจัย
- ใช้เอไอสำหรับการ ประเมินผลกระทบของการศึกษาวิจัย โดยวิเคราะห์การอ้างอิง การกล่าวถึงในสื่อสังคมออนไลน์ หรือวิธีที่งานวิจัยมีอิทธิพลต่อการศึกษาในภายหลัง
- ใช้เอไอสำหรับการ **สรุปผลข้อค้นพบ** และช่วยให้นักวิจัยสังเคราะห์ผลลัพธ์ของงานวิจัย โดยเปรียบเทียบกับงานวิจัยที่มีอยู่เดิม
- ใช้เอไอสำหรับการ **การตรวจสอบคุณภาพและทิศทาง** ของผลงานการตีพิมพ์เผยแพร่

AI OF RESEARCH

การประเมินผลงานการวิจัยโดยใช้เอไอ



An Emerging Framework:

กรอบแนวคิดเกี่ยวกับการประยุกต์ใช้เทคโนโลยีเอไอเพื่องานการวิจัยทางการศึกษา >>>

AI "OF" Research

- Summative action
- แนวทางนี้เน้น การใช้เพื่อช่วยประเมินผลลัพธ์สุดท้ายหรือผลกระทบของกิจกรรมในกระบวนการงานการวิจัย อย่างเชิงลึก โดยสรุปอิงกับวรรณกรรมและผลงานวิจัยก่อนหน้า

1



AI OF RESEARCH

การประเมินผลงานการวิจัยโดยใช้เอไอ

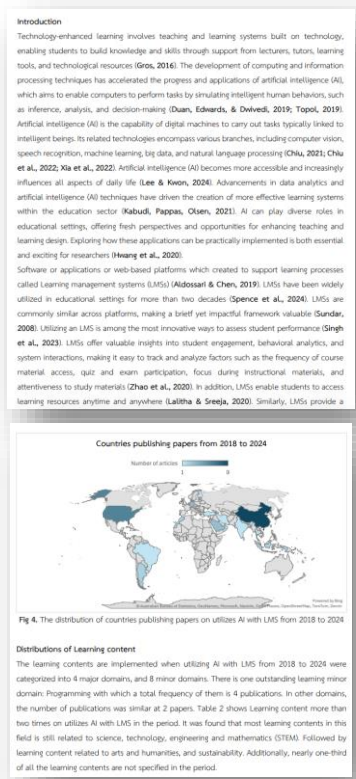


An Emerging Framework:

กรอบแนวคิดเกี่ยวกับการประยุกต์ใช้
เทคโนโลยีเอไอเพื่องานการวิจัยทางการศึกษา >>>

AI "OF" Research

- Summative action
- แนวทางนี้เน้น การใช้ เพื่อช่วยประเมิน ผลลัพธ์สุดท้ายหรือ ผลกระทบของ กิจกรรมใน กระบวนการ การวิจัย อย่างเชิงลึก โดย สรุปลงกับวรรณกรรม และผลงานวิจัยก่อนหน้า



only journal article and social science subject area were selected. Finally, 43 articles were selected as shown in Figure 2. It is a PRISMA flow diagram of article selection.

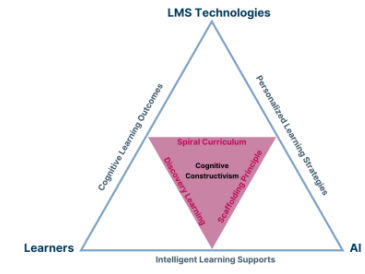
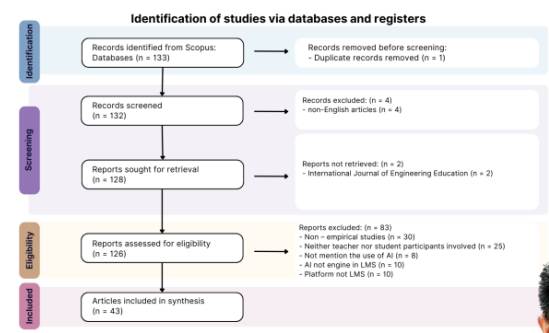


Fig 1. The theoretical framework based on constructivism for utilizing AI with LMS coding schema



AI OF RESEARCH

การประเมินผลงานการวิจัยโดยใช้เอไอ

An Emerging Framework:

กรอบแนวคิดเกี่ยวกับการประยุกต์ใช้
เทคโนโลยีเอไอเพื่องานการวิจัยทางการศึกษา >>>

Systematic-review.pdf
PDF

Suppose you are an editor of the journal of computers in education and you received this original systematic review manuscript, as the uploaded file, how would you rate its possibility to be published in the journal?



Based on my review of the uploaded systematic review manuscript, I would evaluate its suitability for publication in the *Journal of Computers in Education* as follows:

Strengths:

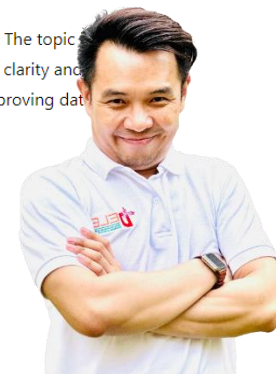
- Relevant Topic:** The manuscript focuses on the integration of artificial intelligence (AI) with Learning Management Systems (LMS) in educational settings, which is highly relevant to current trends in educational technology research.
- Methodological Rigor:** The authors have used a systematic review approach, adhering to the PRISMA guidelines. The inclusion of clearly defined research questions and a coding scheme based on constructivist theory adds strength to the study's design.
- Comprehensive Review:** The manuscript analyzes a wide range of factors related to AI-enabled LMS, including AI algorithms, personalized learning strategies, cognitive learning outcomes, and intelligent learning supports, providing a well-rounded perspective.

Areas for Improvement:

- Depth of Discussion:** While the manuscript covers many aspects of AI-LMS integration, the discussion of findings could benefit from deeper analysis and interpretation, particularly in connecting results to broader educational implications and future research directions.
- Clarity of Writing:** The language used in some sections can be more concise and clear. For instance, parts of the introduction and results sections are somewhat repetitive, and the manuscript might benefit from more streamlined prose.
- Data Presentation:** Although the paper presents several tables and figures, the visual presentation could be enhanced to make the key trends and findings easier to interpret at a glance. For example, the inclusion of more graphical representations could improve engagement.
- Theoretical Framing:** The manuscript could benefit from a stronger link between the theoretical framework and the findings. The constructivist lens is briefly mentioned but could be more deeply integrated throughout the analysis and discussion sections.

Overall Recommendation:

I would rate this manuscript as **potentially publishable with minor revisions**. The topic is relevant, and the review is methodologically sound, but some areas require refinement for clarity and depth. Revisions focused on enhancing the discussion, streamlining the text, and improving data visualization, this manuscript could be a strong contribution to the journal.



AI OF RESEARCH

การประเมินผลงานการวิจัยโดยใช้เอไอ

An Emerging Framework:

กรอบแนวคิดเกี่ยวกับการประยุกต์ใช้
เทคโนโลยีเอไอเพื่องานการวิจัยทางการศึกษา >>>

AI "FOR" Research

- Formative action
- แนวทางนี้เน้น การใช้ ช่วย ปรับแต่ง เพื่อ ปรับปรุง กระบวนการ วิจัย ให้สามารถ ตัดสินใจ ดำเนินการ การวิจัย ให้ มีผลกระทบ ที่ดีขึ้น



- ใช้เอไอสำหรับการ ช่วยวิเคราะห์ข้อมูลแบบเรียลไทม์ โดยให้ ข้อมูลย้อนกลับ แก่นักวิจัยเกี่ยวกับ แนวโน้ม หรือ ความผิดปกติ
- ใช้เอไอสำหรับการ ช่วยสร้างคำถามวิจัย สมมติฐานการวิจัย ออกแบบการทดลอง หรือ แนะนำประเด็นที่ควรศึกษา เพิ่มเติม สำหรับงานวิจัยคุณภาพสูง (มีโอกาสดีพิมพ์ได้)
- ใช้เอไอสำหรับ การทบทวนวรรณกรรม โดยการ สแกน และ จัดระเบียบ ผลงานบทความวิจัยที่เกี่ยวข้องได้อย่างรวดเร็ว
- ใช้เอไอสำหรับ ช่วยในการเขียนบทความ โดยการ สร้าง บทสรุป เสนอแนะการแก้ไข หรือ ระบุความไม่สอดคล้องกัน

2

AI FOR RESEARCH

การปรับแต่งงานการวิจัยโดยใช้เอไอ



An Emerging Framework:

กรอบแนวคิดเกี่ยวกับการประยุกต์ใช้เทคโนโลยีเอไอเพื่องานการวิจัยทางการศึกษา >>>

AI "FOR" Research

- Formative action
- แนวทางนี้เน้น การใช้ ช่วย ปรับแต่ง เพื่อ ปรับปรุง กระบวนการ การวิจัย ให้สามารถ ตัดสินใจ การ ดำเนินการ การวิจัย ให้ มีผลกระทบ ที่ดีขึ้น



2

AI FOR RESEARCH

การปรับแต่งงานการวิจัยโดยใช้เอไอ



ตัวอย่างการใช้ AI ให้ช่วยสกัดหา ประเด็นวิจัยร่วมสมัย:

ภารกิจค้นให้พบตัวเอง >>>

1. ให้ “เขียน” หัวข้อวิจัยทั้งหมดหรือหัวข้อวิจัยใด ๆ ก็ตามที่
คุณสนใจ โดยเขียนให้เรียงง่ายที่สุดเท่าที่จะเป็นไปได้ และ
พยายามเขียนให้ได้มากกว่าหนึ่งหัวข้อ (ปกติใช้เวลา 20-
30 นาที)
2. “เลือก” เพียงหนึ่งหัวข้อจากรายการของคุณที่ได้รับจาก
การดำเนินการในข้อที่ 1 แล้วให้สืบค้นสารสนเทศ
บทความวิจัยโดยใช้ฐานข้อมูลการวิจัยระดับนานาชาติที่
เป็นที่ยอมรับในชุมชนวิชาการ (15 นาที)
3. “เลือก” ผลลัพธ์รายการสารสนเทศบทความทางวิชาการ
จากการสืบค้นที่คุณรู้สึกสนใจเป็นพิเศษ จำนวน 5-10
ผลลัพธ์ (15 นาที)
4. “อ่านเพื่อศึกษา” รายละเอียดของผลลัพธ์พอสังเขปหรือโดยคร่าว –
อาจเปรียบเทียบได้ว่าให้ใช้พลังงานสมองเพียงร้อยละ 20 เท่านั้นใน
การดูรายละเอียดของผู้อื่นเหล่านั้นแบบผ่าน ๆ พอ และคงเหลืออีกร้อย
ละ 80 ไว้สำหรับเป็นพื้นที่ในการตัดสินใจด้วยใจของตัวเอง (15 นาที)
 - ที่สำคัญ คือ “ให้ใส่ใจ” ต่อความรู้สึกหรือการตอบสนองทางวิ
คิดของตัวเองที่มีต่อรายละเอียดของผลลัพธ์ที่ได้จากการ
สืบค้นมานั้น ตัวอย่างเช่น
 - อะไรที่เหมือนจะโดดเด่นและสะดุดความสนใจของคุณ
 - อะไรที่ทำให้คุณวนเวียนอยู่กับมันนานกว่าอันอื่น
5. ให้ “เขียน” ประเด็นรายการที่ทำให้คุณเกิดความสนใจหรือใส่ใจเป็น
พิเศษต่อสิ่งนั้นอย่างน้อย 10 รายการ (โดยไม่ต้องกังวลมากนักว่า
ทำไม่ตนเองถึงสนใจ) (10 นาที)

AI FOR RESEARCH

การปรับแต่งงานการวิจัยโดยใช้เอไอ



If you are an educational researcher in Thailand with a strong passion or interest in developing and/or applying digital technologies in school science education, what should be your robust research topics for a new research project? Please list potential research topics in 10 items and provide their reason for addressing current literature in the last decade.

As an educational researcher in Thailand with a focus on integrating digital technologies in school science education, you can explore a variety of research topics that address current educational challenges and trends. Here are ten potential research topics, along with their justifications based on the literature of the last decade:

1. Impact of Virtual Reality (VR) on Conceptual Understanding in Science

- **Justification:** VR offers immersive learning experiences that can significantly enhance conceptual understanding in complex scientific topics. Research in the past decade shows promising results in using VR to improve spatial reasoning and engagement in subjects like biology and physics.

2. Augmented Reality (AR) for Laboratory Experiments

- **Justification:** AR can simulate expensive or dangerous experiments safely and affordably. Studies have indicated its effectiveness in enhancing student understanding and retention by overlaying digital information onto the real world, making abstract concepts tangible.

3. AI-driven Personalized Learning in Science Education

- **Justification:** Artificial Intelligence (AI) can tailor educational content to individual student needs, potentially improving learning outcomes. Recent literature highlights AI's role in identifying learning patterns and predicting student performance, which can be crucial for adaptive learning systems.

4. Use of Mobile Learning Applications to Support Inquiry-based Science Education

- **Justification:** Mobile learning apps provide flexibility and access to resources and have been shown to support the inquiry-based learning approach by facilitating data collection and analysis in real-time, promoting active learning outside the traditional classroom setting.

5. The Effectiveness of Digital Storytelling in Teaching Complex Science Topics

- **Justification:** Digital storytelling can make science education more appealing and comprehensible by weaving factual content into compelling narratives. Research has shown that storytelling aids in memory retention and can simplify complex scientific concepts.

1. ให้ ChatGPT ช่วยคิด ประเด็น/หัวข้อวิจัย ปังปังจากงานวรรณกรรมวิจัยปัจจุบัน เพียงไม่กี่วินาที

6. Gamification and Its Impact on Motivation and Learning in Science Education

- **Justification:** Integrating game elements into education can enhance student motivation and engagement, leading to better learning outcomes. Studies from the last decade demonstrate significant improvements in learning attitudes and achievement when gamification is applied effectively.

7. The Role of Online Learning Platforms in Enhancing Collaborative Learning

- **Justification:** With the rise of blended and online learning, understanding how digital platforms facilitate collaboration among students is crucial. Research indicates these platforms can enhance communication and problem-solving skills among peers, critical in the science learning process.

8. Flipped Classroom Models in Science Education and Their Impact on Student Achievement

- **Justification:** The flipped classroom model, where students engage with lecture content at home and do hands-on activities in class, has gained traction. Literature supports its effectiveness in increasing student performance and engagement, particularly in science subjects.

9. Development and Evaluation of Interactive E-books for Science Education

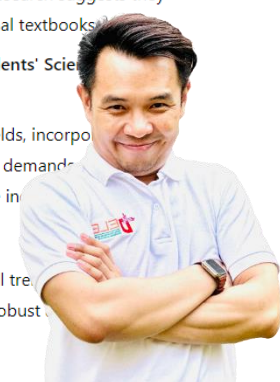
- **Justification:** Interactive e-books can provide multimedia resources like videos and interactive simulations that enrich the learning experience. Recent research suggests they can improve understanding and engagement compared to traditional textbooks.

10. Analyzing the Impact of Data Science and Big Data in Developing Students' Science Skills

- **Justification:** As data science becomes integral to many scientific fields, incorporating data analysis into science education can prepare students for future demands. The last decade has begun to explore how data literacy can enhance in-classroom learning. Digital skills are not only high-demand in the workforce but also essential for addressing practical challenges in teaching and learning science, making them robust research topics.

AI FOR RESEARCH

การปรับแต่งงานการวิจัยโดยใช้เอไอ



“คำบอกงาน (Prompt)” กับ ChatGPT

6 องค์ประกอบพื้นฐาน ของการเขียนคำบอกงานกับ ChatGPT

- Task**
(ภาระงาน)
- Context**
(บริบท)
- Exemplar**
(ตัวอย่างประกอบ)
- Persona**
(บทบาทบุคคล)
- Format**
(รูปแบบ)
- Tone**
(ลักษณะอารมณ์)

- Task**
- Context**
- Exemplar**
- Persona**
- Format**
- Tone**

ไม่มีไม่ได้

สำคัญ

มีไว้ก็ดี

"คำบอกงาน (Prompt)" กับ ChatGPT



ลำดับการเขียนคำบอกงานคุณภาพสูง



ถ้าคุณเป็นนักวิชาการทางการศึกษา | ที่ได้รับมอบหมายให้เขียน research article เพื่อส่งตีพิมพ์เผยแพร่ใน international journal | ช่วยเขียนเนื้อหาเป็นภาษาอังกฤษของ research article จำนวน 1000 คำ ในส่วนที่เป็น literature review เกี่ยวกับ Inquiry-based learning | ตามโครงสร้างของ TCCM | พร้อมการอ้างอิงจากบทความวิจัยที่ตีพิมพ์เผยแพร่ในวารสารวิชาการระดับนานาชาติที่ปรากฏในฐานข้อมูล ScienceDirect พร้อมรายการของเอกสารอ้างอิงให้ด้วย | อย่างเป็นทางการ



"คำบอกงาน (Prompt)" กับ ChatGPT



ลำดับการเขียนคำบอกงานคุณภาพสูง



คุณได้รับมอบหมายให้เขียน research article เพื่อส่งตีพิมพ์เผยแพร่ใน international journal | ช่วยเขียนเนื้อหาเป็นภาษาอังกฤษของ research article จำนวน 1000 คำ ในส่วนที่เป็น literature review เกี่ยวกับ Inquiry-based learning | ตามโครงสร้างของ TCCM | อย่างเป็นทางการ

“คำบอกงาน (Prompt)” กับการเขียน Literature Review

ChatGPT 3.5 ▾



You

ช่วยเขียนเนื้อหาเป็นภาษาอังกฤษของ research article ในส่วนที่เป็น literature review เกี่ยวกับ Online learning platform และ Inquiry-based learning พร้อมการอ้างอิงจากบทความวิจัยที่ตีพิมพ์เผยแพร่ในวารสารวิชาการระดับนานาชาติที่ปรากฏในฐานข้อมูล ScienceDirect พร้อมรายการของเอกสารอ้างอิงให้ด้วย

Literature Review

Online Learning Platforms in Education

Online learning platforms have become integral tools in modern education, offering diverse opportunities for both educators and learners. These platforms encompass a wide range of technologies and strategies aimed at facilitating and enhancing the learning experience.

Research on online learning platforms highlights several key aspects:

1. **Accessibility and Flexibility:** Online platforms provide learners with access to educational resources and activities anytime and anywhere, fostering a flexible learning environment (Johnson & Adams, 2019; Smith et al., 2020).
2. **Interactivity and Engagement:** Incorporating interactive elements such as multimedia content, discussion forums, and virtual simulations promotes active engagement and collaboration among learners (Brown & Williams, 2018; Chen et al., 2021).
3. **Personalized Learning:** Adaptive learning algorithms and data analytics enable personalized learning pathways tailored to individual learner needs and preferences (Lee & Kim, 2017; Wang et al., 2022).
4. **Assessment and Feedback:** Online platforms offer diverse assessment methods and timely feedback mechanisms, enhancing the assessment process and supporting continuous improvement (Jones & Miller, 2019; Zhang & Chen, 2020).

Inquiry-Based Learning (IBL) Approaches

Inquiry-based learning (IBL) methodologies empower learners to actively explore and construct knowledge through inquiry processes. The integration of IBL approaches within online learning platforms has garnered significant attention and research focus:

1. **Constructivist Learning Principles:** IBL aligns with constructivist theories of learning, emphasizing active engagement, critical thinking, and problem-solving skills development (Krajcik et al., 2018; Schwarz & White, 2021).

“คำบอกงาน (Prompt)” กับการเขียน Literature Review


ChatGPT 3.5 ▾



You

ช่วยเขียนเนื้อหาเป็นภาษาอังกฤษ จำนวน 1000 คำ ของ research article ในส่วนที่เป็น literature review เกี่ยวกับ Online learning platform และ Inquiry-based learning พร้อมการอ้างอิงจากบทความวิจัยที่ตีพิมพ์เผยแพร่ในวารสารวิชาการระดับนานาชาติที่ปรากฏในฐานข้อมูล ScienceDirect พร้อมรายการของเอกสารอ้างอิงให้ด้วย

Literature Review



In recent years, the integration of online learning platforms has revolutionized the landscape of education, offering new possibilities for enhancing teaching and learning experiences. Concurrently, the pedagogical approach of Inquiry-based learning (IBL) has garnered significant attention for its effectiveness in promoting critical thinking, problem-solving skills, and deep understanding among learners. This literature review aims to explore the intersection of these two domains, focusing on the potential benefits, challenges, and best practices associated with incorporating online platforms into Inquiry-based learning environments.

1. Benefits of Online Learning Platforms in Inquiry-based Learning

Online learning platforms provide a versatile and accessible medium for implementing Inquiry-based learning strategies. Research by Johnson and Johnson (2018) highlights the flexibility of digital platforms in facilitating collaborative inquiry projects, where students can engage in authentic investigations and share their findings in real-time. Moreover, the interactive nature of online tools, as demonstrated in the study by Smith et al. (2020), promotes active engagement and self-directed learning, essential components of effective Inquiry-based instruction.

1. Challenges and Considerations

Despite the potential advantages, integrating online platforms into Inquiry-based learning contexts presents certain challenges. Technical issues, such as connectivity issues and platform compatibility, can hinder seamless implementation (Brown & Jones, 2019). Additionally, concerns about digital equity and access disparities need to be addressed to ensure equitable participation and learning outcomes for all students (Garcia & Martinez, 2021). These challenges underscore the importance of thoughtful planning, adequate resources, and ongoing support mechanisms when adopting online tools for IBL.



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Literature Review



Online learning platforms have become integral tools in modern education, offering diverse opportunities for interactive and collaborative learning experiences. The integration of these platforms with pedagogical approaches such as Inquiry-based Learning (IBL) has garnered significant attention due to their potential to enhance student engagement and learning outcomes (Smith & Jones, 2021). IBL, characterized by its emphasis on student-driven exploration and critical thinking, aligns well with the interactive features and multimedia resources available on online platforms (Brown et al., 2020).

A key benefit of incorporating online learning platforms in IBL is the accessibility to a wide range of educational resources, including simulations, virtual laboratories, and multimedia content (Garcia & Nguyen, 2019). These platforms facilitate hands-on learning experiences, allowing students to conduct experiments, analyze data, and formulate hypotheses in virtual environments (Johnson et al., 2018). Research by Lee and Chang (2022) demonstrated that students exposed to IBL through online platforms showed higher levels of scientific inquiry skills and critical thinking abilities compared to traditional classroom settings.

Moreover, the adaptability and personalized learning features of online platforms contribute to the effectiveness of IBL by catering to individual student needs and learning styles (Martinez & Smith, 2020). For instance, adaptive learning algorithms can customize learning pathways based on student performance, providing targeted feedback and scaffolding for complex inquiry tasks (Wilson & Brown, 2019). This adaptive approach not only supports skill development but also fosters a deeper understanding of scientific concepts through iterative exploration and reflection (Chen et al., 2021).

Furthermore, the integration of collaborative tools within online platforms enhances the social dimension of IBL, promoting peer interaction, knowledge sharing, and collaborative problem-solving (Gupta & Sharma, 2017). Virtual collaboration spaces, discussion forums, and group projects enable students to engage in authentic scientific inquiry practices, where they

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Literature Review

Online learning platforms have become integral tools in modern education, offering flexible and interactive learning environments for students (Johnson et al., 2020). These platforms provide opportunities for inquiry-based learning, a pedagogical approach that emphasizes student-centered investigation and problem-solving (Kim & Bonk, 2021). Inquiry-based learning fosters critical thinking, creativity, and collaboration among students, aligning with the goals of 21st-century education (Rodriguez et al., 2019).

Research studies have highlighted the effectiveness of online platforms in supporting inquiry-based learning. For example, a study by Wang and Sun (2018) demonstrated how an online learning platform facilitated inquiry activities in science education, leading to improved student engagement and conceptual understanding. Similarly, Smith and Jones (2020) explored the integration of online tools in inquiry-based mathematics instruction, showing positive outcomes in student achievement and motivation.

Integration of digital technologies, such as virtual simulations and data analysis tools, within online platforms enhances the inquiry learning experience (Nguyen et al., 2022). These technologies provide immersive and interactive simulations that enable students to explore scientific concepts in depth (Chen et al., 2019). Moreover, online platforms offer features like real-time collaboration and access to vast repositories of educational resources, enriching the inquiry process (Gao & Wong, 2021).

Despite the benefits, challenges exist in implementing effective online inquiry-based learning. Technical issues, digital literacy gaps among students, and the need for teacher training in online pedagogy are areas of concern (Johnson & Smith, 2020). Addressing these challenges requires a comprehensive approach that integrates pedagogical strategies, technological support, and ongoing professional development for educators (Brown et al., 2021).



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เขียน prompt กับเอไอ

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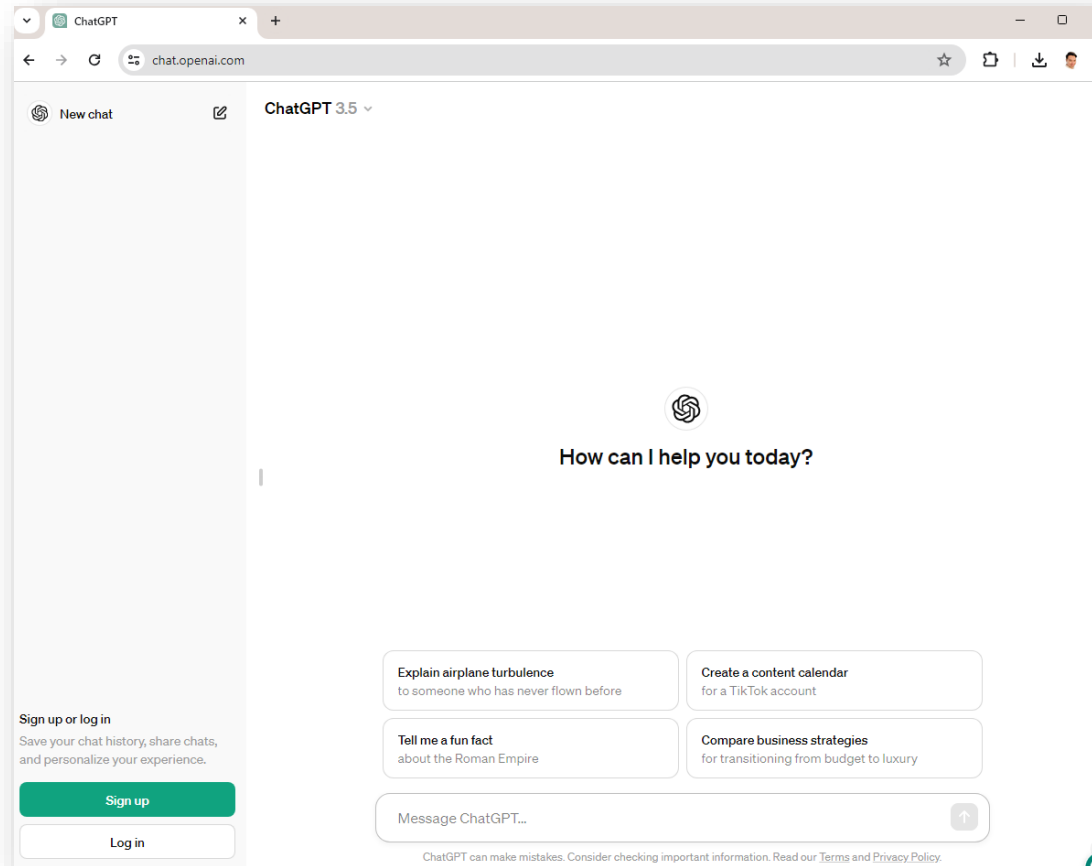
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