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The Dynamics of Student Knowledge Creation through SECI: A Qualitative Exploration in the Indonesian Context

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Abstract This study aims to analyze the implementation of the SECI model (Socialization, Externalization, Combination, Internalization) in the process of knowledge creation among higher education students in Indonesia. The SECI model, developed by Nonaka and Takeuchi, is an important framework in managing tacit and explicit knowledge in organizations, including higher education institutions. Through a descriptive qualitative approach, data were collected through structured in-depth interviews, participatory observation, and documentation at several public and private universities in Indonesia. The results showed that the socialization process more often occurs informally through interactions between students, while the externalization process occurs when students express ideas in assignments and discussions. The combination process appears in collaborative activities such as group work and research, while the internalization process is driven by direct learning experiences and practices. Academic culture, lecturer support, and digital infrastructure proved to be the main supporters of the success of the SECI model on campus. This research confirms the importance of SECI-based knowledge management in shaping students' innovative capabilities and suggests strategies for integrating SECI in the curriculum and extracurricular activities.

Keywords: SECI model, knowledge creation, students, higher education, innovation, tacit and explicit knowledge

INTRODUCTION

Higher education is currently facing tremendous challenges in the face of increasingly digitized global dynamics. In this context, higher education institutions become centers for the production and reproduction of knowledge. The institution's responsibility is not only limited to the transfer of information, but also includes the creation of new knowledge. This approach is in accordance with the SECI (Socialization, Externalization, Combination, Internalization) model proposed by Nonaka and Takeuchi (Cahyani et al., 2022), which emphasizes the importance of social interaction in knowledge creation, in line with the concept of constructivism where knowledge is seen as the result of the interaction between individuals and their social context (Zhang et al., 2020; Angraini et al., 2024; Tanjung et al., 2023).

Epistemologically, higher education needs to facilitate students not only as passive recipients, but as active participants in the learning process. As explained by Fatimah, students should be involved in constructing their own knowledge through reflection and personal experience (Darmawan & Ramli, 2025). This is in line with the principles of constructivism that prioritize social experience and collaboration in the learning process (Fatimah, 2022; Zulfiyah, 2022). In other words, students play an important role as agents in the creation of knowledge, and not just objects of the educational process.

Learning models based on constructivism show that students can develop critical thinking and problem-solving skills through meaningful learning experiences (Candra & Retnawati, 2020; Eliza et al., 2024). Research by Darmawan and Ramli shows that constructivism approaches in education can lead to better learning outcomes, where students are forced to actively engage in the learning experience (Perkowska-Klejman & Górka-Strzałkowska, 2023). Given this, the challenge for higher education institutions is to create a learning climate that supports collaboration and interaction, so as to facilitate knowledge transfer among students (Erawati & Adnyana, 2024).

While there is an awareness of the importance of the SECI model in the context of higher education, there is still a lack of practical application. Recent research shows that many institutions have yet to fully integrate the model into their curriculum, with most research focusing on the role of lecturers in knowledge management (Pribadi et al., 2022; Sukinawan & Haq, 2024). This illustrates a significant knowledge gap where student involvement in this process has not been researched in depth (Syukri et al., 2020). Research conducted by Yakhlef noted that traditional pedagogical barriers may inhibit the SECI cycle from functioning optimally in educational environments (Huang, 2024).

Conceptualizing Knowledge as a Dynamic Process

Constructivism emphasizes that knowledge is not a fixed entity, but rather the result of a construction process that takes place through experience, interaction, and reflection (Hanggara et al., 2023; Sofiana et al., 2022). In learning, students are expected to not only absorb information, but also actively engage in problem solving and concept development through group discussions, collaborative projects, and other practical experiences (Nurhasnah et al., 2024; Matthews, 2024). Research shows that collective experiences shared in groups can strengthen learning and revitalize learning strategies (Faiqoh et al., 2023). This is in line with the Socratic model that encourages dialog and critical reflection as part of the process of acquiring deeper knowledge (Ahzim, 2023).

In addition, research by Cahyani et al. highlighted the importance of inquiry-based learning in developing critical thinking skills among university students (Septiani & Nirmala, 2020). Collaborative inquiry-based learning allows students to access knowledge independently while building critical skills essential for real life. This approach is consistent with the view that knowledge is built through social and cultural interactions, where individual and group experiences complement each other in the development of cognition (Dougherty et al., 2024).

In line with these principles, Zhang et al. assert that the utilization of digital technologies in English language learning practices should also be framed within a social constructivism perspective, paying attention to social and cultural factors that influence the learning process (Nazeef et al., 2024). This suggests that in a digitized world, it is important to balance technical skills with the social and emotional development of students.

Challenges and Strategies for Implementing the SECI Model

In Indonesia, there are still limitations in the application of the SECI model in higher education, especially in involving students as the center of the knowledge creation process (Ardianyah, 2023). Research by Suryani has highlighted the importance of digital literacy in supporting the socialization and combination process, but has not touched on the internalization aspect which should be an important part of the SECI cycle (Nurhuda et al., 2023). To overcome this, a more holistic study is needed that can explore each stage of the SECI model from the perspective of the students themselves.

One of the proposed approaches is the implementation of project-based learning (PBL), which not only emphasizes learning outcomes but also the development of collaborative skills among students (Sulindra et al., 2024). Developing interdisciplinary projects involving various disciplines and cross-functional collaboration can help students to be more involved in each stage of the SECI cycle, from socialization to internalization (Sumarna & Gunawan, 2022; Umayrah et al., 2024). This approach not only has the potential to improve learning outcomes, but also prepare students for the challenges of an increasingly complex world of work.

From a practical point of view, it is important to put together policies that support inclusive and collaborative learning. Research showing a positive relationship between interaction among students and improved learning outcomes in educational programs should also be used as a reference for curriculum policy development (Husni & Izzah, 2020; Syahrial et al., 2020). Through involving students in designing and developing curriculum and teaching methods, educational institutions can create a learning environment that is more empowering and responsive to their needs (Supriyadi, 2021).

Research Roadmap and Practical Implications

This study aims to explore the experiences of Indonesian students in going through each stage of the SECI model with a qualitative-descriptive methodology, including in-depth interviews, observations, and reflective documentation (Xavier, 2020; Hussain et al., 2020). Through this method, it is expected to illustrate how contextual factors affect students' knowledge creation process and how they can play an active role in knowledge creation. The practical implications of this research include making recommendations for knowledge creation-based curriculum development, where lecturers can act as active facilitators in the student learning process.

Of course, challenges include maintaining student participation in active learning processes while maintaining the quality of expected learning outcomes (Siregar et al., 2024; Сторчак, 2022). Approaches to creating responsive policies as well as revisions to existing curricula will be necessary to meet the learning needs of students in this rapidly changing world. In this framework, the importance of seeing students not as objects of learning, but as active subjects who have the potential to develop new knowledge needs to be emphasized in every policy taken (Darko & Zadoroshnyj, 2021; Zhao & Wong, 2024).

To summarize and strengthen the results of this study, it is important to assert that students' experiences in the process of knowledge creation in higher education institutes not only enrich individual knowledge, but also contribute to the development of a broader knowledge society. In this context, the university should be made a transformative space where students not only consume knowledge but also contribute to the building of the nation's knowledge civilization. This includes relentless efforts to disseminate the knowledge generated into society, establishing linkages between academic knowledge and broader and more comprehensive social practices.

METHOD

This research uses a descriptive qualitative approach to deeply understand the process of knowledge creation and conversion experienced by students in Indonesian universities through the lens of the SECI Model (Socialization, Externalization, Combination, Internalization). This approach is considered appropriate because it allows the exploration of subjective experiences and the process of internalizing meaning in a complex and dynamic context (Rose & Johnson, 2020).

Research Locations and Subjects

The research sites were several universities in Indonesia that were purposively selected to represent the diversity of higher education institutions (public and private, public and religious). The research subjects are active undergraduate students from various disciplines who have taken at least four semesters. Students in this phase are assumed to have experienced various forms of learning and social interaction relevant to knowledge conversion according to the SECI model.

Data Collection Technique

Data collection techniques included structured in-depth interviews, participatory observation and reflective documentation. All three were used triangulatively to increase the validity and richness of the data.

Structured In-Depth Interview

Interviews were conducted with selected students with guideline questions based on the four dimensions of the SECI model. Some of the key questions asked include:

For the Socialization stage:

"How do you usually study or exchange knowledge with classmates outside of lecture hours?" and "What is the role of the informal learning community you belong to in helping you understand the material?"

For the Externalization stage:

"How do you translate personal ideas into writing or class discussion?" and "Have you ever had difficulty explaining your ideas to others?"

For the Combination stage:

"How do you combine different sources of information when working on academic assignments?" and "Do you use digital platforms like Google Docs or Mendeley to organize and share information?"

For the Internalization stage:

"Tell me about a learning experience that changed the way you think or behave" and "How do you apply academic concepts to real life outside the classroom?"

Interviews were conducted online and offline depending on the geographical location of the participants, and the entire process was recorded and transcribed for further analysis.

Participatory Observation

Researchers observed student interactions in various activities such as group discussions, practical work, organizational activities, and campus seminars. Observations focused on behaviors that demonstrate knowledge transfer, shared meaning formation, and the use of media or space to create collective knowledge. Observations were made by recording activities, dialogues, and interaction patterns that reflect the stages of SECI.

Documentation and Written Reflection

In addition to interviews and observations, we collected learning artifacts such as papers, students' reflective notes, project reports and presentation results. Students were also asked to write personal reflections on how their learning process contributed to their understanding and knowledge transformation. This document is complementary to assess value internalization and the formation of deeper conceptual understanding.

Data Analysis Technique

Data were analyzed by thematic analysis using an inductive approach. The process involved:

(1) transcription and organization of data,
(2) thorough reading to understand the context,
(3) Initial coding based on SECI stages,
(4) identification of recurring themes and subthemes, and
(5) interpretation of findings within a theoretical frame.

Data validity was maintained through triangulation of techniques and sources, as well as member checking to ensure the researcher's interpretations were in line with the participants' perspectives.

Research Ethics

This study followed the ethical rules of social research by prioritizing the principles of informed consent, confidentiality of participants' identities, and the use of data for scientific purposes only. Prior to data collection, all participants were given a detailed explanation of the purpose and methods of the study as well as their rights as informants (Palestin, 2006) .

RESULTS AND DISCUSSION

The results of this study are presented systematically based on the four stages in the SECI Model (Nonaka & Takeuchi, 1995), which describes the knowledge conversion process of students in Indonesian higher education. Each stage is enriched with data from interviews, observations, and documentation, accompanied by in-depth analysis by considering the socio-cultural, technological, and pedagogical contexts.

Socialization: Tacit to Tacit Knowledge Conversion

The socialization process is particularly important in academic settings, as students often learn from informal interactions outside the classroom. Group discussions, student organization activities, and interactions in online learning communities are some of the ways in which tacit knowledge - intuition and personal experience - is converted through dialogue and shared practice (Liu et al., 2021; Attard et al., 2022). This study found that students recognized that a deep understanding of the course is often gained from discussions with peers, not just from lecturers. This is in line with the opinion of Liu et al. who emphasized that the tacit knowledge transformation approach supports students'

cognitive development (Liu et al., 2021; . However, access to supportive communities varies depending on the academic cultural climate on each campus, indicating that socialization does not always occur equally for all students (Qin et al., 2022).

Some students admitted to getting a deep understanding of certain courses not from lecturers, but from discussions with peers who were able to explain with a contextual approach. One informant stated:

"I only really understood the concept of social justice after a long chat in a campus café with a friend who was active in a student social organization."

The importance of social interaction as described by Nonaka is also realized here. However, challenges arise when some students do not have access to an inclusive learning community, especially those who come from regions or study programs with a competitive atmosphere. Studies show that students from these backgrounds often experience difficulties in gaining space for intellectual socialization, potentially hindering the knowledge conversion process (Fabrizzio et al., 2023)Șandor & Tonț, 2021). These findings highlight that the need to create a social environment that supports academic discussions is crucial in enhancing student learning.

Externalization: Tacit to Explicit Conversion

In the externalization stage, students try to put their ideas or experiences into more explicit forms such as writing, presentations, and discussions in class. This process involves symbolization, where the choice of language and argumentation structure affect the effectiveness of tacit knowledge communication (Vidic, 2022). The majority of students noted that writing the paper was a reflective moment that clarified their understanding of certain issues. For example, one student emphasized that the writing process provided an opportunity to recognize flaws in their arguments, thus making externalization a constructive process that provides a bridge to deeper knowledge (Milligan & Berta, 2021).

The majority of students mentioned that the process of writing an essay or paper was a reflective moment that clarified their understanding of an issue. One participant mentioned:

"When I write a paper, I know what I really think. Sometimes it's only while writing that I realize there are logical holes in my arguments."

This statement reinforces the proposition that externalization is constructive, rather than simply transfer. However, challenges arise for students who come from backgrounds with low academic literacy. They expressed difficulty in expressing ideas systematically, indicating the need for additional support in academic literacy (Wynn & Dreyer, 2021). Without adequate assistance, the externalization process may be an obstacle to knowledge development rather than a bridge (Miton & DeDeo, 2022). This research emphasizes the importance of implementing structured literacy programs to support students in this externalization process.

Combination: Explicit to Explicit Conversion

The combination stage where students integrate information from various sources to build new knowledge structures is crucial to the learning process in higher education. In this context, technology acts as an important tool for information processing. Students often use digital platforms such as Google Docs and Zotero to collaborate and aggregate information Attard et al., 2022)Esfandyarpour et al., 2024). Many students report that the use of technology makes it easier for them to organize and share data online, but also implies a risk of information overload, where they could potentially feel overwhelmed by the sheer volume of information (Obal et al., 2024).

Many students mentioned the importance of using technology in the combination process. For example, the use of Zotero, Google Docs, or Mendeley as aggregation and collaboration tools. One informant stated:

"We used to organize papers together through Google Docs. Everyone adds citations, then we discuss the relevance and accuracy of the data online."

However, this combination process also presents the risk of information overload. Students often experience confusion in sorting out valid information, especially because not all have adequate information literacy skills. This is an epistemological challenge that should be observed in the implementation of SECI in the digital era. Ties to information literacy issues are also evident here, as the challenge of sorting out valid information continues to be a topic of concern. Students do not always have sufficient ability to assess the accuracy of the information they encounter, which can disrupt the combination process and jeopardize the quality of knowledge built (Santos et al., 2020;

Lange et al., 2020). This research shows the importance of developing information literacy skills in the curriculum to support students in managing available information in a more effective way.

Internalization: Explicit to Tacit Conversion

Internalization is the stage where explicit knowledge, once cognitively understood, influences the way students think, value, and behave. The context of practical experience, such as field practice, serves as a catalyst for internalization (Ananto et al., 2021; Kucharska, 2021). Many students revealed that they only felt they understood the value of a theory, such as humanistic education theory, after applying it in a real context (Fabrizzio et al., 2023). This reinforces the finding that internalization is more than just cognitive knowledge; it also relates to the transformation of the individual's personal values and dispositions Attard et al., 2022). Many students stated that they "only felt they understood" after encountering concrete social realities.

One of the education study program students revealed:

"During my PPL (Field Experience Practice), I really realized that humanistic education theory is relevant. I became more patient and empathetic with students."

This finding supports that internalization is not only a matter of cognitive knowledge, but also the transformation of personal values and dispositions. However, not all students experience this transformation optimally. The administrative nature of the academic load sometimes hinders the reflective experiences needed to achieve deeper understanding, which may limit the internalization process (Leung, 2022). As such, this research provides insight into how important an academic atmosphere that supports the development of practical experiences and critical reflection is to maximize the internalization stage of learning (Dewitz, 2023).

Critical Discussion and Implications

Through these findings, it can be concluded that the SECI Model remains relevant in explaining the dynamics of knowledge creation among Indonesian university students, although the existing cultural context, technology and organizational structure have a significant impact on the effectiveness of each stage. Not all universities create an ecosystem that supports the socialization process, so it is important for institutions to increase support for non-formal academic activities that encourage collaboration among students (Liu et al., 2021; Attard et al., 2022). In addition, strengthening information literacy capacity is urgent to ensure that students are able to go through each stage of knowledge conversion effectively.

The results also imply the need for experiential curriculum development that considers the local context and students' needs. In a theoretical perspective, this study extends the understanding of SECI in the context of higher education, showing that this approach is not only relevant in a business environment but also in different educational contexts. Thus, the relevance and application of the SECI Model in academic settings should be a major concern for future teaching practices and educational policies.

CONCLUSION

This research examines the dynamics of student knowledge conversion in Indonesian higher education using Nonaka and Takeuchi's SECI (Socialization, Externalization, Combination, Internalization) Model approach. The findings show that knowledge creation in the context of higher education does not solely depend on the availability of information or technological instruments, but is also strongly influenced by the social, cultural and institutional dimensions surrounding students.

The socialization process is effective when there are supportive informal interaction spaces; however, differences in academic culture and social access create gaps. The externalization stage is a reflective moment for students to express their ideas, although academic literacy remains a significant barrier. The combination stage saw productive collaboration between students with technological support, but posed challenges of information overload and lack of curation skills. Meanwhile, the internalization stage emphasizes the importance of concrete experiences and reflective practices as a trigger for changes in personal values and attitudes.

Theoretical Implications

This research contributes to the expansion of the scope of the SECI Model, which was originally developed in the context of business organizations, to be relevant in the higher education

space. This proves that knowledge creation can not only be studied in the logic of economic productivity, but also in the framework of personal and collective transformation of students. The findings also reinforce the importance of tacit knowledge and social interaction in the learning process based on social constructivism.

Practical Implications

Practically, the results of this study indicate that students' knowledge creation requires the support of a more holistic learning environment, which not only focuses on cognitive but also socio-affective aspects. Universities need to provide informal learning spaces, cross-disciplinary collaborative activities, and academic literacy integrated in the curriculum. Practices such as peer teaching, collaborative projects, and open discussions can strengthen the socialization and externalization processes.

Managerial Implications

For policy makers in higher education, this research highlights the importance of strategically managing the student knowledge ecosystem. The development of a Learning Management System (LMS) that supports collaboration, training lecturers in facilitating reflective learning, and drafting independent campus policies that support real practices in the field are some of the managerial steps that support the success of the SECI model in higher education.

Recommendation

First: Strengthening Academic Literacy. Systematic training is needed for students on academic writing skills, critical thinking skills, and skills in sorting and evaluating information. Strong academic literacy is the main foundation in the externalization and combination stages of the SECI Model, where students are required to convert tacit knowledge into explicit forms and integrate various existing knowledge. Without adequate literacy competencies, the knowledge conversion process will stagnate and potentially reduce the quality of learning in higher education

Second: Development of Student Learning Communities. Universities need to facilitate the formation of inclusive and interdisciplinary learning communities through cross-faculty discussion spaces, student scientific forums, and peer mentoring programs. These activities will strengthen the socialization process, where tacit knowledge can be shared through informal interactions, narration of experiences, and equal reflective dialogue. A conducive social environment will encourage cognitive growth while forming a collective academic ethos among students.

Third: Integration of Field Projects in the Curriculum. The higher education curriculum should integrate experiential learning such as internship programs, community service learning (KKN), and project-based learning (PBL). These activities provide students with space to internalize values, knowledge, and skills concretely in a real-world context. internalization stage in the SECI model becomes more meaningful when students experience the application of knowledge in their social, professional, and personal lives

Fourth: Formulation of Education Digital Transformation Policy. Digital transformation in higher education is not enough to provide a technology platform, but it must be accompanied by optimal use training and continuous support for lecturers and students. Learning technology should be interpreted as a collaborative tool for knowledge co-creation, not just a content distribution tool. Thus, technology can play an active role in strengthening the combination stage and expanding the reach of externalization in the digital ecosystem

Fifth: Further Research. Further research needs to be conducted by expanding the population and locus of study, including students from different types of universities such as public, private, vocational, and religious. In addition, comparative research across geographical areas and cultural settings could provide a richer understanding of how the dynamics of the SECI Model operate in the diverse Indonesian context. This follow-up research will strengthen the external validity of the model as well as enrich the literature on knowledge creation in higher education.

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