

**EXTENDING COMMUNITY OF INQUIRY
MODEL FOR ONLINE LEARNING
EFFECTIVENESS FROM THE PERSPECTIVE
OF A MALAYSIAN HIGHER EDUCATION
INSTITUTION**

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UNIVERSITI SAINS MALAYSIA

2025

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by

CHOO TENG SENG

**Thesis submitted in fulfilment of the requirements
for the degree of
Doctor of Philosophy**

March 2025

ACKNOWLEDGEMENT

Embarking on this PhD journey has been a transformative milestone in my life. Not only has it enriched my knowledge about the subject matter, academic research, and writing, but it has also widened my perspectives on the process of systematic knowledge construction.

My deepest gratitude goes to my supervisor, Professor Dr Hazri Jamil. His patience, enthusiasm, and unwavering support had been a beacon of light throughout the entirety of my doctoral studies. His exceptional mentorship and leadership had greatly contributed to making my PhD journey both rewarding and enjoyable.

I extend my heartfelt appreciation to Dr Thein Mee Lee for her unwavering dedication and guidance throughout my PhD. Her willingness to share her profound technical expertise and publication experience had truly made this study possible. Her invaluable advice had sped up the progress of my journey.

To my beloved wife, Er Saw Yong, I express my deepest thanks for her encouragement and boundless support. Her inspiration and motivation have always pushed me to exceed my limits. I am eternally grateful for her love, encouragement, and patience. She is the woman who has truly made all the difference in my life. Without her sacrifice and support, this thesis would not have been possible.

I must also extend a special note of thanks to my mother, Chew Gaik Cheng. Her invaluable help, stepping in to fill the void whilst I was engrossed in the studies, allowed me to focus on the work at hand. Her crucial role as a caretaker for my children cannot be overemphasized.

Lastly, I extend my heartfelt gratitude to my daughters, Choo Yynn and Choo Ernn, and my son, Choo Xean. This PhD journey demanded sacrifices, particularly time that could have been spent with you. However, if this journey stands as an example for your future endeavors, then every sacrifice will have been worth it. Always remember, nothing is impossible, and no setback can hold us back in life if we relentlessly pursue growth and learning.

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LIST OF ABBREVIATIONS

AIC	Akaike Information Criterion
AVE	Average Variance Extracted
BIC	Bayesian Information Criterion
BLT	Behaviourist Learning Theory
CAPPLS	Cognitive, Affective, Psychomotor Perceived Learning Scale
CB-SEM	Covariance Base Structural Equation Modeling
CLT	Constructivist Learning Theory
CMB	Common Method Bias
CMC	Computer Mediated Communication
CoI	Community of Inquiry
COP	Community of Practice
CP	Cognitive Presence
CR	Critical Ratio
CSCL	Computer Supported Collaborative Learning
GM	Geweke-Meese Criterion
HEI	Higher Education Institution
HTMT	Heterotrait-Monotrait Ratio of Correlations
ICT	Information and Communication Technology
LMS	Learning Management System
MCQ	Metacognitive Questionnaire
MEB	Malaysia Education Blueprint
MOOC	Massive Open Online Course
MSLQ	Motivated Strategies For Learning
OSQL	Online Self-Regulated Questionnaire
OSRL	Self-Regulated Learning Questionnaire

PLS-SEM	Partial Least Squares Structural Equation Modeling
RQ	Research Question
SDT	Self-Determination Theory
SEM	Structural Equation Modeling
SMQ	Shared Metacognitive Questionnaire
SP	Social Presence
SR	Self-Regulation
SRL	Self-Regulated Learning
SSQ	Student Satisfaction Questionnaire
SSRL	Socially Shared Regulated Learning
STEM	Science, Technology, Engineering and Mathematics
TDL	Transactional Distance Theory
TP	Teaching Presence
USM	Universiti Sains Malaysia
VIF	Variance Inflation Factor

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**PEMGEMBANGAN MODEL KOMUNITI INKUIRI UNTUK
KEBERKESANAN PEMBELAJARAN ATAS TALIAN DARI PERSPEKTIF
SEBUAH INSTITUSI PENDIDIKAN TINGGI DI MALAYSIA**

ABSTRAK

Tesis ini berfokus pada konseptualisasi dan pembangunan model keberkesanan pembelajaran dalam talian untuk pendidikan tinggi Malaysia, dengan objektif utama untuk mengkaji pengaruh faktor asal yang diintegrasikan dalam kerangka Teori Komuniti Inkuiri (CoI) terhadap keberkesanan pembelajaran dalam talian. Sebuah kerangka CoI yang diperluas, termasuk faktor metakognitif, telah dicadangkan dan dibandingkan terhadap kerangka CoI asal untuk menilai relevansi penjelasan dan ramalan mereka terhadap keberkesanan pembelajaran dalam talian. Kajian ini menerima pakai kaedah kajian kuantitatif, menggunakan data penampang yang dikumpulkan melalui instrumen yang disesuaikan untuk menilai model kajian. Data dikumpulkan dari universiti-universiti di Malaysia melalui pensampelan kemudahan melalui kaji selidik dalam talian, berakhir dengan 497 sampel yang boleh digunakan. Hipotesis diuji dan model hipotesis dianalisis menerusi penggunaan teknik Pemodelan Persamaan Struktural Partial Least Squares (PLS-SEM). Bukti empirikal menunjukkan bahawa kehadiran kognitif, kehadiran sosial, dan kehadiran metakognitif mempunyai pengaruh positif yang signifikan terhadap persepsi pelajar terhadap pembelajaran kursus dalam talian. Selain itu, penemuan lebih lanjut menguatkan bahawa kehadiran kognitif, kehadiran sosial, kehadiran pengajaran, dan kehadiran metakognitif mempunyai pengaruh positif yang signifikan terhadap kepuasan pelajar yang terbentuk terhadap kursus dalam talian. Kajian menunjukkan bahawa model CoI asal menjelaskan secara signifikan keberkesanan pembelajaran

dalam talian. Integrasi kehadiran metakognitif ke dalam model CoI asal didapati sedikit meningkatkan kuasa penjelasannya terhadap keberkesanan pembelajaran dalam talian. Dari segi teori, kajian ini memberikan bukti sokongan untuk formulasi teori keberkesanan pembelajaran dalam talian untuk pendidikan tinggi. Dari segi praktikal, ia menyampaikan model keberkesanan pembelajaran dalam talian yang memberikan maklumat tentang amalan pedagogi, berfungsi sebagai panduan untuk memperkaya pengalaman pembelajaran dalam kursus dalam talian. Kajian ini menekankan pentingnya strategi pembelajaran metakognitif dan menyokong kurikulum dengan pengajaran yang didorong metakognisi. Kajian ini membina sokongan asasi untuk penyelidikan masa depan, membekalkan haluan untuk mengkaji potensi pembinaan teori yang kukuh tentang keberkesanan pembelajaran dalam talian untuk pendidikan tinggi di Malaysia dan seluruh dunia.

**EXTENDING COMMUNITY OF INQUIRY MODEL FOR ONLINE
LEARNING EFFECTIVENESS FROM THE PERSPECTIVE OF A
MALAYSIAN HIGHER EDUCATION INSTITUTION**

ABSTRACT

This thesis focuses on conceptualising and developing an online learning effectiveness model for Malaysian higher education, with a primary objective to investigate the influence of the original factors integrated within the Community of Inquiry (CoI) theoretical framework on online learning effectiveness. An extended CoI framework, inclusive of a metacognitive factor, was proposed and juxtaposed against the original CoI framework to assess their respective explanatory and predictive relevance on online learning effectiveness. The study adopted a quantitative research methodology, utilising cross-sectional data collected through adapted instruments to assess the research model. Data was collected from Malaysian universities via convenience sampling through an online survey, culminating in 497 usable samples. The hypotheses were tested and hypothesised models were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) techniques. Empirical evidence substantiated that cognitive presence, social presence, and metacognitive presence exert a significant positive influence on student perceived learning of online courses. Additionally, the findings further corroborated that cognitive presence, social presence, teaching presence, and metacognitive presence have significant positive influence on student perceived satisfaction in online courses. It was demonstrated that the original CoI model significantly explains online learning effectiveness. The integration of metacognitive presence into the original CoI model was observed to slightly augment its explanatory power on online learning effectiveness. Theoretically,

this study furnishes supporting evidence for the formulation of an online learning effectiveness theory for higher education. Practically, it delivers an online learning effectiveness model that informs pedagogical practices, serving as a guide to enrich learning experiences in online courses. The study underscores the importance of metacognitive learning strategies and advocates for metacognition-driven curriculum and instruction. This study lays the groundwork for future research, providing direction to investigate the potential of constructing a robust theory of online learning effectiveness for higher education in Malaysia and around the world.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Online learning, often referred to as e-learning, is a form of education that occurs over the Internet, allowing learners to engage in educational activities while being physically separated from instructors. This mode of learning leverages digital technologies to facilitate interactions and deliver educational content, making it a flexible and accessible alternative to traditional face-to-face instruction (Singh & Thurman, 2019). Online learning encompasses a variety of formats, including fully online courses, hybrid models, and the use of online tools to support learning in traditional settings. It is characterised by its ability to accommodate individual learning needs, promote learner-centred education, and utilise a range of information and communication technologies, such as multimedia learning objects and virtual learning environments. Online learning has become increasingly mainstream, particularly in higher education. While offering many advantages, it requires new competencies from both learners and instructors (Blaschke & Bedenlier, 2020).

The development of online learning has been a significant focus in educational research, driven by advancements in technology and the need for flexible learning solutions. Online learning has evolved from early forms of distance education, such as correspondence courses, to sophisticated digital platforms. The transition from traditional to online education has been marked by the integration of various technologies, including the Internet and multimedia tools, to enhance learning experiences (Kentnor, 2015). Different national models and stages of development in online higher education have been explored, highlighting the diverse

approaches taken globally to address challenges such as access, quality, and cost (Garrett, 2019).

Research has consistently shown that well-designed online courses can be as effective as traditional face-to-face instruction. Meta-analyses have identified key factors that contribute to the efficacy of online learning, including the importance of instructional design and institutional support (Castro & Tumibay, 2019). Studies have also emphasized the need for rigorous and systematic research to identify the most effective instructional methods and to understand the conditions under which these methods are most successful (Mayer, 2019). Despite the benefits, online learning presents several challenges. Issues such as learner engagement, participation, and the digital divide need to be addressed to ensure equitable access to education (Cook & Steinert, 2013).

Contemporary research in online learning focuses on interdisciplinary approaches that integrate educational technology, psychology, and learning sciences. Key areas of interest include community building, engagement strategies, pedagogical innovations, and equity in online learning environments (Greenhow et al., 2022). Additionally, there is a need for more comprehensive frameworks to guide the design, development, and implementation of online courses (Dahal et al., 2023). Aligning with the theme of contemporary online learning research, this study attempts to extend the Community of Inquiry (CoI) framework for online learning effectiveness with an overarching aim to support the development of online teaching and learning in Malaysian higher education setting.

1.2 Global Trend and Development of Online Education

The global landscape of online education has undergone significant transformation, driven by technological advancements, widespread Internet adoption, and the increasing need for continuous workforce development. The onset of the COVID-19 pandemic has further accelerated this evolution, positioning online education as an essential component of the global educational framework (Greenhow et al., 2022). Online education is poised to become a mainstream element of the educational experience by 2025 (Kumar et al., 2019; Palvia et al., 2018). This trajectory is largely fuelled by innovations in technology and the demands of the global digital economy. The COVID-19 pandemic has intensified this progression, compelled educational institutions worldwide to integrate online modalities as a necessity rather than an option (Chen et al., 2022; Kanunnikova, 2023).

The integration of emerging technologies such as big data, artificial intelligence, and blockchain is reshaping the educational landscape. These technologies are catalysts for digital transformation and innovation, heralding a new era in education (Yang et al., 2022). The development of an educational superhighway, alongside advances in modern communication technologies, promises to dismantle traditional barriers of time and space in higher education (McKenzie et al., 2022). Despite these advancements, significant disparities exist in access to online education, primarily due to the digital divide. Many regions suffer from inadequate Internet connectivity and insufficient digital infrastructure (Kanunnikova, 2023; Palvia et al., 2018). Furthermore, the level of online education development varies across countries, shaped by local social contexts, learner preferences, and regional infrastructural

constraints (Chen et al., 2022). Online education has the potential to function as a global public good, enhancing educational equity by providing access to quality education across different regions and socio-economic groups (Li et al., 2016). The United Nations Sustainable Development Goals aim to provide quality education to all by 2030. Therefore, addressing the disparities and the digital divide is crucial to ensuring equitable access to education globally (Kanunnikova, 2023). The challenges of online learning are discussed in following sections.

1.2.1 Challenges of Online Education

The global shift to online education, accelerated by the COVID-19 pandemic, has highlighted numerous challenges in its implementation. These challenges span across technological, infrastructural, cultural and pedagogical domains, affecting both developed and developing countries.

Despite rapid development of technological infrastructure worldwide, many regions across the world, especially in developing countries, face significant challenges due to inadequate ICT infrastructure, poor internet connectivity, and lack of necessary hardware and software (Latifi et al., 2022). A systematic review conducted by Merwe et al. (2023) revealed that ICT infrastructure, technical support and student bandwidth are also major issues, particularly in sub-Saharan Africa. Addressing these issues will improve online learning implementation in the institutions of higher education located in that region.

Implementing online education globally presents numerous cultural and social challenges. These challenges stem from differences in cultural norms, communication styles and educational expectations. Cultural differences significantly impact how learners perceive and engage with online education. For instance, students from

different cultural backgrounds may have varying expectations and interpretations of the curriculum, which can affect their learning experience and outcomes (Azer & El-Sherbini, 2011; Pincas, 2001; Sadykova & Meskill, 2019). The relevance of the curriculum to the learners' cultural context is crucial for deep and sustainable learning. Educational content that does not consider cultural differences may fail to engage students effectively, leading to lower educational outcomes (Sadykova & Meskill, 2019).

Besides the online curriculum, culturally relevant pedagogy is also important in online learning environments. Culturally relevant pedagogy uses cultural referents to impart knowledge, skills, and attitudes to students. These cultural referents include the cultural characteristics, experiences, and perspectives of ethnically diverse students, which are used as conduits to teach them more effectively (Mahani, 2023). Understanding and addressing cultural issues is crucial for the successful adoption and effectiveness of online learning across diverse cultural contexts.

1.2.2 Online Education Quality and Outcome

Online education has become increasingly prevalent in the higher education industry globally, but several challenges continue to affect its quality and effectiveness. Three major areas of challenges in promoting online education quality and outcomes are the effectiveness of teaching and learning, quality assurance of processes and outcomes, and perceptions of stakeholders: students, staff, and employers (Gaskell & Mills, 2014; Radin & Shlat, 2021). Online education, particularly fully online distance programmes often faces scepticism regarding the quality of its programmes and qualifications, affecting its credibility among students, staff, and employers (Gaskell & Mills, 2014). There is a significant challenge in ensuring high-quality teaching and learning

processes. Instructors need a plethora of additional skills such as educational and communication software, course structuring, asynchronous and synchronous interaction with students. Students, on the other hand, need to master the same skills and are expected to be more self-directed compared to traditional face-to-face settings (Lewis, 2020; Markova et al., 2017). The presence of a skill gap in online pedagogy often results in instructors facing difficulties transitioning from traditional to online teaching, managing time, and adapting their teaching styles (Kebritchi et al., 2017). Online courses often struggle with student engagement and motivation. Factors such as a lack of sense of community, untimely and ineffective assessments and feedback, and technical problems can negatively impact the student learning experience (Markova et al., 2017; Puiu et al., 2023).

Promoting the quality and outcomes of online education involves a concerted effort from educational institutions in addressing several interconnected challenges highlighted earlier. While the quality and outcomes of online education are critical areas of focus for educators and researchers, a robust theoretical framework is essential to address the complexities and ensure the effectiveness of online pedagogy and learning environments.

1.2.3 Section Summary

There is a positive development trend in online learning in higher education globally. More universities are creating new programmes and enrolling students online to meet the diverse needs of students opting to study fully or partially online. Nevertheless, challenges and unresolved issues exist simultaneously in the form of stakeholder acceptance, quality and student retention. Various studies have been conducted by higher education researchers to understand factors affecting online

learning experience and how it is compared to face-to-face classroom learning. In the subsequent section, the focus is given on the development trends and education policies of online learning in Malaysian higher education.

1.3 Online Education in Malaysian Context

The emergence of the Internet and telecommunications technology has expanded the range of options available for improving the facilitation of online education and learning. The traditional approach of knowledge dissemination by direct interpersonal communication is gradually receding, despite its continued prevalence in both public and private universities in Malaysia. The adoption of virtual classrooms, e-learning, and hybrid online learning is gradually increasing in Malaysia (Grapragasem et al., 2014). Generally, the rapid adoption of online learning in Malaysian universities can be divided into two significant phases: the initial phase characterized by national policies and the subsequent phase triggered by the COVID-19 pandemic.

1.3.1 Policy Driven Adoption

In 2013, the Malaysian Ministry of Higher Education began drafting the Malaysia Education Blueprint 2015–2025 (Higher Education) also known as MEB (HE). The MEB (HE) was published in 2015 (Ministry of Education Malaysia, 2015). It outlines the Malaysian government's 10-year vision of transforming Malaysian Higher Education to a greater height. One of the goals is to transition from a mass distribution paradigm to the use of technology-enabled delivery innovations that cater to the individual needs of students and facilitate a more personalised learning experience (MEB, E-7). The goals and aspirations outlined in MEB have huge implications on the development of local online higher education ecosystem. They

demand both public and private higher learning institutions in Malaysia to relook on their programme delivery strategies and adoption of advanced educational technologies.

1.3.2 Pandemic Driven Adoption

Prior to COVID-19 pandemic, the Malaysia Education Blueprint (2013-2025) emphasizes the use of information and communication technology to enhance learning quality, including distance and self-paced learning. However, the adoption of online learning was still in its infancy, with various challenges and inefficiencies being reported (Tan et al., 2021). The shift towards online education in Malaysia, particularly in higher education, has been significantly influenced by the COVID-19 pandemic. Online learning has become a critical component of the Malaysian education system, especially during the COVID-19 pandemic.

The adoption of online learning by the institutions of higher education in Malaysia driven by the pandemic has not been without challenges. Key issues include technological and technical difficulties, unconducive learning environments, and emotional stress (Atan et al., 2023) . Rural students, in particular, face significant barriers due to limited access to technology and the internet (Tham et al., 2021). Additionally, the sudden shift to online learning has raised concerns about students' ability to meet curriculum demands, potentially hindering their intention to continue with online education (Hussein & Hilmi, 2022). The readiness of Malaysian students for online learning has been a topic of investigation. A study assessing the preparedness of undergraduates for potential future Movement Control Orders (MCO) found that computer self-efficacy and student agency in the form of self-directed learning were positively linked to online learning readiness (Soekarno et al., 2023).

This suggests that enhancing these skills could improve students' overall readiness for online education.

1.3.3 Online Learning Challenges

Several studies have explored the effectiveness of online learning in Malaysian higher education from student perspectives. For instance, a study conducted at a Malaysian university found that while 75% of undergraduates appreciated the flexibility and control over their learning provided by online resources, they still preferred face-to-face classes for pursuing their degrees (Ng & Chan, 2022). Another study highlighted that students' motivation and satisfaction were generally positive, but a lack of interaction was a significant drawback (Tan et al., 2021). The role of academicians is crucial in the successful implementation of online learning. A study on Malaysian university lecturers' perspectives revealed that the effectiveness of online learning is contingent on proper teaching plans and the readiness of academicians. The study found a positive correlation between lecturers' skills and students' participation, indicating that continuous skill development for lecturers is essential for effective online teaching (Ramli et al., 2021).

To address the challenges and improve the effectiveness of online learning in Malaysian universities, several recommendations have been proposed. These include enhancing the curriculum and its online delivery, improving student support and interaction, and addressing technical challenges (Atan et al., 2023; Ng & Chan, 2022; Yee & Ean, 2020). Tan et al. (2021) identified three main areas of improvements: quality instruction, online interaction, and instructional and technical support. The authors also called for future studies to investigate the perceptions of online instruction in online courses to achieve quality in local universities.

1.4 Statement of Problem

Beyond technological and infrastructural constraints highlighted in the literature discussed previously, most challenges observed by researchers (Dykman & Davis, 2008; Lewis, 2020; Markova et al., 2017; Soekarno et al., 2023) are rooted in a shift from behaviourism to constructivism demanded by online education.

Behaviourism emphasizes observable behaviours and the ways they're learned through interaction with the environment. Students assume the roles of passive recipient of knowledge. Their learned behaviours are shaped by external factors rather than internal processes (Chen, 2009). In traditional face-to-face classroom teaching, didactic teaching method are commonly adopted (Chen, 2022). The instructor is the primary source of knowledge, delivering information directly to students (Steffens, 2011). Neither the content nor the knowledge of the teacher is questioned. Lessons are often highly structured, with clear objectives and a focus on specific outcomes (Miranda, 2009). Emphasis is placed on repeating information and practicing skills to reinforce learning. Standardized assessments are used to measure student understanding and reinforce correct responses (Chen, 2009).

Online learning environments have distinct characteristics that necessitate different teaching approaches compared to traditional classrooms which are heavily situated in behaviourism. Online learning environments afforded by advanced information and communication technologies (ICT) and powered by broadband internet connectivity have made seamless collaboration and diverse interaction among students possible (Huang, 2002; Rovai, 2004). They allow for personalized learning experiences, where students can learn at their own pace and according to their own learning styles (Noguera et al., 2022). Vast learning resources availability in various

form of digital media that can be distributed easily and cheaply via broadband internet, shifted the role of instructor from being the main source of educational content to content aggregator and learning facilitator. Instead of focusing on didactic teaching, online instructors can assume the role of promoting active learning, which is essential for keeping students engaged and motivated in online courses (Ruey, 2010).

Constructivist teaching, which emphasizes active, student-centred learning, is often seen as more suitable for online education than behaviourist teaching, which focuses on passive reception of information and reinforcement through repetition. Effective online instructors use constructivist strategies to create a supportive and interactive learning environment, encouraging critical thinking and self-directed learning (Carwile, 2007; Rovai, 2004). Constructivist methods are adaptable to individual learning needs and preferences, making them well-suited for the diverse and flexible nature of online learning (Huang, 2002; Noguera et al., 2022). Online platforms benefit constructivist practices by enabling diverse interactions among students and between students and instructors, fostering a community of learners (Gold, 2019). Online learning environments support constructivist methods that encourage students to actively participate, explore, and construct their own understanding (Carwile, 2007).

The shift from traditional face-to-face to online teaching, both internationally and locally in Malaysia, has introduced new challenges in higher education sector discussed in previous sections. The challenges primarily revolve around the transition of adopting constructivist teaching and promoting higher degree of student agency, which comprises self-directedness and self-regulation. This shift necessitates the development of theoretical frameworks to guide and support effective online teaching

practices. These frameworks help educators navigate the complexities of online education by providing structured approaches to pedagogy, technology integration, and learner engagement. This study addresses the need of a theoretical framework to overcome the challenges of quality online teaching and learning in the context of Malaysian higher education.

1.5 Purpose of Study

This study developed a model for effective online learning in Malaysian higher education, addressing challenges in shifting to constructivist teaching demanded by online courses. This thesis examines how the three key presences in the CoI framework impact online learning effectiveness in Malaysian universities. A proposed extended CoI framework, which includes the metacognitive presence, were compared against the original CoI framework on their explanatory and predictive relevance to the online learning effectiveness. This study also investigate the influence of the presences on students' perceptions of their desired learning outcomes as well as the degree of satisfaction on their online learning experiences.

1.6 Objectives of Study

To support the purpose of study highlighted in previous section, the following objectives guide the planning and implementation of this study in developing an online learning effectiveness framework by extending the original three-factor CoI theoretical framework:

1. Examine the influence of the presences in the original CoI Framework perceived learning and satisfaction (RO1)

2. Investigate the explanatory power of original CoI Framework on online learning effectiveness (RO2)
3. Extending original CoI Framework with metacognitive presence (RO3)
4. Compare and contrast the original and extended CoI Framework (RO4)
5. Examine the influence of presences in extended CoI framework on online learning effectiveness (RO5)

The five primary objectives of the study are to evaluate the efficacy of the proposed model of online learning effectiveness based on CoI framework and to examine the relationships between factors stipulated in the CoI framework and metacognitive presence and the factors of online learning effectiveness. Achieving these objectives would provide a robust model to support the application of the online learning effectiveness framework in addressing the challenges in shifting to constructivist teaching demanded by online courses. Online educators are able to clearly identify the weak contributing factors to improve while administrators are able to leverage on the framework to prioritise resources to improve the institutional level of online delivery.

1.7 Research Questions

The present study was guided by the following research questions, which aimed to achieve the objectives outlined in the preceding section:

1. To what extent do the presences of original CoI framework influence the student perceived learning of online courses conducted in the Malaysian universities? (RQ1)
2. To what extent do the presences of original CoI framework influence the student perceived satisfaction of online courses conducted in the Malaysian universities? (RQ2)

3. To what extent does the original CoI model explain the student perceived learning of online courses conducted in the Malaysian universities? (RQ3)
4. To what extent does the original CoI model explain the student perceived satisfaction of online courses conducted in the Malaysian universities? (RQ4)
5. To what extent does the original CoI model explain the student learning effectiveness of online courses conducted in the Malaysian universities? (RQ5)
6. What is the effect of incorporating metacognitive factor to the original CoI framework on the student perceived learning of online courses conducted in the Malaysian universities? (RQ6)
7. What is the effect of incorporating metacognitive factor to the original CoI framework on explaining the student perceived satisfaction of online courses conducted in the Malaysian universities? (RQ7)
8. To what extent does metacognitive presence influence the student perceived learning of online courses conducted in the Malaysian universities? (RQ8)
9. To what extent does metacognitive presence influence the student perceived satisfaction of online courses conducted in the Malaysian universities? (RQ9)
10. What is the effect of incorporating metacognitive factor to the original CoI framework on explaining the learning effectiveness of online courses conducted in the Malaysian universities? (RQ10)
11. To what extent does teaching presence influence the learning effectiveness of online courses conducted in the Malaysian universities? (RQ11)
12. To what extent does social presence influence the learning effectiveness of online courses conducted in the Malaysian universities? (RQ12)

13. To what extent does cognitive presence influence the learning effectiveness of online courses conducted in the Malaysian universities? (RQ13)
14. To what extent does metacognitive presence influence the learning effectiveness of online courses conducted in the Malaysian universities? (RQ14)

1.8 Research Hypotheses

This empirical study followed a deductive research approach. Hypotheses were formulated based hypothesised theoretical framework derived from the CoI theoretical framework and Self-regulated Learning (SRL) theories. Empirical data were collected to test the relationships between the variables of the hypothesised theoretical framework. The conclusion was drawn to attest the integrity of the hypothesised theoretical framework and its associated theories from the results of the hypothesis tests. They were tested with the empirical data collected according to the procedure described in Section 3.9 and Section 3.10. The following research hypotheses were developed based on their corresponding research questions described in Section 1.7.

H_{1a}: Teaching presence has a significant positive effect on the student perceived learning of online courses conducted in the Malaysian universities.

H_{1b}: Social presence has a significant positive effect on the student perceived learning of online courses conducted in the Malaysian universities.

H_{1c}: Cognitive presence has a significant positive effect on the student perceived learning of online courses conducted in the Malaysian universities.

H_{2a}: Teaching presence has a significant positive effect on the student perceived satisfaction of online courses conducted in the Malaysian universities.

H_{2b}: Social presence has a significant positive effect on the student perceived satisfaction of online courses conducted in the Malaysian universities.

H_{2c}: Cognitive presence has a significant positive effect on the student perceived satisfaction of online courses conducted in the Malaysian universities.

H₃: The original CoI model substantially explains the variance of student perceived learning of online courses conducted in the Malaysian universities.

H₄: The original CoI model substantially explains the variance of the student perceived satisfaction of online courses conducted in the Malaysian universities.

H₅: The original CoI model substantially explains the variance of student learning effectiveness of online courses conducted in the Malaysian universities.

H₆: The hypothesised extended CoI model has higher explanatory power than the original CoI model on the student perceived learning.

H₇: The hypothesised extended CoI model has higher explanatory power than the original CoI model on the student perceived satisfaction.

H₈: Metacognitive presence has a significant positive effect on the student perceived learning of online courses conducted in the Malaysian universities.

H₉: Metacognitive presence has a significant positive effect on the student perceived satisfaction of online courses conducted in the Malaysian universities.

H₁₀: The hypothesised extended CoI model has higher explanatory power than the original CoI model on the online learning effectiveness of online courses conducted in the Malaysian universities.

H11: Teaching presence has a significant positive effect on the learning effectiveness of online courses conducted in the Malaysian universities.

H12: Social presence has a significant positive effect on the learning effectiveness of online courses conducted in the Malaysian universities.

H13: Cognitive presence has a significant positive effect on the learning effectiveness of online courses conducted in the Malaysian universities.

H14: Metacognitive presence has a significant positive effect on the learning effectiveness of online courses conducted in the Malaysian universities.

1.9 Summary of Research Questions and Hypotheses

This study seeks to confirm the answers for the 14 research questions and 18 hypotheses based on the hypothesised conceptual models proposed in chapter two and the research methodology discussed in chapter three. By answering the research questions based on empirical evidence, a conceptualised theoretical framework of online learning effectiveness can be tested and validated. In the process of validating the relationships between the constructs in the conceptualised models through hypothesis testing, valuable theoretical and practical insights can be drawn. Table 1.1 below provides the summary of the hierarchical relationships of all research objectives, questions and hypotheses elicited in the previous section.

Table 1.1*Summary of Research Objectives, Questions and Hypotheses*

Research Objective	Research Question	Hypothesis
R01. Examine The Influence of CoI Presences in the original framework on perceived learning and satisfaction	RQ1. To what extent do the presences of original CoI framework influence the student perceived learning of online courses conducted in the Malaysian universities?	H1 _a : Teaching presence has a significant positive effect on the student perceived learning of online courses conducted in the Malaysian universities.
		H1 _b : Social presence has a significant positive effect on the student perceived learning of online courses conducted in the Malaysian universities.
		H1 _c : Cognitive presence has a significant positive effect on the student perceived learning of online courses conducted in the Malaysian universities.
	RQ2. To what extent do the presences of original CoI framework influence the student perceived satisfaction of online courses conducted in the Malaysian universities?	H2 _a : Teaching presence has a significant positive effect on the student perceived satisfaction of online courses conducted in the Malaysian universities.
		H2 _b : Social presence has a significant positive effect on the student perceived satisfaction of online courses conducted in the Malaysian universities.

Table 1.1 Continued.

Research Objective	Research Question	Hypothesis
		H2 _c : Cognitive presence has a significant positive effect on the students' perceived satisfaction of online courses conducted in the Malaysian universities.
RO2. Investigate the Explanatory Power of Original CoI Framework on Online Learning Effectiveness	RQ3. To what extent does the original CoI model explain the student perceived learning of online courses conducted in the Malaysian universities?	H3: The original CoI model substantially explains the variance of student perceived learning of online courses conducted in the Malaysian universities.
	RQ4. To what extent does the original CoI model explain the student perceived satisfaction of online courses conducted in the Malaysian universities?	H4: The original CoI model substantially explains the variance of the student perceived satisfaction of online courses conducted in the Malaysian universities.
	RQ5. To what extent does the original CoI model explain the student overall learning effectiveness of online courses conducted in the Malaysian universities?	H5: The original CoI model substantially explains the variance of student learning effectiveness of online courses conducted in the Malaysian universities.
RO3. Extending the CoI Framework with metacognitive presence	RQ6. What is the effect of incorporating metacognitive factor to the original CoI framework on the student perceived learning of online courses conducted in the Malaysian universities?	H6: The hypothesised extended CoI model has higher explanatory power than the original CoI model on the student perceived learning.

Table 1.1 Continued.

Research Objective	Research Question	Hypothesis
	RQ7. What is the effect of incorporating metacognitive factor to the original CoI framework on the student perceived satisfaction of online courses conducted in the Malaysian universities?	H7: The hypothesised extended CoI model has higher explanatory power than the original CoI model on the student perceived satisfaction.
	RQ8. To what extent does metacognitive presence influence the student perceived learning of online courses conducted in the Malaysian universities?	H8: Metacognitive presence has a significant and positive effect on the student perceived learning of online courses conducted in the Malaysian universities.
	RQ9. To what extent does metacognitive presence influence the student perceived satisfaction of online courses conducted in the Malaysian universities?	H9: Metacognitive presence has a significant and positive effect on the student perceived satisfaction of online courses conducted in the Malaysian universities.
RO4. Comparing and Contrasting the Original and Extended CoI Framework	RQ10. What is the effect of incorporating the metacognitive factor to the original CoI framework on explaining the learning effectiveness of online courses conducted in the Malaysian universities?	H10: The hypothesised extended CoI model has higher explanatory power than the original model on the learning effectiveness of online courses conducted in the Malaysian universities.
R05. Examine The Influence of Presences in extended CoI framework on online learning effectiveness	RQ11. To what extent does teaching presence influence the learning effectiveness of online courses conducted in the Malaysian universities?	H11: Teaching presence has a significant positive effect on the learning effectiveness of online courses conducted in the Malaysian universities.

Table 1.1 Continued.

Research Objective	Research Question	Hypothesis
	RQ12. To what extent does social presence influence the learning effectiveness of online courses conducted in the Malaysian universities?	H12: Social presence has a significant positive effect on the learning effectiveness of online courses conducted in the Malaysian universities.
	RQ13. To what extent does cognitive presence influence the learning effectiveness of online courses conducted in the Malaysian universities?	H13: Cognitive presence has a significant positive effect on the learning effectiveness of online courses conducted in the Malaysian universities.
	RQ14. To what extent does metacognitive presence influence the learning effectiveness of online courses conducted in the Malaysian universities?	H14: Metacognitive presence has a significant positive effect on the learning effectiveness of online courses conducted in the Malaysian universities.

1.10 Definitions of Key Terms

1.10.1 Teaching Presence

Teaching presence in the CoI framework is defined as the design, facilitation, and direction of cognitive and social processes to achieve meaningful learning outcomes. It is one of the three core elements of the CoI model. Teaching presence is crucial for creating and maintaining a productive learning environment, as it involves the organization and management of learning activities, the facilitation of discourse, and the provision of direct instruction. Operationally, teaching presence can be measured through students' observation on the degree of presence of actions and strategies employed by instructors in an online learning environment in three sub-dimensions: design and organisation, facilitation of discourse and direct instruction.

1.10.2 Cognitive Presence

Cognitive presence, within the CoI framework, is defined as the extent to which learners can construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry. It is one of the three core elements of the CoI model. The practical inquiry model is used to operationalize cognitive presence, with specific indicators based on students' perception of the degree of identification of triggering event, exploration of idea, integration of information and resolution of problem (Garrison et al., 2001).

1.10.3 Social Presence

Social presence in the CoI framework is defined as the ability of participants to project themselves socially and emotionally as real people in an online learning

environment. It is one of the three core elements of the CoI model. Social presence is crucial for creating a supportive and engaging learning community, as it facilitates open communication, emotional expression, and group cohesion. It allows learners to identify with the community, communicate in a trusting environment, and develop interpersonal relationships, which are essential for collaborative learning (Shea et al., 2022). Operationally, social presence is measured through students' perception of own ability to present themselves and engage with others authentically in online learning environment in three sub-dimensions: emotional expression, open communication and group cohesion.

1.10.4 Metacognitive Presence

Metacognitive presence is conceptualized as the awareness and regulation of one's cognitive processes in a collaborative learning environment within the context of CoI. It involves the ability to reflect on, monitor, and control one's learning strategies and cognitive activities, as well as to engage in shared regulation with others. This construct is essential for effective learning in online and blended learning environments, where learners must navigate complex information and collaborate with peers. Metacognitive presence encompasses both self-regulation, where individuals manage their own learning processes, and co-regulation, where learners engage in shared regulation with peers to achieve common learning goals. Operationally, metacognitive presence is measured through students' perceived own ability to regulate their cognitive processes both individually and collaboratively. It consists of self-regulation and co-regulation sub-dimensions as defined by Garrison & Akyol (2015).

1.10.5 Self-regulation

Self-regulation refers to the ability of an individual to monitor and control their cognitive processes during learning. It involves the awareness and management of one's own learning strategies, motivation, and effort to achieve meaningful learning outcomes. Self-regulation is seen as a critical component of metacognition, which learners supervise and control their own cognitive processes to ensure they are executed appropriately and according to superordinate rules (Garrison & Akyol, 2015b). Operationally, self-regulation is measured through students' own perception on the degree of presence of behaviours and strategies that they employ in metacognitive monitoring and managing strategies and skills that they use when engaged in personal reflective learning as independent learners.

1.10.6 Co-regulation

Co-regulation, within the context of metacognition and collaborative learning, refers to the shared regulation of cognitive processes among individuals in a group setting. It involves the interaction and mutual influence of individuals as they engage in collaborative learning activities. Co-regulation is characterized by the integration of individual and shared regulatory processes, where learners not only manage their own cognitive processes but also engage with others to regulate the group's learning dynamics (Garrison & Akyol, 2015b). Operationally, co-regulation is measured through students' own perception on the degree of presence of specific behaviours and metacognitive monitoring and managing strategies that individuals employ when engaged in collaborative learning.