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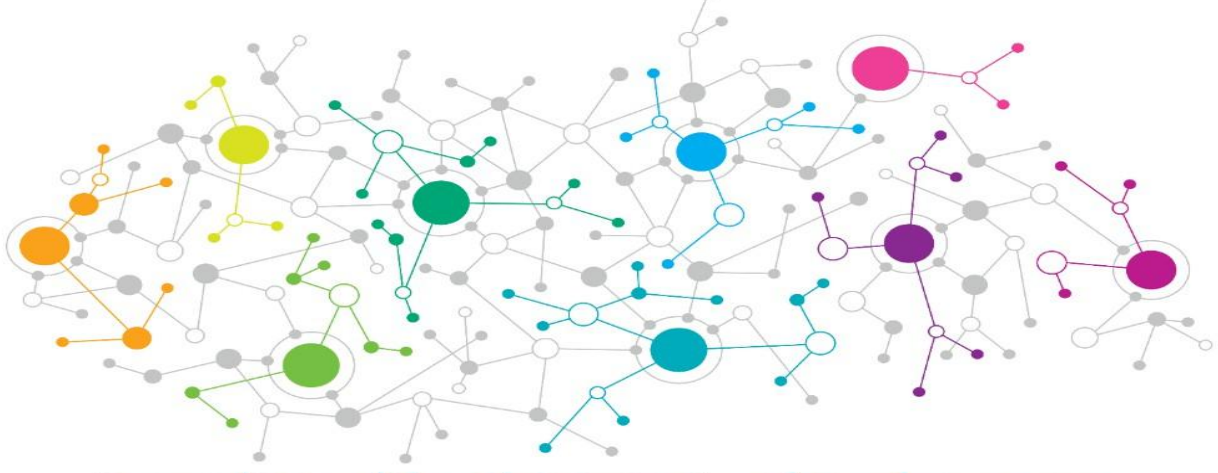
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Empowering Learners & Unlocking Their Potential

Unlocking the Potential of the Metaverse: Empowering Moroccan Teachers to Revolutionize Education through Emerging Technologies

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Abstract

This study investigates Moroccan teachers' perceptions of the Metaverse and virtual reality (VR) technologies within educational contexts, evaluating their potential to support pedagogical innovation and professional empowerment. Grounded in the Technology Acceptance Model (TAM), the research examines the extent to which perceived usefulness and perceived ease of use predict educators' intentions to adopt immersive technologies. A quantitative survey was conducted with 166 teachers from both public and private schools in the Fez-Meknes region, and the data were analysed using t-tests, ANOVA, and regression models. The findings confirm that both core TAM variables significantly influence adoption intentions, with notable variations across gender, institutional affiliation, and geographical location. Contrary to dominant assumptions in technology adoption literature, older and more experienced teachers reported higher perceived benefits, suggesting a reframing of technological engagement as a means of professional reassertion rather than remediation. While male and female teachers demonstrated comparable levels of perceived usefulness and readiness, female educators reported lower satisfaction, highlighting affective and contextual disparities that condition the experience of technological integration. Educators working in rural or under-resourced environments expressed greater enthusiasm for adopting immersive tools, indicating that such technologies may serve as a disruptive force in spatial and institutional hierarchies. These results suggest that empowerment emerges not from access

alone, but from the interaction between technological opportunity, professional identity, institutional support, and broader questions of systemic equity. This study contributes to a context-sensitive application of TAM within an underrepresented national setting. It underscores the need for professional development frameworks that prioritise teacher agency in the process of digital transformation.

Keywords: immersive learning, Moroccan teachers, Metaverse, virtual reality, technology acceptance model, teacher empowerment

Introduction

The Metaverse, as the most recent development in educational technology, introduces not merely an additional digital platform, but a fundamental reconfiguration of how teaching, learning, engagement, and spatiality may be conceptualised. Since the 1990s, with the emergence of personal computing, through the widespread availability of the internet in the 2000s, and the proliferation of smartphones throughout the 2010s, educational systems have undergone successive restructurings, each shaped by evolving technological affordances (Álvarez et al., 2024, Çengel & Yildiz, 2022, Dwivedi et al., 2022). The Metaverse may now represent the culmination of these developments, positioning itself as the next significant successor in this historical trajectory (Dwivedi et al., 2022). In addition, following the COVID-19 pandemic, which exposed significant limitations in conventional infrastructures and pedagogical models, institutional interest has increasingly turned towards virtual and immersive learning environments, particularly after Facebook's strategic rebranding as Meta, which refocused global discourse on virtual technologies (Bhavana & Vijayalakshmi, 2022, Çengel & Yildiz, 2022). Engagement with Metaverse-related technologies is no longer limited to speculative futures, as published research and emerging policy frameworks now address the educational implications of VR, AR, and Creative Reality, each of which presents distinct possibilities for pedagogical innovation. However, a critical question persists; do these technologies possess the capacity to empower educators, particularly in contexts such as Morocco, where persistent structural barriers, uneven access to digital tools, and limited institutional support continue to constrain opportunities for technological integration?

1.1. Background of the Study

Virtual environments have increasingly been theorised as spaces where theory and practice converge, offering not only simulation-based instruction but also participatory, student-centred

models of engagement that reduce dependency on physical infrastructure and enable differentiated learning pathways (Lee & Hwang, 2022). Among other things, these technologies permit teachers to create immersive scenarios, facilitate real-time interaction in multilingual and multicultural classrooms, and incorporate experiential learning within standard curricula. Yet, alongside these affordances, implementation is conditioned by the willingness and readiness of educators to adapt their pedagogical practices, a readiness that is neither natural nor spontaneous, but cultivated through ongoing exposure, training, and institutional support (Çengel & Yildiz, 2022). In Moroccan education, despite a growing interest in digital transformation, Metaverse technologies remain marginal in both discourse and practice. This disconnect between technological possibility and educational praxis signals a need to foreground the teacher not as a passive recipient of innovation but as a central agent whose perceptions, needs, and constraints must be understood if such tools are to be integrated meaningfully and sustainably.

1.2. Problem Statement

Despite increasing global investment in immersive education and sustained theoretical interest in the pedagogical affordances of such technologies, classrooms in Morocco, meanwhile, do not appear to have consistently engaged with or assessed the Metaverse or VR as international financing expands and theoretical interest in their educational potential continues. Without empirical data indicating how educators within the region perceive these tools, evaluate their pedagogical relevance, and interpret their practical applications, policy recommendations become either excessively ambitious or disconnected from local realities. For instance, although studies conducted globally have identified recurring variables influencing the adoption of educational technologies, these studies do not always account for the educational culture, infrastructural limitations, and linguistic diversity specific to Morocco. It is in this regard that when investigations fail to examine the contextual factors essential for successful implementation, the likelihood that such immersive technologies become instruments of professional empowerment for Moroccan educators is significantly reduced. Therefore, this research seeks to address this knowledge gap by assessing educators' perceptions and identifying the institutional conditions required to support the integration of these technologies across Moroccan classrooms.

1.3. The Purpose, Significance, and Scope of the Study

This article seeks to investigate the perceptions of teachers in Morocco regarding the use of Metaverse and VR technologies in the classroom, as features that promote professional empowerment, as an addition to the pedagogical arsenal, and as technologies that transform

historically entrenched dynamics of classroom engagement. This study is based on the Technology Acceptance Model (TAM), which holds that perceived usefulness and perceived ease of use are the most significant predictors of technology adoption (Davis, 1989), and compiles results from public and private school teachers to determine whether the theory is applicable in an otherwise under-researched country. Therefore, this study extends the theoretical applicability of TAM while it also produces findings specific to the needs of the Moroccan education system. In addition, it examines teachers' perceptions of institutionalised training and infrastructural assistance needed for proper integration, thereby recasting empowerment beyond a theoretical notion to a tangible one, dependent upon situational elements. By contributing to the national literature where a gap previously existed, this study both contributes to theoretical improvements to TAM and provides findings with strong potential for more contextually grounded and effective digital learning solutions.

1.4. The Research Questions and Hypotheses

The study is guided by the following research question:

- How do Moroccan teachers perceive the usefulness and ease of use of Metaverse and VR technologies in their instructional practices, and what institutional conditions support or hinder their adoption?

  From this question, two hypotheses are developed:

- H1: Moroccan teachers' perceived usefulness of Metaverse and VR technologies positively influences their intention to integrate them into teaching.

- H2: Moroccan teachers' perceived ease of use of Metaverse and VR technologies positively influences their intention to integrate them into teaching.

1.5. Structure of the Article

The remainder of the article is structured in four principal sections. The first offers a critical review of the literature, outlining both theoretical and empirical perspectives on immersive learning environments, with a focus on applications of TAM in educational settings. The second outlines the study's methodological framework, which adopts a quantitative approach to generate a detailed understanding of teacher perceptions. The third section presents and interprets the findings concerning both the TAM framework and the Moroccan context. The final section provides a conclusion, reflects on practical implications, addresses the study's limitations, and suggests directions for future research. The next section turns to the conceptual foundations of the study by situating it within broader scholarly discussions of immersive education, teacher agency, and technology acceptance.

Literature Review and Theoretical Framework

1.1. Empowerment through Immersive Pedagogies

As more immersive technologies become increasingly integrated into the instructional process, academic focus has shifted not only to potential student learning results but also to the empowerment of teachers. Where scarce resources and low levels of exposure to professional development can discourage the likelihood of innovation and creativity in teaching, contemporary use of Virtual Reality (VR) and Augmented Reality (AR) via Metaverse platforms has demonstrated transformative potential in how teachers can access, design, and deliver instruction. Few scholars have examined this transformative potential directly. As a case in point, Murala (2024), who systematically outlines these possibilities, argues for the pedagogic and structural potential of Metaverse-enabled classrooms and contends that teacher-student interaction can be reconceptualized in immersive modalities to promote flexibility and engagement. Yet, whereas the conclusions of the author are wide-ranging, they are based more on theoretical conjecture rather than primary research with data from participants and rely upon secondary literature to support claims about how teacher identity or agency can change without empirical evidence.

1.2. Professional Development and Teacher Readiness

A more practically focused approach comes from a 2022 study by Mystakidis et al., who, through their "Ready Teacher One" initiative, present a direct attempt to build teacher capacity for VR and AR integration through an online professional development framework. By prioritising the development of technological fluency and pedagogical confidence among educators, the initiative supports the argument that educational transformation is unattainable without adequate teacher training. However, it does not examine the long-term impact of such training on teaching efficacy or broader institutional transformation. Aithal and Aithal (2023) reinforce the importance of professional development by asserting that empowering educators necessitates the cultivation of adaptive digital pedagogies across instructional formats. However, their findings, which are derived from diverse online data sources, including generative AI tools, raise methodological concerns. Yet, the article remains significant for its theoretical emphasis on faculty autonomy as a prerequisite for meaningful innovation in technology-mediated education.

1.3. Systemic Constraints and Institutional Support

Certainly, much of the empirical research remains overwhelmingly student-focused, without consideration of the teacher perspective. For example, Gervasi et al. (2023) conduct a quasi-experimental, quantitative study to examine VR and AR implementation and find that learning

environments can transform with immersive technologies into co-created experiences filled with emotional investment for interest and engagement in learning, yet, the results position the teacher as a secondary agent, often empowered but not studied through an empirical lens. Similarly, Chua and Yu (2024) offer a conceptual discussion on ethical and pedagogical considerations to better understand immersive learning design, yet this article portrays the teacher as someone who operates the systems once designed, not someone who can lend situational awareness for knowledge generation or institutional change from within the field. The mere existence of the teacher in discourse surrounding VR/AR immersion is marginal and should be further investigated, particularly in situations where teacher agency might be at risk but still essential to efficacy in unstable, unempowered environments.

However, a number of studies offer preliminary insights into the factors influencing teacher engagement with Metaverse technologies. For example, earlier immersive experiences are identified by Lee and Hwang (2022) as a catalyst for preparedness and perceived competence among pre-service teachers. Similarly, Yakubova et al. (2022) highlight the importance of institutional support, technological infrastructure, and prior digital familiarity in enabling effective implementation. Collectively, these findings suggest that empowerment is not solely contingent on access to immersive tools but rather on the deliberate alignment between pedagogical intent, infrastructural capacity, and institutional backing. However, in the absence of longitudinal and context-specific research, particularly within under-resourced systems such as Morocco's, these insights remain difficult to generalise.

1.4. Theoretical Framing: The Relevance of TAM for Teacher Empowerment

Furthermore, although many studies employ user-centred evaluative tools, few are explicitly anchored in a theoretical model capable of explaining the attitudinal and behavioural dimensions of technology adoption. TAM offers a robust conceptual foundation for analysing how perceived usefulness and perceived ease of use shape users' acceptance of new technologies. While it has been widely validated across sectors, its application to teacher empowerment within immersive educational contexts remains limited. In particular, TAM has not yet been systematically applied to examine how educators in settings such as Morocco interpret and respond to emerging digital tools, nor has it been adapted to account for the distinctive forms of professional agency that immersive technologies may enable or inhibit.

This literature review has synthesised key empirical and theoretical contributions related to teacher empowerment through VR, AR, and Metaverse technologies. While the body of work encompasses a wide spectrum of insights, much of it prioritises student-centred outcomes or theoretical possibilities over sustained inquiry into teachers' perspectives and capacities. To

consolidate and evaluate these diverse contributions to the present study, Table 1 offers a thematic overview of the key sources discussed, identifying their core focus, major contributions, and critical limitations. This table does not serve as a synthesis of consensus, but rather as a critical mapping of the scholarly field in which the current research is situated.

Table 1

Overview of Reviewed Studies

Study	Focus	Key Contribution	Identified Limitations
Murala (2024)	Immersive pedagogies and teacher-student interaction	Conceptual mapping of Metaverse affordances in reshaping classroom engagement	Theoretical synthesis only, lacks empirical evidence on teacher empowerment
Mystakidis et al. (2021)	Professional development via VR training	Practical implementation of teacher training model, emphasis on technological fluency and confidence	No longitudinal evaluation of training outcomes or systemic institutional effects
Aithal & Aithal (2023)	Adaptive digital pedagogies and faculty autonomy	Advocates for pedagogical adaptability and teacher agency within emerging tech environments	Methodologically opaque, relies on online and AI-generated data without empirical triangulation
Gervasi et al. (2023)	Student engagement through immersive technologies	Quantitative data showing increased student motivation using VR/AR	Focus exclusively on students, teachers remain analytically peripheral
Yu (2024)	Design ethics and pedagogical principles in VR/Metaverse	Conceptual framework for ethical design of immersive environments	Treats teachers as passive users, lacks analysis of teacher-driven transformation
Lee & Hwang (2022)	Pre-service teacher readiness through experiential VR exposure	Highlights experiential learning as key factor in building confidence and competence	Context-specific findings, not generalisable across diverse educational systems
Yakubova et al. (2021), Jansen (2020)	Institutional support and infrastructural prerequisites	Emphasise the enabling role of resources, infrastructure, and prior knowledge	Absence of longitudinal studies, limited focus on agency or empowerment in under-resourced settings
Davis (1989)	TAM	Foundational model linking perceived usefulness and ease of use to technology adoption	Not yet fully adapted to immersive educational contexts or linked directly to teacher empowerment

The findings suggest that while immersive technologies are frequently positioned as transformative, their actual impact on teacher empowerment is mediated by multiple interrelated factors, including professional development opportunities, institutional infrastructure, prior experience, and pedagogical orientation. The recurrent marginalisation of

educators in many of these studies underscores the necessity of more theoretically grounded, empirically informed, and contextually relevant investigations. In Morocco, where digital environments and levels of professional empowerment remain inconsistent, the opportunity to determine whether immersive technologies can foster transformative pedagogical practices rather than merely reinforce existing instructional models is particularly timely.

Thus, this research seeks to bridge the gap between theoretical frameworks and empirical findings by employing the TAM model to evaluate Moroccan educators' perceptions of VR and Metaverse technologies in practical application, and to determine the correlation between these perceptions and their sense of professional empowerment. The next chapter outlines the study's methodology, including the research context, instruments for data collection, and analytical procedures employed.

Methodology

1.1. Research Design

This study employed a quantitative research design to examine Moroccan teachers' perceptions and readiness for the implementation of immersive technologies, particularly VR and Metaverse tools. The design was cross-sectional, as data were collected at a single point in time to capture prevailing attitudes across demographic categories. Given its use of structured instruments to measure attitudes and investigate relationships among variables, the study is also classified as survey-based and correlational.

1.2. Sampling Procedure

A total of 166 participants were recruited from public and private schools in the Fez-Meknes region of Morocco. The sampling strategy combined snowball and purposive techniques. Snowball sampling enabled access through peer referral, while purposive sampling ensured the inclusion of individuals with specific characteristics, namely, English proficiency and active teaching status. Teachers were identified through targeted searches on social media platforms, particularly Facebook, and contacted via Messenger, WhatsApp, and email.

1.3. Inclusion and Exclusion Criteria

Participants were eligible if they were currently practising teachers within Moroccan public or private institutions and were proficient in reading English. Individuals were excluded if they were unable to comprehend the questionnaire due to linguistic limitations or declined to provide informed consent.

1.4. Questionnaire Development

The instrument used to collect quantitative data was adapted from a scale developed by Çengel and Yildiz (2022), which assesses teachers' attitudes toward Metaverse integration. The scale includes three dimensions: Perceived Benefit, Readiness, and Satisfaction. Developed in Turkey, a country with a socioeconomic profile comparable to Morocco, and designed for a teacher-focused context, the scale was deemed suitable with minimal adaptation, limited to the inclusion of demographic questions.

1.5. Ethical Considerations

All participants received a consent form outlining the study's aims, defining key terms such as "Metaverse," and explaining measures taken to ensure anonymity and confidentiality. No personally identifiable data, including email addresses or IP information, were collected or retained.

1.6. Data Analysis

Quantitative data were first coded in Microsoft Excel and subsequently analysed using SPSS 27. Statistical procedures included t-tests and ANOVA to assess gender- and institution-based differences, as well as regression analyses to examine the strength of relationships among variables. Descriptive statistics were used to characterise the sample.

1.7. Validity and Reliability

Internal consistency of the instrument was assessed using Cronbach's alpha, yielding the following results: Perceived Benefit (.963), Readiness (.644), and Satisfaction (.776). Exploratory and Confirmatory Factor Analyses confirmed the reliability of the construct measures.

Findings

1.1. Descriptive Statistics

A total of 166 participants completed the survey. The modal age among respondents was 26 years (n = 56, 33.7%), followed by 29 years (n = 24, 14.5%), with other age groups each constituting less than 10% of the sample. Gender distribution showed a slight imbalance, with 53% female and 47% male teachers. Regarding institutional affiliation, 63.9% of participants were employed in public schools, while 36.1% taught in private institutions. A significant majority of respondents (77.7%) worked in urban areas, compared to 22.3% based in rural locations. Teaching experience ranged from 1 to 23 years. The modal teaching experience was 2 years (n = 45, 27.1%), followed by 1 year (12%). A graph (Figure 1) summarising these descriptive results is presented below.

Figure 1
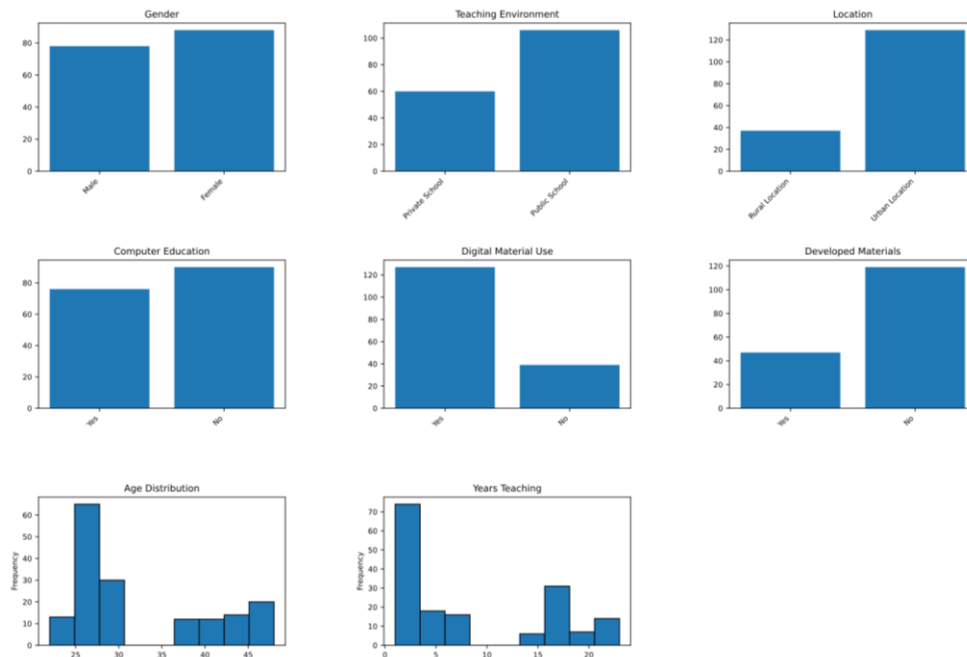
1.2. Inferential Statistics

This section presents inferential analyses conducted to determine whether Moroccan teachers' perceptions of Metaverse and VR technologies differed by gender, school type, location, age, and teaching experience. Independent samples t-tests and one-way ANOVA were used to assess group differences in the dimensions of perceived benefit, readiness, and satisfaction.

1.2.1. *Independent samples t-tests*

1.2.1.1. *Gender Differences*

No significant differences were observed between male and female teachers in perceived benefit ($t(164) = -.021$, $p = .983$) or readiness ($t(164) = .485$, $p = .628$). However, a significant difference emerged in satisfaction, with female teachers reporting lower satisfaction than their male counterparts ($t(164) = 5.517$, $p < .001$).

1.2.1.2. *Differences by School Type*

Significant differences were found between public and private school teachers. Those in public schools reported higher perceived benefits ($t(164) = -2.204$, $p = .029$), but lower readiness ($t(164) = 4.442$, $p < .001$) and lower satisfaction ($t(164) = 3.432$, $p = .001$) than teachers in private schools.

1.2.1.3. *Differences by Location*

Teachers in rural areas reported significantly higher perceived benefits ($t(164) = 4.849$, $p < .001$) and greater satisfaction ($t(164) = 2.607$, $p = .010$) compared to their urban counterparts. No statistically significant difference was found in readiness ($t(164) = 1.214$, $p = .227$).

Figure 2

Metaverse and VR Perceptions by Demographic Factors
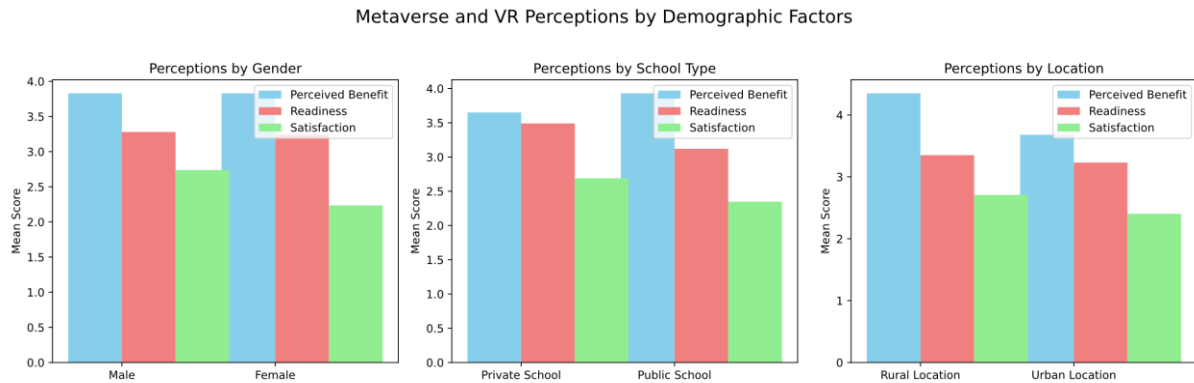
1.2.2. Linear Regression Analysis Results for Age and Yeas of Teaching
1.2.2.1. Perceived Benefit Dimension

Both age and teaching experience were significant predictors of perceived benefit. Years of teaching showed a moderate positive correlation with perceived benefit ($\beta = .523$, $p < .001$), explaining 27.4% of the variance ($R^2 = .274$). Age was also a significant predictor ($\beta = .472$, $p < .001$), accounting for 22.3% of the variance ($R^2 = .223$). These results indicate that older and more experienced teachers perceive greater benefit in adopting Metaverse technologies.

1.2.2.2. Readiness Dimension

Neither age nor years of teaching significantly predicted readiness. The regression model for age showed minimal explanatory power ($R^2 = .004$, $F(1, 164) = .264$, $p = .608$), and the model for teaching experience was similarly non-significant ($R^2 = .005$, $F(1, 164) = .265$, $p = .388$). These findings suggest that readiness to adopt immersive technologies is independent of age and teaching tenure.

1.2.2.3. Satisfaction Dimension

Age and teaching experience were also non-significant predictors of satisfaction. A weak negative trend was observed for years of teaching ($\beta = -.120$, $p = .122$), though the model did not reach statistical significance ($R^2 = .014$). Age likewise failed to significantly predict satisfaction ($p = .378$). These results imply that other contextual or institutional factors may play a more decisive role in shaping satisfaction levels.

To illustrate the comparative explanatory power of age and teaching experience for each dimension, Figure 3 presents a bar graph based on the R^2 values derived from the regression

analyses. The visualisation highlights the extent to which each predictor accounts for variance in perceived benefit, readiness, and satisfaction.

Predictive strength (R^2 values) of age and teaching experience on three dimensions of Metaverse adoption. Teaching experience had the strongest predictive value for perceived benefit, while other relationships were weak or non-significant.

Figure 3
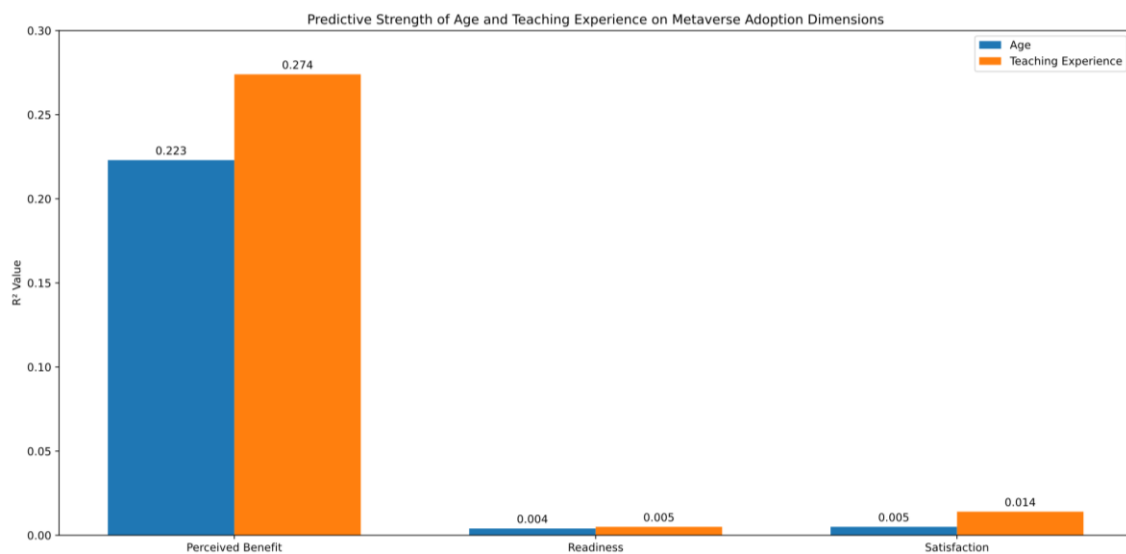
Discussion - Interrogating the Promises of the Metaverse: Perceived Usefulness as an Agentive Catalyst

In addressing how Moroccan educators perceive the usefulness and ease of use of Metaverse and VR technologies in instructional contexts, alongside the institutional conditions that facilitate or hinder adoption, it becomes evident that the intersection of digital innovation and teacher empowerment cannot be captured through reductionist narratives. Rather than affirming technological integration as a linear trajectory of either inevitable progress or insurmountable disruption, the findings invite a situated and dialectical analysis, one that foregrounds the lived pedagogical realities of teachers in Morocco and interrogates the institutional asymmetries, professional histories, and epistemic assumptions that shape their digital engagements. TAM, while effective in predicting behavioural intention based on perceived usefulness and ease of use, remains analytically insufficient in isolation. Its utility is enhanced when contextualised within broader conversations on agency, structural inequality, and professional autonomy, particularly in systems historically shaped by educational centralisation and socio-technical stratification.

1.1. Usability and the Problem of Technical Mediation

The empirical confirmation of both core hypotheses—that perceived usefulness and ease of use predict teachers' intention to adopt immersive tools—supports TAM's foundational assumptions. However, this confirmation quickly becomes unstable when these constructs are interpreted within the Moroccan context, where entrenched institutional norms, gender dynamics, and infrastructural disparities mediate all forms of technological uptake. As such, empowerment cannot be understood as a motivational abstraction, but must be framed relationally: as the capacity to renegotiate professional identity, resist systemic marginalisation, and generate new pedagogical possibilities within and against dominant models of instructional practice.

The theoretical implications relative to the second hypothesis—that age predicts perceived usefulness—disrupt the extant literature surrounding technology adoption, which promotes younger, innovative teachers as more conducive to a 21st-century classroom. For a country like Morocco that privileges discourse surrounding the need for technological advancement to the point where experience must give way to novelty, the fact that older teachers deem VR and the Metaverse useful suggests that years of experience in quasi- and effectively regulated systems does not hinder their ability to penetrate new spaces, but rather, empowers them to reclaim their value. Their need to penetrate VR spaces and Metaverse applications is not because they have fallen behind relative to younger teachers, but because they want to redefine established roles they know and have long practiced. Thus, their attainment of such tools legitimizes efforts to re-stimulate engagement within a regulated, exam-based system for them and their students; it is not for compliance purposes, as Aithal and Aithal (2023) suggest that empowerment is equity of teaching practice over technological access.

This recuperative account stands in contrast to the gendered satisfaction gap. Male and female teachers report similar perceived advances and perceived preparedness; however, female teachers' satisfaction is significantly lower. Satisfaction—the positive, affective response to one's experience with technology—is correlated not only to the ease of use of the tool employed but also to the professional environment in which it is used. The results suggest that women possess the same cognitive attributes and technological access as men but, instead, have institutionalized and socio-relational conditions that render negative affective responses. Thus, for example, feminist analyses of educational technology, such as Mystakidis et al. (2021), argue that empowerment must extend beyond access and include attention to the gendered structures that shape professional recognition. Where male teachers feel empowered by VR

implementation in the classroom, for female teachers, it may be just one more facet of their work going unacknowledged and challenged authority.

1.2. Attitudes, Intentions, and the Performance of Agency

The higher levels of perceived benefit, readiness, and satisfaction among public school teachers challenge a common assumption: that private institutions, typically better resourced, are inherently more conducive to digital innovation. The findings reveal that the desire for technological transformation is most acute in under-resourced environments. In overcrowded public schools with outdated curricula and diminished morale, immersive technologies are not simply enhancements but disruptions to stagnant conditions. Teachers in these contexts view VR not as a novelty but as a means to reclaim agency over pedagogical space and content. Murala's (2024) assertion that Metaverse environments can reconfigure classroom dynamics finds empirical support here, though unlike Murala's speculative optimism, these findings are rooted in the expressed perspectives of educators themselves. This suggests that digital transformation is not driven by access alone, but by a demand for pedagogical reinvention in settings marked by systemic neglect.

1.3. Empowerment as Situated Readiness: The Emergence of a Reflexive Pedagogical Ethos

This assertion of agency is further accentuated in the rural-urban divide. Despite facing greater infrastructural limitations, teachers in rural and semi-rural locations throughout the region of Fez-Meknes reported much higher perceived benefit in comparison to their urban counterparts. The same significance was also observed concerning the satisfaction dimension. Such results necessitate a reorientation of analytical focus away from urban centres and toward peripheral regions, where the stakes of empowerment are often more existential. For rural educators, the Metaverse represents more than a digital platform; it becomes a counter-hegemonic resource capable of disrupting the spatial hierarchies that govern educational opportunity. Their enthusiasm stems not from a desire to "catch up" but from an imperative to challenge their historical marginalisation within national education policy. Here, empowerment is not about acquiring tools, but about reframing professional identity, from spatial subordination to epistemic centrality. This interpretation resonates with Yakubova et al. (2021), who argue that institutional support must be conceptualised not only in technical terms but also as a form of symbolic inclusion and recognition.

Thus, while the findings affirm TAM's core principles, that perceived usefulness and ease of use inform behavioural intention, they simultaneously demand a more expansive and critical articulation of these constructs. Usefulness must be understood not only in terms of operational functionality, but also through its symbolic, affective, and institutional significance. Similarly,

ease of use must go beyond technical interface simplicity to include factors such as professional confidence, pedagogical alignment, and institutional support. Yu's (2024) ethical reflections on immersive technology design are particularly relevant in this regard, as they advocate for the teacher's role not as a passive end-user, but as an active co-designer of educational futures. In this light, empowerment is not a product of TAM's variables, but a precondition for their meaningful realisation.

Implications, Recommendations and Conclusions

These findings highlight the critical necessity of professional development programmes that extend beyond instrumental models of technological training and instead prioritise the cultivation of reflective digital pedagogies, where perceived usefulness becomes a site of professional empowerment. Policymakers and institutional stakeholders should commit to the co-development of Metaverse-integrated curricula in active partnership with teachers, ensuring that such innovations are not externally imposed, but rather contextually justified by those directly responsible for their implementation. Educational institutions must also recognise that while ease of use facilitates initial uptake, it is insufficient on its own to sustain integration. Infrastructural support, sustained mentorship, and access to collaborative spaces for pedagogical design are equally essential.

Crucially, the Metaverse should not be framed as a pre-packaged solution to an undefined educational problem, but rather as a flexible pedagogical environment whose legitimacy must be validated by the educators who inhabit and shape it.

Ultimately, the empowerment of Moroccan teachers through VR and Metaverse technologies cannot be reduced to intentions or adoption metrics. It is a contextualised and contested process, shaped by generational location, gendered expectations, institutional affiliation, and spatial inequities. These technologies do not inherently empower educators; rather, they become sites of empowerment only when embedded within professional cultures and pedagogical practices that affirm agency, support critical engagement, and recognise innovation not as a technical fix, but as a relational and transformative act.

The findings of this study affirm that Moroccan educators are not passive recipients of innovation but active negotiators of its significance, crafting not merely new instructional strategies but professional identities attuned to the socio-political conditions in which they work. Empowerment, therefore, must be understood not as a promise delivered by digital advancement, but as a praxis that emerges from the friction between aspiration and constraint.

Limitations & Directions for Future Research

Although the study employed a rigorous quantitative methodology, it was constrained by its reliance on self-reported data, which may not fully capture the complexities of classroom contexts or the embodied tensions associated with integrating unfamiliar technologies. The exclusive reliance on the TAM framework, while theoretically defensible, may have excluded consideration of sociocultural, interpersonal, and institutional variables that mediate the experience of technology adoption.

Future research should adopt qualitative or ethnographic approaches to investigate how perceived usefulness and empowerment are negotiated in everyday practice, particularly across rural-urban divides, gendered professional environments, and varying instructional contexts such as language teaching versus general education. Additionally, longitudinal studies are needed to assess how initial perceptions evolve into sustained pedagogical use or transformative innovation over time.

Acknowledgements

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A dedicated Ph.D. student at Sidi Mohamed Ben Abdellah University (Fez, Morocco), Faculty of Letters and Human Sciences Dhar Elmehraz, Nouh holds a Master of Arts in International Studies & Diplomacy from Al Akhawayn University in Ifrane. This academic background has provided a strong foundation in international relations, diplomacy, and research methodologies. With a passion for critical theory, neoliberalism, the political economy of higher education, and the role of technology in empowering learners and educators, Nouh is committed to contributing to the academic community through rigorous inquiry and scholarly discourse.

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