

Engagement, Motivation, and Involvement in Hybrid Learning: A Qualitative Investigation in Tunisian Universities

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ABSTRACT

This article examines how students perceive hybrid learning environments in higher education and which factors influence their engagement, motivation, and sense of belonging. The originality of this study lies in its qualitative approach focused on students' experiences and its exploration of the specific context of higher education in Tunisia, integrating the cognitive, emotional, and behavioral dimensions of engagement. Thirteen semi-structured interviews were conducted with master's students at ISCAE Manouba and ENIT Tunis. The results highlight that the effectiveness of hybrid learning relies on a balance between flexibility and pedagogical interactions: distance learning promotes autonomy and personal organization, while face-to-face sessions support group dynamics and learning consistency. Intrinsic motivation, content quality, and sense of belonging emerge as key drivers of engagement. This study enriches the existing literature by identifying often overlooked contextual variables, such as content design, pedagogical stance, and temporal regulation. Practically, it provides recommendations to optimize hybrid learning environments by fostering social interaction, reducing isolation, and providing valuable insights to guide pedagogical interventions.

Keywords: Hybrid learning, Student engagement, Intrinsic motivation, Flexible learning, Quality of content.

INTRODUCTION

Hybrid learning has become a central topic in discussions on the evolution of higher education, particularly in Tunisia, following the COVID-19 pandemic. The health crisis exposed the limitations of traditional instructional models and accelerated the shift toward digital and mixed learning environments. In this context, universities were compelled to adopt online modalities to ensure pedagogical continuity, revealing disparities in technological access and uneven student readiness. Hybrid learning combining face-to-face and online instruction thus emerged as a strategic response to current constraints and diverse learner profiles.

As higher education increasingly adopts mixed learning formats, student engagement within hybrid environments has become a major concern. While the literature acknowledges the potential benefits of hybridization, it also highlights persistent challenges, including unequal access to digital resources, risks of reduced interaction, and the need for pedagogical adaptation. Understanding how students perceive these modalities is essential for identifying the conditions that support effective participation and learning.

The theoretical foundation of this study draws on research showing that hybrid learning promotes continuity, supports diverse learning approaches, and reinforces engagement when accompanied by structured guidance and high-quality instructional materials (Garrison & Kanuka, 2004; Bernard et al., 2009; Laurillard, 2012).

These models emphasize that while hybrid environments offer opportunities for flexibility and self-regulated learning, their success relies on consistent institutional support, meaningful interactions, and the relevance of digital resources. Student engagement further depends on motivational dynamics, particularly the fulfillment of autonomy, competence, and social connection needs as articulated in self-determination theory (Deci & Ryan, 1985).

In the Tunisian context, these dynamics are shaped by specific cultural and institutional constraints, making it crucial to analyze how students experience hybrid learning in practice.

This study therefore seeks to identify the factors that influence learners' motivation, sense of belonging, and engagement within hybrid modalities.

This leads to the following research question:

How do students perceive hybrid higher education modalities in Tunisia, and which factors influence their engagement, motivation, and sense of belonging in these mixed learning environments?

Objectives

This study aims to analyze students' perceptions of hybrid education in universities and to identify the factors influencing their engagement, motivation, and sense of belonging within these mixed pedagogical formats.

METHODOLOGY

Sampling Strategy and Participants

This qualitative study relied on purposeful sampling, a strategy commonly used in exploratory research to select participants able to provide rich and relevant insights. Thirteen master's students enrolled at ISCAE Manouba and ENIT Tunis were recruited. The selection of these two institutions was justified by their differing pedagogical environments, allowing the study to capture diverse experiences while maintaining a relatively homogeneous academic level.

Participants were recruited on a voluntary basis, following a call for participation disseminated in class groups. Inclusion criteria required participants to (1) be enrolled in a master's program, (2) have experienced at least two different learning modalities (in-person, digital, hybrid), and (3) consent to participate in an individual interview.

Interview Procedures

Each participant took part in a single semi-structured individual interview. To ensure consistency, interviews lasted between 18 and 25 minutes, with an average duration of approximately 20 minutes. This range allowed for sufficient depth while minimizing participant fatigue.

An interview guide comprising twenty open-ended questions was developed beforehand. It covered themes such as time management, perceived flexibility, pedagogical and social interactions, cognitive engagement, technological access, and general perceptions of different learning modalities. While the guide ensured comparability across interviews, participants were encouraged to elaborate freely on their experiences.

Interviews were conducted either in-person or online via videoconferencing, depending on participants' availability and logistical constraints. This dual modality also provided the opportunity to observe communicational dynamics in both environments. All interviews were fully documented and transcribed verbatim.

Data Analysis

Data were analyzed using thematic analysis, following Braun and Clarke's (2006) six-phase framework:

1. Familiarization with the data through repeated readings of the transcripts.
2. Initial coding by identifying meaningful units related to experiences, perceptions, and challenges of hybrid learning.

3. Searching for themes by grouping codes into preliminary categories (e.g., flexibility, time management, pedagogical quality, technological constraints).
4. Reviewing themes **to** ensure coherence within themes and distinction between them.
5. Defining and naming themes, leading to refined conceptual categories.
6. Producing the report, integrating theoretical insights and participant narratives.

Reliability and Researcher Reflexivity

To enhance analytical reliability, a double-coding procedure was applied: 30% of the transcripts were coded independently by a second researcher, and discrepancies were discussed until consensus was reached. An audit trail documenting coding decisions and theme revisions was maintained.

The researcher also engaged in a reflexive process, noting potential biases related to prior experience with hybrid teaching environments. Reflexive memos were used throughout the analysis to ensure transparency and minimize interpretive bias.

Ethical Considerations

The study complied with the ethical standards required for qualitative research in social sciences. Participants were informed about the objectives of the study, the voluntary nature of their participation, and the confidentiality of their responses. **Written informed consent was obtained** from all participants. No identifying information was collected.

This research did not require formal approval from an institutional ethics committee, in accordance with national regulations for non-clinical and non-interventional studies.

RESULTS

Information was gathered through guided interviews conducted with thirteen master's students enrolled at ISCAE Manouba and ENIT Tunis. Each participant responded to an interview guide comprising twenty questions during a single session, with an average duration of approximately twenty minutes, conducted either in-person or online depending on availability.

The reporting of the results focuses **exclusively on raw data** and emerging themes, without interpretation, in accordance with qualitative research best practices. Participants' responses were grouped into major thematic categories, illustrated with representative excerpts from the interviews.

1. Importance of In-Person Interactions

- Participants emphasized the richness of face-to-face engagement.
- Representative quotes:
 - “I can't replace the interaction with the teacher in person. The drawback of online learning is that one can become distracted and lose engagement with the course and the educator.”
 - “In in-person classes, we can benefit from direct contact with the teacher: eye contact and physical presence. Online, the teacher is limited to reading the slides.”
 - “Direct interaction with others and the active environment favors in-person learning compared to online learning.”

2. Flexibility of Online Learning as a Driver of Autonomy

- Online and hybrid formats were valued for flexibility in time and location.
- Representative quotes:
 - “En ligne, je peux revoir les vidéos, prendre mon temps, et organiser mes révisions comme je veux.”
 - “Online learning allows me to attend classes even when I am sick or traveling.”
 - “It is more flexible, but sometimes I feel alone and find it difficult to stay motivated.”
 - “Autonomy is an advantage, but one needs to be highly disciplined to avoid disengagement.”

3. Central Role of Personal Motivation

- Students highlighted intrinsic motivation as key to learning, independent of the instructional format.
- Representative quotes:
 - “If I am motivated, I can learn even on my own. But without motivation, even in face-to-face settings, I disengage.”
 - “What matters is my desire to learn. The format helps, but it doesn’t do everything.”
 - “When the topic interests me, I invest myself, regardless of whether it is online or in class.”

4. Importance of Institutional Framework and Regularity

- Students noted the need for temporal and spatial structure to maintain engagement.
- Representative quotes:
 - “In face-to-face classes, I am obliged to attend, which helps me maintain my rhythm.”
 - “Online, it’s easy to procrastinate if you don’t have a strict schedule.”
 - “I need a framework; otherwise, I quickly get overwhelmed.”

5. Perceived Quality of Content and Learning Materials

- The clarity, interactivity, and structure of learning materials were highlighted as crucial for engagement.
- Representative quotes:
 - “Well-produced videos with examples help me a lot.”
 - “Online, the materials need to be clear, otherwise it’s easy to get lost.”
 - “I like when there are quizzes or activities; it makes the course more engaging.”

6. Sense of Belonging and Group Dynamics

- Connection to peers and instructors was seen as essential for motivation and persistence.
- Representative quotes:
 - “In class, we discuss with others, which creates a positive atmosphere.”

- “Online, I sometimes feel isolated, as if I am alone in front of the screen.”
- “Group work helps me stay motivated, even remotely.”

Table 1: Study Participants and Data Collection Details

Element	Description
Population	Master's students, 13 participants
Selection criteria	Students enrolled at University of Manouba and ENIT
Data collection type	Semi-structured interview
Frequency	One interview per participant
Tools used	Interview guide with 20 questions
Data collection method	Online and in-person
Average duration	Approximately 20 minutes per interview
Data analysis	Thematic analysis

This research employed a qualitative methodology to explore students' perceptions, experiences, and feelings regarding hybrid learning..

This approach proved particularly suitable for exploring complex phenomena that are difficult to quantify and for capturing the subjective perspectives of respondents (Paillé & Muccielli, 2012). Qualitative research thus facilitates a rich, contextualized understanding, allowing for the identification of nuances and dynamics inherent in the student experience within an evolving educational landscape.

The study sample comprised thirteen students attending two Tunisian universities: the University of Manouba and the National Engineering School of Tunis (ENIT). These institutions were chosen for their disciplinary diversity and participation in the relevant learning arrangements, thereby ensuring broader representativeness of Tunisian university contexts. This purposive selection followed the principle of theoretical saturation, aiming to gather data that were sufficiently varied and rich to respond to the research objectives.

Information was gathered using guided interviews, a widely employed qualitative method that enables participants to share their perspectives while steering the discussion toward the study's key thematic areas. This approach ensures both flexibility in participants' responses and consistency in the data collection process. Each interview lasted between [to be completed, 20 and 40 minutes] and was audio-recorded with prior informed consent, in accordance with prevailing ethical standards. The recordings were then documented in full to allow for a comprehensive examination of the participants' responses.

The collected information was examined using a thematic analysis method (Braun & Clarke, 2006).which involves identifying, analyzing, and reporting recurrent patterns within qualitative data. Manual coding of the verbatim transcripts was performed using a combination of inductive (emergent categories from the data) and deductive (anchored in pre-established theoretical dimensions) approaches. This dual strategy enabled the identification of relevant themes

While remaining aligned with the conceptual framework. The methodology ensures the rigor and validity of interpretations while maintaining a solid empirical foundation.

This approach enabled the extraction of rich and nuanced insights, while maintaining the empirical grounding of the students' narratives. It offers a more comprehensive view of the challenges and dynamics related to hybrid education in the Tunisian university context.

Moreover, hybrid learning is characterized by temporal flexibility, which represents a major advantage for students, allowing them to organize their studies more autonomously and in alignment with their personal and professional constraints. This flexibility in time management provides greater freedom in scheduling, facilitating a better integration of academic responsibilities with other aspects of daily life. Consequently, this temporal flexibility becomes a significant motivational lever, as it enables learners to effectively balance their studies with additional commitments, whether professional, familial, or related to personal projects. In this way, students can enhance their sense of purpose, achievement, and personal development—factors that are essential for sustained engagement and academic success.

DISCUSSION

1. Value of In-Person Interactions

The results highlight that students perceive face-to-face interactions as essential for learning. These interactions foster both verbal and non-verbal communication, enhancing engagement, attention, and comprehension. This finding aligns with the literature emphasizing the pedagogical benefits of in-person instruction (Tinto, 1997; Chickering & Gamson, 1987), particularly for fostering relational closeness and a sense of belonging within the academic community. The students' verbatim statements suggest that in-person learning remains irreplaceable for maintaining motivation and active participation

2. Flexibility of Online Learning as a Driver of Autonomy

Students consistently appreciated the temporal and spatial flexibility offered by online learning, which allows for self-paced study and better integration of academic, professional, and personal responsibilities. This autonomy supports self-directed learning, confirming prior research on hybrid learning environments (Allen & Seaman, 2016; Hrastinski, 2008). Nevertheless, the data indicate an ambivalent perception: while flexibility enables personalized learning, it can also lead to feelings of isolation and reduced engagement, especially without structured support mechanisms. This underscores the importance of balancing autonomy with guidance in hybrid education.

3. The Central Role of Personal Motivation

The findings demonstrate that intrinsic motivation is a fundamental driver of learning, independent of modality. This is consistent with Deci and Ryan's self-determination theory (1985, 2000), which emphasizes autonomy, competence, and relatedness as core components of motivation. Students' accounts indicate that while pedagogical formats (in-person or online) can facilitate engagement, they cannot substitute for the internal drive to learn. Hybrid learning, by combining relational and flexible elements, can enhance motivation, but it primarily acts as a supportive tool rather than a determinant of engagement.

4. Importance of Institutional Structure and Regularity

The results indicate that students rely on clear institutional frameworks and consistent schedules to maintain engagement. Structured face-to-face sessions provide temporal and spatial discipline, whereas online learning demands higher self-regulation. This finding aligns with prior studies emphasizing the role of institutional scaffolding in promoting learner persistence and mitigating disengagement in distance education (Garrison & Vaughan, 2008). Institutions should therefore ensure predictable rhythms, explicit expectations, and structured support for students engaging in hybrid formats.

5. Quality of Content and Learning Materials

Students emphasized the role of high-quality, interactive, and well-structured content in sustaining attention and facilitating comprehension, particularly in online settings. This observation supports the argument that learning

materials are not mere information carriers but critical pedagogical levers for engagement (Bernard et al., 2009; Garrison & Kanuka, 2004). The need for diverse formats, quizzes, and interactive elements highlights the importance of design strategies that maintain interactivity and motivation in hybrid environments.

6. Sense of Belonging and Social Connection

A recurring theme in the interviews is the necessity of social connection for maintaining motivation and engagement. In-person interactions foster relational bonds and collective engagement, while online learning can produce feelings of isolation unless supplemented by collaborative tools (forums, group work, synchronous discussion). This finding resonates with studies on social presence in online and hybrid education, which demonstrate that community building enhances persistence and satisfaction (Garrison, 2007; Hrastinski, 2019). Hybrid learning designs should therefore integrate mechanisms that cultivate social interaction and a sense of belonging.

7. Pedagogical and Managerial Implications

Based on these findings, six key strategies can guide higher education institutions in optimizing hybrid learning:

1. Strengthening Teachers' Digital Pedagogical Training

Effective online learning depends on instructors' ability to design engaging content, facilitate interactions, and use technology pedagogically. Institutional support for professional development is essential.

2. Harmonizing Practices Across Modalities

Cohesion between in-person and online formats ensures pedagogical continuity, clarity of objectives, and alignment of assessment methods.

3. Adapting Modalities to Content Type

Scientific or experimental subjects benefit from face-to-face instruction, while theoretical content can be delivered online with appropriately designed materials.

4. Improving Technological Accessibility

Equitable access to devices, reliable internet, and downloadable content is crucial to avoid digital exclusion and maintain engagement.

5. Fostering Interaction and Community

Collaborative mechanisms, discussion forums, and synchronous sessions help recreate social presence in digital environments, enhancing motivation and belonging.

6. Involving Students in Pedagogical Planning

Participatory approaches in course scheduling and design promote autonomy, ownership, and engagement.

8. Theoretical Contributions

This study contributes to existing models of student engagement and hybrid pedagogy by confirming that engagement results from the interplay of multiple factors: interaction quality, institutional structure, personal motivation, and sense of belonging. It highlights contextual variables such as content design, pedagogical stance, temporal regulation, and group dynamics that modulate the hybrid learning experience. These relational and organizational dimensions complement traditional engagement models and encourage viewing hybrid learning as an integrated, context-sensitive pedagogical strategy rather than a mere alternation of modalities.

9. Limitations and Future Research

The study is limited to thirteen participants from two Tunisian universities, which restricts generalizability. The qualitative focus emphasizes descriptive insights and individual perceptions, indicating the need for complementary quantitative or mixed-method research to examine causal relationships between motivation, engagement, and learning outcomes. Future research could involve larger, more heterogeneous samples and assess the effectiveness of targeted hybrid pedagogical interventions.

DISCUSSION

1. Comparison with Previous Studies on Hybrid Learning

The findings of this study are largely consistent with prior research on hybrid higher education. Students value face-to-face interactions for their richness and immediacy, confirming previous evidence that personal engagement and social presence enhance learning outcomes (Tinto, 1997; Chickering & Gamson, 1987). Similarly, the flexibility and autonomy afforded by digital learning align with global studies highlighting the benefits of asynchronous learning for self-directed study and time management (Allen & Seaman, 2016; Hrastinski, 2008).

However, our results provide additional nuance. While prior studies often emphasize the general benefits of hybrid formats, students in this Tunisian context highlighted **risks of isolation, lack of interactivity, and uneven quality of materials**, suggesting that hybrid learning is effective only when combined with structured guidance and relational support.

2. Influence of Tunisian Cultural and Institutional Contexts

The study reveals that local cultural and institutional conditions shape students' perceptions and experiences. In Tunisia, higher education traditionally relies on **structured, face-to-face instruction**, with strong expectations regarding regular attendance, teacher guidance, and social interaction. Consequently, students expressed greater reliance on **institutional frameworks and session regularity** to sustain engagement, particularly in online settings.

Moreover, limited access to reliable digital infrastructure and variability in teachers' digital competencies affect the feasibility and effectiveness of hybrid learning. These findings underscore the importance of contextual adaptation: strategies successful in other countries may need modification to account for local norms, resource constraints, and pedagogical traditions.

3. Novel Contributions of the Study

This study provides several **innovative insights** beyond existing literature:

1. **Temporal Regulation:** Students emphasized the importance of structured schedules, highlighting that temporal flexibility in hybrid learning is beneficial only when paired with self-regulatory strategies and institutional scaffolding.
2. **Content Design and Structuring:** The findings underscore the need for materials that are **interactive, clear, and tailored to modality**. Differentiating formats based on content type (scientific, experimental, theoretical) emerged as a key recommendation.
3. **Pedagogical Stance:** Teacher presence, relational engagement, and digital facilitation skills were critical. The study highlights that instructors' pedagogical posture—balancing autonomy with guidance—directly influences motivation and engagement in hybrid contexts.

These contributions advance the understanding of hybrid pedagogy by highlighting **intersections between content, modality, instructor behavior, and learner autonomy**, providing a richer and context-sensitive perspective.

4. Pedagogical and Managerial Implications

Six strategies can guide institutions to optimize hybrid learning:

1. **Strengthening Teachers' Digital Pedagogical Training** – Effective online teaching requires specific skills in technology use, facilitation, and relational engagement.
2. **Harmonizing Practices Across Modalities** – Aligning objectives, content, and assessment ensures continuity between online and in-person formats.
3. **Adapting Formats to Content** – Experimental and practical subjects benefit from face-to-face instruction, while theoretical content can be delivered online with interactive materials.
4. **Improving Technological Accessibility** – Equitable access to devices and internet connectivity is essential.
5. **Fostering Interaction and Community** – Collaborative tools and synchronous engagement mitigate isolation and enhance belonging.
6. **Involving Students in Planning** – Participation in scheduling and course design fosters autonomy, ownership, and active engagement.

5. Limitations

This study has several limitations:

- **Sample Size and Scope:** Only thirteen participants from two Tunisian universities were included, limiting generalizability.
- **Type of Institutions:** The selected universities may not fully represent all higher education contexts in Tunisia, especially private institutions or vocational programs.
- **Participant Homogeneity:** Most participants were master's students, which constrains applicability to undergraduate populations.
- **Qualitative Nature:** Findings are descriptive and based on self-reported perceptions; quantitative validation is needed to confirm observed trends and causal relationships.

Future research should include larger, more heterogeneous samples, and consider **mixed-method designs** to quantify relationships between motivation, engagement, and learning outcomes in hybrid environments.

CONCLUSION

This study demonstrates that effective hybrid learning in higher education hinges on the interplay of flexibility, structured guidance, content quality, and relational engagement. The Tunisian cultural and institutional context shapes students' experiences, highlighting the need for locally adapted pedagogical strategies. The research contributes theoretically by identifying contextual variables—temporal regulation, content design, and instructor pedagogical stance—that extend existing models of student engagement and hybrid pedagogy. Practically, the findings offer actionable recommendations for institutions to enhance student autonomy, motivation, and sense of belonging, including teacher training, harmonization of modalities, and promotion of interactive and collaborative learning. Future research should test these insights using larger, more diverse samples and mixed-method approaches to quantify the relationships between motivation, engagement, and learning outcomes, thereby supporting the development of more inclusive and effective hybrid education models.

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including conceptualization, data collection and analysis, methodology design, drafting of the manuscript, and final review and editing.

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RÉFÉRENCES

1. Allen, I. E., & Seaman, J. (2016). *Digital learning compass: Distance education enrollment report 2017*. Babson Survey Research Group.
2. Astin, A. W. (1999). Student involvement: A developmental theory for higher education. *Journal of College Student Development*, 40(5), 518–529.
3. Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2009). A meta-analysis of blended learning and technology use in higher education: From the general to the applied. *International Review of Research in Open and Distributed Learning*, 10(3), 1–23. <https://doi.org/10.19173/irrodl.v10i3.824>
4. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1177/1478088706qp063oa>
5. Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, 39(7), 3–7.
6. Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Springer Science & Business Media.
7. Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01
8. Garrison, D. R. (2007). Online community of inquiry review: Social, cognitive, and teaching presence issues. *Journal of Asynchronous Learning Networks*, 11(1), 61–72. <https://doi.org/10.24059/olj.v11i1.1733>
9. Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *Internet and Higher Education*, 7(2), 95–105. <https://doi.org/10.1016/j.iheduc.2004.02.001>
10. Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. Jossey-Bass.
11. Hrastinski, S. (2008). Asynchronous and synchronous e-learning. *Educause Quarterly*, 31(4), 51–55.
12. Hrastinski, S. (2019). What do we mean by blended learning? *TechTrends*, 63(5), 564–569. <https://doi.org/10.1007/s11528-019-00375-5>
13. Kahu, E. R. (2013). Framing student engagement in higher education. *Studies in Higher Education*, 38(5), 758–773. <https://doi.org/10.1080/03075079.2011.598505>
14. Kuh, G. D. (2009). What student affairs professionals need to know about student engagement. *Journal of College Student Development*, 50(6), 683–706. <https://doi.org/10.1353/csd.0.0099>
15. Laurillard, D. (2012). *Teaching as a design science: Building pedagogical patterns for learning and technology*. Routledge.
16. Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 22–38). Routledge.
17. Peraya, D. (2011). *Didactique et formation à distance*. Presses universitaires de France.
18. Rienties, B., Tempelaar, D. T., & Giesbers, B. (2015). Stability and sensitivity of learning analytics-based prediction models. In *Proceedings of the 7th International Conference on Computer Supported Education* (pp. 1–12). SCITEPRESS. <https://doi.org/10.5220/0005373700010001>

19. Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). University of Chicago Press.
20. Viau, R. (2002). *La motivation en contexte scolaire*. De Boeck Supérieur.

Ethical Considerations

Ethical Approval:

"This study was approved by the Ethics Committees of ENIT (École Nationale d'Ingénieurs de Tunis) and the University of Manouba, in accordance with guidelines for research involving human participants."

Conflict of Interest:

"The authors declare no financial or personal conflicts of interest that could have influenced the content of this article."

Data Availability

"The data supporting the findings of this study are not publicly available as they are part of the author's ongoing doctoral research. Access may be granted upon reasonable request to the corresponding author."

Revisions

"All reviewers' comments have been carefully addressed. The manuscript has been revised accordingly, and a detailed response letter outlining the changes has been provided