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The Knowledge Management of the University in the Digital Age: Towards a Model based on Karl Wiig's Approach in 1986



Abstract: - This article examines the optimization of knowledge management through digital technology in Moroccan universities. We utilized a research methodology based on a review of theoretical literature. Drawing on Wiig's 1986 approach as a conceptual foundation, we used it as a starting point for a thoughtful integration of digital technological resources and artificial intelligence capabilities. The objective is to provide support to higher education institutions in knowledge management by creating an environment conducive to dynamic interaction and progressive learning for both students and teachers. The early stages of a higher education model focused on digital knowledge management already demonstrate the significant value of this approach, thus opening promising prospects for future advancements in the field of higher education.

Keywords: Artificial intelligence, Digital technology, Higher education, Knowledge management

I. INTRODUCTION

The transition to the Moroccan university environment represents a shift towards a more mature academic context, centered on research, where student learning methods are transforming with a reinforced emphasis on independence, individual research, and critical thinking (Barbot & Giovanni, 1999). Simultaneously, work requirements increase significantly in this context rich in complex readings and in-depth assignments (Letiche, Lightfoot, & Lilley, 2017). The abundance of knowledge and skills available at the university presents opportunities while also posing challenges. Among the significant opportunities is students' access to a variety of fields of study and disciplines, potentially enriching their learning. However, to thrive in this academic environment, it is essential to guide and support students in their academic journey to foster their success and personal development. Aspirations remain grounded in the university domain

Academic institutions, particularly universities, greatly benefit from Knowledge Management to support various aspects of their mission. According to the research of (Kidwell, Linde, & Johnson, 2000) five key areas in which Knowledge Management can be utilized within universities have been identified: research, academic program design, administrative services, innovation, and planning. On the other hand, rapid technological advancements and social changes have transformed the way we learn and access information, compelling higher education institutions to rethink their pedagogical methods to remain relevant and effective (Lember, Kattel, & Tönurist, 2018). In this context, higher education institutions are compelled to reassess the academic learning space and incorporate Knowledge Management practices associated with digital technology to create an environment conducive to students' development.

Our goal is to explore through a literature review: How can digital technology optimize knowledge management in the Moroccan university space?

The work plan follows this structure: First, we examine the digital evolution of the university in Morocco. Next, we delve into the use of digital technology and artificial intelligence in the context of knowledge management, drawing inspiration from the approach of Karl Wiig, 1986. Finally, our research turns towards the future of Moroccan higher education, proposing the implementation of a digital knowledge management model.

II. THE DIGITAL EVOLUTION OF UNIVERSITIES IN MOROCCO: THE NEW FRONTIER OF EDUCATION

A. *Reform and Innovation in Higher Education in Morocco*

Faced with a multitude of challenges and complexities, Moroccan higher education institutions find themselves at a crossroads, torn between the pursuit of sustainable development and the necessity to adapt to an increasingly

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complex set of demands (Attouch & Nia, 2013). These demands notably revolve around issues such as massive enrollments, globalization, market-oriented approaches, and the growing influence of digital technology (Giesenbauer & Christ, 2020).

In the current era of transformation, the university in Morocco takes on profound significance: it represents not only an anticipated stage but also an encouragement to acquire contemporary skills and an openness to global perspectives. Moroccan universities actively engage in designing diverse and specialized educational paths, providing students with the opportunity to develop skills aligned with the demands of the job market and society. This approach aims to establish a connection between academic knowledge and the challenges graduates will face. Traditional teaching methods in Morocco are evolving to align with this objective.

In this context, over the years, Morocco has undertaken several reforms of its educational system, with the most recent one being implemented in 2023. The Moroccan government approved the draft decree No. 2.23.668. This decree suggests modifications and additions to the decree No. 2.04.89 dated June 7, 2004, which establishes the missions of universities, the durations of higher education cycles, as well as associated national diplomas. The ultimate purpose is to organize and structure higher education in Morocco.

Simultaneously, in 2019, the framework law No. 51-17 regarding the education, training, and scientific research system in Morocco was initiated to modernize the entire education system, from early childhood to higher education. This law emphasizes academic excellence, teaching quality, vocational training, and scientific research, while integrating technology as an essential element of educational system modernization.

The integration of digital tools in the field of education aligns with a global trend, and Morocco is no exception. Higher education institutions in Morocco recognize the importance of this evolution and actively commit to incorporating contemporary educational technologies into their academic programs (Riyami, 2018). This transformation from the traditional educational environment into a dynamic learning environment presents various advantages, such as the reinvention of learning through the use of tools and platforms aimed at increasing learner engagement and improving their performance (Coen, 2011). Thus, the higher education space in Morocco is evolving towards an environment characterized by the judicious use of digital resources.

The digital transformation of the university in Morocco is an imperative to effectively meet the changing needs of higher education and align with the rapid developments in the global market. Faced with a constantly changing academic environment, Moroccan universities are increasingly aware of the importance of integrating digital technologies into all aspects of their operations, processes, and services. This transformation is the result of various factors, such as the need to maintain competitiveness on the international level, optimize the efficiency of teaching methods, and provide a more adequate response to student expectations. In this ever-evolving landscape, digital transformation emerges as an essential catalyst for the future of higher education in Morocco.

Morocco strives to modernize its education system, adapt to the changing demands of higher education, and leverage digital technologies to enhance the quality of teaching and the competitiveness of its higher education institutions on the international stage.

B. Technological Tools Transforming Higher Education: Selective Overview

The digital revolution impacting university education is an inevitable step in adapting teaching methods to an increasingly interconnected world. This educational transformation encompasses a series of substantial changes, ranging from the incorporation of technological tools to the rise of online education. In the table below, we present a selection of digital technology tools that provide support for university knowledge management, relying on systems derived from Artificial Intelligence. Each tool is accompanied by its key features and its utility in universities.

Table 1: Digital Technology Tools, Features, and University Utility

Digital Technology Tools		Features	Utility
Experts system	AI-Based Career Exploration Tool	Explore career options based on the student's skills and goals.	Career advice and guidance
	Educational Chatbot	A chatbot integrated into a Learning Management System (LMS) that can address frequently asked questions from students.	Teacher support
	Student Tracking and Analysis Platform	Collects and analyzes students' learning data, providing reports for teachers and educational administrators.	Learning data analysis

	Intelligent Tutoring Systems Progress Tracking Systems Adaptive Assessment Systems	Adapts learning paths based on each student's performance and progress, offering content and activities tailored to their specific needs.	Adaptive learning
	AI-Based Academic Research Tool	A specialized search engine that uses AI to identify and rank research articles and academic resources.	Research assistance
	Automated Timetable Management System	The purpose is to optimize teachers' and students' schedules.	Administrative services support
	Remote Collaboration Platforms	Allows students and teachers to communicate, share resources, and collaborate on projects online.	Student-teacher collaboration
	Plagiarism Detection Software	The plagiarism detection software helps teachers to identify copied content in students' assignments.	Academic fraud detection
Automated Reasoning System	School counseling platforms Learning Management Systems (LMS) Electronic response software	Assist students in making decisions about their academic path by guiding them to programs and specializations that best align with their interests and skills.	Student guidance
	Text recognition tools Online assessment platforms Online tests	Automatically assess certain types of student work, such as multiple-choice assignments, short responses, or exams. This helps teachers save time in the evaluation process and obtain results more quickly.	Automated assessment
	Digital library Social media platforms Database	Assist in finding articles, academic resources, and data based on their study or research subjects.	Assistance in research
	University academic guidance tools School information systems	Assist students in planning their study program by recommending courses based on their academic program.	Academic planning support
Natural Language System	Spelling and grammar checkers Automatic correction of multiple choice answers	Automatically correct certain types of assignments, such as short essays or multiple-choice responses. This allows for providing prompt feedback to students on their performance and alleviating the workload of teachers for grading	Automatic correction and feedback
	Processing of open-ended questions Analysis of themes and subjects Tone analysis Trend analysis	Analyzing student feedback and responses to determine their level of satisfaction, engagement, and well-being, enabling institutions to identify issues and improve the student experience.	Student senses analysis
	Valence Aware Dictionary Key-words analysis	Analyzing classroom interactions, such as discussions, teacher and student comments, which can help assess and enhance teaching effectiveness.	Interaction analysis

In addition to traditional teaching, whether on a global scale or locally in Morocco, these tools play a crucial role. They will enable appropriate personalization of learning, facilitate data analysis for a better understanding of student performance, streamline educational processes by automating administrative tasks, and enhance the overall learning experience. These technologies provide teachers with the opportunity to focus more on interacting with students, offering them instant feedback, immediate responses, and personalized resources, while fostering collaboration. However, it is imperative to consider them as complements to traditional teaching, as emphasized by (Bedel, 2015), in order to create a balanced learning environment that combines the efficiency of digital technology with human interaction, thus promoting optimal education.

III. DIGITAL TECHNOLOGY IN KNOWLEDGE MANAGEMENT, KARL WIIG'S APPROACH

The knowledge management process, as shown in Figure 1 described by Karl Wiig in 1986, is closely linked to optimizing knowledge management in the university setting. Knowledge management, as conceptualized by Karl Wiig in 1986, involves several key stages, and the use of digital technology can enhance these stages. In this section, we provide a detailed description of Karl Wiig's knowledge management model, explaining how the concepts of this process can be improved through digital technology and adapted to the Moroccan university context.

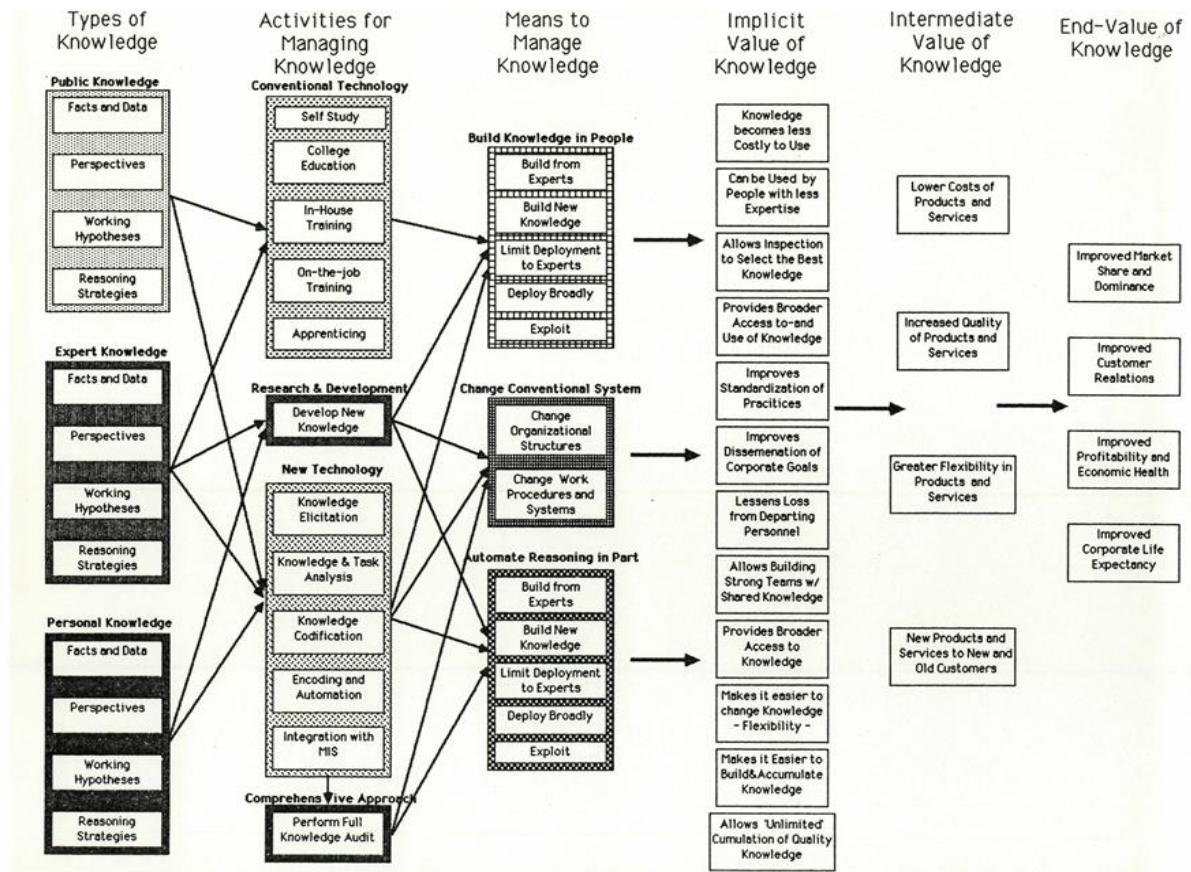


Figure 1: Knowledge Management Process, Source: (Wiig, 1986)

A. Principles of the Knowledge Management Process (Wiig, 1986):

The process, in its general framework, aims to assist organizations in leveraging their internal knowledge to enhance decision-making, operational efficiency, and problem-solving. In the context of higher education, we suggest that this structured approach can be applied meaningfully to improve the overall experience of students, faculty, and administration.

✓ Types of Knowledge:

The three dimensions of knowledge – explicit, shared by experts, and implicit – form a network that influences how we learn and understand the world around us.

Explicit knowledge is based on course materials that provide clear, accurate, and unbiased information. Knowledge shared by experts comes from experienced teachers; this type of knowledge is rooted in practice and deep understanding.

Tacit knowledge includes personal skills, expectations, and nuances integrated into how we perceive the world.

✓ Activities for KM:

The field of education benefits from the integration of Knowledge Management (KM) to promote the adaptation and enhancement of teaching practices. The three key activities of knowledge management, as conceptualized by Karl Wiig, resonate in this context.

The first activity, « conventional technology », translates into the incorporation of proven methods and approaches. This may involve adopting well-established educational programs, using standardized teaching resources, or implementing ready-made solutions to enhance teaching.

The « Research & development » activity in the field of education encompasses the research and experimentation of new pedagogical methods, innovative didactic approaches, and emerging educational technologies. Teachers and researchers engage in development processes to create innovative teaching strategies, test and refine methods to improve learning.

Finally, the activity centered on « New technology » in the context of education involves exploring and adopting revolutionary educational technologies.

✓ Means to Manage Knowledge:

Firstly, it is essential to promote the construction of individual knowledge, ensuring that students build and develop cognitive skills, acquire knowledge, and enhance their understanding of the world. However, this is only one facet. To develop individuals' knowledge, it is necessary to create an environment where education, curiosity, and practical experiences converge. Encouraging lifelong learning through formal education, diverse readings, and interactive dialogues helps build a solid understanding of the world. By promoting continuous improvement and using technology to facilitate access to information, we enable students to develop intellectually.

Secondly, it is necessary to move away from conventional education and knowledge management systems towards the modernization of education. This transition involves the integration of educational technologies, the reassessment of programs, the adoption of innovative teaching methods, and the implementation of learning management systems, all aimed at modernizing education and optimizing knowledge transfer.

Thirdly, partial automation of reasoning processes is relevant to improving knowledge management within the university. It can streamline administrative tasks, but it cannot replace human thinking and teaching. Automation involves the application of technologies or computer tools aimed at reducing individuals' cognitive workload by handling repetitive or complex tasks, providing relevant information, generating recommendations, or performing data analysis.

B. Propelling Knowledge Management Activities through Digital Technology:

Leveraging pre-existing knowledge and fostering a collaborative learning environment strengthens the capacity of educational institutions to improve their rankings while ensuring students receive a quality education (Elkharraz, El Kharraz, & Chafik, 2018). Furthermore, digital technology acts as a catalyst for Knowledge Management, facilitating the efficient management and sharing of knowledge within educational institutions (Poizat & Bétrancourt, 2017). In the university context, propelling Knowledge Management activities through digital technology holds crucial importance.

Traditional technology relies on digital technology to revolutionize learning. Teachers can leverage a multitude of online resources such as video courses, interactive simulations, online discussion forums, classroom management tools, and digital libraries (Jacquot & Hoffmann, 2021). For instance, a science professor can integrate virtual laboratory simulations to experiment with complex scientific phenomena securely. Online learning platforms, as mentioned earlier, provide an interactive space where students can access courses, submit assignments, and collaborate on projects. Digital technology tools enhance student engagement, promote self-directed learning, and allow teachers to adapt their teaching methods to meet student needs. Thus, digital technology provides innovative means for university institutions to deliver high-quality learning experiences and meet evolving student needs (France, Vincent, & Ghislain, 2019).

In Research and Development, digital technology plays a crucial role in enhancing university education (Cornu & Véran, 2014). Teachers and researchers can leverage this technology for innovative and collaborative research. For example, students can access online platforms that aggregate research studies, enabling them to stay updated on the latest advancements in their field. Additionally, these platforms provide a conducive space for teachers to experiment with new teaching methods.

Revolutionary technologies in higher education are influenced by digital advancements, significantly impacting the way education is designed. Educational technologies such as virtual reality enable students to explore virtual environments for immersive learning experiences; for example, a biology student can explore a 3D organism (Porte, 2021). Artificial intelligence enables personalized learning by adapting content and exercises to the specific needs of each student (Molenaar, 2022). Online collaboration tools offer the opportunity for real-time interaction among students, teachers, and experts worldwide, encouraging collaborative learning and knowledge exchange. Mobile applications provide instant access to a multitude of educational resources, fostering learning beyond the classroom. These technologies transform the university landscape by offering flexible, innovative learning opportunities tailored to individual student needs, enriching the university experience.

As we can observe, the integration of digital technology in higher education represents a valuable opportunity to enhance knowledge management, personalize learning, and promote educational innovation. This transformation

provides students, teachers, and administration with access to innovative resources and teaching methods, thus enriching the university experience.

IV. TOWARDS A NEW MODEL OF DIGITAL KNOWLEDGE MANAGEMENT IN THE MOROCCAN UNIVERSITY

As shown in Figure 2, the transition to a new model of digital knowledge management in Moroccan universities is an essential process to promote efficiency, accessibility, and collaboration within these academic institutions. Such a model can be beneficial for students, teachers, researchers, and university administration.

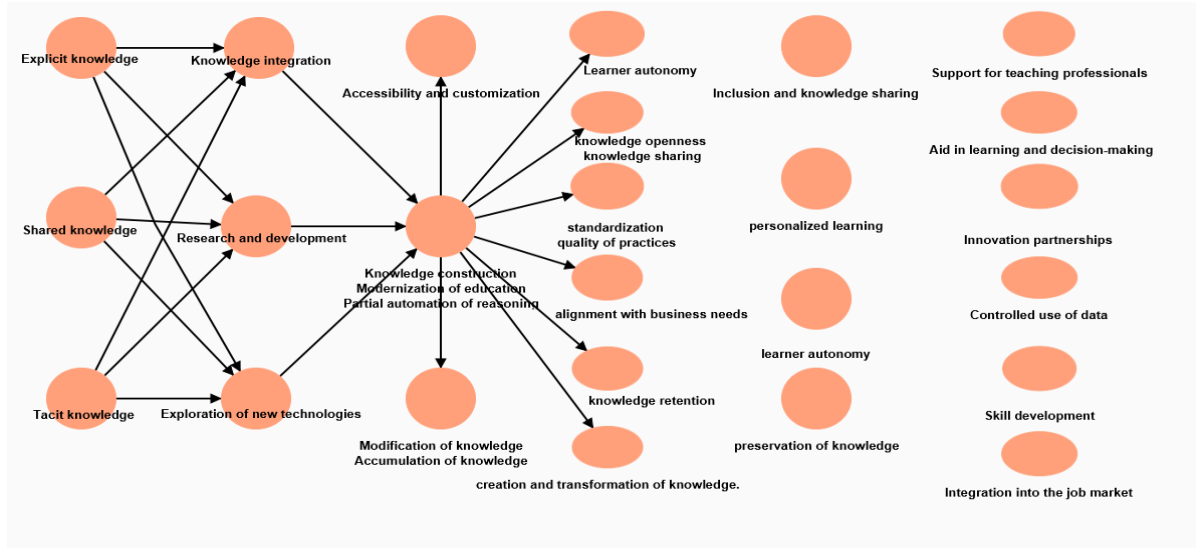


Figure 2: Digital Management Process of University Knowledge

A. *Rethinking Education in Morocco with Digital Knowledge Management:*

The knowledge management process presented by Wiig (1986) provides a solid foundation for higher education to leverage the wealth of available knowledge. Thoughtful integration of technology-supported activities into university knowledge management promotes the creation of more dynamic, interactive learning environments to student’s needs. Implementing knowledge management in the context of educational change, amplified by the relevant integration of digital tools, allows leveraging teacher knowledge to shape a more targeted and effective learning experience for students. This process can be adapted to meet the needs of Moroccan universities.

The values defined in our knowledge management model closely align with the fundamental principles of Wiig's knowledge management process. They draw inspiration from Wiig's concepts of creating, accessing, sharing, and preserving knowledge, tailored to the Moroccan university context. We have sought to implement these values to promote proactive knowledge management, personalized learning, openness to innovation, and preparing students for a constantly evolving environment while maintaining a high level of quality and efficiency in education.

Implicit values arising from the goals of the proposed digital knowledge management model for higher education in Morocco can be presented as follows:

Accessibility and Personalization: Revolutionizing education in Morocco through Personalized Knowledge Access. In this new phase of higher education, technological advances such as AI, digital platforms, and open educational resources have made knowledge accessible and affordable. Digital learning platforms provide global access to educational materials, and AI adapts content to individual needs, eliminating geographical barriers for Moroccan students to access high-level knowledge without having to relocate.

Learner Autonomy: Fostering the autonomy of Moroccan learners by involving them in the knowledge selection process encourages them to make informed decisions about what they want to learn. This places Moroccan students at the center of their educational process, empowering them to make informed decisions about the knowledge to assimilate. This approach promotes a more self-managed and learner-centered educational experience.

Openness and Knowledge Sharing: Reflecting a shift towards a more inclusive, open, and knowledge-sharing educational model. It allows for an expansion of use and contribution to the collective knowledge pool.

Standardization and Quality Practices: This improvement in the standardization of educational practices in Moroccan universities reflects a progression toward greater efficiency, quality assurance, and consistency in education and other areas. The goal is to provide learners with education better aligned with workplace requirements

and international standards, enhancing their preparedness and competitiveness while maintaining a high level of quality and uniformity among educational institutions.

Alignment with Moroccan Business Needs: This points to a shift towards an educational approach more focused on the concerns of Moroccan businesses. The aim is to prepare students to understand the goals and aspirations of the business environment and contribute to it. It strives to bridge the gap between the academic and job markets, preparing students to become valuable assets in the business world in Morocco by aligning their knowledge, skills, and aspirations with those of the Moroccan business sector.

Knowledge Retention: Reducing losses associated with the departure of staff in the context of Moroccan universities involves a shift toward proactive management with decisions made in advance and the preservation of knowledge, particularly in the context of the departure of teachers or other key figures within the university. The goal is to highlight the preservation of institutional and academic knowledge, ensuring that valuable expertise and experience are retained and effectively passed on to new generations of staff and students. This approach aims to maintain continuity and excellence in teaching and administration in Morocco.

Leadership and Management Skill Development: Forming strong management teams within the university in Morocco reflects a shift toward acquiring leadership and management skills among Moroccan students and teachers.

Knowledge Creation and Transformation: The modification, construction, and accumulation of knowledge within the framework of the university in Morocco represent a dynamic and evolving educational approach, transcending mere knowledge transmission.

The goal is to embody a forward-looking and adaptable pedagogical perspective, preparing Moroccan students to actively participate in knowledge creation and transformation.

B. Digital Knowledge Management Model in the Moroccan University:

The implementation of knowledge management in the context of educational change, amplified by the relevant integration of digital tools, offers transformative potential. The "University Digital Knowledge Management Process" model will be an attempt to conceptualize and structure digital technology in knowledge management in the university context, based on principles drawn from Karl Wiig's knowledge management work. The structure of this model follows a logical progression, starting from basic concepts (knowledge). It can be used to develop a strategic plan for knowledge management in the university space, describing how knowledge is managed and how it contributes to achieving educational objectives.

The classification of knowledge into three categories - explicit, shared by expert teachers, and tacit - reflects the acknowledgment of the diversity of knowledge types present in an academic environment. This distinction is fundamental as it informs the specific approaches necessary to manage, share, and effectively leverage this knowledge.

Knowledge management activities, such as the adoption of conventional technologies, research and development of innovative teaching methodologies, and the integration of educational technologies, highlight a balanced approach to knowledge management. This reflects an understanding that knowledge management is not limited to a single domain but must encompass a variety of approaches to ensure the effective dissemination and use of knowledge in the university context.

Knowledge management means, such as knowledge building, education modernization, and partial automation of reasoning, illustrate strategies to facilitate the creation, updating, and streamlining of knowledge to enhance teaching and learning.

The approach on which the model is based aims to achieve three distinct categories of objectives: Implicit, Intermediate, and Final.

Implicit objectives focus as explained on optimizing knowledge management, emphasizing selection, extensive access, and standardization of practices. They seek to promote goal dissemination, reduce losses related to departures, and form strong management teams. These objectives underpin the model by ensuring a solid foundation for the acquisition, storage, and distribution of knowledge.

Intermediate objectives are centered on improving learning and knowledge retention. They encourage knowledge inclusion and sharing, personalized learning, learner autonomy, and knowledge preservation. These objectives aim to create a more efficient learning environment adapted to each individual.

The ultimate goals of the Digital Knowledge Management model are to provide comprehensive support for teaching professionals and learners. By offering innovative tools, resources and partnerships, the model seeks to empower

educators to improve their pedagogical practices and make informed decisions in the dynamic education landscape. The emphasis on controlled and ethical use of data underlines a commitment to confidentiality and security. In addition, the priority given to skills development is in line with the objective of preparing individuals for the challenges of the digital age, fostering adaptability and competitiveness. Finally, the objective of integrating knowledge into the labor market reflects a strategic alignment with industry needs, ensuring that educational efforts lead to tangible, useful results for learners when they enter the labor market. Through these objectives, we aim to make a significant impact in the field of education.

V. CONCLUSION

At the university, the successful integration of digital technology into knowledge management requires a carefully considered implementation. It is essential to preserve the humanistic foundations of education, which add depth and invaluable value to learning. By managing human assets through digital assets, we will build a flexible, adaptable, and enriching university education system for future generations. The success of this innovative approach requires thorough teacher training and constant reflection on the balance that can be found between digital, management, and human elements that underpin education.

Adopting a digital knowledge management model is a fundamental step towards effectively achieving the expected goals of higher education. Digital technology optimizes knowledge management in the Moroccan university space to become a more efficient, sustainable, collaborative, and innovative environment. This structured approach to knowledge management, aligning with the principles of Karl Wiig, will leverage internal knowledge to improve access to educational resources, personalize learning, share best practices among teachers, manage educational resources, and facilitate collaboration among students. It will also contribute to data collection for informed decision-making and the creation of new knowledge.

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