Abdelmajid Tahiri

Educational Sciences, Philosophy and Humanity Laboratory,
Normal High School, Moulay Ismail University,
Meknes, Morroco;
e-mail: tahiriabdelmajid@gmail.com

Mohamed Halim

Interdisciplinary Physics And Computing Laboratory,
Normal High School, Sidi Mohamed Ben Abdellah University,
Fez, Morroco;
e-mail: mohamed.halim@usmba.ac.ma

Aissa Ahnay

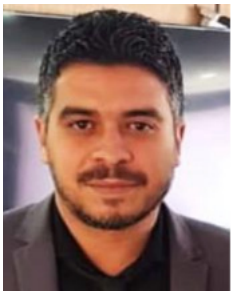
Applied Human Sciences Laboratory,
Normal High School, Sidi Mohamed Ben Abdellah University,
Fez, Morroco;
e-mail: aissa.ahnay@usmba.ac.ma

Khalid El Khattabi

Interdisciplinary Physics And Computing Laboratory,
Normal High School, Sidi Mohamed Ben Abdellah University,
Fez, Morroco;
e-mail: khalid.elkhattabi2018@gmail.com

Yassir El Ghzizal

Interdisciplinary Physics And Computing Laboratory,
Normal High School, Sidi Mohamed Ben Abdellah University,
Fez, Morroco;
e-mail: yassir.elghzizal@usmba.ac.ma



Rachida Gougil

Applied Human Sciences Laboratory,
Normal High School,Sidi Mohamed Ben Abdellah University,
Fez, Morroco;
e-mail: rachida.gougil@usmba.ac.ma

Measures Likely to Promote the Successful Integration of ICTE in the Moroccan Context

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This article contributes to an exploratory study examining the integration of Information and Communication Technologies in Education within teachers' instructional practices as well as its effects on teaching and learning outcomes. This paper analyses the current state of ICTE within the Moroccan context and identifies measures that may facilitate the effective integration of these tools into teachers' practices, addressing the constraints and challenges impacting the education system. The measures implemented by stakeholders for the integration of ICTE in Morocco and other regions have been analysed, drawing from specialised literature on the topic. These findings were then compared with the results of semi-directive interviews conducted with a sample of 20 participants engaged in the ICTE sector. The analysis of data from our qualitative study revealed two primary dimensions: the institutional dimension and the human dimension. These dimensions are central to the measures that may enhance the effective integration of ICTE within the Moroccan education system.

Keywords: teachers' practices, ICTE, education, Moroccan teachers, learner, instructional, education system.

Introduction

The swift advancement of Information and Communication Technologies in Education (ICTE) has significantly altered teaching and learning methodologies globally, presenting

new avenues for improving educational results [*Fullan, Langworthy*, 2014]. The integration of these technologies into instructional practices presents a complex challenge, shaped by institutional, infrastructural, and human factors [*Teräs*, 2022]. The favourable outcomes attained through ICTE in leading nations motivated educational authorities in various regions to oversee the substantial influence of ICTE on pedagogical approaches and learning modalities and to engage in the digital sphere [*UNESCO*, 2021]. This involvement aims to align with the technological advancements mandated by globalization and address the challenges and hindrances associated with the educational system.

The literature scrutiny provides insights into typologies categorizing factors relevant to ICTE integration, such as the model emphasized in the research conducted by [*Rasmy*, *Fiévez*, 2015] underscoring technological, pedagogical, and human dimensions as fundamental prerequisites for pedagogical innovations in education. Alternatively, the typology proposed by [*Asamoah et al.*, 2022] emphasizes initiatives like establishing computer labs, staff resource center, internet facilities, learning management systems, and library software solutions. Incorporating ICTE, requiring educators to have adequate technological training for effective implementation [*Gogia et al.*, 2024; *Kraft, Lyon*, 2024], ICT positively affects all stakeholders in Education, especially Teachers' pedagogical beliefs and attitudes.

In Morocco, as in other regions, the integration of ICTE presents potential benefits and significant challenges, requiring a thorough analysis of the current environment and the strategies necessary for effective implementation [*Voogt et al.*, 2013]. This article presents an exploratory study that investigates the role of ICTE in teachers' instructional practices and its effects on teaching and learning outcomes. This study examines the current state of ICTE integration within the Moroccan context, identifies significant challenges, and investigates potential solutions to enhance its application in education. This research examines specialized literature alongside insights from semi-structured interviews with 20 stakeholders in the ICTE sector, identifying two critical dimensions — institutional and human — that influence the successful adoption of these technologies.

The results highlight the necessity for collaborative initiatives among policymakers, educators, and other stakeholders to overcome obstacles and fully utilize ICTE's potential within Morocco's educational framework. This report delivers a diagnostic evaluation of existing conditions and presents recommendations to inform future strategies for sustainable and effective ICTE integration.

Literature Review

The integration of Information and Communication Technologies (ICT) into our daily lives significantly influences our lifestyles and cognitive functions [*Catapani*, 2018]. Integral to the progress of several sectors, ICT is pivotal in the contemporary age of digital transformation and globalization. Consequently, the ways of learning and teaching are likewise influenced. The literature study evaluates existing research on the efficiency and usability of ICTE, summarizes its perceived advantages, and its positive impact on the educational system. The purpose is to determine the measures and situations conducive to the effective integration of ICTE. This review is split into two sections: perceived benefits of incorporating ICTE into the international education system and integration of ICTE in the Moroccan setting.

Perceived benefits of integrating ICTE into the international education system

Numerous studies [*Ahmed Al-Hunaiyyan1 et al.*, 2021] have illustrated the benefits of integrating ICTE into educational systems, highlighting favourable results for all individuals involved in teaching and learning activities. ICTE is recognised as a significant factor impacting educational quality, particularly in relation to academic achievement [*Adarkwah*, 2021], student engagement, and teaching methodologies [*Martin et al.*, 2022]. This research has facilitated an analysis of the effects of ICTE on educational processes.

The impact of ICT on educational processes

The incorporation of ICTE in educational environments presents two outcomes: initial resistance to change and subsequent advancements in the integration process, notwithstanding challenges such as diminished social interaction, inadequate teacher preparation, and issues related to inefficiencies and disruptions within the educational system [*Bibeau*, *Québec*, 2007]. Through ICT, the instructional engagement becomes more effective and relevant in terms of communication and knowledge sharing between educators and students [*Tahiri et al.*, 2023]. This interaction is largely rooted in a constructivist framework rather than an instructive one under the cover of ICTE [*Medina-García et al.*, 2021].

The integration of ICTE should not be perceived merely as an incorporation of educational tools but rather as a transformation of educational methodologies, as innovative teaching methodologies, enhanced pedagogical strategies, and skillfully utilizing diverse tools and innovative technologies to improve the quality of education. The capabilities and contributions of ICTE contribute to strengthen various educational demonstrations and communication initiatives [*Messaoudi*, *Talbi*, 2012]. Through simulation software reflecting reality, complicated processes at microscopic and macroscopic levels can be clarified, overcoming constraints associated with hazardous or short-lived experimental equipment.

The impact of ICTE integration on teachers

Teachers hold a vital place in the education system, and any introduction of innovation within the system necessarily leads in a shift in their duties and instructional methods. When teachers engage in the process of implementing ICTE, they typically enhance their abilities by exploring new instructional activities with their lernears. Teachers' ICT expertise increases motivation and usage of ICT [*Medina-García et al.*, 2021]. The amount to which ICTE is incorporated differs among teachers based on their particular skill levels: some educators try to create interdisciplinary abilities through ICTE utilization, while others confine themselves to its didactic application. Three unique sorts of teachers arise based on their interest levels in new technologies: innovators, hesitant adopters, and resisters [*Ertmer et al.*, 2012].

The integration of ICTE represents not merely a shift in teaching practices but rather a significant challenge involving the strategic use of technology to foster student autonomy, promote innovative approaches, and ensure quality knowledge acquisition; this transition necessitates a considerable amount of time. Benefits of ICTE, such enhanced pedagogies and technology integration, which are connected to change in teachers' attitudes and the increase of their competencies, can only be realized if educators possess inventive, analytical, and imaginative talents [*Kearney et al.*, 2020].

The vast array of resources and information accessible on the internet enables teachers to design and implement their lessons effectively, as well as compensate for any lack of materials [*Pettersson*, 2021], teachers praised the ICTE role in boosting teaching quality. In their work [*Medina-García et al.*, 2021] highlights out in a conceptual model created and validated through PLS with 142 teachers that ICTE in education increases inclusiveness, motivates teachers, and supports various needs. On other hand, Multimedia is a vital educational instrument that fulfils teachers' interests, promotes their roles and enhances comprehension [*Mayer*, 2021]. Collaboration among professionals is essential for success, hence the role of ICTE, which empowers teachers to collaborate with peers in a community of practice setting, offering opportunities to enhance the learning process [*Trust et al.*, 2023], evaluate learners, and guide them effectively towards solutions through asynchronous (forums, emails, etc.) and / or synchronous (webinars, video conferences, etc.) modes [*Seufferheld, Scagnoli*, 2011].

The impact of integrating ICTE on learners

The implementation of ICTE is transforming the methods by which learners acquire knowledge and skills. This transition prompts inquiries into the benefits for learners and the potential skills that may be developed. Currently, students can utilize e-learning to access university services remotely, eliminating the need for physical attendance and effectively addressing educational disruptions, thereby creating a flexible educational framework [*Dhawan*, 2020; *Teräs*, 2022]. This action signifies a departure from the traditional notion that knowledge is exclusively acquired within the confines of a physical university [*Rapanta et al.*, 2021]. The modern educational environment features collaborative discussions, shared resources, and enhanced accessibility for a wider audience [*Kurnaedi*, 2025]. This is achieved through direct control and interaction, which promote effective lesson delivery and greater participation in remote learning contexts. There exists a mutually beneficial relationship between technology and learners that can accelerate the integration of ICTE.

ICTE encourages learners to take ownership of their educational journey and jointly develop knowledge alongside educators and peers; this can be achieved through the dedication of practitioners in collaborative design. This collaborative approach increases motivation among learners, encouraging active engagement and exploitation of their talents for the collective growth of the class [*Bovill*, 2020]. ICTE supports easy communication between learners and overcoming communication obstacles; this may enable the training of virtual communities through various communication technologies such as discussion forums, e-learning platforms, and social networks [*Khan et al.*, 2021]. The advantages of ICTE emerge in higher academic achievement, cognitive development, increased autonomy [*Sailer, Homner*, 2020], and a deeper comprehension of knowledge among learners [*Mayer*, 2021].

Integration of ICTE in the Moroccan context

The integration of ICTE: a multidimensional effort by the Moroccan government

Any educational approach must utilise human, material, and financial resources, considered essential for its efficacy. The improvement of infrastructure and the upskilling of stakeholders engaged in ICTE integration, together with the development of contextually appropriate digital resources, are the primary concerns for education policymakers [*Nto-*

rukiri et al., 2022]. The initiatives and procedures enacted demonstrate the Moroccan government's steadfast dedication to integrating ICTE within the educational system [*OECD*, 2018]. This commitment beyond simple policy requirements or legislative texts, manifesting in concrete actions and efforts aimed at the effective execution of ICTE, coupled with the provision of substantial people and material resources [*Ajhoun*, *Daoudi*, 2018]. The technological advancements in Morocco were acknowledged in a report by the ECA[1], ranking Morocco among the top five North African countries that have effectively implemented policies for digital integration, alongside initiatives to develop action plans for enhancing ICTE integration in education.

The incorporation of technology into the curriculum was a collaborative choice. The engagement of stakeholders and a bottom-up approach resulted in success [*Pañares*, 2025]. The Ministry of National Education is creating favourable conditions to enable educators and students to engage effectively in the ICTE integration process by offering access to digital resources and promoting autonomous learning among students [*Lamtara, Bouziane*, 2025a]. Furthermore, the Ministry provides school administrators with resources for effective management and improving service quality for educational stakeholders, while the comprehensive national ICTE development strategy is developed in response to substantial changes in teaching methods and learning preferences [*Lamtara, Bouziane*, 2025b]. To alleviate resistance to change, it is essential to first inform educators about the benefits of ICTE in education prior to initiating the integration process [*Hazzat et al.*, 2024]. The recommendations presented at the French-speaking ministerial conference on the information society (TMSI) focus on several facets, including expanding the accessibility of ICTE across all educational tiers, encouraging ICTE integration, preparing educators, and advancing the creation of digital resources customised to local requirements [*Lamtara, Bouziane*, 2025b].

A concise overview of initiatives implemented and techniques employed to facilitate the incorporation of ICTE

To operationalise and implement the State's policy, the education ministry is launching various programs and strategies within the education sector, underscoring the necessity of aligning ICTE initiatives with national educational policies to ensure sustainability and relevance. In 2006, the Ministry commenced the implementation of the "GENIE" plan to promote the extensive adoption of ICTE by providing schools throughout the Kingdom with computer resources and internet access. The administration of the "GENIE" initiative initiated an emergency plan (2009–2012) to assess and diagnose progress, highlighting the active participation of educational stakeholders [*Dardary et al.*, 2019]. The plan seeks to leverage attained results, identify obstacles, and rectify shortcomings such as equipment shortages, inadequate software, and insufficient teacher training [*Kadiri*, 2022].

Simultaneously with the implementation of the programs and emergency strategy, the Ministry is promoting targeted large-scale projects aimed at improving connectivity quality and ensuring efficient data transmission speeds. Examples of these projects include the MARWAN[2] initiative [*Team*, 2023], governance and management schemes such as the AP-

[1] The Economic Commission for Africa (ECA) was established in 1958 to encourage economic cooperation between its member states (the nations of the African continent).

[2] Moroccan Academic and Research Wide Area network.

OGEE[3] program, and NATIONAL STRATEGY DIGITAL MOROCCO 2030. These endeavours, coordinated by the Ministry, are crucial to the larger *e-Maroc* plan, which aims to overcome the digital divide and establish Morocco as a trailblazer in ICTE [*Ferouali*, 2021]. The important programs and their description are listed in table 1.

Table 1. Programs related to ICTE initiated by the Ministry

Type of Program	program description
E-SUP program	Establishment of digital work environments (ENT) Enhancement of the ICT infrastructure of accredited research institutions Creation of digital educational materials (RPN)
MARWAN program:	A national non-profit IT network specifically for education, training, and research
NET-U program	Provision of WIFI coverage in university facilities and dormitories to connect them to the Internet (150 potential university establishments and dormitories)
INJAZ program	Provision of ICT access and utilization services for students
LAWHATI program	Provision of "2 in 1 Tablets" to higher education students, vocational training participants, and educators at competitive prices
SIMARech: Information system for scientific and technical research	Engaging all stakeholders in the emergency program of the Ministry of Higher Education, emphasizing meticulous planning of strategies
APPOGEE	Administration of educational matters (enrollments, examinations, etc.)

The current stage of integration of ICTE in the Moroccan environment

The Moroccan government is aggressively seeking to create a position within the area of information and knowledge society. Nevertheless, certain researches have found flaws and discontentment about the integration of ICTE across various courses [*Amaghouss*, *Zouine*, 2022; *Lamtara*, *Bouziane*, 2025b]. Specifically, a study conducted by [*Omar*, Benjelloun, 2013] who talk about poor ICT integration in Moroccan life and earth sciences education despite recognized benefits and underlined the inefficacy of the strategies adopted in utilising the capabilities of these developing technologies, whereas for [*Narayanan, Komalavalli*, 2022], giving learners with computers, regardless of the approaches applied, is adequate for boosting their comprehension.

Countries including Europe, Canada, and the USA have made notable advancements in the integration of ICTE within their educational institutions, a milestone that Moroccan universities have not yet reached, highlighting a potential disparity in comparison to their counterparts in developed nations [*OECD*, 2015]. The integration of ICTE in this sector faces significant challenges and barriers, including cultural, technical, and contextual factors specific to each country, as noted by [*Alfelaij*, 2016]. A limited proportion of educators have successfully integrated ICTE into their pedagogical methods, even though they acknowledge its positive effects on teaching practices. A study by [*Mastafi*, 2015] indicated that the limited or absent use of ICTE in Moroccan schools is due to the slow implementation of ICTE-related initiatives.

[3] Application for the Organization and Management of Teaching and Students.

Methodology

Our research commenced with a deductive methodology to examine the effects of ICTE integration on stakeholders in the educational framework, the strategies employed, and the current state of ICTE integration in relation to the Moroccan government's comprehensive initiatives. The study utilises specialised literature. Given the varied origins of strategies and the present state of ICTE, we will limit our analysis to those strategies that arise specifically from the context of Morocco. Thus, utilising an inductive methodology, we conducted a series of interviews with practitioners in the ICTE sector who have practical experience in teaching and / or learning. We conducted a thematic analysis of insights from the interviews, categorising the factors related to strategies and conditions that facilitate the effective integration of ICTE in Morocco into a two-dimensional framework: institutional and human. This initial phase of our study is exploratory, aimed at developing a framework of strategies and conditions that promote the effective integration of ICTE. This framework will serve as a tool for Moroccan policymakers to assess the degree of ICTE integration in educators' instructional methodologies.

Findings

In this section, the measures and conditions conducive to the effective integration of ICTE have been identified by focusing solely on a thematic analysis of data obtained from perceptions and representations gathered through interviews with individuals engaged in ICTE and possessing practical experience in education. The participants were in virtually total agreement regarding the significance of several elements influencing the improved integration of ICTE. In order to highlight the procedures and conditions that permit the successful integration of ICTE within the Moroccan setting, they have been grouped into two basic dimensions: the institutional dimension and the human dimension.

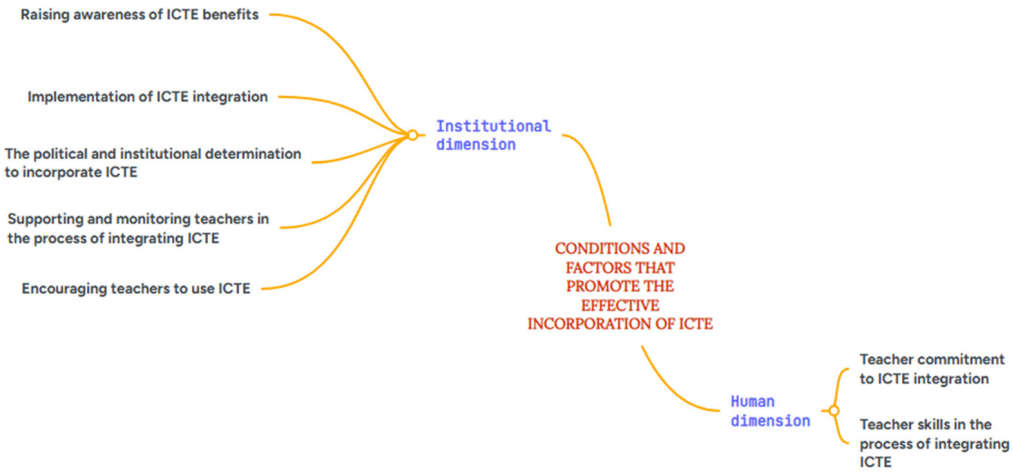

Fig. 1. Human and institutional dimensions that support the successful integration of ICT in the Moroccan context

This classification appears comprehensive to us, as all variables required for guaranteeing the successful integration of ICTE centre around it. Table 2 delineates the distinct dimensions included as conditions, the factors linked with each dimension, and the items connected to these factors.

Table 2. Conditions and factors that promote the effective incorporation of ICTE and the items connected to these factors within the Moroccan context

Dimension	Dimensional factors	Items
Institutional dimension	The political and institutional determination to incorporate ICTE	The commitment and active support of all the components (Delegations and Schools) of the education system in the process of integrating ICTE.
		The room for manoeuvre given to the school to exercise its new role with freedom and autonomy
		A global vision based on human, material, and financial resources in line with international guidelines.
		Opening Moroccan schools to their socio-economic environment
		Providing teachers with a wide range of digital resources adapted to the Moroccan context
	Raising awareness of ICTE benefits	Raising awareness of ICTE benefits
		Enriching social relations between players, exchange, and collaboration between learners
		Enhancing teaching resources (text, video, tutorials, etc.) to ensure that content is mediatised, attractive and accessible.
		Learner effort and autonomy in learning pace,
		Flexibility offered by facilities and the absence of time constraints
		Correcting misperceptions about ICT reduces teachers' possible resistance to change in their practices
		Creating an information bank for traceability of exchanges, making it easier for learners to refer to answers already proposed in similar situations (history, suggested links, etc.).
		Ease of assessing learners
		Overcoming problems posed by learners who are behind schedule or in difficulty, and the positive effects of ICT on pupils' results
	Encouraging teachers to use ICTE	Valuation of teachers' work by stakeholders
		Recognition of teachers' efforts and initiatives
		Consolidating participation in learners' performance development
		Material and moral motivation of teachers.
	Implementation of ICTE integration	Updating teacher training plans in terms of teaching methods
		Consulting teachers about their needs, in-service training for ICTE integration.
		Introduction of in-service training specifically tailored to the integration of ICTE.
		Introducing digital resources in textbooks
		Sharing and capitalising successful experiences
	Supporting and monitoring teachers in the process of integrating ICTE	Evaluation after different stages of the ICTE integration process, from the use phase to the appropriation phase.
		Developing teachers' skills to enable them to make ICT their own
		Daily, ongoing support and monitoring for teachers as they integrate ICTE.

End of the table 2

Dimension	Dimensional factors	Items
Human dimension	Teacher commitment to ICTE integration	The commitment of the teacher as the central pedagogical player in the education system to the success of the ICTE integration project.
		The involvement of the teacher in the various phases of the integration of ICT to overcome any resistance to change.
	Teacher skills in the process of integrating ICTE	The teacher's central role in the success of the project, involvement in different integration phases to overcome resistance, development of techno-pedagogical skills
		Innovation in teaching methods
		Cross-disciplinary skill development
		Combining new technologies with teaching methods
		Creating a conducive climate for student exchange and synergy

Discussion

After reviewing the outcomes gained regarding the aspects related to the institutional and human dimensions as indicators that may assist the successful inclusion of ICTE into teachers' instructional practices within the Moroccan setting, as indicated in Table 2. The scholarly examination provides insights into alternative classifications of factors pertaining to the assimilation of ICTE, such as the framework employed in the research conducted by [*Rasmy*, *Fiévez*, 2015] which underscores the significance of technological, pedagogical, and human elements as a crucial prerequisite for any transformation or instructional advancement in the educational framework. The Key aspects impacting ICT adoption in educational contexts are administrative support, organizational competence, ICT infrastructure, perceived usefulness, and simplicity of use. whereas for [*Medina-García et al.*, 2021], a teacher's enthusiasm for ICT in curricular development, teaching experience, and the institutional setting are Key elements impacting the integration of ICTE.

Initiatives to enhance the integration of ICTE associated with the institutional framework

The political and institutional commitment to integrate ICTE

Several studies [*Messaoudi, Talbi*, 2012; *Omar, Benjelloun*, 2013] have underscored the significant role of political determination in the process of ICTE integration. Moreover, active encouragement from educational institutions, particularly schools and universities, serves to inspire educators to incorporate ICTE. [*Asamoah et al.*, 2022] recommends in his research that universities should implement a robust and practical ICTE policy and promptly take necessary actions. Moreover, Political determination influences the pace of economic integration in developing countries. [*Omar, Benjelloun*, 2013] have also stressed the pivotal role of digital resources as valuable assets for time-saving and lesson facilitation. These resources should be tailored to the Moroccan context, even incorporating them into the school curriculum *[el Madhi et al.*, 2014], simply because a tailored approach considering local realities is crucial for effective outcomes.

Numerous research [*GEM Report UNESCO*, 2023; *Kassaw et al.*, 2024; *Nurtayeva et al.*, 2024] have highlighted the crucial influence of political will in the integration of ICTE. Furthermore, proactive support from educational institutions, especially schools and universities, motivates educators to integrate ICTE. [*Nurtayeva et al.*, 2024] proposes in his research that colleges should create a robust and practical ICTE policy and swiftly take required actions. Furthermore, political resolve affects the speed of economic integration in developing nations [*Zinoveva, Moskovskaya*, 2024]. [*Castillo et al.*, 2021] have emphasised the crucial importance of digital resources as essential assets for efficiency and lesson enhancement. These resources must be adapted to the Moroccan environment, potentially integrating them into the school curriculum, as a customised strategy that considers local realities is essential for achieving effective outcomes [*Berrada et al.*, 2020].

Increasing knowledge on ICTE integration

Various studies suggest that the initiation of integrating ICTE should start with raising awareness of its contributions to teaching and learning, particularly its advantages for teachers' instructional methodologies [*Scherer et al.*, 2020], despite the majority of youths being digital natives, there exists a minority resistant to change, often due to misconceptions about ICTE or limited access to new technologies .Therefore, focusing awareness-raising and informational efforts is vital [*European Commission. Joint Research Centre*, 2022]. It is vital to emphasise that continual and comprehensive awareness activities will only positively impact teaching methods if upheld consistently. In this sense, the study of [*Cabasan*, 2024] advises boosting awareness of ICTE integration among educators and students by financial assistance for devices, enhanced internet infrastructure, and intensive teacher training programs.

Promoting the utilization of ICTE among teachers and learners

As a means of honouring the dedication demonstrated by educators engaged in reforming instructional approaches, it is appropriate for the undertaken activities to be praised, motivated, and endorsed by the relevant local authorities [*Sinnema et al.*, 2023]. Conversely, substantial investment in hardware, software, and the technological framework of educational institutions is imperative, specifically emphasizing the establishment of a functional multimedia facility accessible to educators, thereby facilitating their adoption and dissemination of ICTE tools [*el Madhi et al.*, 2014]. To this purpose, the Ministry of Education has established the INJAZ project, which strives to provide graduate learners with a laptop to facilitate an individualised teaching and learning environment. Investigations in this domain frequently reveal that supplying devices without addressing the connectivity problem merely shifts the digital divide from the computer lab to the student's residence [*Moore et al.*, 2018].

Implementation of ICTE integration

A substantial body of scholarly literature emphasises teacher training as the primary factor, illustrating the institution's dedication to improving educators' abilities to effectively incorporate ICTE into their teaching methodologies [*Cabasan*, 2024]. Effective ways for teacher training in ICTE integration boost confidence and skill in using ICT tools. Furthermore, have highlighted the imperative for educators to possess expertise in ICTE and

associated integration methodologies, hence accentuating the importance of implementing and / or updating teacher training programs [*Scherer et al.*, 2018]. These proposals accord with those of [*Omar, Benjelloun*, 2013], who highlight the urgent imperative to overhaul teacher training. Engagement, consultation, and collaboration with educators from the first phase of training development are essential, facilitating the customisation of courses and the creation of adaptive educational environments that align with educators' requirements and expectations.

Furthermore, a contemporary researcher supports a radical change in teaching and learning methodologies because of emerging technologies and a flood of information, as opposed to proponents of a gradual ICTE integration approach [*Drysdale, Braithwaite*, 2017]. These methodologies can bridge theory and practice and foster adaptability in dynamically changing educational landscapes. Indeed, in the context of ICTE, any initiative to reform teaching and learning techniques without educational engineering will certainly falter [*Doulougeri et al.*, 2024]. The growing role demanded by this transition pushes educators to build new abilities appropriate to the novel conditions, either through training programs or by creating a collaborative environment favourable to sharing experiences with peers [*Omar, Benjelloun*, 2013].

Assisting and monitoring instructors during the ICTE integration process

In addition to training and equipping educational institutions, enabling measures and monitoring systems are important for educators to internalize ICTE and embed them into their instructional techniques. Evaluation following any ICTE-related operation is crucial for identifying obstacles and finding strategies to surmount them [*Drysdale, Braithwaite*, 2017]. To do this, [*Amaghouss, Zouine*, 2022] states that stakeholders must establish active, dedicated, and proficient committees to manage the ICTE integration process. The integration of school administration and academic supervision can boost support for educators, successful ICTE integration involves support and encouragement teacher educators by watching their practices, giving resources, and encouraging positive attitudes [*OECD*, 2019]. It's also much better to focus on the major educational stakeholders inside the educational system who play a direct part in the teaching and learning process. Consequently, successful ICTE integration relies on the attitude and level of commitment displayed by instructors in embracing the new technology [*Mastafi*, 2015]. In fact, the commitment and skills of teachers are crucial elements for enhancing the integration of ICTE, which is associated with the human dimension and is considered as a key aspect in this process.

The changing landscape brought about by advancements in technology necessitates that teachers possess the ability to innovate their teaching methods, integrate new technologies with new teaching approaches, and foster an environment that promotes collaboration and interaction among learners. A framework outlined by (Africa and UNESCO BREDA: Regional Office for Education in Africa 2011) highlights various skills (technical, pedagogical, methodological, and didactic) that are essential for teachers to effectively integrate ICTE into their classrooms [*Mastafi*, 2015]. It is crucial to recognize that technologies serve as mere tools to support teachers, hence the importance of enhancing employability skills among prospective teachers by blending traditional and digital teaching methods required for the successful integration of ICTE.

Advancements in technology require teachers to innovate their teaching methods, integrate new technologies with contemporary approaches, and cultivate an environment

that encourages collaboration and interaction among learners [*Turnsek*, 2024]. A framework presented by Africa and UNESCO BREDA (2011) identifies essential skills for teachers, including technical, pedagogical, methodological, and didactic competencies, necessary for the effective integration of ICTE in classrooms [*Liang, Law*, 2023]. Recognising that technologies function solely as tools to assist educators is essential. Therefore, enhancing employability skills among future teachers is vital through the integration of traditional and digital teaching methods necessary for the effective incorporation of ICTE [*Narayanan, Komalavalli*, 2022].

The essential role of ICTE in the field of education is progressively acknowledged along with discussions held among communities and governmental entities. Despite this, contrasting opinions exist that challenge the effectiveness and practicality of ICTE, proposing that an optimistic viewpoint towards its incorporation fails to consider certain limitations [*Hatamleh*, 2024].

Conclusion

The incorporation of ICTE faces several enduring challenges. The utilization of these educational tools fluctuates between instances of failure and success. The present state of ICTE integration diverges markedly from the expected results, notwithstanding the execution of various programs and strategies. There exists a disconnect between the practical usage of digital tools and the functionality of the technological infrastructure provided to Moroccan educators to address educational constraints. The proficiency of teachers in ICTE does not meet the levels outlined in the UNESCO framework. There is significant interest in identifying measures that can facilitate the integration of these technologies. Research findings categorise the factors contributing to the effective integration of ICTE into two dimensions : institutional and human, as illustrated in figures 1 and 2. Nevertheless, quantifying the genuine impact of ICTE on learning and the amount of teachers' adoption of these technologies is problematic due to the absence of appropriate standards and frameworks tailored to the Moroccan environment. Furthermore, the low sample size hampers the generalization of data regarding the successful incorporation of ICTE. Nonetheless, a set of principles and prerequisites conducive to the seamless integration of ICTE has been established, which will be provided to Moroccan authorities as a tool to evaluate the extent of ICTE integration in teaching practices. Additionally, aside from political support, a combined effort between institutional attempts and school-based initiatives is vital to surmount difficulties and develop competency in ICTE. Consequently, further study, taking into account the numerous players involved in the teaching-learning operation, is needed to develop a full list of metrics within a specific contextual framework appropriate to the Moroccan educational landscape.

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Меры, которые могут способствовать успешной интеграции ICTE в Марокко

Абдельмаджид Тахири

Университет Мулая Исмаила,
Мекнес, Марокко;
e-mail: tahiriabdelmajid@gmail.com

Мохамед Халим

Университет Сиди Мохамед Бен Абдаллах,
Фес, Марокко;
e-mail: mohamed.halim@usmba.ac.ma

Аисса Ахнай

Университет Сиди Мохамед Бен Абдаллах,
Фес, Марокко;
e-mail: aissa.ahnay@usmba.ac.ma

Халид Эль Хаттаби

Университет Сиди Мохамед Бен Абдаллах,
Фес, Марокко;
e-mail: khalid.elkhattabi2018@gmail.com

Ясир Эль Гжизал

Университет Сиди Мохамед Бен Абдаллах,
Фес, Марокко;
e-mail: yassir.elghzizal@usmba.ac.ma

Рашида Гужил

Университет Сиди Мохамед Бен Абдаллах,
Фес, Марокко;
e-mail: rachida.gougil@usmba.ac.ma

Предлагаемая работа — шаг на пути исследования интеграции информационных и коммуникационных технологий в образовании (ICTE) в рамках учебной практики учителей, а также ее влияния на преподавание и результаты обучения. В статье проанализировано текущее положение ICTE в Марокко и выявлены меры, которые могут содействовать эффективной интеграции этих инструментов в педагогическую практику, с указанием ограничений и проблем, влияющих на систему образования. Эти меры, реализуемые заинтересованными сторонами для интеграции ICTE в Марокко и других областях, проанализированы с опорой на специализированную литературу по данной теме. Эти выводы затем были сопоставлены с результатами полуструктурированных интервью, проведенными с выборкой из 20 участников, вовлеченных в сферу ICTE. Анализ данных проведенного качественного исследования выявил два главных аспекта: институциональный и человеческий. Эти аспекты занимают центральное место среди мер, которые могут усилить эффективность интеграции ICTE в марокканской системе образования.

Ключевые слова: педагогическая практика, информационные и коммуникационные технологии в образовании, образование, марокканские преподаватели, учащийся, обучающий, система образования.