Blended Learning in the Digital Skills Module: Insights from Students' Perceptions

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***Abstract*—Blended learning is emerging as a significant pedagogical innovation in higher education, integrating traditional and distance learning methods. There is limited research focusing on students' perception of blended learning mode in the context of Moroccan universities. Therefore, this article aims to investigate the perceptions of undergraduate students majoring in physics at Ibn Tofail University regarding the digital skills module that integrates blended learning mode. To achieve this objective, we randomly selected a sample of 265 students from the target population to conduct a quantitative research using a questionnaire consisting of ten questions employing a 5-point Likert scale. The median scores of all questions ranged between 3.36 and 3.95. The obtained scores suggest that the surveyed students hold a positive perception of blended learning-based digital skills module instruction. Furthermore, the results of this article show that students' perception of the pedagogical resources and the pedagogical activities offered in the context of the digital skills module positively correlate with their overall satisfaction with the learning experience. The study's originality stems from its role in bridging the literature gap by providing new insights into students' perceptions of blended learning in the context of higher education in Morocco.**

***Keywords*—blended learning, digital skills, higher education, students perception, undergraduate students**

I. Introduction

Nowadays, higher education institutions promote a flexible learning environment for students to achieve learning objectives [1]. Online learning environments offer flexibility, such as self-paced study, access from any location, and adaptability to various learning preferences, providing a personalized learning space that meets individual learner needs [2]. During the implementation of blended learning, teachers and learners had the opportunity to mobilize their creativity for teaching and learning [3]. From the learners' perspective, this has been an opportunity to benefit from the support of both traditional classroom (face-to-face courses) and virtual classroom (online courses) as learning environments encouraging autonomy, information seeking, investigation, and engagement [4, 5].

Blended learning, which encompasses a variety of definitions, essentially combines traditional face-to-face education with online elements to enhance learning experiences by utilizing the advantages of both modalities. This approach aims to enrich "traditional" training methods by using the opportunities offered by educational technologies [6]. Aminah and Cahyono [7] considered blended learning as a complete amalgamation of pedagogical methods, using a combination of different teaching strategies for effective, adaptive, and personalized learning. Other researchers argue that blended learning is a blend of tools and/or philosophies. The goal is to have the most suitable approach for each learning situation [8].

By promoting learner autonomy and personalized pacing, blended learning, as a pivotal strategy, tackles issues in the Moroccan educational system, such as varied learners' needs and the restrictive availability of learning resources [9]. This learner-centered approach fosters learners' autonomy by granting them a certain degree of agency and control over their educational trajectory. Students, accordingly, may develop their own pace independent of the instructor or the class [10]. Furthermore, by adopting blended learning, educators are empowered to tailor their teaching methods to meet the varied needs of their learners by customizing the learning experience to cater to various learning styles [8]. On the one hand, the integration of online platforms, which are often used in online education, facilitates tracking students' progress, and provides faster and more oriented feedback [11, 12]. Moreover, using such an approach equips students with digital skills through the utilization of online resources demanded by the professional world.

The incorporation of blended learning has transformed teaching and learning methods in Moroccan universities [6]. This has led to improved student performance and better preparation for the technology-focused professional world [4]. Adaptive technologies offer benefits such as precise recommendations that take into consideration diverse learning styles. Therefore, designers must understand the needs of their audience [13] to provide tailored instruction by varying forms of learning [14]. In this perspective, higher education institutions have integrated cross-cutting modules called "soft skills" into students' academic careers. Among the range of soft skills modules, the "digital skills" module is included. The main goal of this module is to bring the learner to master the basic concepts of interacting with a digital environment in order to accomplish daily tasks of information management. Accordingly, this module is taught

in a hybrid mode: 30% in face-to-face sessions and 70% online. The latter mode is delivered via the Moodle platform.

Additionally, the integration of blended learning into the initial and ongoing training of physical science teachers has been extensively explored and tested in various countries, resulting in remarkable outcomes in terms of the development of pedagogical [6], disciplinary (physics) [15], digital [16], and professional [17] skills for both practicing teachers [18] and future educators [19] (as evidenced by the sample of participants in the present study, who are undergoing ongoing training).

This article aims to explore the perceptions of first-year physics students on blended learning, focusing on its impact on engagement, autonomy, and learning outcomes. To achieve this aim, we have formulated four specific objectives:

- To assess students' perception of the pedagogical resources offered in the context of the digital skills module.
- To evaluate students' perception of the pedagogical activities proposed in the context of the digital skills module.
- To identify students' opinion on the interaction between their peers and teachers respectively.
- To explore and investigate the targeted students' attitudes on how blended learning impact their learning autonomy, knowledge acquisition as well as self-organization.

Thus, the purpose of this research is to test the following four hypotheses:

1. Students' perception of the pedagogical resources offered in the context of the digital skills module positively correlates with their overall satisfaction with the learning experience.
2. Students' perception of the pedagogical activities proposed in the context of the digital skills module positively influences their engagement and participation in the learning process.
3. Students' perception of the interaction between their peers and their teachers significantly impacts their sense of belonging and collaboration within the learning community.
4. The implementation of blended learning positively affects students' autonomy, acquisition of knowledge, and personal organization, compared to traditional learning methods.

II. Materials and Methods

A. Participants

To ensure methodological rigor, this study employed a systematic approach to sample selection and randomization. The target population for this investigation comprised students enrolled in the Bachelor of Education Sciences program, with a specialization in physics, at the Higher School of Education and Training in Kenitra. To achieve a representative sample, a total of 265 students were randomly selected from the population of eligible participants. The randomization process involved assigning each eligible student a unique identifier and then using a computer-generated random number generator to select participants. This method was chosen to mitigate selection bias and ensure that every eligible student had an equal chance of being included in the study. Moreover, to enhance the reliability and validity of the findings, strict criteria were established for inclusion in the study. These criteria included active enrollment in the Bachelor of Education Sciences program with a physics specialization during the specified academic year. Additionally, participants were required to have provided informed consent to participate in the research. It is essential to note that this research was conducted during the first semester of the 2023–2024 academic year to capture a snapshot of students' experiences and perceptions within the designated timeframe. By adhering to these rigorous sampling and randomization procedures, we aimed to ensure that the sample accurately represented the target population, thereby enhancing the generalizability and validity of the study findings.

B. Data Collection Instrument

To measure the effectiveness of blended learning compared to traditional methods, a questionnaire was designed for undergraduates majoring in Bachelor of Education with a focus on physics. The questionnaire consists of ten questions to elicit the required data to gauge the participants' perception of their blended learning experience while taking part in the Digital Skills Module.

The questionnaire was developed from past published research concerning blended learning [14, 20–22] and the aspects of the Bachelor of Education Sciences program. The practical application of the questionnaire was further improved by seeking feedback from education scientists and professionals in ICT integration regarding the questionnaire draft.

To ensure the questionnaire's administration was under optimal conditions, a pilot test was conducted to verify the questionnaire's comprehensibility for the respondents. Subsequently, the questionnaire was administered to 10 students specializing in physics. The small group facilitated making certain adjustments, particularly regarding the clarity of the questions.

C. Data Collection Procedure

Data was collected from students following their participation in two teaching sessions: A four-hour session based on traditional classroom lecturing (face-to-face), and an online session conducted by Moodle platform. The online session included pedagogical resources like videos and PDF files, pedagogical activities in the form of quizzes and assignments, as well as collaborative work through discussion forums already integrated into Moodle. The Digital Skills Module comprises six chapters, all taught in French:

Chapter 1: Work environment.
Chapter 2: Computer Networks.
Chapter 3: Introduction to Online Learning Platforms.
Chapter 4: Word Processing Software.
Chapter 5: Spreadsheet Software (see Fig. 1).
Chapter 6: Presentation Software.

Within each chapter, we provided students with educational resources in the form of videos and PDFs,

pedagogical activities in the form of quizzes and assignments, and a cooperative space with discussion forums.

Students completed the questionnaire after finishing two teaching sessions, which allowed them to reflect on their blended learning experience.

Fig. 1. Screenshot of Chapter 3 of the digital skills module.

D. Data Analysis

The data collected via the questionnaire were analyzed mainly using Excel software. We processed the collected data in Excel spreadsheets and performed calculations to obtain descriptive statistics, such as means, percentages, and comparisons to assess the perception of students specialized in physics regarding blended learning. The findings were succinctly presented in tables and graphs for clear and concise interpretation.

Scaling was achieved by using a Likert scale in the questionnaire, with responses categorized from "strongly disagree" to "strongly agree". Each response was assigned a numerical value, allowing for quantitative analysis of the participant attitudes.

III. Result

This study utilizes a questionnaire comprised of ten questions using a 5-point Likert scale: "SD: Strongly Disagree", "D: Disagree", "N: Neutral", "A: Agree", and "SA: Strongly Agree", where 1 represents Strongly Disagree and 5 represents Strongly Agree. The interviewed students express their satisfaction with blended learning in the Digital Skills Module, with average scores ranging from 3.7 to 3.95 (excluding the level of assignment complexity). They reported finding the content comprehensible and the interactions with peers and teachers noteworthy. However, there are concerns about the complexity of assignments (with a mean score of 3.36) that respondents perceive as less satisfactory compared to quizzes (with a mean score of 3.93). Data analysis shows a positive perception of the effectiveness of blended learning in enhancing learning concepts related to the Digital Skills Module (See Table 1).

Table 1. Frequency distribution of perceptions of blended learning process

	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean
1. Are you satisfied with your blended learning experience in the Digital Skills module?	21	44	21	8	6	3.78
2. The content of the videos is easy to understand	30	41	14	10	5	3.95
3. The content of the PDF files is easy to understand	25	41	16	11	7	3.77
4. The complexity of the quizzes is adequate.	26	45	16	9	4	3.93
5. The complexity of the assignments is adequate	11	39	23	18	9	3.36
6. The interaction with your peers in the context of blended learning was remarkable	17	45	21	11	6	3.70
7. The interaction with the teachers in the context of blended learning was remarkable	22	48	15	12	3	3.87
8. Blended learning has facilitated your schedule and personal organization	22	42	17	14	5	3.73
9. The online resources and pedagogical activities have facilitated the acquisition of knowledge	22	45	19	8	6	3.81
10. The online resources and pedagogical activities have encouraged autonomous learning.	23	42	22	9	3	3.87

The analysis of the means reveals valuable insights into participants' perceptions of blended learning in the Digital Skills module. Overall, participants generally expressed satisfaction with their blended learning experience, as indicated by an average mean of 3.78. This suggests that the majority of participants found the blended learning approach effective and beneficial. Specifically, the content delivery methods, such as videos and PDF files, were well-received, with means of 3.95 and 3.77, respectively. These findings imply that the instructional materials were perceived as clear and comprehensible by the participants. Additionally, the complexity of quizzes was deemed adequate, with a mean score of 3.93, indicating that participants found the assessments appropriately challenging. However, there was slightly lower agreement regarding the complexity of assignments, with a mean of 3.36, suggesting that some participants may have perceived the assignments as overly difficult or complex. Moreover, participants positively rated their interaction with peers and teachers in the blended learning environment, with means of 3.70 and 3.87, respectively. This underscores the importance of collaborative and supportive interactions in facilitating learning experiences. Furthermore, blended learning was seen as advantageous in terms of personal organization and time management, with a mean of 3.73. The utilization of online resources and pedagogical activities was also perceived to enhance knowledge acquisition, with a mean of 3.81, indicating that participants found these resources

helpful in their learning journey. Notably, these resources were noted for encouraging autonomous learning, with a mean of 3.87, suggesting that participants felt empowered to take ownership of their learning process. The mean scores reflect a general consensus on different aspects of blended learning in the Digital Skills module. However, nuances are evident in participants' perceptions, particularly concerning the complexity of assignments. These findings highlight the effectiveness of blended learning methods while also identifying potential areas for enhancement to further enrich the learning experience.

A. Perception of Students Regarding the Blended Learning Mode of the Digital Skills Module

The findings of the first item in the questionnaire (Are you satisfied with your blended learning experience in the Digital Skills Module?). As shown in Fig. 2, a significant majority of respondents (65% in agreement) are satisfied with their blended learning experience in the Digital Skills Module. However, a smaller portion of participants (14%) reported their dissatisfaction (comprising 8% in disagreement and 6% strongly disagreeing).

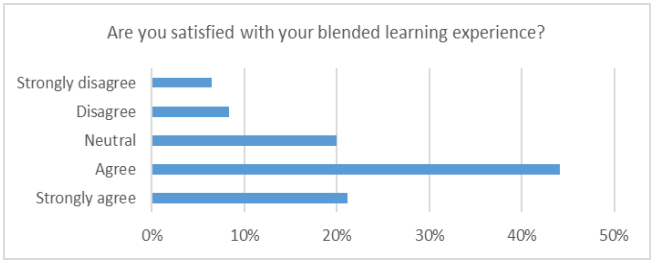

Fig. 2. Perception of students regarding their experience of blended learning.

B. Students' Perception Regarding the Pedagogical Resources Offered in the Digital Skills Module

The findings from the second and third items of our questionnaire indicate that a considerable proportion of respondents perceive both the videos and the PDF files content as easily understandable. According to Fig. 3, 71% and 66% of respondents, respectively, either strongly agree or agree that the aforementioned content is easy to comprehend. These results suggest a favorable perception among students regarding clarity, accessibility, and comprehensibility of the pedagogical resources provided in the Digital Skills Module.

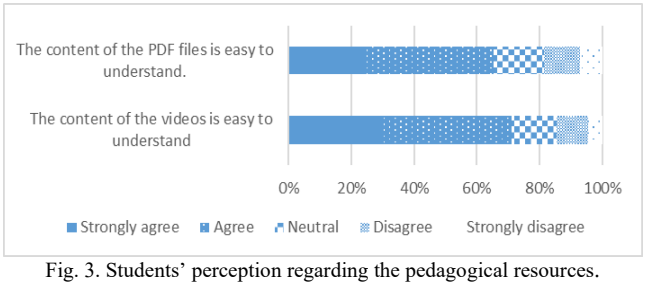

Fig. 3. Students' perception regarding the pedagogical resources.

C. Students' Perception Regarding the Pedagogical Activities Offered in the Digital Skills Module

The results of our fourth and fifth questionnaire items indicate, as illustrated in Fig. 4, that a higher percentage of respondents consider the complexity level of quizzes to be suitable compared to the complexity of assignments. Specifically, 71% of respondents find the complexity of quizzes to be appropriate, whereas only 50% consider the complexity of assignments likewise. These results suggest that, although most respondents find the complexity of both quizzes and assignments to be adequate, there is a higher level of agreement regarding the adequacy of complexity for quizzes compared to assignments.

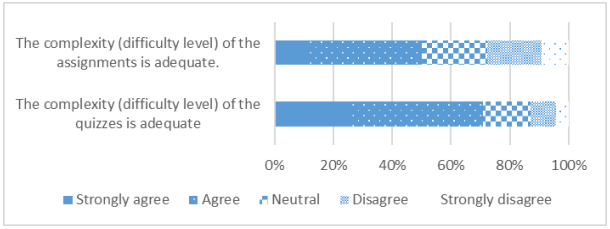

Fig. 4. Students' perception regarding the pedagogical activities.

D. Students' Perception Regarding the Interaction between Their Peers and Their Teachers

The results of the sixth and seventh questionnaire items show that most respondents have a positive perception of interaction with their peers (62% in agreement) and with their teachers (70% in agreement) in the context of blended learning. These findings point to a broadly favorable experience with social interactions in blended learning environment, as depicted in Fig. 5.

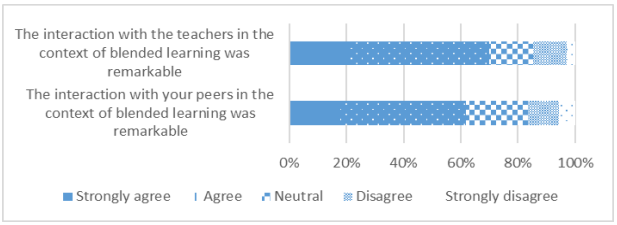

Fig. 5. Students' perception regarding the interaction between their peers and their teachers.

E. Students' Perception Regarding the Effect of Blended Learning on Their Autonomy, Acquisition of Taught Knowledge and Personal Organization

The data analysis of the last three items of the questionnaire, as demonstrated in Fig. 6, shows that a significant proportion of respondents perceive blended learning positively in terms of its impact on their autonomy (63% either strongly agree or agree), knowledge acquisition (67% either strongly agree or agree), and their personal organization (66% either strongly agree or agree). Overall, the findings show that students hold a positive view of blended learning, which is attributed to its benefits for learning autonomy, knowledge acquisition and self-organization.

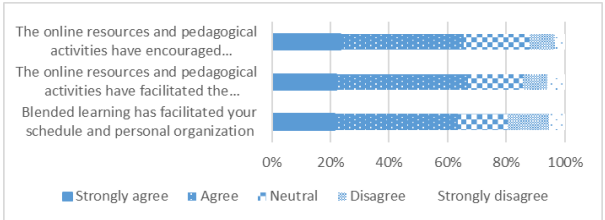

Fig. 6. Students' perceptions on blended learning impact on their independence, knowledge acquisition, and personal organization.

IV. Discussion

The results of the study, based on a questionnaire using a 5-point Likert scale, provide valuable insights into participants' perceptions of blended learning in the Digital Skills module. Firstly, the majority of participants expressed satisfaction with their blended learning experience, with 44% agreeing and 21% strongly agreeing. This suggests that the approach is generally well-received. These outcomes align with those of an exploratory study conducted at The Gulf Medical University [23]. Regarding the instructional materials, both the content of videos and PDF files were deemed easy to understand by a significant portion of participants, with means of 3.95 and 3.77, respectively. This indicates that the materials effectively conveyed the necessary information. Consistent with these findings, the literature underscores the effectiveness of employing blended learning as the preferred strategy for teaching digital skills in higher education contexts. This approach enables students to acquire digital competencies by interacting with online learning platforms, advanced technologies, and enhancing their information research skills in an increasingly digital world [24–26]. Participants also found the complexity of quizzes and assignments to be appropriate, with means of 3.93 and 3.36, respectively. However, it is worth noting that while the majority found the quizzes adequately complex, there was less agreement regarding the complexity of assignments. Aligning with this research, a study conducted at An-Najah National University found that student attitudes towards asynchronous pedagogical activities were positive in terms of three areas: quizzes, assignments, and student group projects [27]. In terms of interaction, participants rated both peer interaction and interaction with teachers positively, with means of 3.70 and 3.87, respectively. This highlights the importance of collaborative and supportive interactions in the blended learning environment. A comparison of these results with findings from other studies examining student interactions with peers and teachers reveals strikingly similar outcomes. DeLacey and Leonard observed that students not only learned more effectively when online sessions complemented traditional courses, but also experienced enhanced interaction and satisfaction [28]. Additionally, So and Brush contend that integrating online sessions with traditional courses boosts student interaction and satisfaction [29].

Furthermore, participants agreed that blended learning facilitated their schedule and personal organization, with a mean of 3.73. This indicates that the flexibility of the approach was beneficial. Additionally, online resources and pedagogical activities were perceived to facilitate knowledge acquisition and encourage autonomous learning, with means of 3.81 and 3.87, respectively. This suggests that participants found these resources effective in promoting self-directed learning. These findings are consistent with a research conducted at York University in Toronto, Canada [30].

Overall, while the results generally reflect positive perceptions of blended learning in the Digital Skills module, there are areas where improvements could be made, such as clarifying the complexity of assignments to better meet participants' needs.

V. Conclusion

The questionnaire results offer insightful perspectives on how students perceive the blended learning mode in the Digital Skills Module. Indeed, a significant majority (65% agreeing against 14% disagreeing) of respondents report high levels of satisfaction with the blended learning experience in the Digital Skills Module, underscoring its effectiveness. Furthermore, a significant proportion of the surveyed students find the content of the videos and PDF files easy to understand. Regarding the complexity of quizzes and assignments, a high percentage of students consider the complexity of quizzes to be adequate (71%). However, only half of the respondents perceive the complexity of assignments as adequate. In terms of cooperation and collaboration, most respondents positively view their interaction with peers and teachers, reflecting well on the module's collaborative environment. Therefore, most surveyed students appreciate the impact of blended learning on autonomy, knowledge acquisition, and personal organization. In conclusion, the overall results suggest that students generally have a favorable opinion of the blended learning approach in the Digital Skills Module. The positive responses regarding satisfaction, the comprehensibility of resources, and the perceived benefits in terms of autonomy and knowledge acquisition reflect the effective integration of blended learning in the educational setting. However, areas such as the complexity of assignments could be revised to further improve the blended learning experience for students.

In terms of recommendations, it is crucial to capitalize on the positive aspects of the blended learning approach while addressing its limitations. Enhancing the complexity and clarity of assignments could significantly enhance students' learning experiences. Additionally, fostering greater collaboration and interaction among students and teachers could amplify the benefits of the blended learning environment. Furthermore, the current study focuses on students at Ibn Tofail University. However, expanding the study to encompass additional Moroccan universities could offer a more extensive perspective on the impact of blended learning across different educational settings.

The study underscores the favorable reception of blended learning in the Digital Skills course. Positive feedback on satisfaction, resource accessibility, and perceived improvements in self-reliance and learning affirm the effective integration of blended learning. Nonetheless, recognizing and overcoming limitations is key to enhancing the blended learning experience for future student groups.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Y.H. and M.C. designed and conducted the research study. Y.M., M.A. and N.E.A. analyzed the data. N.E.M. contributed to revising the paper. All authors approved the final version.

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