



Teachers' Attitudes Toward Information Communication Technology in Moroccan Higher Education

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Abstract

The study explores Moroccan professors' attitudes toward integrating Information and Communication Technology (ICT) in Higher Education teaching and learning processes. Employing a quantitative non-experimental descriptive survey design, the research investigates teachers' perspectives on ICT adoption. Data collection involved administering an online survey questionnaire to teachers. Results indicate that male teachers expressed greater comfort with technology compared to their female counterparts. Additionally, the study reveals no significant correlation between age and interest in ICT, suggesting that age alone does not determine a teacher's inclination toward technology. Furthermore, the findings underscore the necessity of employing qualitative methods to gain a deeper understanding of teachers' attitudes toward ICT integration.

Keywords: Information and Communication Technology, Attitudes, Non-experimental design, Survey questionnaire, Comfort with technology.



Introduction

Over the past few decades, the world has witnessed a ubiquitous growth in information and communication technology (ICT, henceforth) in numerous domains, especially in the area of education. Technology is often regarded as an essential tool that enables educators to accomplish their tasks. Moreover, it has undoubtedly permeated almost every facet of contemporary life including the economic, industrial, and educational sectors to name just a few. Additionally, the immense endorsement and particularly the pervasive use of ICT in the teaching and learning process has always been premised on the possibility of these innovations to honestly change the Moroccan traditional educational system into a more sophisticated and well-developed framework. These new tools possess an immeasurable potential to better equip students for the digital era.

A great number of researchers have zeroed in on the fact that technology integration promotes not only higher-order thinking but also the capacity to resolve real-world problems, (Hopsen, Simons, and Knezek 2002). Teachers, too, reap numerous advantages from the universal espousal of ICT. The latter has substantially assisted educators in aptly modifying their stands on teaching from a teachers-centered approach to a learner-centered perspective. This new paradigm centers around the weighty needs of learners throughout an effective process that enables them to be more interactive with their peers, and classmates and ensures considerable participation and involvement in the course content. Along the same vein, students will inevitably upgrade their retention of knowledge by developing real-life scenarios that are de facto germane to their daily problems. This modern mechanism may also boost and cultivate collaborative learning. In light of this, both instructors and students cooperate to generate an environment conducive to invigorating and strongly vitalizing the teaching and learning process.

In this day and age, digital technology constitutes an integral part of education. Nevertheless, Teachers' attitudes play a fundamental role in effectively adopting ICT. According to Rogers (1995), Teachers' attitudes toward the new technology are a key element in its diffusion. Recently, studies have showcased that the effective implementation of educational technology is premised on professors' stands who eventually decide how the new apparatuses are employed in higher education. Bullock (2005) uncovered that teachers' attitudes are a major enabling or disabling factor in the adoption of technology.

Bakare (2014) defines information and communication technology as the strategy or technology used to structure information and communication, put differently, ICT in its essence is associated with information and technology. The latter may encapsulate the use of electronic technological devices, websites, PowerPoint, and computers as well as communication tools that are used to proliferate, store, and process educational information. This element of ICT underlines the fact that technology streamlines the exchange of information. Modern digital technology has been highly praised for being a robust tool allowing both reform and radical change. When employed effectively and efficiently, diverse ICT devices diametrically assist the extensive access to a wealth of information, and heightened quality and probably render both technology and learning intriguing processes linked to real life.

In the same framework, Toomey (2001) offers a pertinent definition of ICT which is the following: the term generally relates to those technologies that are used for accessing, gathering manipulating, and presenting or communicating information. These technologies include hardware, software applications, and connectivity. What is most significant about ICT is manifested in the increasing convergence of computer-based multimedia and communication technologies as well as the rapid rate of change that characterizes both technologies and their



uses. These modern tools touch upon a wide-ranging field simply denoting computers and peripheral tools.

As far as technology adoption is concerned, Cutance and Stroke (2000) find it more challenging as a definition despite having been a principal aim of the educational system. ICT integration alludes to the inclusion of information and communication technology tools, resources, and practices into diverse dimensions of teaching and learning processes. This implementation is designed to ameliorate educational experiences, optimize processes, and improve communication and cooperation within the school environment. Furthermore, ICT adoption entails aligning technology usage with pedagogical objectives. Professors strive to include these new tools into their lesson plans and teaching activities aiming to enrich the courses and smooth the learning practices. In this regard, ICT integration reflects a salient transformation in the pedagogical approaches which makes these innovations less in the margin of schooling but rather in the core of the educational processes.

Typically, these new devices are fundamentally used to usher in the inception of a digital era. They become indispensable constituents of all-embracing improvement that alter not only how teaching and learning take place but also what is to be taught and learned. This process touches upon the idea that technology can assist learners in gaining a solid grasp of things and acquiring knowledge in a better and more favorable environment. Papeurt (1989) advances that better learning will not come from finding better ways for teachers to deliver instructions to learners but from giving students opportunities to construct and build their learning.

Baylor & Richie (2002) stipulate that technology cannot be used successfully regardless of its intricacy or availability unless educators possess the ability, know-how, and attitudes required to integrate it effectively into the curriculum. To successfully employ technology in the classroom, professors need to become proficient end-users. Teachers are considered the principal catalysts for a real transformation in the educational setting. Research underscoring the practical adoption of technology often regards teachers' attitudes toward ICT. This apparent neglect of users' viewpoints may lead to unexpected results concerning the adoption of ICT in Moroccan schools. In his theory of diffusion of innovations, Rogers (1985) considers adopters' attitudes as indispensable to the innovation-decision process. Koochang (1989); Selwyn (1997) advance that several studies have shown that teachers' attitudes toward technology are major factors related to both the individual acceptance of technology as well as future behavior regarding its usage. This idea intelligibly showcases that research on end-users attitudes toward technology adoption is of paramount importance. Concerning the educational field, these apparatuses are offered to educators without de facto taking into account their attitudes and perceptions toward these innovations.

Within this framework, a notable gap in research exists regarding teachers' attitudes. Despite the growing emphasis on technology in education, several studies have highlighted the dearth of comprehensive investigations into educators' perceptions and beliefs regarding the employment of ICT tools in classroom settings. For instance, Smith and Jone (2019) noted that while numerous studies have examined the impact of ICT on student's learning outcomes, fewer studies have delved into teachers' attitudes toward these new tools in Moroccan higher education. Probably, this gap suggests a critical need for further empirical enquiring to better understand how teachers perceive and engage with ICT in their educational environment.

The significance of exploring teachers' attitudes toward ICT in higher education lies in its profound implications for pedagogy, students' learning outcomes, and educational equity. Understanding teachers and attitudes can help in identifying barriers and challenges they may encounter in successfully integrating technology into their teaching practices. Addressing these barriers can lead to the effective implementation of ICT tools, ultimately enhancing the quality



of instruction and fostering student engagement. Additionally, teachers' attitudes impact their willingness to experience professional development and adapt to evolving technological trends, which is paramount in preparing students for the digital edge. By examining these attitudes, all stakeholders can work collaboratively toward creating a more inclusive and equitable educational experience for all students.

Studying teachers' attitudes is multifaceted and routed in the evolving landscape of education and technology. Firstly, teachers play a pivotal role in facilitating student learning experiences, and their attitudes toward ICT profoundly influence the adoption and effective use of educational technology in the classroom. Secondly, ICT has become increasingly ubiquitous in modern society, shaping various aspects of daily life. As such, equipping students with digital technology skills and preparing them for the demands of a technology-driven world is a fundamental goal of education. Teachers' attitudes significantly impact the extent to which these skills are integrated into the curriculum and successfully taught to students. Furthermore, exploring these attitudes provides essential insight into the broader challenges and opportunities associated with technology integration in higher education. By considering these factors that influence teachers' acceptance and utilization of ICT tools, stakeholders can develop target strategies to overcome barriers, promote innovations, and foster a culture of digital innovations in universities.

The main objective of this research is to identify teachers' attitudes in Moroccan higher education. The study also seeks to investigate factors affecting teachers' acceptance or resistance to incorporating ICT into their instructional practices and the barriers that hamper the effective implementation of these new tools in the educational field. Likewise, the research is guided by the following research questions:

- What are teachers' attitudes toward ICT integration in Moroccan higher education?
- Does perceived ease of use impact teachers' attitudes toward technology adoption?
- Does perceived usefulness affect teachers' attitudes toward ICT implementation?
- What are the obstacles preventing teachers from embracing technology in their instructional practices?

The study is also guided by the following hypotheses:

- teachers' attitudes toward Moroccan higher education correlate with their level of experience in using technology for instructional practices.
- Perceived ease of use impacts teachers' attitudes toward technology integration in Moroccan higher education.
- Perceived usefulness influences teachers' attitudes toward technology integration in Moroccan higher education.

Literature Review

In recent years, the integration of technology into higher education has become increasingly prevalent, shaping the landscape of teaching and learning. Central to this integration are the teachers' attitudes and perceptions toward technology adoption within the academic environment. Understanding teachers' attitudes is essential as it influences their pedagogical practices, curriculum design, and ultimately the quality of education communicated to learners. Teachers' attitude in higher education has many facets and can significantly impact the effectiveness of technology integration initiatives. Positive attitudes correlate with enthusiastic adoption and innovative use of technology, while negative attitudes may hinder implementing efforts and impede the realization of the full potential of technology-enhanced learning environments. Furthermore, exploring teachers' attitudes provides insights into the factors affecting teachers' adoption and resistance to higher educational settings. By identifying



barriers, challenges, and facilities professors can develop targeted strategies to promote the effective use of technology for the teaching and learning process.

Background and Context

In the Moroccan context, university teachers consider ICT as a fundamental tool in their teaching and learning instruction. Teachers are aware of the fact that utilizing both software and hardware systems in their teaching may bring diversity to the approaches and methods. Additionally, incorporating these new devices in their approaches provides students with a wide range of unique and personalized experiences. These advancements indeed serve as robust support for ICT adoption, yet mastering them can be intricate and challenging as they require specific sets of skills. The educational reforms in Morocco have propelled a transition from traditional in-person teaching to a remote one using ICT to transmit information effectively (Hodges et al., 2020).

Within this framework, Morocco is undergoing significant transformations driven by new technology as well as the diverse array of professional opportunities available. Furthermore, the necessity for ongoing training becomes indispensable for educators to achieve their desired and beneficial objectives. Noticeably the wealth of knowledge, the evolving approaches to teaching and learning, and the shifting dynamics within society have significantly pressured higher education to deeply reconsider its fundamental orientation. With these considerations in mind, Moroccan higher education will strive to enhance the quality of its pedagogical institutional delivery to a superior level.

Furthermore, recognizing the impact of ICT on enhancing the productivity of the teaching and learning and teaching process, Morocco is actively involved in restructuring these innovations to maximize their effectiveness, driven by two key reasons: to position Morocco as a leading technological hub in the region and to firmly establish ICT as a potential driver for educational advancement. Along the same vein, Morocco prioritizes the imperative to modernize pedagogical practices by thoughtfully incorporating these tools and fostering extensive access to both teachers and students.

Theoretical Framework

Recently considerable focus has been directed toward the incorporation of these innovations within the educational domain. Many scholars view this integration as a notable advantage with the potential to considerably enhance educational practices. Numerous theories have been proposed to investigate the practical implementation and the optimal utilization of ICT. The Technology Acceptance Model (TAM) is a widely recognized theoretical framework extensively utilized in both information systems and technology adoption research. Originating in the late 1980s by Fred Davis, the Technology Acceptance Model (TAM) endeavors to comprehend and predict users' acceptance and adoption of novel technologies. The model elucidates how individuals accept and utilize information systems. According to this framework, a user's inclination to use a technological device is shaped by their perception of its utility in task accomplishment.

Furthermore, the perceived ease of use significantly impacts the adoption of technology. These factors, commonly referred to as perceived ease of use and perceived usefulness, are pivotal in the adoption of information and communication technology (ICT). Embracing and utilizing ICT can lead to immediate and long-term benefits at both institutional and individual levels, including improved performance, financial and time efficiency, and convenience (Foley and Curley, 1984).

Perceived ease of use pertains to an individual's subjective evaluation of how straightforward and uncomplicated it is to utilize a specific technological system. Perceived ease of use



embodies users' assessments of the ease or difficulty in interacting with technology or a system, thereby augmenting their capacity to accomplish particular tasks, objectives, or goals effectively. The perception of users towards a system is subject to various influential factors, which include but are not limited to the design of the system interface, the structure of navigation, the comprehensibility of instructions, and the prior experience of users with analogous technologies. The concept of perceived ease of use is concerned with the users' perception regarding their ability to operate technology with ease and confidence, without facing significant obstacles or challenges. This construct is critical in assessing the usability of technology and determining the level of user satisfaction. Perceived usefulness is the subjective appraisal made by an individual regarding the level to which a technology or system enhances their capability to attain particular objectives, goals, or tasks. This construct is important in determining the value of a technological system to the user. The concept of perceived usefulness is founded on the users' perception of the degree to which technology provides utility or benefit in facilitating effective task performance when compared to alternative methods. The perceived usefulness variable is influenced by various factors, including the functionality, features, and capabilities of a technological system, as well as the user's perception of its relevance and alignment with their individual needs and preferences. These factors play a crucial role in shaping the user's attitudes and behavioral intentions towards technological systems. The construct aims to evaluate how users perceive the effectiveness of integrating and utilizing the technology in their professional or personal tasks. The assumption is that the incorporation of this technology will lead to tangible benefits or improvements in their work or daily lives.

The Technology Adoption Model stands as a widely acknowledged theoretical construct employed within scholarly discourse to elucidate the nuanced dynamics governing individual acceptance and integration of novel technological innovations. By implementing this model, researchers can obtain significant insights into the attitudes and behaviors of educators toward the assimilation of information and communication technology (ICT) tools into their teaching methodologies. This theoretical framework can assess the factors influencing individuals' acceptance and usage of technology. TAM provides a comprehensive framework that helps understand how users perceive the ease of use and usefulness of technology and how it affects their intention to use it. Moreover, TAM is effective in predicting user behavior toward technology adoption in various contexts, including education. Due to its versatility and effectiveness, TAM is considered a valuable tool for investigating the factors that impact the successful implementation of new technologies. Teachers may exhibit a greater propensity to embrace and employ novel tools when they are convinced that such tools can function as instruments facilitating the achievement of their goals with enhanced effectiveness and efficiency. Through the application of this model, the researcher can effectively scrutinize teachers' technological attitudes and pinpoint the distinct determinants that sway technology adoption. The present model offers a methodical framework for understanding the complexities associated with the integration of technology in educational settings.

Previous Studies

The Impact of Attitudes toward Technology

Initial research neglected to consider the viewpoints of academic staff regarding these innovations (Harper;1987). These researchers redirected their attention towards alternative variables, particularly emphasizing the significance of information communication technology, accessibility, and technological infrastructure. While we appreciate the importance of the variables previously mentioned, it's essential to acknowledge that there are other equally crucial factors deserving of increased attention. The integration of ICT into the teaching and learning process heavily relies on the attitudes of teachers, making them a crucial factor in the educational environment. These concepts are foundational in determining the ways academic



staff integrate educational tools into their institutional practices, as emphasized by (Ertmer, 1989). Mayer and Halpin (2002) found that the success of efforts aimed at integrating technology into education relied heavily on the willingness of academic staff to embrace and incorporate new tools and technologies.

Luan and Roseland (2005) comprehensively investigated the significance of teachers' roles and their technological competence in education. They found that educators with proficiency in ICT likely held a favorable attitude toward integrating the new tools into their pedagogical practices. Their study revealed that educators who demonstrated proficiency in information and communication technology (ICT) tended to exhibit a positive disposition toward incorporating these new tools into their teaching methodologies. The study underscores the notion that possessing requisite skills and knowledge significantly influences an individual's receptiveness to innovations within their academic milieu. Erdogan (2011) examined Turkish primary school teachers' perceptions of their school culture's stance regarding the integration of information and communication technology (ICT) into educational practices. The findings suggested that teachers faced insufficient technical support and lacked sufficient administrative assistance, resulting in overall negative attitudes toward the integration of ICT. Furthermore, the results indicated that teachers who possessed personal computers and unrestricted internet access tended to exhibit more favorable attitudes towards innovations in comparison to their counterparts lacking these resources. The results emphasize the importance of providing teachers with adequate technological support and administrative assistance during the process of incorporating information and communication technology into educational practices. Inadequate support in these domains may exacerbate negative dispositions toward the adoption of technology among teachers. The positive correlation observed between personal computer ownership, internet accessibility, and favorable attitudes toward these technological resources underscores the significance of promoting equitable access to such resources. This finding emphasizes the importance of ensuring that individuals and communities have equal access to technology, to reduce the digital divide and promote technological empowerment. Upon further examination, it becomes evident that these variables not only have an impact on attitudes but also play a significant role in the successful implementation of Information and Communication Technology (ICT) in educational settings, as well as the factors that affect ICT adoption.

Factors affecting the use of ICT in education

The role of technology in education has greatly evolved in recent times, bringing about significant changes in the way students learn and teachers impart knowledge. This has transformed the traditional methods of instruction and made education more effective and efficient. At the core of this metamorphosis lie two pivotal notions: the perceived ease of incorporating technology and its perceived usefulness in educational settings. These concepts stem from the theoretical framework of the Technology Acceptance Model, which investigates individuals' perceptions and interactions with technology. The researcher utilized this framework to analyze its applicability within the context of Morocco. This approach underscores the universality of the Technology Acceptance Model, which provides a structured lens to examine technology adoption across diverse cultural and contextual landscapes. By applying this framework to the Moroccan context, the researcher aims to illuminate the nuanced factors influencing technology acceptance and utilization within this specific setting, offering valuable insights for both academia and practical implementation.

Perceived Ease of Use

Perceived ease of use is a term used to describe the extent to which an individual perceives the use of a particular technology system or tool to be simple, without any complications. Within the realm of education, when students and educators view technology as user-friendly,



they are more inclined to embrace it voluntarily and incorporate it into their teaching and learning methodologies. Teachers are inclined to favor employing an application if they anticipate that it will enhance their job performance (Davis,1989). Moreover, the perceived ease of use can be shaped by various factors including previous encounters with technology, institutional training, and support mechanisms. For example, educational software featuring explicit instructions and requiring minimal learning efforts tends to be perceived as more user-friendly, thus fostering increased acceptance and utilization among teachers.

Perceived Usefulness

Perceived usefulness is a term used to describe the degree to which individuals perceive that a specific technology will positively impact their performance and streamline their tasks (Davis,1989). It is an important factor to consider when evaluating the potential benefits of implementing new technologies in the educational environment. By assessing the perceived usefulness of a technology, it becomes possible to determine whether it is worth the investment and whether it will truly improve productivity and efficiency. In education, perceived usefulness is intricately linked to how technology can effectively assist in achieving learning goals, captivating student interest, and ultimately enhancing educational achievements. This statement emphasizes the pivotal role of technology in education and highlights the importance of perceived usefulness in driving its adoption and integration. By focusing on how technology can support learning objectives, engage students, and improve educational outcomes, educators are more likely to embrace and utilize technological tools in their teaching practices. Ultimately, this recognition of technology's potential to enhance educational achievements underscores its value as a valuable resource in modern educational environments.

Barriers to the Integration of ICT in Teaching and Learning

The perceived ease of use and usefulness are undeniably influential factors in shaping attitudes toward technology adoption. Despite the potential advantages, educators often face significant obstacles that impede their willingness to fully embrace information and communication technology (ICT). Numerous studies have explored the barriers hindering the adoption and effective utilization of technology within the educational context, as exemplified by Al-Alwani's research in 2005. Challenges such as limited access to resources, inadequate training, and concerns regarding the compatibility of technology with educational objectives can generate resistance among teachers. Addressing these barriers is crucial to ensuring the success of technology integration efforts. Recognizing and comprehending these obstacles represent initial steps toward assisting teachers in surmounting them and feeling more at ease with incorporating technology into their instructional practices.

Methodology

Introduction

Numerous researchers put forward that the effective integration of technology into the process of teaching and learning hinged on professors maintaining favorable attitudes toward these new tools. Rogers (2000) emphasized the crucial importance of attitudes in shaping as well as influencing the implementation of educational technology as these perceptions could present a significant challenge to the adoption of ICT in the classroom settings. In addition, Braak (2001) investigated the relationship between the integration of technology and several factors that could immensely influence the utilization of ICT in the context of teaching and learning. He found that the level of acceptance and adoption of technology in the classroom was largely impacted by the attitudes of instructors. According to Harper (1987), research on technology implementation in higher education frequently neglected to consider the perspectives and attitudes of teachers toward these machines. This limitation is meaningful



because attitudes play a crucial role in determining the successful integration and acceptance of these tools into the teaching and learning process.

Tackling the potential correlation between gender and the level of experience with ICT among teachers is an issue of utmost importance as technology proficiency is becoming a crucial skill for educators to effectively engage with students and utilize technology-enhanced teaching practices. Put differently neglecting to consider these attitudes can hinder the adoption and acceptance of Technology-enhanced teaching methods, ultimately impacting the effectiveness of educational development. therefore, research and initiatives aimed at implementing technology in education should prioritize understanding and addressing the attitudes of teachers to ensure successful outcomes.,

The current study utilized a quantitative non-experimental descriptive survey design to investigate the attitudes of Moroccan higher education teachers toward ICT. Using a quantitative non-experimental descriptive survey design is probably a systematic approach to exploring the attitudes of Moroccan higher education teachers toward ICT. This method allows for the collection of data that can provide valuable insights into the prevalent attitudes, perceptions, and preferences of teachers regarding technology integration in the academic environment.

The choice of this design enables the researcher to systematically collect numerical data allowing for a deeper understanding of the various dimensions and nuances of teachers' attitudes toward ICT. This approach provides a structured framework for data collection, Analysis, and interpretation, facilitating the identification of patterns, Trends as well as correlations within the data set. By quantifying teachers' attitudes, the researcher can identify common themes, disparities, and factors that influence their perceptions of ICT in education. Overall, employing such a design enhances the vigor and reliability of research findings, contributing to a more comprehensive understanding of teachers' attitudes toward ICT and its implications for educational practices and policies. Furthermore, we examined the factors influencing ICT adoption, emphasizing perceived ease of use and usefulness. the researcher also explored teachers' perspectives regarding obstacles to integrating ICT into classroom instructions.

Sampling methods

To delve into the intricate and potentially multifaceted subject of Moroccan higher education teachers' attitudes toward ICT, the researcher reached out to 52 teachers from Moulay Ismail University inviting their participation in the survey questionnaire. by targeting a sample of teachers to participate in the survey, I acknowledge the importance of gathering first-hand insights from individuals directly involved in the educational context under study. out of a total of 52 teachers, 49 responded to and fully completed the survey questionnaire the response rate of 49 out of 52 teachers who completed the survey questionnaires indicated a participation rate of approximately 80.7%. this response rate is relatively high and suggests a strong level of Engagement from the participant with such a high response rate the risk of nonresponse bias is reduced. besides, the high response rate enhanced the statistical power of the study, increasing the Precision and reliability of the results. this is particularly beneficial for drawing accurate conclusions and making generalizations about the attitudes of the population of teachers toward ICT integration in Moroccan higher education. furthermore, the research design is characterized as non-experimental and cross-sectional, as data collection occurred during a single instance, specifically throughout the school year 2023-2024. statistical analysis essential for this project was performed using SPSS Statistics version 21.



Scales and measures

Teachers were presented with an online survey using Google Forms. the survey questionnaire focused on Moroccan teachers' attitudes toward the integration of ICT in higher education. in these contexts, the dependent variable is the attitudes of teachers towards ICT integration, while the independent variables are perceived ease of use and perceived usefulness. against this backdrop, the dependent variable represents the overarching construct of interest and reflects the opinions beliefs, and inclinations regarding the integration of technology in their teaching practices.

the independent variables are perceived ease of use and perceived usefulness. these variables comprise factors that are hypothesized to influence teachers' attitudes toward ICT integration. the independent variables are based on Davis' 1989 Technology acceptance model, which posits that perceived ease of use and perceived usefulness are key determinants in individual attitudes and intentions to adopt and effectively use technology. attitude toward ICT integration in higher education encompasses broader beliefs opinions and feelings about the use of technology in teaching and learning practices. this includes perceptions of the importance of technology adoption, confidence in one's ability to use these modern tools, and overall enthusiasm for incorporating technology into educational practices. The ICT adoption attitudes scale developed by Alberini is a valuable tool utilized in many research to gauge individuals' inclinations to embrace and incorporate technology into their educational setting.

Instrumentation

The survey questionnaire on teachers' attitudes toward ICT is structured into five sections. the initial section covers demographic information including age gender and use of teaching experience. following this, the second section explored teachers' attitudes, while the third section delved into perceived ease of use. the fourth section examined perceived usefulness, and the final section investigated barriers hindering the utilization of ICT in their educational environments. collecting demographic data such as age gender and use of teaching experience was vital for comprehending how these variables might influence teachers' attitudes.

these demographic details offered context for interpreting responses enabling the identification of overarching trends and patterns. additionally, assessing teachers' attitudes provided valuable insights into their overall sentiments regarding the adoption of ICT among educators. understanding the perceived is or difficulty of technology is essential, as it directly impacts individuals' readiness to adopt and effectively utilize ICT tools in their professional endeavors. evaluating perceived usefulness also allowed the researcher to gauge the degree to which teachers believe that ICT can enhance teaching and learning outcomes, thereby, influencing their motivation to incorporate technology into their instructional practices. Moreover, identifying barriers that impede the effective integration of ICT in educational settings is fundamental for addressing challenges and promoting successful integration.

Professors expressed their arguments with attitude statements using a five-point Likert scale ranging from 1 strongly disagree to 5 strongly agree. Sections 3 and 4 focused on closed-ended questions where teachers were asked to indicate yes or no regarding their perception of the ease of use and usefulness of Technology. This approach provided a structured means of gathering data on professors' attitudes toward technology adoption. By utilizing a five-point Likert scale, the survey allowed for obtaining nuanced responses, enabling a more detailed analysis of attitudes. Additionally, incorporating closed-ended questions about the ease of use and usefulness of technology provided a quick snapshot of teachers' perceptions, which complemented the Likert scale responses. This combination of data collection methods offered a comprehensive understanding of professors' perspectives on technology integration in education. To assess the primary hypothesis, the researcher computed a comprehensive score



for the teachers by taking the average of all the individual items. By calculating the scores for each teacher based on the average of all individual items, the researcher was able to obtain an overall measure of teachers' attitudes. The survey items were based on a scale utilized in multiple studies conducted by Alberin (2002). Using a consistent scale across multiple studies is a common research practice, allowing for easier comparison and synthesis of the results. Alberin's previous studies using the same scale provided a useful baseline for comparison and interpretation of the current survey results. Additionally, using a validated scale can increase the reliability and validity of the survey results, as it has already been tested and proven to be effective in measuring the constructs of Interest.

Subscale 1: focusing on teachers' attitudes towards ICT, consisted of 10 items intended to address two main aspects: teachers' level of comfort with ICT and the perceived potential of technology to improve the teaching and learning experience. these descriptions effectively outlined the Key components of scale 1, which examined teachers' attitudes towards ICT by highlighting the two main aspects related to teachers' comfort with ICT and their perceptions of Technology's potential to enhance the teaching and learning process. The description provided a clear understanding of the scale objectives this approach allowed for a comprehensive assessment of teachers' attitudes toward technology integration in education, considering both their comfort level with using ICT and their beliefs regarding its effectiveness in improving the teaching and learning practices. in this section, teachers were tasked with rating their agreement with the statements using a five-point Likert scale. this scale ranged from one indicating strongly disagree to five indicating strongly agree. their responses gauged the degree of their alignment with each statement regarding their attitudes toward ICT.

subscale 2: perceived usefulness. This section comprised 21 items designed to assess teachers' perceptions of the advantages of ICT. the questions were specifically crafted to inquire whether these tools aided in the grading process. For example, "online assessment tools simplify the gradient process for teachers". teachers were asked to indicate their level of agreement with each statement on a 5-point Likert scale, ranging from 1 strongly disagree to 5 strongly agree. by asking teachers directly about the perceived impact of these tools on grading efficiency, the survey aimed to gather valuable insights into their practical experiences and perceptions. the method provided a focused lens allowing the examination of teachers' attitudes toward the usefulness of ICT in their educational settings, specifically in the context of grading tasks.

subscale 3: perceived ease of use. This section encompassed 19 items designed to gauge teachers' perception of the user's friendliness of technology. these questions were carefully crafted to probe into the adaptation of teaching content. For example, participants were asked to express their agreement level with statements such as educational software, and the adaptation of institutional content to meet individual needs using a five-point Likert scale, with 1 indicating strongly disagree and 5 indicating strongly agree.

subscale 4: of the study delved into the barriers to the implementation of ICT into teaching and learning practices. this section comprised 12 specific items aimed at gauging teachers' perceptions regarding obstacles that may hinder their effective adoption of ICT. these questions were designed to explore various facets of these barriers. for instance, participants were asked to express their level of agreement or disagreement with statements such as "Do you think your university has the necessary infrastructure to integrate ICT in teaching and learning practices?" using a binary option of yes or no. this question format allowed the participants to provide a clear indication of their stances on the availability of infrastructure for ICT integration within their University. By doing so, the researcher could gather more nuanced information about the specific challenges or concerns they may face regarding ICT integration. The participants were able to cite any deficiencies impacting their abilities to utilize ICT effectively within their University environment.



Operationalization

in this study, the operational variables were defined as follows: the dependent variable pertained to teachers' attitudes towards ICT, while the independent variables encompassed perceived ease of use and perceived usefulness. it is noteworthy to mention that these variables were assessed utilizing the Alberini scale, which was grounded in Davis's (1989) technology acceptance model. focusing on investigating teachers' attitudes towards information and communication technology with perceived ease of use and perceived usefulness as the independent variables. the operationalization of these variables was crucial for ensuring the reliability and validity of the study's findings. defining the dependent variables as teachers' attitudes toward ICT suggests that the study aimed to measure the overall sentiments or dispositions of teachers toward utilizing ICT in their professional activities. this entailed encompassing factors such as willingness to adopt ICT tools, comfort level with technology integration, and perceived benefits or advantages of ICT implementation. The choice of perceived ease of use and perceived usefulness as independent variables aligned with the technology acceptance model proposed by Davis (1989). perceived ease of use refers to the extent to which individuals perceive a particular technology as free from efforts or difficulty to use while perceived usefulness pertains to the belief that utilizing the technology will enhance job performance or productivity. utilizing the Alberini scale to assess these variables indicates an approach to measurement involving a series of items rated by the participants according to the level of agreement or disagreement.



Results

The major objective of this non-experimental quantitative study was to examine teachers' attitudes toward ICT, focusing on perceived ease of use and perceived usefulness, employing the Alberini scale (2002) within the Technological Acceptance Model of Davis (1989). The central research inquiry guiding this investigation was articulated as follows: To what extent does perceived ease of use influence teachers' attitudes toward implementing ICT in Moroccan higher education? Based on the extant literature, the hypotheses are as follows: According to the null hypothesis, there is no significant influence of perceived ease of use and usefulness on teachers' attitudes toward ICT in Moroccan higher education. According to the alternative hypothesis, perceived ease of use and perceived usefulness significantly influence teachers' attitudes toward ICT in higher education.

Given the fundamental aim of gauging educators' propensity to embrace technology within their instructional methodologies, the subquestions were devised to discern the individual effects of perceived ease of use and perceived usefulness on teachers' attitudes: what are the perceptions of teachers in Moroccan higher education regarding the influence of ease of use on their attitude towards ICT? Based on previous literature, the following hypotheses are proposed: the null hypothesis: there is no significant effect of perceived ease of use on teachers' adoption of ICT. the alternative hypothesis: perceived ease of use significantly influenced teachers' adoption of ICT. To what extent does perceived usefulness affect teachers' attitudes toward its adoption and integration into their institutional practices? Drawing upon prior scholarly research, it is posited that the null hypothesis advances that perceived usefulness does not impact teachers' attitudes toward ICT; the alternative hypothesis assumes that perceived usefulness influences such attitudes.

Descriptive statistics

This study furnishes a succinct portrayal of findings derived from the examination of teachers' attitudes toward Information and Communication Technology (ICT), employing descriptive statistical methodologies. The outcomes delineated herein primarily concern the distributional attributes and central tendencies evident within the amassed dataset, serving as foundational insights into teachers' inclinations regarding ICT integration. The dataset encompasses responses garnered from educators, encompassing demographic inquiries in conjunction with queries on ICT attitudes. Moreover, the data analysis delves into the impact of perceived ease of use and perceived usefulness on teachers' perspectives regarding ICT adoption.

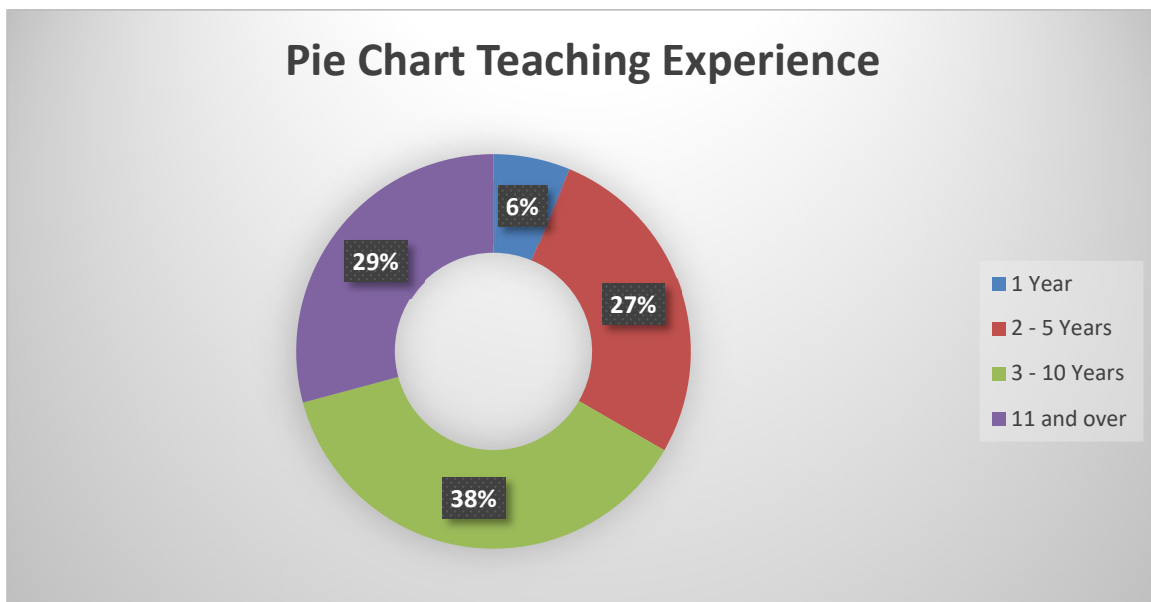


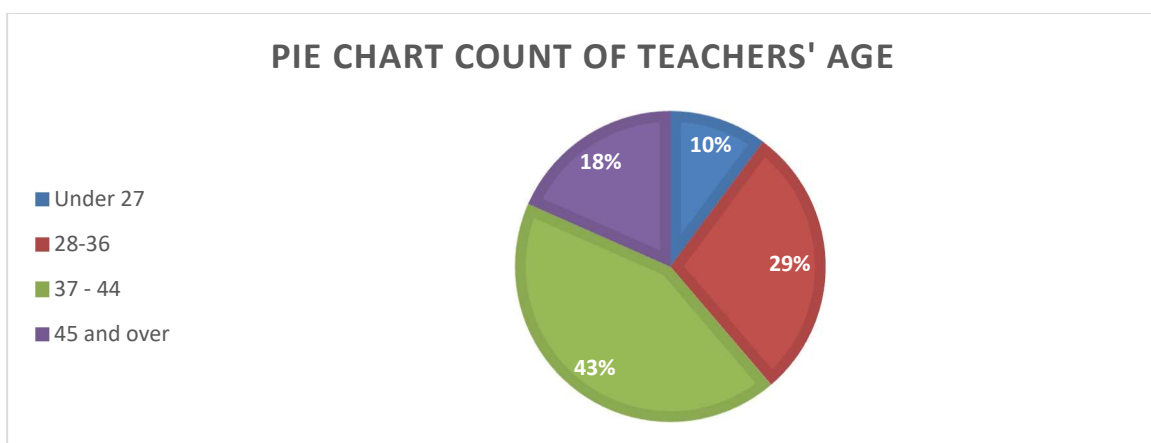
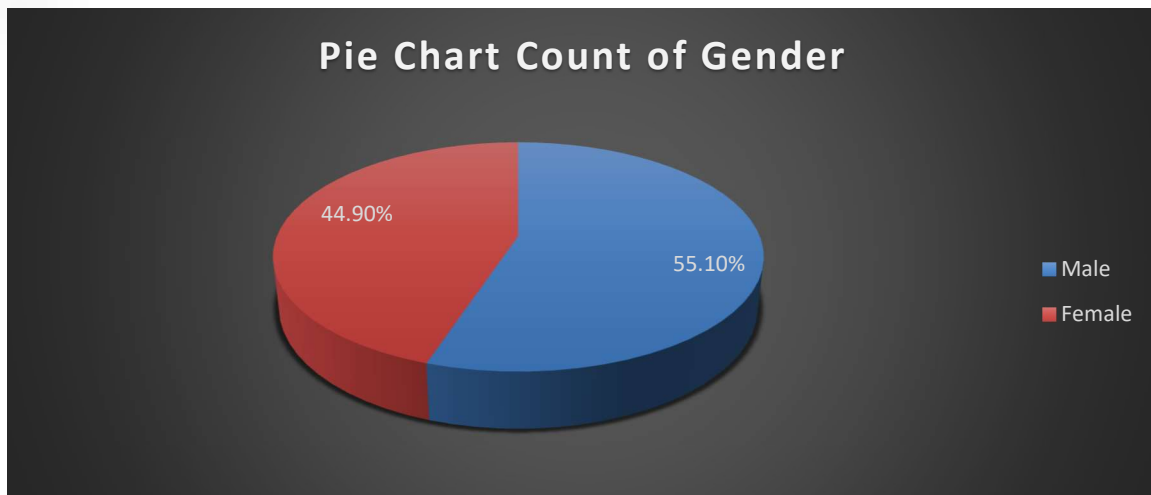
Sampling

The sample under investigation comprised data collected from 49 respondents, all of whom completed an online survey distributed through Google Forms. Notably, the participants were educators actively integrating information and communication technology into their instructional practices. To bolster response rates, the researcher employed email reminders to prompt professors to complete the survey questionnaire. It is pertinent to note that participation in the study was voluntary, and respondents did not receive any form of compensation.

Among the cohort of educators enlisted in this study, 49 individuals participated, with 22 self-identifying as females, constituting 49.9% of the total, and 27 identifying as males, comprising 55.1%, as illustrated in Figure 1 appended herewith. Regarding age demographics, a diverse range was observed; however, educators within the 37-44 age bracket emerged as the predominant demographic, accounting for 42.9% of the sample. Other age cohorts did not exhibit similar prominence.

Within the cohort of 49 teacher participants, an analysis of teaching experience revealed distinct patterns. Three individuals disclosed possessing a tenure of 1 year, representing approximately 6% of the total cohort. Furthermore, a demographic subset comprised of 13 participants demonstrated an experience range spanning from 2 to 5 years, constituting approximately 27.1% of the overall sample. Additionally, a distinct bracket consisting of 18 participants evidenced a teaching experience duration ranging from 6 to 10 years, accounting for approximately 37.5% of the total sample. Furthermore, 14 participants reported a teaching experience exceeding 11 years, representing the remaining segment of the cohort. This delineation offers a comprehensive portrayal of the distribution of teaching experience among the educators under investigation.





Inferential statistics

Survey responses

In contemporary society, the pervasive integration of information and communication technology (ICT) has exerted substantial influence across various spheres, encompassing daily life, education, and professional realms. Given the dynamic evolution of the digital landscape, discerning individuals' comfort levels with ICT assumes paramount importance in gauging their adaptability and proficiency in utilizing technological tools. Gender disparities in ICT usage and comfort have emerged as focal points within academic discourse, reflecting broader societal discrepancies in technology access and utilization. Exploring such gender differentials not only illuminates disparities in digital literacy but also informs endeavors aimed at fostering equitable access to and utilization of ICT resources.

Within this framework, examining the comfort levels with ICT among individuals of different genders offers significant analytical avenues for discerning potential gender-related variations in technological adeptness. In line with the aforementioned introduction, empirical analysis conducted on the comfort level of males and females with ICT presents a structured exploration of gender disparities in technological comfort.

In the sample comprising 49 participants, the mean comfort score for males was 1.90, contrasting with 1.23 for females. Moreover, the standard deviation for males, standing at



0.478, exceeded that of females (0.316), indicative of greater variability in comfort scores among males compared to their female counterparts.

A t-test was administered, yielding a statistic of 3.543 at a significance level of .001. The results indicate a statistically significant distinction in mean comfort scores between genders. This suggests that the observed variance in comfort levels is improbable to have arisen solely due to random chance. Furthermore, the 95% confidence interval, spanning from 0.88 to 0.245, was calculated. As this interval does not encompass zero, it implies a statistically significant distinction in mean comfort scores between males and females. The rejection of the null hypothesis, positing no disparity between genders regarding the comfort level variable, provides additional support for the conclusions drawn from the t-test analysis.

In summary, the analysis revealed that males exhibited a higher level of comfort with Information and Communication Technology (ICT) compared to females, as evidenced by their respective mean scores of 1.90 and 1.33.

Groups Statistics

ICT Comfort	N	Mean	Standard deviation	Average Standard error
Gender: 1 male	39	1.33	.478	.076
2 Female	10	1.90	.316	.100

Independent t-test

	Levene test for equality of variance					t-test for equality of means			
								95% confidence interval	
	F	Sig	t-test	DDL	Sig bilateral	Mean difference	Standard deviation	Inferior	Superior
Gender	16.998	.000	-3.543	47	.001	-.567	.160	-.888	-.245
Equal variance hypothesis									
Unequal variance hypothesis			-4.501	20.911	.000	-.567	.126	-.829	-.305

Regarding the examination of the relationship between age and interest in ICT, the null hypothesis assumed no significant association between these variables, implying their independence. Conversely, the alternative hypothesis proposed an association between them.



The researcher employed a chi-square statistic to assess the extent of deviation of observed frequencies from the expected frequencies under the assumption of independence.

Moreover, the chi-square statistic computed at 22.25, with a corresponding p-value of 0.75, suggested a lack of statistical significance in this association. Thus, the evidence derived from the analysis failed to convincingly support the notion of a relationship between age and interest in ICT.

Chi-square test

	Values	DDL	Asymptotic significance
Chi-square test	22.557	28	.755
Ratio	18.195	28	.921
Valid observations	49		

The final analysis targeted the examination of the potential correlation between the gender variable and the level of experience with Information and Communication Technology (ICT). The variable "experience with ICT" denotes a categorical measure representing the level of proficiency a teacher possesses in utilizing ICT tools and resources.

The sample comprised 49 respondents, where 1 denotes male and 2 denotes female. the data indicated that, on average, males score 6.22, and females score 6.44. Males have a standard deviation of 3.672, whereas females have a standard deviation of 4.018. the t-test statistic obtained is 0.376, with a significance level of 0.707. This high significance level implies that the observed difference in means between the genders is not statistically significant and does not appear to correlate with experience.

Groups Statistics

ICT Comfort	N	Mean	Standard deviation	Average Standard error
Experience: 1 male	27	6.22	3.672	.707
2 Female	22	6.64	4.018	.857



Independent t-test

	Levene test for equality of variance					t-test for equality of means			
								95% confidence interval	
	F	Sig	t-test	DDL	Sig bilateral	Mean difference	Standard deviation	Inferior	Superior
Experience	.109	.743	-.376	47	.708	-.414	1.100	-2.628	1.799
Equal variance hypothesis									
Unequal variance hypothesis			-.373	43.163	.711	-.414	1.111	-2.654	1.825

Discussion

The observed difference in average convert with ICT scores between genders shows that males on average scored higher and exhibited a smaller standard deviation compared to females. firstly, the higher average score among males suggests that they reported greater comfort with technology compared to their female counterparts. Additionally, the smaller standard deviation among males implies that there was less variability in their comfort with these new tools scores compared to females. besides, this may suggest a more consistent level of comfort among males potentially indicating that factors influencing comfort with ICT are more uniform and stable within the male group.

Concerning the potential relationship between teachers' age and their interest in information and communication technology the null hypothesis posited no significant association between age and interest in ICT, implying that the variables are independent. conversely, the alternative hypothesis suggested a correlation between age and interest in ICT. To test these hypotheses, a chi-square statistic was employed to measure the deviation of observed frequencies from the expected frequencies under the assumption of Independence between age and interest in ICT. The analysis yielded a chi-square statistic of 22.5 with a corresponding P-value of 0.755, indicating that the association between age and interest in ICT was not statistically significant.

Contrary to the alternative hypothesis the findings of the chi-square analysis don't provide convincing evidence to support a significant correlation between age and interest in ICT among teachers. the non-significant p-value suggests that the observed frequencies of age and interest in ICT do not deviate significantly from what would be expected under the assumption of Independence. while age alone may not directly correlate with interest in ICT, different generations of teachers may have distinct attitudes, experiences, and comfort levels with technology. when exploring factors beyond age, it becomes evident that individual characteristics such as prior experiences, personality traits, and professional motivations play pivotal roles in igniting teachers' interest in ICT. these elements encompass a diverse array of



personal attributes and experiences that profoundly shape teachers' attitudes and receptivity toward teaching technology integration into education.

The study aimed to examine the potential correlation between gender and the level of experience with ICT among teachers with a sample of 49 respondents, where the value 1 denotes male and 2 denotes female. the researcher sought to examine whether there existed a significant difference in ICT experience between male and female teachers. to assess this relation, descriptive statistics, including means, and standard deviation were calculated for both genders. Subsequently, an independent sample t-test was conducted to compare the mean scores of ICT experience between male and female teachers. the obtained t-test statistic and its corresponding significance level were used to determine the statistical significance of the observed difference in means.

Contrary to expectations, the analysis revealed that the observed difference in means scores of ICT experience between male and female teachers was not statistically significant. specifically, males scored an average of 6.22 with a standard deviation of 3.672, while females scored slightly higher on average with a mean of 6.64 and a standard deviation of 4.18. The t-test statistic obtained was 0.376, with a significance level of 0.707. The high significance level indicates that the observed difference in means between gender groups is not statistically meaningful suggesting that gender does not appear to correlate with the level of experience with ICT among teachers. These findings challenge the assumptions regarding gender differences in technology adoption and proficiency. This further implies that gender might not be a determining factor on its own in someone's level of skillfulness or experience with technology. The non-significant differences in ICT experience between male and female teachers underscore the importance of promoting inclusive and equitable approaches to technology integration in higher education.

In analyzing the challenges hindering the seamless integration of information and communication technology into educational contexts, Alberini (2006) identified a notable barrier: the deficiency in technology competence. This inadequacy has emerged as a primary obstacle impeding the effective utilization of ICT tools in teaching and learning environments. Furthermore, Alberini sheds light on related concerns emphasizing the significance of technology proficiency as a critical impediment to the broader incorporation of technology into the educational domain. These insights underscore the pivotal role of digital literacy and competency in shaping the successful integration of ICT into educational practices.

In the survey questionnaire assessing the readiness of the educational institution to integrate ICT, findings revealed a mixed response among educators regarding the sufficiency of their university infrastructure. Of the survey cohort, 14 teachers affirmed the presence of requisite infrastructure, representing 25.5%, whereas 35 respondents expressed a negative outlook, constituting 74.5% of the sample. these contrasting perspectives highlight the disparity in infrastructure Readiness within the Moroccan educational setting and emphasize the significance of addressing the infrastructure shortcomings to facilitate effective ICT integration.

When gauging the effectiveness of administrative assistance for ICT within the educational Institution, divergent perspectives emerged among the respondents, Out of the total surveyed participants, 20% expressed dissatisfaction with the prevailing level of support, representing 42.6% of the sample. Conversely, 27 respondents conveyed a positive perception, comprising 57.4% of the surveyed cohort. this distribution of responses underscores the Varian viewpoints regarding the effectiveness of administrative backing for ICT initiatives in educational settings.



Implications

The study delves beyond assessing administrative support for ICT, addressing nuanced intersections such as gender, age, and technology experience. Gender disparities highlight the necessity for targeted interventions to ensure equitable access for educators. Additionally, age correlates with interest in ICT, emphasizing the need for lifelong learning initiatives. The relationship between gender and ICT experience reveals potential barriers, necessitating proactive measures for inclusivity. These findings underscore a multifaceted approach to support ICT integration in education.

Limitations

While the study contributes to scholarly discourse, its non-experimental survey design limits the establishment of causative relationships. Reliance on self-reported data may introduce biases, potentially restricting generalizability. Future research should incorporate qualitative methodologies for deeper insights and consider contextual factors for broader applicability.

Future Research Recommendations

Utilizing mixed methods can enhance understanding and validity, providing a more comprehensive view of Moroccan teachers' attitudes. Exploring additional variables can offer insights into broader contexts and inform strategies for effective technology integration.

Conclusion

The study explores the relationship between Moroccan teachers' attitudes toward technology and various influencing factors. Positive attitudes are crucial for successful ICT implementation despite existing challenges. Gender disparities in technology comfort underscore the importance of equitable access and inclusive policies in higher education. Addressing these disparities fosters a conducive learning environment where all educators can thrive.



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