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A ROLE OF ARTIFICIAL INTELLIGENCE IN CONJUNCTION WITH KNOWLEDGE MANAGEMENT AND REUSE IN HIGHER EDUCATIONAL ENVIRONMENT

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ABSTRACT

Objective: This theoretical exploration examines the transformation of knowledge—both explicit and tacit—within an extended Nonaka-inspired model of three-dimensional knowledge management. The model emphasizes the strategic roles of reusability, information technology, and Artificial Intelligence (AI) in enhancing knowledge processes.
Method: The study analyzes the theoretical application of digital resources for learning and coaching (teaching) in higher education. It situates these applications within the context of reusability in the three-dimensional model and compares them with key empirical and theoretical research on knowledge reuse in higher education systems.
Results: Findings suggest that the three-dimensional model enables the generation of additional, contextually relevant knowledge in higher education environments. When reusability is applied effectively, organizations gain access to a broader and more actionable knowledge base. The strategic integration of AI and related technologies—when guided by appropriate wisdom—can significantly enhance knowledge management processes. This alignment facilitates more informed decision-making by linking knowledge directly to institutional strategy.
Novelty: The research introduces a conceptual framework for knowledge management and reuse in a three-dimensional environment, where knowledge location is modeled as a cone—particularly relevant for distance and open learning contexts. The use of artificial intelligence (AI) increases the variety of explicit and tacit knowledge. As knowledge is refined due to continuous advancement, its quality also improves. The transformation and utilization of knowledge through technology leads to simpler and more useful knowledge.

KEYWORDS: Artificial Intelligence; Nonaka Model; Knowledge Reuse; Tacit Knowledge; Explicit Knowledge; Higher Education.

INTRODUCTION

Artificial intelligence (AI) is increasingly reshaping how knowledge is created, managed, and reused, particularly in the domain of education. Rather than merely altering how we think, AI has transformed entire knowledge systems by extending human capacities and reconfiguring the ways organizations handle knowledge resources. Within higher education, knowledge management (KM) is not merely a technical process but a strategic necessity, and AI applications are beginning to play a central role in enhancing these practices (Taherdoost & Madanchian, 2023; Alavi et al., 2024). As institutions adopt digital tools for knowledge transformation, the question of how tacit, explicit, and reusable knowledge interacts in AI-enabled environments becomes increasingly significant.

Tacit, Implicit, and Explicit knowledge

Normally, knowledge may be represented in three forms: Explicit, Tacit, and Implicit knowledge. The explicit or documented form is a type that the knower can constitute explicitly through the technique of declaration, such as oral (Sun et al., 2023). According to the author (Jashapara, 2011), Someone has explicit knowledge of something if a statement of it can be elicited from him by suitable inquiry or prompting, while Implicit knowledge is described just as knowledge that is not explicit. Agreeing with the work of Polanyi (1966), and Conrad et al. (2024) tacit, knowing: “we can know more than we can tell".

Knowledge Management Processes and Artificial Intelligence

Knowledge management has long been recognized as critical to organizational sustainability, enabling processes such as knowledge production, storage, retrieval, sharing, and reuse (Cooke & Leydesdorff, 2006; Stenholm et al., 2019). Foundational theories of KM emphasize both the theoretical and empirical dimensions of knowledge reuse. Theoretical perspectives address the “what” and “why” of knowledge reuse through models, standards, and typologies, while empirical perspectives focus on the “how” of reuse in real-world contexts through usability, functionality, and practice (Alavi et al., 2024).

Nonaka and Takeuchi (1995) pioneered one of the most influential frameworks for KM through their SECI model—internalization, externalization, combination, and socialization—which explains the dynamic transformation between tacit and explicit knowledge. Their model showed that tacit and explicit knowledge, although distinct, are interdependent and change over time in iterative cycles (Nonaka and Takeuchi, 1995; Nonaka et al., 2000). Later extensions of this model, particularly by Harsh (2007a; 2007b; 2008a; 2008b; 2009; 2011) and Shuaib and Harsh (2020), presented reusability as a third, autonomous dimension. This protracted framework clarified that tacit and explicit knowledge, as well as their level of reusability, operate as orthogonal constructs and open up new perspectives on the development and reuse of knowledge in organizations.

Artificial intelligence offers new opportunities for improving these knowledge management processes. Jarrahi et al. (2023) claim that despite the extensive KM literature, research investigating autonomous units of explicit and tacit knowledge in AI settings is limited. Intelligent agents, as an instance, can favour the recombination, recovery, and search of knowledge, thus leading to advanced insights. AI, therefore, has the promise not only to accelerate processes of SECI but also to extend the opportunity of knowledge reusability in educational contexts.

Reusability in Educational Contexts.

The incorporation of reusability into KM frameworks has been mainly discovered in the arena of Open Educational Resources (OER). White and Manton (2011) led empirical investigation across eleven universities in the UK, signifying how faculty approaches concerning digital source reuse formed curriculum design and teaching exercises. Their conclusions highlighted the importance of structure, context and quality, in inspiring the knowledge reuse in digital environment. Likewise, Sanabria et al. (2024) exposed that the adaptation and delivery of OER can meaningfully improve thoughtful capabilities among students, allowing universities to support education with the stresses of the twenty-first century. Adding these conclusions, Al Abri (2018) proposed a theoretical examination of OER acceptance, noticing equally its possible benefits—such as dropping prices and nurturing novelty—and the challenges connected to source availability and quality assurance.

Stenholm et al. (2019) additional suggested a framework that classifies strategic, technological, procedural and cultural proportions of knowledge reuse. Organised, this knowledge underline that reusability is a vigorous issue in refining educational consequences, improving teaching excellence, and supporting institutional novelty. Though, notwithstanding these developments, the role of AI in easing reusable knowledge inside higher education is still not explored. While OER trainings prove the practical significance of reusability, few works have examined how AI can mediate the processes of tacit and explicit knowledge transformation in educational organizations. This non-appearance signifies a serious study gap, as the management of reusable knowledge in AI-permitted settings could intensely impact learning, teaching, and formal efficiency.

Central Problem and Objectives

The current study addresses this gap by examining the hypothetical role of explicit, tacit, and reusable knowledge within a three-dimensional AI-oriented KM setting. Upholding Nonaka and Takeuchi's foundational model and its protracted forms, this investigation compares theoretical concepts with empirical indications from the OER investigation. This investigation suggests the subsequent crucial ideas:

1. To analyse the consequences of reusability on explicit and tacit knowledge transformation in a three-dimensional, AI-supported educational setting.

2. To assess the significance of reusable knowledge in advanced education establishments by connecting hypothetical models through empirical studies.

3. To inspect the role of information technology and AI in backing KM procedures for explicit and tacit knowledge.

ISSN 2581-5148

Vol. 8, Issue.6, Nov-Dec 2025, p no. 132-164

4. To investigate the comparison between the protracted Nonaka-Harsh framework and empirical investigation on OER and hypothetical analyses of the reuse of technology.

5. To find the potentials for growing the choice of explicit and tacit knowledge

allocation and administration in educational institutions.

6. To judge the inferences of reusability of knowledge for the knowledge quality and transparency in ongoing teaching settings.

Scope and Need for the Study

This investigation is inspired by the absence of full theoretical investigation on information–technology–oriented reusable knowledge management in advanced teaching. While important studies on empirical research available on OER acceptance and reuse of technology (White & Manton, 2011; Sanabria et al., 2024; Cronin et al., 2017; Al Abri, 2018; Stenholm et al., 2019), there is a partial theoretical examination of how AI can broaden KM-oriented models to improve the educational requirements. By placing AI inside the protracted framework of Nonaka, the present investigation aims to forecast and deliberate how reusability helps in supporting knowledge efficiency, quality, and novelty in advanced education.

Eventually, this investigation aims to validate that inserting (embedding) AI into KM agendas can make knowledge organizations clear, adaptive, and operative. By sanitizing the quality of explicit and tacit knowledge through the technique of reusability in multi-phase procedures, organizations can improve both organizational and academic products in the developing educational systems.

RESEARCH METHOD

The present investigation assumed a theoretical and analytical investigation design, grounded in the comparison and assessment of recognised frameworks of knowledge (KM) management and their applications in the environment of artificial intelligence (AI). The procedure was organised in numerous phases to safeguard both analytical precision and conceptual complexity.

Primarily, we led an extensive examination of the Nonaka and Takeuchi SECI model (Nonaka & Takeuchi, 1995; Nonaka et al., 1994, 2000) and its extended version, with specific care to the adding of knowledge reusability projected by Harsh (2007a; 2007b; 2008a; 2008b; 2009; 2011) and later expanded by Khan and Harsh (2020). This phase permitted us to put the concept of reusability inside the wider KM available literature. Another analytical debate was assumed to inspect the potential for explicit and tacit knowledge, which is required to be reused in advanced education settings facilitated by tools like AI. This stage stressed how information technology enables knowledge alteration actions and ropes multi-phase procedures of refinement of knowledge.

Next, we investigated a comparative analysis between the basic SECI original framework (model) and the framework of the protracted Nonaka-Harsh. Empirical and theoretical research on Open Educational Resources (OER) by White and Manton (2011), Sanabria et al. (2024), and Cronin et al.

ISSN 2581-5148

Vol. 8, Issue.6, Nov-Dec 2025, p no. 132-164

(2017) was taken as a standard to demonstrate how reusability functions in practice. These assessments aided in supporting the theoretical agenda with evidence from documents from the educational division. Next, the role of IT (information technology) and Artificial Intelligence in backing KM activities was inspected, chiefly relating to the explicit and tacit knowledge revolution. This involved creating understandings from current works that suggest the connection of AI and knowledge-supported KM settings (e.g., Jarrahi et al., 2023; Alavi et al., 2024).

Next, an investigation on OER and the reuse of technology was jointly conducted. Specifically, Al Abri's (2018) review of theoretical work and framework of Stenholm et al.'s (2019) on reuse of technology were analysed and compared with the protracted Nonaka model. Such analysis (synthesis) offered a wider role of reusability understanding during practical and theoretical settings. Lastly, the investigation ended in a critical debate of the insinuations of reusability for the purpose of quality of knowledge in advanced education. Superior stress was placed on how multi-phase reusability improves the refinement, transparency, and adaptability or flexibility of knowledge within AI-empowered environments. The dialog also drew the boundaries of the current study and recognized guidelines for future investigation.

NONAKA AND EXTENDED MODEL

Analytical Discussion on Knowledge Management and Reuse

Today, we seek inexpensive and rapid solutions that can be deployed with enthusiasm. To facilitate this process, we value reusable solutions and components (Highsmith 2003). According to Highsmith (2003), we are not only interested in reusable solutions, but also in understanding how this reusable technology can be easily applied to existing knowledge solutions and how we can improve our chances of increasing the number of reusable resources. There are numerous reasons why models such as the two-dimensional Nonaka knowledge model are unsatisfactory. First, factors such as reusability of tacit and explicit knowledge, the time factor, and their interconnectedness cannot be explicitly considered.

We are aware that knowledge transfer takes time and that a company's knowledge base fluctuates over time (Harsh 2007b and Harsh 2009a). As a result, we understand that knowledge is constantly evolving and that a company's actual knowledge base steadily grows over time. This knowledge growth is due to the company's increased resources, experience, and expertise. Time is a crucial factor in the compilation, design, and transfer of knowledge from one valuable form to another. Time is also necessary to acquire competitive know-how. This creates additional resources within an organization or company. It is not difficult to understand that the "time" feature was indirectly present in the model of Nonaka and Takeuchi (1995), since the emergence of a knowledge spiral requires time.

Due to the incessant processes of Nonaka's (1994, 1995) two-dimensional model, a certain type of knowledge is constantly available and can be reused. It is difficult to discover reusable knowledge precisely according to our needs; therefore, we must adapt to it. Reusable knowledge should be preserved as a unique knowledge asset in every organization (Harsh 2007a and Harsh 2009a). As the knowledge time spiral in Nonaka's (1994, 1995) model grows, so does reusable knowledge. Such reusable knowledge can be both tacit and explicit. This implies that knowledge and reusable knowledge grow over time through knowledge modification processes. Therefore, the current model provides additional space for knowledge processes, and from here on, the role of reusable knowledge becomes important. It is very important to understand that in this model, space and time are treated equally, which means that knowledge can be disseminated more widely.

Twyoniak's (2005) work on the four interdependent dimensions of knowledge deformation (personal, shared, tacit, and explicit) and their interactions is available in literature. This conceptualization of knowledge as a complex system forms the basis of knowledge-based organization theory. Recognizing the interdependence between the four dimensions of knowledge deformation (personal, shared, tacit, and explicit) allows us to explain the plethora of knowledge manifestations and does not claim to favor one dimension over another. It means that all dimensions should be treated equally. While in the present case, we treat tacit, explicit, and reusable knowledge equally with time.

The Baas and Schuwer (2020) research show that inflexible or time-consuming material assets are more often reused without third-party adaptation. They analyzed a quantitative survey on teachers' resource management at higher education institutions in the Netherlands. This is the reason that the present work emphasizes the adaptation of knowledge. A similar study (Schuwer, and Janssen, 2018) in the Netherlands found that the actual acceptance of open sharing and reuse of learning resources and courses among teachers at publicly funded higher education institutions in the Netherlands is quite low. According to them, this could be due to the problem of self-reporting in similar (survey) studies and the different interpretations of the term "open" by participants.

Expanded Dimensionality in Knowledge Management

The scope of variation in knowledge management expands significantly when considered across three dimensions rather than two. This multidimensional approach not only broadens the framework but also enhances the codifiability of knowledge. Specifically, it enables the integration of technical process delivery tools that support the adoption and operationalization of these expanded knowledge management variations.

Extension of the SECI Model to Include Reusability

Building on the foundational SECI model developed by Nonaka and Takeuchi (1995; Nonaka et al., 1994, 2000) and illustrated in Figure 1, Harsh (2007a, 2007b, 2008, 2009, 2011) and Khan & Harsh (2020) introduced a critical extension: the inclusion of knowledge reusability as a distinct third dimension (Figures 2 and 3). This revision marks a conceptual shift, positioning reusability not as a derivative feature but as an independent axis within the knowledge creation framework.

Implications of Reusability for Knowledge Systems

By incorporating knowledge reusability into the Nonaka framework, the revised model facilitates a more robust and evolutionary system encompassing:

- Knowledge formation

ISSN 2581-5148
Vol. 8, Issue.6, Nov-Dec 2025, p no. 132-164

- Knowledge exchange
- Knowledge application
- Knowledge procurement

Each of these processes is now informed by and contributes to the dynamic of reusability. As shown in Figure 2, the activities within this three-dimensional model mirror those of the original SECI framework, with the added benefit of enhanced scalability and sustainability. These activities are further detailed in Table 1.

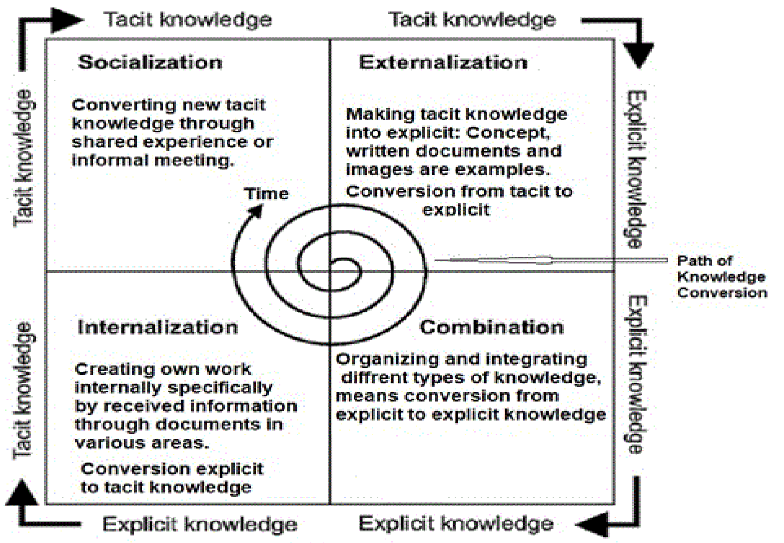

Figure 1

Reusability of Knowledge:
The presence of reusable explicit and tacit knowledge significantly reduces the effort required for managing similar knowledge processes. It simultaneously enhances the quality of knowledge by enabling the application of repetitive and verifiable insights within a three-dimensional environment.

Dimensional Shift in Knowledge Transformation:
The ultimate form of knowledge transformation in three dimensions depends on the category of knowledge being transformed and the nature of events facilitating that transformation. Unlike the two-dimensional spiral model proposed by Nonaka and colleagues (1995; 2000) (Figure 1), knowledge in three dimensions evolves into a solid cone—a more stable and integrative structure—reflecting its dynamic status or locus in space and time (Harsh, 2009; Harsh & Harsh, 2024; Khan & Harsh, 2020) (Figure 3).

Time-based Dynamics and Reusability:
The added dimension of reusability—encompassing both explicit and tacit forms—enables continuous and reciprocal knowledge transfer between these forms as time progresses. This time-based variability

International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 8, Issue.6, Nov-Dec 2025, p no. 132-164

supports the cone-shaped transformation model, where knowledge conversion occurs in three dimensions rather than remaining confined to a flat spiral. Thus, the reusable nature of knowledge fundamentally alters its conversion trajectory, resulting in a solid cone structure that better represents the evolving complexity and integrative potential of knowledge in dynamic, multidimensional environments (Figure 3).

In Figure 2 and Figure 3 (three dimensional pictures), we can realize that knowledge enjoys a similar cycle as mentioned in the Nonaka and Takeuchi SECI model (Nonaka, 1995 Nonaka et al. 2000) (Figure 1); However, due to the presence of knowledge reusability, the proportion of knowledge variation is high over time as per Harsh's and Harsh's et al. modified model (Figure 3) (2020; 2008; 2007a; 2007b; 2009; 2011).

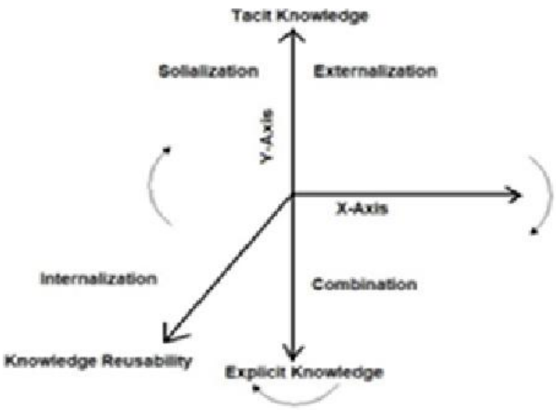

Figure 2

Here, we also realize that there will be continuing growth of effective explicit and tacit knowledge due to the transformation of explicit knowledge into tacit knowledge (and the other way around) over time due to the application of reusability. Reusable knowledge effectively enhances the entire knowledge of the system because of its recurring applications.

International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 8, Issue.6, Nov-Dec 2025, p no. 132-164

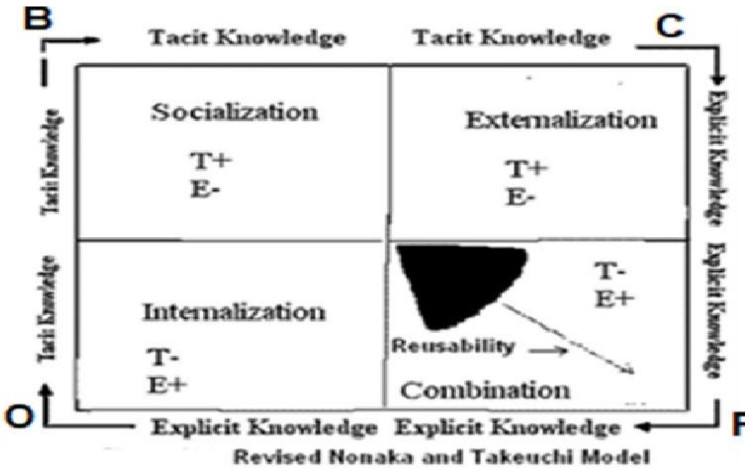

Figure 3

In the extended Nonaka and Takeuchi (Nonaka, & Takeuchi, 1995; Nonaka et al., 2000) framework, the knowledge revolution activities in the three dimensions (in the presence of reusability) may be explained as:

Modes of Knowledge Conversion and the Solid Cone Framework

1. Socialization

Socialization refers to the process by which tacit knowledge—often verbal and experiential—is transferred from one individual to another, remaining tacit in nature. A prime example is face-to-face interaction in educational settings such as classrooms or universities, where knowledge is shared through dialogue, observation, and practice.

- This form of knowledge resides in the minds of learners and is accessed through experiential engagement.
- Through the reuse and sharing of knowledge between individuals and situations, it contributes to a cumulative improvement in general applications.
- This phenomenon facilitates the notion of a three-dimensional knowledge cone, as projected in the Harsh model (2009), which shows the incessant and multidirectional expansion of knowledge.
- In contrast to Nonaka's spiral model, which is confined to a two-dimensional route, the knowledge cone represents the reuse of multidimensional knowledge, which reduces over time.

2. Externalization

Externalization is the conversion of tacit knowledge into explicit, documented methods. This happens when a person translates their inner insights into palpable outputs, for example, as manuals, books, or documented media.

• Once the knowledge is documented, it becomes physical and enduring, available to others outside its original background.

• Novel operators can re-explain, alter, or encompass documented knowledge grounded in their personal reuse or for appropriate application.

• Such a recursive procedure helps in the creation of a structure of multidimensional knowledge and reinforces the model of a solid cone through the process of continuous reuse and adaptation.

3. Combination

Combination states the fusion of dissimilar types of explicit knowledge into novel, organized results. This approach comprises the restructuring, examination, and aggregation of current information to produce added reusable and explicit knowledge.

- A distinctive instance is the formation of analytical credentials, such as fiscal reports from the data related to bank transactions.
- The incorporation of artificial intelligence technologies further advances this procedure by sanitising and automating recurring revolutions of knowledge.
- This dynamic interaction of explicit knowledge bases contributes to the further development of the solid cone construction, particularly in data-concentrated environments of reusability.

4. Internalization

- Internalization is the procedure by which explicit knowledge converts into tacit through recurrent exercise, exposure, and related adaptation.
- Originally obtainable in documented methods (e.g., rules, manuals), knowledge is slowly engrossed and adapted by persons within institutions.
- Over time, employees or learners internalize these instructions, adapting them to their own cognitive frameworks and operational contexts.
- This transformation fosters the development of tacit and reusable knowledge, which is then transmitted informally, reinforcing institutional memory and experiential depth.

A representative example of knowledge transformation is the shift from fabrication-related knowledge to research and development (R&D) investigative knowledge. A decent instance is the alteration of fabrication knowledge to research and development knowledge investigation, where each time one can reuse the fabrication-connected knowledge for the investigation of research and development, and thus the assets (knowledge) are transformed from explicit-into-explicit types (because of reusable

ISSN 2581-5148

Vol. 8, Issue.6, Nov-Dec 2025, p no. 132-164

knowledge). The transformed knowledge with multistage methods will be more qualitative because it has been administered or worked on in numerous stages. The quality of knowledge relies on the systematic and consistent application of multi-stage methods, not on the individual steps that transform one type of data into another. This reuse enables the transformation of knowledge assets from one explicit form to another—what may be termed explicit to explicit transformation—driven by the inherent reusability of the knowledge.

When such knowledge undergoes multistage refinement, its qualitative value increases. This enhancement arises not from any single transformation step, but from the systematic and consistent application of multiple stages. Each stage contributes to the depth, reliability, and contextual richness of the resulting knowledge. An updated model of knowledge transformation activities—structured across three dimensions—is presented in Table 1. This model integrates the current concept of reusable knowledge with foundational frameworks proposed by Nonaka et al. (2000) and Harsh (2008; 2007b; 2009). For visual reference, see Figures 2 and 3.

RESULTS AND DISCUSSION

Analysis of the Extended Harsh Model of Knowledge Organizations

In learning organizations, employees continuously apply both tacit and explicit knowledge in multiple phases. As mentioned previously, effective knowledge within an organization evolves, constantly introducing new ideas, concepts, or interpretations, whether tacit, explicit, or both. The extended Harsh model reveals enormous potential for the continuous reuse of this knowledge by teachers and students at all levels. This knowledge can spread through multiple transfers, between institutions and between teachers, and exhibits a diffusion pattern that resembles a solid cone rather than a two-dimensional spiral.

Strategic Reuse in Higher Education: Insights from Sanabria et al. (2024) within the Nonaka–Harsh Extended Framework

Building on Nonaka and Harsh's extended model, which emphasizes the dynamic interaction between information technology, strategy, culture, and processes in the creation and reuse of knowledge, Sanabria et al. (2024) offer a compelling analysis of reuse in the context of Open Educational Resources (OER). Their study demonstrates how the reuse, redistribution, and adaptation of OER contribute significantly to the development of complex thinking skills and support pedagogical practices aligned with the educational needs of the 21st century.

The main conclusion is that maximum OER podiums explicitly allow reuse, redeployment, reshape, and amendment under Creative Commons licenses, therefore nurturing a philosophy of adaptability and openness.

Sanabria et al. likewise suggest an agenda of a system of twelve practices for technical reuse, separated into four tactical steps:

– Information technology: Empowers actual management and access to knowledge.

– Process: Eases the addition of technology into instructional procedures.

– Strategies: Supports podium design with reuse, concerned with objectives.

– Culture: Endorses the formation and allocation of reusable educational possessions.

This outline is similar to the Nonaka model's importance on institutional ethos and IT policy as the main fundamentals for knowledge alteration and reuse, both within and throughout institutions. It highlights that reuse is not just a technical role but a planned and cultural competence that ropes incessant learning, novelty, and institutional growth. The work of Cronin et al. (2017), on open educational practices (OER) includes a comprehensive range of actions, comprising the formation, reuse, and appropriate application of these open educational resources (OER), among educational methods that endorse openness and the allocation of teaching approaches. These practices focus on the power of reuse and the fundamental approaches within open educational resources (OTR).

Likewise, the Nonaka model, in line with Cronin et al.'s agenda, can be useful to systems of open learning platforms or practices. The model shapes the SECI spiral—a four-phase knowledge alteration procedure that comprises socialization, externalization, combination, and internalization. The reviewed form of this procedure, in three dimensions, inside an environment of reuse, allows the incessant production of novel knowledge via the translation of tacit and explicit knowledge.

Open learning is not an isolated notion but refers to the growth of surroundings that inspire open teamwork and message. This is reliable with Nonaka's emphasis on building faith and making collective spaces, particularly throughout the socialization stage. Consequently, the scope for reuse is correspondingly obvious in the Nonaka model. Conferring to Al Abri (2018), the notion of Open Educational Resources (OER) advances consciousness of knowledge distribution and allows workers the consent to reuse and repurpose agreeably approved resources to meet precise instructional requirements. The chief objective of OER, Al Abri highlights, is to decrease the prices of advanced education while inspiring the instructive and learning.

In line with the values of the William and Flora Hewlett Foundation (2013), Al Abri additionally contends that reproducing and reapplying OER should be merged into academic systems to advance learning products. These iterative procedures help to the incessant growth of OER resources, therefore enlightening their quality and endorsing broader acceptance in instructional systems. Open educational resources (OER) also follow the Nonaka SECI system (model) for knowledge formation, delivering a collection of easily available resources that can be collected, adapted, and dispersed to produce novel tacit and explicit knowledge for the learning communities. Therefore, the reuse-related method of this work relates to OER investigation and practice.

ISSN 2581-5148

Vol. 8, Issue.6, Nov-Dec 2025, p no. 132-164

As part of connected planning, in 2010, the Joint Information Systems Committee (JISC), led by the University of Oxford, studied the influence on the study of the usage of OER in the UK advanced education segment (White & Manton, 2011). Led between November 2010 and June 2011, the work intended to assess the influence of OER acceptance, chiefly for academic people involved in the design of courses and distribution, who may not have been familiar with its approach and relevant potential.

In January and May 2011, the investigation squad surveyed scholars, academic staff, and recognised stakeholders to examine open educational resources (OER) practice and patterns of reuse. Interviews, meetings, and conferences were organised at 11 universities to explore activities and attitudes related to the addition of resources for digital education. The study adopted a comprehensive methodology to identify high-quality, reusable digital resources available online. It focused on key attributes valued by educators and researchers—such as content quality, provenance, format, and contextual relevance—and underscored reusability and usability as critical criteria for effective incorporation of OER into teaching and learning environments. This testimony supports key recommendations for advancing learner support, improving teaching practices, refining assistance mechanisms, and promoting further inquiry.

White and Manton's (2011) report, "The Value of Reuse in Higher Education," offers a comprehensive analysis of reuse within the sector. Central to their study is Figure 4, which categorizes reuse-related activities into four conceptual quadrants. and it was stated that the quadrants are not "hard-edged", while in reality they "blur or blend" into both. Each quadrant illustrates how reuse can be strategically applied across different educational contexts, offering a framework for enhancing resource efficiency, pedagogical innovation, and institutional development.

The report by White and Manton (2011) does not refer to the knowledge management model of Nonaka and Takeuchi (1995). However, we argue that their framework reflects the principles of Nonaka's model. Building on this consensus, we present a three-dimensional knowledge management model that not only deepens the interpretation of White and Manton's findings but also offers a more contextually appropriate approach to knowledge reuse in higher education. This expanded model enhances its applicability by considering the dynamic and multidimensional nature of academic environments (see Figure 5). We now turn to the standard actions depicted in each quadrant of Figure 5. This expands the conceptual framework of Figure 4 of the White and Manton (2011) report into a three-dimensional framework aligned with Nonaka's (1995) knowledge management model. This synthesis is further supported by related studies, including Nonaka et al. (2009) and Iiyoshi and Kumar (2008), highlighting its relevance to knowledge reuse in higher education.

Independent: In Figures 1–3, based on Nonaka's SECI model and its extensions, the lower left quadrant represents the internalization process, in which explicit knowledge is transformed into tacit understanding. This quadrant resembles the "independent" region shown in Figure 4, which highlights autonomous learning. By engaging with explicit knowledge and internalizing it through application and reflection, scholars independently develop tacit knowledge and understanding. This procedure will be chiefly active in a framework of a three-dimensional environment (Figures 4 and 5) as it enhances complexity and scalability to the knowledge cycle of alteration. In such independent sectors or quadrants, tacit knowledge accrues meaningfully due to its reusability. When internalized, this knowledge can be recovered, modified, and applied in dissimilar settings, thus making an enduring and movable source in the educational setting.

Beaven (2021) highlights that Open Educational Resources (OER) can improve instruction and learning by nurturing co-operative systems of instructors who adapt, reuse, share, and unceasingly recover content and coaching approaches. This teamwork rationalizes teaching procedures and endorses novelty. Liyoshi and Kumar (2008) next noticed that educational knowledge frequently remains concealed and is hard to formalize or articulate. They argued that Open Educational Practices (OEP) offer a way to externalize this knowledge and transform it into practical, shareable insights. By fostering openness and collaboration, OEP can improve the quality of education by disseminating experiential knowledge that would otherwise remain inaccessible.

Strategic: In White and Manton's model (Figure 4), the strategic quadrant encompasses valuable teaching materials that support the teaching of key concepts and skills. These materials cannot be used in isolation but require contextualization by the teacher, who integrates them meaningfully into the curriculum. This quadrant emphasizes the deliberate design of learning experiences that use strategic materials to reinforce fundamental understanding within the context of a broader pedagogical project.

In both the original and revised Nonaka models (Figures 4 and 5), the strategic part corresponds to the process of socialization, the transformation of tacit knowledge into further tacit knowledge. This typically occurs through direct interpersonal interactions, such as face-to-face conversations or training sessions, where experiential and verbal knowledge are informally shared. This argument is vital for determining communal performance and cultural standards, particularly in enlightening organizations. The word "strategic" imitates the central part of tacit knowledge in determining instructive strategies and nurturing profound, personified learning. In a three-dimensional setting, socialization (which spreads in all directions) is an outstanding tool when reusability is present, thus aligning the locus of knowledge with a fixed cone.

In the previous discussion, high-quality animation (according to White and Manton (2011)) is solely conceivable when the notion of reusability is available at a high level, as this contributes to the repetitive style of knowledge, which eventually leads to quality knowledge. Support for the above argument further came from the work of Stenholm et. al. (2019) who suggested that across huge establishments and in project-founded systems, it is probable that they have numerous assemblies employed with similar jobs. They added that, particularly for knowledge like tacit allocation, a strategy for personalization is appreciated with keys (mechanisms), such as face-to-face communication, Yellow Pages, and programs for mentorship, which is significant (Catic, 2011). Of course, in such a situation, the reuse probability is very high, particularly in a three-dimensional environment (such as in Figure 5) (because of wider space and enhanced probability), which further supports our argument.

Appropriated: According to White and Manton (2011) reports (Figure 4), there are assets in this section that are reusable scholastically (or pedagogically) way like an available strategic quarter (quadrant), nonetheless which were copied and deposited over the official podium, somewhat than connected to. Likewise, there is the probability that they were edited or repurposed to match the accurate requirements of an entire curriculum (course). During this stage, accessible (open) authorization (permit) develops an issue. In the Nonaka and his extended model (Figure 1 & Figure 3) model, this quadrant is responsible for combination, the subsequent kind is converting knowledge from explicit to another type of explicit knowledge. This kind of knowledge can be understood as combining explicit knowledge after (or combining) numerous kinds or centers of knowledge that ultimately yield an additional kind of explicit knowledge. A common example is when we are creating a report or analysis. For instance, we can explore or harvest explicit types of information regarding bank transactions to accomplish a financial statement.

Here, we note that very highly explicit and less tacit knowledge is prevalent, and the reusability of explicit knowledge is very high due to the combined effects of the knowledge, which demonstrates the possibility of deposition of explicit knowledge as mentioned above. Since the deposition with the reusable concept implies that appropriation or seizure of knowledge becomes possible. The large reusability also confirms that authorization (or licensing) becomes difficult in this quadrant because of the duplication of knowledge. Hence, there is an enormous increase in knowledge with the possibility of the locus of knowledge as a solid cone, as in Figure 5 of the three-dimensional model. Here, the important fact is that repeated observation about the codification of reusable knowledge is the best way to seize its source (Markus, 2001).

The support for the above argument is further originated by the fact that, according to Stenholm et al. (2019) knowledge, like explicit allocation, is mainly reinforced by the strategy of codification, frequently materialized by answers like information technology. Considerable investigation has been conducted around what way to seize the knowledge, like explicitly in libraries in a digital environment, and to reuse it effectively. Conversion from explicit-to-explicit knowledge is not only qualitative but also makes it highly reusable, as it happens in Figure 5, where the method of combination is present. White and Manton (2011) highlight that within a specific quadrant (Figure 4), certain assets—previously emphasized—represent “the tip of the iceberg of reuse.” These assets are considered ratified due to their formal accreditation and institutional linkage, underscoring their legitimacy and strategic value.

Their analysis reveals a significant volume of reusable assets situated within the “blurred boundary” between neutral (standalone) and strategic quadrants. This zone facilitates the transformation of tacit (unwritten) knowledge into explicit (documented) forms. However, if scholars transform huge amounts of tacit knowledge into explicit arrangements, deprived of confirming their expertise, this can lead to misperception and misrepresentation—a result that must be prudently avoided. In the Nonaka model (Figures 4 and 5), this quadrant links to the externalization stage, in which tacit knowledge is methodically transmuted into explicit knowledge. This procedure allows scholars to address information vagueness by choosing confirmed and convincing resources, particularly in the face of an overload of formless web-oriented content. A similar example shows how employees refine production procedures by enunciating tacit perceptions that have increased from empirical learning.

O'Meara et al. (2021) explore these dynamics of externalization in the ratified part or quadrant. They support an open mind in telecommunications and emphasize the judicious use of codified information to shape discussions. Collective dialogue generates a shared understanding and clearness of position, which are vital for recognizing information gaps and allowing sensible articulation. In summary, the Ratified quadrant within the OTR (Organizational Tacit Reuse) framework encapsulates the scholarly practice of reusing explicitly articulated assets. It also reflects the ongoing transformation of tacit knowledge into explicit formats via institutional platforms, reinforcing the value of authenticated digital repositories and structured learning environments.

This discussion suggests that in this quadrant (ratified), reusable knowledge is authorized, which is continuously converted into explicit knowledge as long as tacit knowledge is available, and, hence, it is qualitative knowledge as a result of verifiable websites and the application of the concept of reusability. In three dimensions, reusability is available explicitly and defends additional space, and hence it has a broader chance to develop qualitative knowledge. From the above discussion, significant conclusions may be drawn as follows:

1) The work of White and Manton (2011) is based on the huge student survey, which

suggests a comprehensive landscape of reuse in higher education (as in Figure 4) and is compatible with the present three-dimensional model because the locus or path of knowledge representation is a solid cone because of its landscape nature.

2) In the present investigation, the report of White and Manton (2011) is compared with the concept of reuse in the environment such as a three-dimensional (extended framework of Nonak and Takeuchi (1995) by Harsh (2008; 2007a; 2007b; 2009; 2011), Khan and Harsh and Shuaib and Harsh (2020)) in all the four quadrants.

3)The four quadrants of White and Manton (2011) (Figure 4) not only have a great analogy with Nonaka's extended work (Figure 2, Figure 3, Figure 4, and Figure 5) (Khan and Harsh, 2009) but also support knowledge conversion (style) processes in each of the quadrants.

4) Thus, Nonaka's extended model of Harsh (2008; 2007a; 2007b; 2009; 2011) and Khan and Harsh, and Shuaib, and Harsh (2020) support not only reuse but also the learning and educating (teaching) practices recommended by the work of White and Manton (2011).

5) A concept related to the quality of knowledge as predicted by White and Manton (2011) is also fully supported by Harsh's model Harsh (2008; 2007a; 2007b; 2009; 2011) and Khan and Harsh (2020) which support the evolutionary nature of the knowledge.

Analysis of Explicit and Tacit Knowledge and AI during a Three-dimensional Setting

Now think of a system that formed on the view of artificial intelligence and seizes experienced individuals in the company. No doubt, tacit and explicit knowledge, and the connected reusability are linked with and correspond to a focal job in any company setting. The merged know-how collected in the past and present is translated into explicit knowledge, and, likewise, each effort is instructed regarding the operation of the overall efforts of personnel to translate into significant explicit knowledge.

In the environment of three dimensions, there is a continuous translation of tacit kinds of knowledge into explicit and the other way around; moreover, both explicit as well as tacit knowledge increase together due to the inclusion of extra knowledge, for example, analysis of comparison of a company's products and technology with other companies to refine their strategies, which initially adds new technique and later decreases the role of reusable knowledge symmetrically as time enhanced. Thus, this is a justification for the presence of a solid cone of knowledge in the three dimensions. The objective of artificial intelligence (AI) in the present case is to endorse and pertain to scientific and technological harvests (that are beneficial to people), while the objective of wisdom, artificial wisdom, and human intelligence is to resolve the selection of required data, information, and tacit, explicit, and reusable knowledge.

Utilizing approaches, for example, storytelling, visualization, codification, and specialist techniques, knowledge about tacit kinds may be decoded into explicit knowledge (externalization) that may be charted and organized through AI throughout the organization. The procedures utilized by Classen (2011) enormously and continually transform tacit styles of knowledge into explicit types of knowledge, such as mentoring, storytelling, and metaphors.

Analysis of Knowledge Reusability with AI Tools

Investigators (White and Manton, 2011) find that it is not clear whether scholars usually find great levels of knowledge reuse in their prospectuses difficult, which means reuse is not difficult to implement; however, their lessons were based on web technology, which could not be refined, as compared to the revolution of knowledge in three- dimensions means separate consideration of reusability is an asset.

Activities involved in Figure 3 (refined Nonaka model) occur in a three-dimensional situation where the reusability of knowledge is exhibited, which allows less effort in further practices allocated to the reuse performance. Moreover, in a three-dimensional environment, there is enormous information on repeating occurrences, and accordingly, the expansion of obvious verifiable knowledge exists. If such knowledge is tapped and utilized for future applications, it may boost our knowledge systems. Examples are mentioned in Table 2. This type of knowledge may be termed qualitative as a result of the recurring activities, and subsequently, the use of AI will be broader and more rigorous. Table 2 (APPENDIX) (modern tools mentioned at the end of this paper) confirms the theory that (in these knowledge management procedures), both tacit and explicit knowledge are backed by AI via suitable AI tools.

Table 2 (APPENDIX) (mentioned at the end of this paper) witnesses exactly how AI, by which reusability is applicable, provides a wider decision-built approach in a critical business situation through numerous effective practices as in the expanded Nonaka Version. Recurring reuse of knowledge contributes to making competent choices about knowledge each time.

Possibility of overall efforts on the management of knowledge, plus knowledge eminence (quality) based on the reusability of knowledge:

The reusability not only demonstrates a vigorous role in dropping the effort required to effectively make available novel beneficial knowledge but could also be further exploited to grow a sophisticated knowledge management approach, thus offering qualitative and more quantitative knowledge management systems. This creates an additional way of managing systems. A great example of this is Amazon.com (2014), which not only reuses its knowledge in a variety of environments across the globe, but the new, effectively enhanced knowledge is further exploited in the different tasks.

How AI may be Exploited? A theoretical analysis:

Possibility of overall efforts on the management of knowledge plus knowledge eminence (quality) based on the reusability of knowledge:

Normally, we have two varieties (Boucher, 2020) of AI in relation to functioning involving weak and strong. Weak AI, or narrow or limited artificial intelligence (ANI) (learning and machine learning), is the algorithms of AI that are executed to realize groups of peculiar jobs and do not comprise the broad series of cognitive abilities against artificial wisdom, wisdom, and human intelligence. Since tacit, explicit, and reusable quantities are distinctly autonomous sets that help make emotional decisions in a corporate environment, we do not know what type of knowledge is correlated with the company's record or trends. Applying such management as a business attitude with AI tools grants a modest advantage for companies to execute better than their opponents. Knowledge management manages the potential of augmented revenue, diminished expenses, and augmented assets as substantial revenues.

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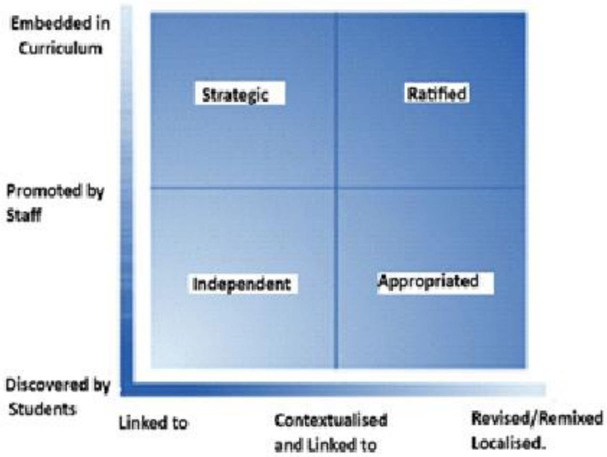

Figure 4: Landscape of Reuse in Higher Education (White and Manton's, 2011)

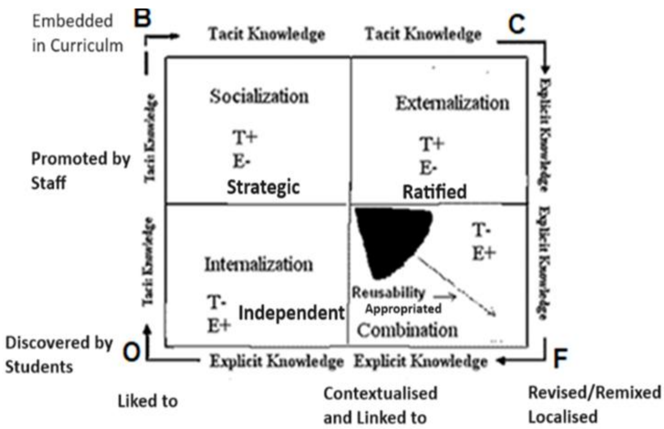

Figure 5: Three Dimensional Model of landscape of reuse in higher education.

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Table 1 **A Comparative Study of Knowledge Conversion in Education: Nonaka's (2000) Original Model vs. Harsh's (2007–2011) Extended Framework in a Three-Dimensional Context**

Type of Style / Modification	KM Activities	Using Original Nonaka Model		Extended Model by Harsh (Conversion with Reusability Concept)	Type of Technology with example
		(Type of Knowledge Conversion Activity with Example)	Category of knowledge conversion activity with example	Conversion of knowledge (from one form to another form)	
Socialization / Knowledge Sharing	Knowledge sharing in society and classrooms during discussions involving two or more individuals (e.g., teacher and students).	Tacit to Tacit Example: Conferences, brainstorming sessions.	Socialization enables the transfer of novel tacit (and reusable) knowledge through joint capabilities.	Reusable Tacit to Reusable Tacit	Collaborative team-oriented tools and repositories. **Examples**: Video conferencing software, cloud file-sharing platforms, online
Externalization/ Knowledge Capture.	Instructors employ methods such as imagination, storytelling, expert systems, and codification to convert tacit knowledge into	Tacit to Explicit Example: Best practices documentation	Externalization involves transforming tacit (and reusable) knowledge into explicit (and	Reusable Tacit to Reusable Explicit AI-based knowledge acquisition systems.	AI based Knowledge Acquirement, **Example**: Expert Systems

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	explicit knowledge.		reusable) formats.		
Combination / Knowledge Discovery.	Activities include digitizing instructor-prepared papers, uploading files online as PDFs, and digitally distributing content.	Explicit to Explicit/ Telephone Discussion	Combination refers to converting explicit (and reusable) knowledge into a more complex and organized series of explicit (and reusable) knowledge.	Reusable Explicit to Reusable Explicit Databases and data mining tools. .	Database, Data Mining, Data Mining **Example**: RapidMiner , Weka, SAS Enterprise Miner, SPSS Modeler.
Internalization/ Explicit information integrated into an individual's skills and knowledge	Scholars and instructors internalize knowledge through practice, such as implementing lesson strategies.	Explicit to Tacit Example: Learning by watching.	Internalization embodies explicit (and reusable) knowledge into tacit (and reusable) understanding	Reusable Explicit to Reusable Tacit Face-to-face meetings and computer-based knowledge acquisition .	Face to Face Meetings/ Knowledge acquisition based on computers. **Examples**: Zoom, Microsoft Teams, Google Meet.

DISCUSSION AND FINDING

See Tables 1, 2, and the above discussion; there, the knowledge flow is a closed cone, and technology exploits the required knowledge. In this study, we attempted to consider the following points in our analysis:

(a) By comparing it with the work of other contributors, a three-dimensional knowledge management model was analytically investigated, in which tacit and explicit knowledge, as well as knowledge reusability, play a crucial role in an AI-driven technological environment in higher education.
(b) By examining more space in a three-dimensional environment, the possibility of more tacit and explicit knowledge than in the two-dimensional Nonaka model was discovered.
(c) By examining reusable space in a three-dimensional environment, the possibility of more effective knowledge due to reusability as an independent variable in a three-dimensional higher education environment was investigated.
(d) The possibility of incorporating an AI environment to differentiate in performance in technologically oriented higher education was explored.
(e) The identification of clarity (transparency) and quality of knowledge was demonstrated using the concept of reusability of explicit and tacit knowledge using multi-phase methods. Knowledge renewed (transformed) with multi-phase methods is qualitative because it is achieved at numerous points.

It is now clear that by using AI in a three-dimensional environment, knowledge organization becomes more productive, individualistic, richer, independent, and knowledge-oriented because of all the above measures.

IMPLICATIONS

Implications of the AI-Based Three-Dimensional Knowledge Management Model in Higher Education

1. Revolutionizing Knowledge Systems

• Developing more tacit, explicit, and reusable knowledge systems in a cost-effective environment.

• Personalized knowledge systems for students, where knowledge is arranged symmetrically in a cone.

• Supporting organizations in the transition from static sources to active, self-regenerating knowledge contexts.

• Promoting continuous learning and adaptation in higher education, essential for future-proof universities.

2. **Promoting Tacit Knowledge**

• Expanding the scope for capturing tacit knowledge, which is often ignored in traditional systems.

• Enabling the structuring and reuse of mentoring, perception, and experiential learning, which are particularly valued in educational contexts.

3. **The Evolving Role of Reusability**

- Establish knowledge reusability as a standard for significance, quality, and efficiency.
- Position knowledge through a multi-phase alteration in an extra responsible and ethically precise context.

4. Artificial intelligence and technology as key players in higher education.

• Develop tailored knowledge and extrapolative analytics for scholars' benefit.

• Improving staff skills and program design.

5. Personalization of Knowledge

• Promoting reuse and knowledge creation by students under staff guidance.

• Inspiring teachers and students to become not just customers but also knowledge creators.

6**. A More Efficient Higher Education Organization**

By applying artificial intelligence in a three-dimensional technological environment, the knowledge organization becomes more creative, distinctive, efficient, autonomous, and knowledge-oriented due to the measures described above.

Thus, we can realize that execution for outright evaluations in a technological situation is not a simple task for higher education today. Several phases should be methodically predicted. However, artificial and human wisdom must be assessed to learn personal feelings in making outcomes. The above discussion and comparison assets underscore that the consideration of reusability as an independent quantity is highly desired, as it addresses an important issue—even within higher educational settings.

Shared relations are the most complex, and rarely are sentiments spared; that is why the collection of knowledge selections is not an unwise fact in an advanced-level decision-making setting. When exhibiting convincing methods of tacit and explicit knowledge, AI can seize improved advantages, which can be a superior incentive to corporations. AI cannot have alternative personal intelligence and has a limited capacity to overcome the bottleneck of decision implementation. The risks connected to AI should also be taught in greater aspects.

CONCLUSION

Conclusion: A Transformative Knowledge Environment in Higher Education

This study confirms that integrating AI into a three-dimensional knowledge management context represents a new paradigm for the conception, design, and renewal of knowledge in higher education institutions. By expanding traditional two-dimensional models, this tactic enables:

- Increased acquisition of tacit and explicit knowledge, fostering a comprehensive understanding in a three-dimensional environment. However, the growth of knowledge depends on the amount of original knowledge, and the rate of growth of knowledge decreases over time because the overall locus of knowledge is a fixed cone.

- Strategic reusability in a three-dimensional environment generated by iterative cycles of tacit and explicit knowledge is critical for knowledge conversion, clarity, and quality, as this type of knowledge is continuously generated over time through the repetition of tacit and explicit knowledge, which is highly recommended for higher education.

- Tables 1 and 2 show how tacit, explicit, and reusable knowledge transforms in an AI-driven technological environment in a three-dimensional environment. The application of AI in a technological environment has broad, and beneficial implications. It clearly redefines how institutions renew, project and consider knowledge outside traditional two-dimensional models. It is useful for both teachers and students. Personalized tutoring systems and adaptive learning platforms, tools tailored to the requirements of each program and major.

- The tools in Table 2 are helpful in automated assessment, and innovative research resources that improve academic productivity and teaching quality.

- Since the locus of knowledge is a solid cone in the three-dimensional environment, this means that there is a symmetric variation of knowledge, including reusable knowledge, and that reusable knowledge can be treated on an equal footing with tacit and explicit knowledge in the higher education environment. Knowledge growth is constrained by the geometry of a fixed cone, which, despite initial acceleration, exhibits diminishing returns over time.

- AI-enabled diversity enables universities to systematize curation and learning and improve their performance. It enables students to learn iteratively and qualitatively.

- Multi-phase regeneration methods that transform knowledge from static content into dynamic resources.

- In the present research, it is possible to achieve qualitative knowledge, since in the knowledge transformation process, the quality of knowledge depends on the methodical and reliable use of multi-phase approaches. A multi-stage approach helps refine and deepen existing data, making it more reliable and complete.

- While digital transformation continues to offer opportunities for better systems for staff and students (Table 1 and Table 2), the role of knowledge transformation modalities is often overlooked. In a digital environment, these processes can be effectively managed. In the current context, where knowledge transformation processes form a fixed cone, the quality and reliability of knowledge can be better controlled because knowledge is defined symmetrically along three dimensions.

Finally, it is recommended that this model promotes personalized, independent, and inheritance-oriented knowledge contexts where efficiency is not merely operational but deeply rational. This model empowers institutions to evolve toward knowledge-oriented environments that support innovation.

Advantages of AI to Knowledge Management

Knowledge management systems (KMS) improve business performance by optimizing plans and protecting corporate knowledge through a balance between tacit and explicit knowledge. KMS increases productivity, facilitates strategic decisions by leveraging appropriate reusable knowledge, and reduces operational risks by distinguishing between tacit, explicit, and reusable knowledge. These systems reduce repetition, lower costs, and accelerate impact through the efficient organization and transfer of relevant information. This eliminates unwanted tacit, explicit, and reusable knowledge. Knowledge-based AI tools optimize routine academic activities, enable personalized learning experiences, and enable breaks for deeper engagement by leveraging the right knowledge at the right time.

Through cost-effective organization and semantic analysis, AI ensures timely access to relevant materials at all stages of the environment. It extracts true meaning from tacit and explicit knowledge and focuses on texts and judgments to understand their context and relationships. Classify outdated or redundant tacit and explicit knowledge for archiving or updating while improving employee understanding by presenting personalized content based on tacit, explicit, and reusable knowledge.

Limitation

Distinguishing between data, information, and knowledge remains difficult, especially in multidimensional reusable environments, leading to integration and security problems. Transforming and leveraging knowledge (especially tacit knowledge) with technology is not always easy. It often requires operational testing and established frameworks. Capturing experiential or tacit knowledge is associated with high costs, practical difficulties, and procedural limitations, and poses a challenge to institutionalization.

Knowledge management systems must, of course, be connected to business objectives. Without a direct connection to strategic objectives, there is a risk that knowledge assets, especially reusable ones, will be underutilized or neglected. Knowledge management platforms require constant updates and evaluation. Without ongoing maintenance, they become unwieldy and can be ignored by users.

The targeted application of AI to data, information, and knowledge (especially in a reusable environment) can irritate users, delay adoption, and reduce system efficiency, especially without the appropriate intelligence. Additional data, poor integration with business objectives, and unclear privacy concerns reduce the strategic value of knowledge management systems.

Future Research

This research could be made even more exciting if we implement a real-time survey technique for an educational institution and statistically analyze the resulting data. The impact of AI on this survey can be analyzed by separating data and information, and its impact on knowledge management in a reusable environment. The knowledge revolution could then generate further valuable knowledge.

Reuse occasionally leads to the corruption of important system information and mixes tacit and explicit knowledge with reusable knowledge. This requires implementation interventions that can be evaluated through a real-time study.

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APPENDIX

Table 2

Our comparative study of knowledge conversion in education: Nonaka's (2000) original model vs. Harsh's (2007–2011) extended framework in a three-dimensional context

KM Method	Procedures	Devices / Instruments / Activities	AI Assistance	Use Case Examples	Reuse Possibilities (Extended Nonaka Model)
Knowledge Applications	A. Improve localized use of knowledge by organizing assets. B. Propose enhanced system interfaces (e.g., speech-based aides).	A. Teamwork and verbal/document review. B. AI agents for classification and tagging (Reshi & Khan, 2014).	A. Adaptive learning platforms tailored to individual learners. B. AI automates tagging and organization; collaborative tools enhance learning.	A. Service knowledge via Q&A sets (e.g., online guidebooks). B. Chatbots delivering human-centric expertise.	A. Reuse enhanced through continuous Q&A expansion. B. Chatbot interactions expand reusable expertise.
Knowledge Tapping (Video & Non-Video)	AI-assisted video processing: enhancement , noise reduction, aspect ratio correction—improving tacit and explicit knowledge capture.	A. Knowledge-based systems B. Case-based reasoning C. Semantic search algorithms (Jarrahi et al., 2023)	Cataloging and maintaining tacit and explicit knowledge assets.	Real-time intelligent tapping for evolving practices.	Reuse amplified through enriched promotional and retail pipelines via tech-human knowledge exchange.

Knowledge Assessment & Measurement	Use data analytics and algorithms to evaluate performance and deliver real-time insights into learner progress.	A. IoT systems B. Software/content management C. Neural networks (Rodriguez et al., 2021)	Diagnostic systems for tacit and explicit knowledge; focused measurement across domains.	Performance-based diagnostics for learners and systems.	Reuse enhanced through growth in diagnostic knowledge and technological proficiency.
Knowledge Construction / Creation	AI enables predictive analytics by analyzing large datasets to identify trends. Educator-student interaction fosters new tacit and explicit knowledge.	A. Chatbots B. Multi-agent intelligent tutoring systems C. AI-enabled digital devices (Reshi & Khan, 2014; Santo, 2010) D. Weblogs, wikis, expert systems	Integrated learning of tacit and explicit knowledge; machine learning and corporate intelligence.	A. Predict retail prospects. B. Identify inefficiencies via CRM analysis.	High reuse potential through predictive technologies and CRM-driven insights.
Knowledge Attainment / Organization (Higher Education)	A. Develop lesson plans B. Provide feedback C. Design grading rubrics D. Manage emails and references E. Integrate AI into projects to	File management systems (Smith & Lyles, 2011; Natek & Lesjak, 2021)	Communication pattern detection and analysis.	Analyze legitimate patterns relevant to core issues.	Rapid reuse growth through continuous acquisition of tacit and explicit knowledge via new files and tools.

	enhance student skills				
Knowledge Allocation / Sharing	AI facilitates sharing and collaboration via centralized, searchable repositories.	A. Blogs, wikis (Evans et al., 2017) B. Yammer (Jarrahi et al., 2023) C. Virtualization, dialogue recognition, writing analysis D. Google Docs, SharePoint, MyNet, GrapeVINE, AI-driven exploration tools	Decomposition and distribution of tacit and explicit knowledge.	A. Streamline peer review processes. B. Foster connections across networks.	Reuse enhanced through collaborative knowledge expansion and integration from diverse sources.

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