Nursing Student s' Readiness toward Using Metaverse Mixed Reality Technology and its Relation to Creativity in Learning and Academic Resilience

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Abstract

Background: Integrating metaverse mixed reality technology in nursing education provides immersive learning environments that can enhance creativity and foster academic resilience. Assessing students' readiness to adopt such technologies is crucial for successful curricular integration. **Aim:** the study aimed to assess nursing students' readiness toward using metaverse mixed reality technology and its relation to creativity in learning and academic resilience. **Design:** A descriptive correlational design was utilized. **Setting:** This study was conducted in all academic departments at the Faculty of Nursing, Benha University. **Subjects**: A stratified random sample was used to select (1107) out of (3741) nursing students from the four academic levels at academic year (2024-2025). **Tools of data collection**: Three tools were used: I) Readiness toward using metaverse mixed reality technology in learning questionnaire, II) Nursing Students' Creativity in Learning Questionnaire and III) Nursing Students' Academic Resilience in Learning Questionnaire. **Results:** Showed that more than half (57.7%) of studied nursing students had high total readiness level toward using of metaverse mixed reality technology in learning, (54.5%) had high creativity levels in learning and (52.3%) had high levels of academic resilience respectively. **Conclusion:** There was highly statistically significant positive correlation among total nursing students' readiness toward using metaverse mixed reality technology, total creativity in learning and total academic resilience in learning. **Recommendations:** Make the digital transformation course a prerequisite for joining nursing colleges so that students can adapt with e-learning.

Keywords: Academic Resilience, Creativity in Learning, Metaverse, Mixed Reality Technology, Nursing Students.

Introduction:

The need for alignment with global standards and technological advancements remains a continuous challenge, beside the dynamic nature of global educational trends demands constant adaptation and innovation within the higher education sector. Therefore embracing technological advancements essential for staying relevant globally, enhancing the quality and effectiveness of educational delivery. furthermore, opens avenues for innovative learning methods, online education and interactive platforms to enhances the overall quality of education and equips students with essential digital literacy skills for the future workforce **(Sundoro et al., 2024).**

Hence the integration of digital immersive technologies into higher education has reshaped the landscape of learning through providing virtual learning environment rather than traditional classrooms which significantly influence student engagement and academic outcomes. In addition to create distinct experience by merging the physical world with a digital

simulated reality, thus immersive technology includes Virtual Reality, Augmented Reality, and Mixed Reality (**Ravshanovna, 2025).**

The virtual reality uses computer-generated information to provide a full sense of immersion However, augmented reality blends computer-generated information onto the user's real environment, therefore Mixed Reality creates a new form of simulation by merging the real and virtual worlds, in which physical and digital elements coexist and interact with each other. Through a head mount device **(Koumpouros et al., 2024**). In addition to, mixed reality initially provides students with sense of immersion into virtual world. Also, enriches students with a large amount of high-quality sensory information. Both aspects of sensory information and immersion create a realistic digital environment, make students feel inhabit and interact within **(Iqbal & Hassan, 2024).**

Furthermore mixed reality enhances student learning outcomes in various educational contexts and broaden learning environments by overcoming limitations in physical space, fostering collaboration and experiential learning, offering personalized learning approaches to support students regardless knowledge level, enable students to explore complex topics and scenarios in realistic and interactive ways to a greater extent than conventional methods improve learning outcomes. Moreover mixed reality provides students with flexible access and self-directed learning opportunities suit needs and preferences. Beside reduce the unimportant cognitive load and facilitate the intrinsic and relevant cognitive load associated with learning complex information **(Petruse et al., 2024).**

Moreover student's creativity is showen by the following indicators namely (originality, flexibility, fluency, and elaboration). Initially originality: refers to the ability to generate new ideas with one's own mind. While secondly flexibility: refers to the person's ability to openness to various kinds of ideas. Therefore thirdly fluency: refers to the ability to generate ideas. Finally elaboration: refers to the ability to provide more complex ideas **(Yulianti et al., 2025).**

Regarding mixed reality creates immersive, interactive environments that allow learners to explore and manipulate virtual objects in real-world contexts through hands-on experience .Students practice experimentation and creative problem-solving. Besides, it supports collaborative learning by allowing multiple learners to interact with the same virtual objects in real-time, regardless of physical location. In addition to that ,it fosters teamwork and collective creativity. Furthermore, mixed reality adapts to individual learning styles and paces, allowing students to explore topics in ways that resonate with. Therefor personalization encourages creative thinking and self-expression **(Reis et al., 2024)**.

On the other hand, academic resilience defined as the ability to survive or maintain success and overcome challenges, setbacks, and stressors in educational journey despite being in difficult conditions or unpleasant situations in the academic field, through developing coping strategies, a growth mindset, and the ability to adapt to difficult situations such as: integrating new learning method, academic failure, heavy workloads, or personal struggles. Therefore, resilient students view obstacles as opportunities for growth rather than insurmountable barriers. By fostering resilience, learners can build confidence, persistence, and a positive attitude toward learning, which is essential for long-term academic and personal success **(Iriana et al., 2025)**.

Moreover, mixed reality enables students to visualize abstract ideas, practice skills in a risk-free virtual setting, receive real-time feedback, which fosters a growth mindset and encourages persistence. Additionally, mixed reality's collaborative features enable students to work together, share ideas, and support one another, therefore strengthening social and emotional resilience by providing personalized, interactive and adaptive learning experiences **(Ghanbaripour et al., 2024)**.

Accordingly mixed reality plays a significant role in enhancing students' academic resilience by creating immersive, engaging and supportive learning environments which help students overcome challenges and build confidence. Through mixed reality, students can interact with complex concepts in a tangible way, making difficult subjects more accessible and reducing frustration. Therefore, resilience teaches students to overcome challenges by thinking in different creative ways out of the box to handle any challenge. Subsequently, three concepts strongly related to each other's. Hence mixed reality is considered the common factor improve both students' creativity and academic resilience **(Salim & Sarajar, 2024).**

Significance of the Study

Today, in order to be competitive, it is not enough to have only certain theoretical knowledge, it is necessary to be able to apply it in real life. the role of universities is in educating active, proactive, creatively and critically thinking student, with developed skills , abilities to work with information , solve various problematic tasks and ready for self-education. The universities' effort to meet the requirements of the rapidly changing world is to focus on a competency based approach to the content of education. **(Gniezdilova & Mykytyn, 2023).**

Mixed reality technology in education in recent years has benefited learners by improving motivation, problem-solving skills, and overall learning experience **(Hauze & Marshall, 2020).** Mixed reality allows students to actively participate in the learning process to creates a learning environment that positively influences learners' attention and provides them with a more engaging and fun learning experience than traditional methods **(Pellas et al., 2020).** Mixed reality has many wide applications and features to offer in the healthcare field such as the 3D operating room with virtual organ models for complex surgeries and more **(Pavithra et al., 2020).**

From the researchers point of view this study highlights the importance of keeping pace with continuous technological development and integrating it into the field of nursing learning and benefiting from it in developing deep thinking skills, creativity and flexibility in nursing learning. so that this study was conducted to assess readiness of nursing students toward using metaverse mixed reality technology and its relation to their creativity in learning and academic resilience.

Aim of the study

This study aims to assess nursing students' readiness toward using metaverse mixed reality technology and its relation to creativity in learning and academic resilience.

Research questions

1. What are the levels of nursing students' readiness toward using metaverse mixed reality technology in learning?
2. What are the levels of creativity in learning among nursing students?
3. What are the levels of academic resilience among nursing students?
4. Is there a relation between nursing students' readiness toward using metaverse mixed reality technology and creativity in Learning?
5. Is there a relation between nursing students' readiness toward using metaverse mixed

reality technology and academic resilience in Learning?

Subjects and method:

Study design:

A descriptive correlational design was used to achieve the aim of the present study

Study setting:

The current study was conducted in all academic departments at Faculty of Nursing Benha University.

Study subjects:

Stratified random sample was used to select (1107) out of (3741) nursing students from the four academic levels at academic year (2024-2025).The sample size was taken from each stratum (an academic level) according to sample size equation and distributed as the following:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n → The required sample size (1107)

N → Total number of nursing students in each academic level (3741)

e → Error tolerance (0.05)

1→ A constant value. **(Simarjeet, 2017).**

Academic level	Total number (N)	Sample size (n)
1st	581	237
2nd	1060	291
3rd	1096	293
4th	1004	286
Total	**3741**	**1107**

Tools of data collection:

Three tools were used for data collection in the present study namely:

Tool (1): Readiness toward using metaverse mixed reality technology in learning questionnaire: It consists of three parts:

Part I: Personal data of nursing students: It includes two sections**:**

Section (1): It consisted of six questions about personal characteristics of studied nursing students as following: (age, sex, marital status, academic level, what learning methods do you prefer and what learning style do you prefer).

Section (2): It consisted of six questions about technology experience.

Part II: Metaverse mixed reality technology knowledge questionnaire:

Self-administered questionnaire was developed by researchers based on related literatures review **(Bekele & Champion, 2019; Hauze et al., 2019 & Zhang et al., 2022)** to assess nursing students' knowledge regarding using of metaverse mixed reality technology. It consisted of 29 items under 3 main dimensions distributed as the following: knowledge about (concept, advantages and disadvantages) of mixed reality technology

Scoring system:

Studied nursing students responses were scored based on two scale ranged from (0-1) as; (1) correct, (0) Incorrect. scores were ranged from (0-29) and it was considered high knowledge level if the percent score was ≥75% that equals (22-29 point scores), while considered moderate knowledge level if the percent score was ranged from 60 to < 75 % that equals (17-21 point scores), and considered low knowledge level if it is < 60 % that equals (0-16 point scores) **(Zhang et al., 2022)**.

Part III: Metaverse mixed reality technology readiness questionnaire:

Self-administered questionnaire developed by the researchers based on related literatures review **(Nordin & Daud, 2020)** to assess nursing students' readiness toward using of metaverse mixed reality technology. It consisted of 72 items under 9 main

dimensions distributed as following: (usefulness, ease of use, intention to use, social influences, self-competence, self-directed learning, discomfort, insecurity and hindrances).

Scoring system:

Studied nursing students responses were scored based on a three-point Likert Scale ranged from (1-3) as; (3) agree, (2) agree to somewhat, (1) disagree. scores were ranged from (72-216) and it was considered high readiness level if the percent score was ≥75% that equals (162-216 point scores), while considered moderate readiness level if the percent score was ranged from 60 to < 75 % that equals (130-161 point scores), and considered low readiness level if it is < 60 % that equals (72-129 point scores) **(Nordin & Daud, 2020)**.

Consequently total readiness level toward using metaverse mixed reality technology in learning (knowledge& readiness)

The total nursing students' readiness scores toward using metaverse mixed reality technology was ranged from (72-245) and it was considered high readiness level if the percent score was ≥75% that equals (184-245 point scores), while considered moderate readiness level if the percent score was ranged from 60 to < 75 % that equals (147-183 point scores), and considered low readiness level if it is < 60 % that equals (72-146 point scores) **(Nordin & Daud, 2020)**.

Tool (2): Nursing student's creativity in learning questionnaire :

Self-administered questionnaire developed by researchers based on related literature review **(Cheung et al, 2003; Sarikhani et al., 2016 & Lehmkuhl et al., 2021)** to assess nursing students' creativity in learning. It consisted of 45 items under 8 main dimensions distributed the as following: (creative personality and curiosity, knowledge and skills expansion advanced cognitive linking, boldness, originality, fluency, flexibility and elaboration).

Scoring system:

Studied nursing students responses were scored based on a three-point Likert Scale ranged from (3) agree, (2) agree to somewhat, (1) disagree. score was ranged from (45-135) and it was considered high creativity level if the percent score was ≥75% that equals (101-135 point scores), while considered moderate creativity level if the percent score was ranged from 60 to < 75 % that equals (81-100 point scores), and considered low creativity level if it is < 60 % that equals (45-80 point score). **(Sarikhani et al., 2016).**

Tool (3): Nursing student's academic resilience in learning questionnaire

Self-administered questionnaire developed by the researchers based on related literature review **(Ali-Abadi et al., 2021; Rachmawati et al., 2021; & Ramdani et al., 2021)** to assess nursing students' academic resilience in learning. It consisted of 25 items under 4 main dimensions distributed as following: (social skills, student empathy, and problem solving ability and self-efficacy).

Scoring system:

Studied nursing students responses were scored based on a three-point Likert Scale ranged from (3) agree, (2) agree to somewhat, (1) disagree.

score was ranged from (25-75) and it was considered high academic resilience level if the percent score was ≥75% that equals (56-75 point scores), while considered moderate academic resilience level if the percent score was ranged from 60 to < 75 % that equals (45-55 point scores), and considered low academic resilience level if it is < 60 % that equals (25-44 point score). **(Ramdani, 2021).**

Validity of the tools:

- To arrive at the final version of the tools. The tools were regarded as valid from the

experts' point of view. It took one month Augusts 2024.

- The validity of the tools aimed to judge its clarity, comprehensiveness, relevance, simplicity and accuracy.
- Face and content validity of study tools were done by group of Jury consisted of seven experts, three of them professors from different Faculties of Nursing and the following universities (Cairo University, Menoufia University, Tanta University). Another two of them, one professor and one assistant professor from faculty of nursing, Benha University in nursing administration department. In addition to one professor of computer science in Misr International University and one professor of veterinary medicine , director of the Quality Assurance and Accreditation Center and the director of E-learning previously and All of their modifications were taken into consideration.
- Some modifications in statements were done in tools based on comments of Jury experts and some items were omitted that gives the same meaning and modifying some words to give the right meaning for the item which did not understood clearly.
- Modifying some knowledge questions such as: before jury (what learning style do you prefer, have you attended training courses on learning with virtual reality and have you attended training courses on learning with mixed reality?. After modification: (what learning style do you prefer(you can select more than one answer, have you attended training courses on learning with virtual or mixed reality).

Reliability of tools:

Reliability of tools was conducted to determine the internal consistency and homogeneity of used tools by using Cronbach's Alpha Coefficient test as the following:

Table (E): Reliability of the study tools:

	Tools	Cornbrash's Alpha test
1	**Readiness toward using metaverse mixed reality technology in learning questionnaire for 101 items** • **nowledge for 29 items** • **eadiness for 72 items**	0.976 0.854 0.986
2	**Nursing students' creativity in learning questionnaire for 45 items**	0.990
3	**Nursing students' academic resilience in learning questionnaire for 25 items**	0.984

Ethical Considerations:

Prior to the conduction of the study, ethical approval was obtained from the Scientific Research Ethics Committee at Faculty of Nursing, Benha University. All subjects were informed that participation in the study was voluntary and informal consent was obtained from the participants in the study through their acceptance for filling questionnaire. Confidentiality of data obtained was protected by the allocation of a code number to the questionnaire sheets. Subjects were informed that the content of the study tools will be used for the research purpose only. Participants' right to withdraw from the study at any time was ascertained.

Preparatory phase:

This phase took three months started from April 2024 to June 2024. It included the following: Reviewing the national and international related literatures using journals,

periodicals, textbooks, internet and theoretical knowledge of the various aspects concerning the topic of the study for developing the tools and translating the tools into Arabic language and back translation to check its accuracy.

Pilot study:

A pilot study was carried out in September 2024 to ascertain the clarity and applicability of the study tools representing 10 % of total study subjects. 111 nursing students from four academic levels were included in the pilot study. It has also served in estimating the time needed for filling the total questionnaires approximately ranged from 20-35 minutes, However it ranged between 10-12 minutes for readiness toward using metaverse mixed reality technology in learning questionnaire by nursing students, between 10-12 minutes for nursing student's creativity in learning questionnaire and between 10-12 minutes for nursing student's academic resilience in learning questionnaire. No modification was needed. The pilot study included in the study main subjects.

Field work:

- Data collection took about 2 months from the beginning of October to the end of November 2024.
- The researchers prepared the questionnaire electronically via google form design and took the permission from heads of academic departments after explained the aim and the nature of the study and the method of filling the electronic questionnaires to the nursing students in their departments and then the link was sent to nursing students through the practical Whats App groups via heads of different academic departments. Nursing Students' questionnaires link: (https://forms.gle/VCCjfCiQMrL6paEx7) That include: readiness toward using metaverse mixed reality technology in learning and its relation to creativity in learning and academic resilience questionnaire**.** Nursing students started to open the links and fill the questionnaires. Data was collected daily and the average number of responses per day was ranged between 18-19 responses from nursing students.

Statistical analysis:

Data were collected, tabulated, statistically analyzed by using an IBM personal computer with statistical package of social science (SPSS) version 26 where the following statistics were applied. Descriptive statistics: In which quantitative data were presented in the form of Mean, standard deviation (SD), frequency, and percentages distribution. Correlation (r): Was used to study association between two qualitative variables. Chi-square test (χ^2): was used to study association between two qualitative variables. Fisher Exact Test (FET) cell2×2: The used tests of significance included p-value test: Statistical significance was considered at P-value 0.05, considered highly statistically significance at p-value P 0.001 and considered not significance at P > 0.05.

Results:

Table (1-a): Shows that more than half (55.0%) of nursing students age were ≥20 years old with Mean ±SD (19.73 1.41). As related to their sex, more than two third (68.4%) of them were females. As far as their marital status, the most (96.2%) of them were unmarried. Regarding to their academic level, more than one quarter (26.5%) of them were in the third academic level. Regarding to preferred learning methods and preferred learning style, more than half (57.2%-57.0%) of them were preferred electronic learning methods and visual learning style respectively.

Table (1-b): Shows that the most (97.6%) of studied nursing students having a mobile phone. As related to type of mobile phone, the majority (84.4%) of them having smart phone.as pertaining to having a computer, more

than three fifth (60.3%) of them had a computer. Regarding to type of computer, more than half (55.5%) of them had handled computer "lap top or tablets". As related to attended training courses on learning with virtual or mixed reality, all (100%) of them had not attended training courses on learning with virtual or mixed reality. Regarding to health problems facing nursing students when using phone or laptop for a long time, less than two third (64.1%) of them had faced eye strain and difficulty focusing.

Figure (1): Clarifies that more than half (57.7%) of studied nursing students had high total readiness level toward using metaverse mixed reality technology. on the other hand, the minority (5.8%) of them had low total readiness level.

Figure (2): Clarifies that more than half (54.5%) of studied nursing students had high level of creativity in learning. While, the minority (6.7%) of them had low level of creativity in learning.

Figure (3): Clarifies that more than half (52.3%) of studied nursing students had high level of academic resilience. While, the minority (8.7%) of them had low level of academic resilience.

Table (2): Indicates that there was highly statistical significant positive correlation between total nursing students' readiness among using metaverse mixed reality technology and total creativity in learning among nursing students.

Table (3): Indicates that there was highly statistical significant positive correlation among total nursing students' readiness toward using metaverse mixed reality technology and total academic resilience in learning among nursing students.

Table (1-a): Frequency distribution of studied nursing students' personal data regarding their personal characteristics (n=1107)

Personal characteristics	No.	%
Age		
≤ 20 years	498	45.0
≥20 years	609	**55.0**
Range	**18-23**	
Sex		
Male	350	31.6
Female	757	**68.4**
Marital status		
Married	42	3.8
Unmarried	1065	**96.2**
Academic levels		
First	237	21.4
Second	291	26.3
Third	293	**26.5**
Fourth	286	25.8
What learning methods do you prefer		
Traditional	474	42.8
Electronic	633	**57.2**
What learning style do you prefer(you can select more than one answer)		
Visual	631	**57.0**
Auditory	557	50.4
Reading and writing	593	53.6
kinesthetic	376	34.0

Table (1-b): Frequency distribution of studied nursing students' personal data regarding their technology experience data (n=1107)

Technology experience data	No.	%
Do you have a mobile phone		
Yes	1080	**97.6**
No	27	2.4
If you have a mobile phone what is the type of it (no.=1080)		
Basic phone	169	15.6
Smart phone	911	**84.4**
Do you have a computer		
Yes	668	**60.3**
No	439	39.7
If you have a computer what is the type it (no.=668)		
Desktop computer	297	44.5
Handled computer "lap top or tablets"	371	**55.5**
Have you attended training courses on learning with virtual or mixed reality		
Yes	0	0.0
No	1107	**100.0**
If you have a mobile phone or computer what are the health problems do you face when using it for long periods (you can select more than one answer)		
Vertigo and blurred vision	595	53.7
Headache and drowsiness	474	42.8
Eye Strain and difficulty focusing	710	**64.1**
Nausea and vomiting	65	5.9
Others	117	10.6

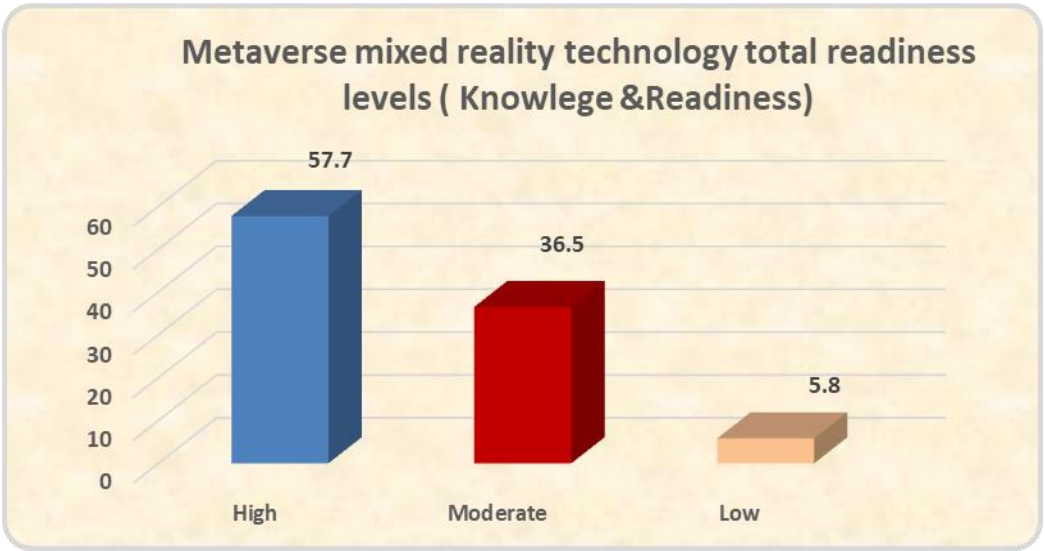

Figure (1): Nursing students' total readiness levels (knowledge and readiness) toward using metaverse mixed reality technology

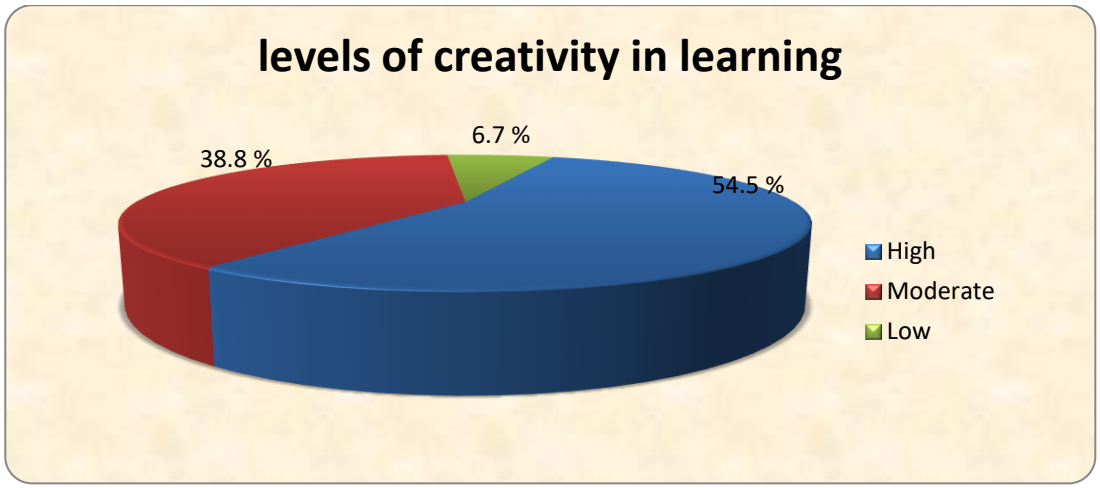

Figure (2): Total levels of creativity in learning among studied nursing students

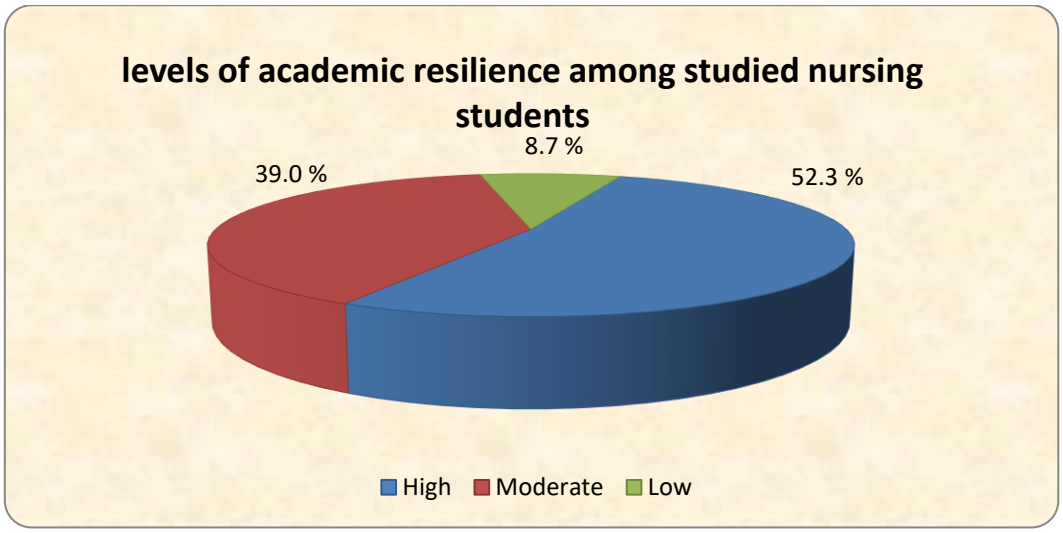

Figure (3): Total levels of academic resilience among studied nursing students

Table (2): Correlation between nursing student s' readiness toward using metaverse mixed reality technology and creativity in learning.

Variables	Total creativity in learning among nursing students	
	r	P value
Total nursing students' readiness toward using metaverse mixed reality technology	0.140	0.000**

Table (3): Correlation between total nursing students' readiness toward using metaverse mixed reality technology and total academic resilience in learning.

Variables	Total academic resilience in learning among nursing students	
	r	P value
Total nursing students' readiness toward using metaverse mixed reality technology	0.103	0.001**

Discussion

Regarding to nursing students personal characteristics, the findings of the present study clearly showed that more than half of nursing students age were more than and equal twenty years old. As related to their sex, more than two third of nursing students were females. As far as their marital status, the most of studied nursing students were unmarried. Regarding to their academic level, more than one quarter of them were in the third academic level. Regarding to preferred learning methods and preferred learning style, more than half of them were preferred electronic learning methods and visual learning style respectively.

Regarding to studied nursing student's technology experience data, the findings of the present study clearly demonstrated that the most of nursing students having a mobile phone. From researchers' point of view it could be due to nursing students need mobile phone to keep in contact with classmates, instructors, and clinical supervisors for quick communication for group projects, scheduling, and emergencies beside help in access medical references, research articles, educational apps, attend virtual lectures and access online resources.

This result was supported with the finding of **Rashed et al., (2017)** who conducted study about "Nursing Staff Readiness toward Advanced Mobile Devices Utilization in Nursing Care in Critical Care Units" and showed that the majority of participants having a mobile phone.

As related to type of mobile phone, the majority of nursing students were having smart phone. From researchers' point of view this could be due to technological advancement, universities coping to have better access to deliver information for their students throw different platforms using smart phone with internet access allow students to be in contact with their teachers for ongoing learning process through online lectures, quiz's and access to E-books to view the study content.

Also, blended learning adds online lectures besides face to face learning. This result was consistent with the finding of **Mgeni et al., (2024)** who conducted study about **"**Adoption of Mobile Application for Enhancing Learning in Higher Education: Students' Views from the State University of Zanzibar" and revealed that the most of participants using smart phones and mobile devices in learning.

As pertaining to having a computer, the result of the current study demonstrated that more than three fifth of nursing students had a computer. From researchers point of view this could be due to nursing students require attending online courses, virtual lectures, participate in discussions, and submit assignments, computers allow nursing students to stay updated with the latest medical research and guidelines, practice documenting patient care electronically, which is a standard practice in healthcare settings and nursing students often use computer-based practice exams and study tools to prepare for licensure exams like the NCLEX.

This result was consistent with the finding of **Hallila et al., (2014)** who conduct study about "Nursing students' Use of Internet and Computer for their Education in the College of Nursing" and stated that most of the students had their own computer at home.

Regarding to type of computer, more than one half of nursing students had handled computer "lap top or tablets". From researchers' point of view this could be due to nursing students often move between classrooms, clinical sites, libraries, and home.

A laptop or tablet are small and portable which allow them to carry their work with them, making it easier to study, complete assignments, or access resources anywhere.

This result was aligned with the finding of **Terkes et al., (2019)** who conduct study about "Determination of Nursing Students' Attitudes towards the Use of Technology" and stated that more than two fifth of nursing students having a computer and more than one half of students having a laptop.

As related to attended training courses on learning with virtual or mixed reality, all of them had not attended training courses on learning with virtual or mixed reality. From researchers' point of view this could be due to mixed reality concept consider trend in learning but virtual concept become somewhat familiar nowadays. The result in disagreement with the finding of **Ismail & Hashim, (2020)** who conducted study about **"**Virtual Reality-Based Education (VRBE): Understanding Students' Readiness and Expectancies" and revealed that the students are somewhat aware of VR, and showed that the students somehow realize that VR is coming its way in education.

Regarding to health problems facing nursing students when using phone or laptop for a long time, the result of this study revealed that less than two third of them had faced eye strain and difficulty focusing. From researchers' point of view this could be due to staying more time preparing researches, electronic projects and attending educational courses so staring at electronic screens which emit blue light for long periods which reduces the rate of blinking, dry and irritated eyes and difficulty eye focusing. The eyes also have to constantly focus and refocus on the screen, which can cause fatigue, beside incorrect posture while using laptops or phones can lead to musculoskeletal strain, which can contribute to tension headaches.

This result was in agreement with the finding of **Asgari Tapeh & Darvishpour, (2024)** who conducted study about **"**Undergraduate Nursing Students' Experiences of Virtual Learning during The Covid-19 Pandemic: a qualitative study" and revealed that the most participants complained of eye fatigue and headache after repeated use of mobile devices attending several hours of online virtual classes.

Regarding to nursing students' total readiness levels toward using metaverse mixed reality technology. The result of the present study demonstrated that more than half of studied nursing students had high total readiness levels toward using metaverse mixed reality technology.

From researchers' point of view it could be interpreted in the light of the study results as it shows that the high total readiness levels toward using metaverse mixed reality technology resulting from the addition of (low knowledge levels toward using metaverse mixed reality technology to high readiness levels toward using metaverse mixed reality technology).In addition to, current nursing students who belong to the technological age tend to use all the latest in educational technology that help them in understand complex learning with practice for better knowledge retention and minimize learning content load.

This result was in agreement with the finding of **Nordin& Daud, (2020)** Who conduct study about "Level of Readiness of Daily Secondary School Students for the Use of Augmented Reality in Form 2 Science Textbooks" and stated that a high level of readiness among students to use virtual learning applications.

In addition to the result of the present study demonstrated that the minority of studied nursing students had low total readiness level.

From researchers' point of view it could be due to little number of students still lacking knowledge about trend learning technologies also, lacking basic technical skills to deal with learning technologies and some still resist for changing from traditional learning methods to technological learning methods under concept from fear that will take long time and effort to learn how to deal with technology.

This result was consistent with the finding of **Palamar et al., (2021)** who conduct study about "Formation of Readiness of Future Teachers to Use Augmented Reality in the Educational Process of Preschool and Primary Education" and reported that the most of the participants' students had a medium and low readiness level toward using virtual reality in learning.

The finding of the prevailing study revealed that more than half of nursing students had high level of creativity in learning. From researchers' point of view MR creates immersive experiences that can transport students to different times, places, or learning scenarios. Accordingly this can stimulate their imagination and encourage creative thinking by allowing them to explore and interact with virtual environments that are not physically accessible this hands on experience can lead to a deeper understanding of the subject matter and inspire innovative solutions to problems.

This result was consistent with **Chen et al., (2024)** who conduct study about "Effectiveness of Virtual Reality on learning engagement" and revealed that virtual reality technology can inspire learners and stimulate their imagination, creating an immersive creative environment that is conducive to fostering creativity.

On the other hand, the result of the prevailing study revealed that the minority of students had low level of creativity in learning. From researchers' point of view this could be due to different conceptual abilities between students that help them to process different creative abilities in addition to, the high nursing education accepted students with higher scoring and higher learning ability so it's normal to find minority of nursing students with low creativity levels.

The result of the prevailing study was contraindicated with the finding of **Alkhasawneh& Khasawneh, (2024)**.who conduct study about "The Effect of Using Augmented Reality Technology in Developing Imaginative Thinking among Students with Learning Difficulties" and stated that learning with virtual reality showed higher levels of creativity.

The finding of the ongoing study revealed that more than half of nursing students had high level of academic resilience. From researchers' point of view it could be due to dealing with different changeable learning circumstances especially after covid 19 crisis after changing traditional learning into online electronic learning it learn students how to be resilient to adapt with different learning circumstances and changing mentality from refusing change to accept it and how to handle and adapt it .

This result was supported with the finding of **Devi et al., (2021)** who conduct study about "Mediating Effect of Resilience on Association among Stress, Depression, and Anxiety in Indonesian nursing students" and stated that more than three fifth of participants a high level of resilience.

Conversely, the finding of the ongoing study revealed that minority of studied nursing students had low academic resilience levels. From researchers' point of view it could be due to not all students have mentality of accepting change especially students who lack required technical skills to

interact with technology they may fear and resist change or taking time to accept change and to learn how to deal with it.

This result was supported with the finding of **Hamadeh Kerbage et al., (2021)** who conduct study about "Undergraduate Nursing Students' Resilience, Challenges, and Supports during Corona Virus Pandemic" and stated that the nursing students' resilience levels were often poor.

Regarding, correlation between nursing student s' readiness toward using metaverse mixed reality technology and creativity in learning. The result of the preceding study Indicated that there was highly statistical significant (positive) correlation between total nursing students' readiness toward using metaverse mixed reality technology, total creativity in learning.

This result was consistent with the finding of **Chang et al., (2023)** who conduct study about "effects of virtual reality on creative design performance and creative experiential learning" and stated that virtual environment has significant positive effects on creativity. Also, this result was supported with the finding of

Regarding, correlation between total nursing students' readiness toward using metaverse mixed reality technology and total academic resilience in learning. The result of the ongoing study indicates that there was highly statistical significant (positive) correlation between total nursing students' readiness toward using metaverse mixed reality technology and total academic resilience in learning.

This result was aligned with the finding of **Pusey et al., (2022)** who conduct study about "resilience interventions using interactive technology: a scoping review" and stated that interactive immersive technology can be used as an effective intervention to increase resilience.

Conclusion:

The present study concluded that more than half of studied nursing students had high total readiness level (knowledge and readiness) toward using metaverse mixed reality technology in learning, had high creativity level in learning and had high academic resilience level. Additionally, there was highly statistical significant positive correlation among total nursing students' readiness toward using metaverse mixed reality technology and total creativity in learning and there was highly statistical significant positive correlation among total nursing students' readiness toward using metaverse mixed reality technology and total academic resilience in learning.

Recommendations:

For Faculty Administration Academic nursing leaders recommended to:

- Prepare orientation seminars on a regular basis to increase academic staff members and student's knowledge about the latest methods of education and teaching and how to incorporate them within the nursing curriculum to enhance their creativity.
- Make the digital transformation course a prerequisite for joining nursing colleges so that students can adapt with e-learning.

For Nursing Students

- Encourage student's participations within orientation and training programs prepared within the college to expand their knowledge about latest technological learning.
- Motivate students to enhance their basic technical skills to be more prepared to adapt to the continuous development of technological education and increase their academic resilience for facing variable academic challenges.

For further research:

- Replication of the study on a larger probability sample is highly

recommended to achieve generalizable results.

- Investigate the impact of MR on different learning styles.
- Investigate AI adapting effect on MR environments in real time for student's creative needs.

References:

Ali-Abadi, T., Ebadi, A., Sharif Nia, H., Soleimani, M., & Ghods, A. A. (2021). Development and psychometric properties of the Nursing Student Academic Resilience Inventory (NSARI): A mixed-method study. PLoS One, 16(6), e0252473.

Alkhasawneh, T. & Khasawneh, M. (2024). The effect of using augmented reality technology in developing imaginative thinking among students with learning difficulties. International Journal of Data and Network Science, 8(3), 1679-1688.

Asgari Tapeh, Z. & Darvishpour, A. (2024). Undergraduate Nursing Students' Experiences of Virtual Learning during the COVID-19 Pandemic: A Qualitative Study. Nursing Research and Practice, 2024(1), 7801500.

Bekele, M., & Champion, E. (2019). Redefining Mixed Reality: User-Reality-Virtuality and Virtual Heritage Perspectives. In Intelligent & Informed, Proceedings of the 24th International Conference of the Association for Computer-Aided Architectural Design Research in Asia (CAADRIA) (Vol. 2, pp. 675-684).

Chen, J., Fu, Z., Liu, H., & Wang, J. (2024). Effectiveness of virtual reality on learning engagement: A meta-analysis. International Journal of Web-Based Learning and Teaching Technologies (IJWLTT), 19(1), 1-14.

Cheung, C. K., Rudowicz, E., Yue, X., & Kwan, A. S. (2003). Creativity of university students: What is the impact of field and year of study?. The Journal of Creative Behavior, 37(1), 42-63.

Devi, H. Purborini, N. & Chang, H. (2021). Mediating effect of resilience on association among stress, depression, and anxiety in Indonesian nursing students. Journal of Professional Nursing, 37(4), 706-713.

Ghanbaripour, A. Talebian, N. Miller, D. Tumpa, R. Zhang, W. Golmoradi, M. & Skitmore, M. (2024). A Systematic Review of the Impact of Emerging Technologies on Student Learning, Engagement, and Employability in Built Environment Education. Buildings, 14(9), 2769.

Gniezdilova, V. & Mykytyn, T. (2023). Case–Study as One of the Innovative Educational Technologies and Its Use in Biology Classes. Journal of Vasyl Stefanyk Precarpathian National University, 10(1), 114-125.

Hallila, L. Al Zubaidi, R. Al Ghamdi, N. & Alexander, G. (2014). Nursing students' use of Internet and Computer for their Education in the College of Nursing. International Journal of Nursing & Clinical Practices, 1(1), 1-5.

Hamadeh Kerbage, S. Garvey, L. Willetts, G. & Olasoji, M. (2021). Undergraduate nursing students' resilience, challenges, and supports during corona virus pandemic. International journal of mental health nursing, 30, 1407-1416.

Hauze, S. & Marshall, J. (2020). Validation of the instructional materials motivation survey: Measuring student motivation to learn via mixed reality nursing education simulation. In International Journal on E-Learning (pp. 49-64). Association for the Advancement of Computing in Education (AACE).

Hauze, S., Hoyt, H., Frazee, J., Greiner, P., & Marshall, J. (2019). Enhancing Nursing Education through Affordable and Realistic

Holographic Mixed Reality: The Virtual Standardized Patient for Clinical Simulation. Biomedical Visualization: Volume 1, 1-13.Retrieved from: https://doi.org/10.1007/978-3-030-06070-1_1

Iqbal, M. & Hassan, M. (2024). Generative Artificial Intelligence and Immersive Technology for Medical Education: Opportunities and Challenges. Interdisciplinary Journal of Virtual Learning in Medical Sciences.

Iriana, D. Yosep, I. & Emaliyawati, E. (2025). The Relationship between Academic Buoyancy and Academic Resilience In First-Year Students At The Faculty Of Health universitas padjadjaran. indonesian nursing journal of education and clinic (INJEC), 19(2), 2-10.

Ismail, S. & Hashim, H. (2020). Virtual reality-based education (VRBE): understanding students' readiness and expectancies. International Journal of Innovation Technology and Exploring Engineering, 9(3), 172-176.

Koumpouros, Y. (2024). Revealing the true potential and prospects of augmented reality in education. Smart Learning Environments, 11(1), 2.

Lehmkuhl, G., von Wangenheim, C. G., Martins-Pacheco, L. H., Borgatto, A. F., & ALVES, N. D. C. (2021). SCORE–A model for the self-assessment of creativity skills in the context of computing education in K-12. Informatics in Education, 20(2), 231.

Mgeni, M., Haji, H., Yunus, S., & Abdulla, A. (2024). Adoption of mobile application for enhancing learning in higher education: Students' views from the State University of Zanzibar, Tanzania. African Journal of Science, Technology, Innovation and Development, 16(2), 265-273.

Nordin, N., & Daud, M. (2020). Level of Readiness of Daily Secondary School Students for the Use of Augmented Reality in Form 2 Science Textbooks. Universal Journal of Educational Research, 8(11), 17-24.

Palamar, S., Bielienka, G., Ponomarenko, T., Kozak, L., Nezhyva, L., & Voznyak, A. (2021). Formation of Readiness of Future Teachers to Use Augmented Reality in the Educational Process of Preschool and Primary Education. In Proceedings of the 4th International Workshop on Augmented Reality in Education (AREdu 2021) Kryvyi Rih, Ukraine, May 11, 2021 (Vol. 2898, pp. 334-350). CEUR Workshop Proceedings

Pavithra, A. Kowsalya, J. Keerthi Priya, S. Jayasree, G. & Nandhini, T. (2020). An emerging immersive technology-A survey. International Journal of Innovative Research In Technology, 6(8), 119-130.

Pellas, N. Kazanidis, I. & Palaigeorgiou, G. (2020). A systematic literature review of mixed reality environments in K-12 education. Education and Information Technologies, 25(4), 2481-2520.

Petruse, R., Grecu, V., Gakić, M., Gutierrez, J., & Mara, D. (2024). Exploring the Efficacy of Mixed Reality versus Traditional Methods in Higher Education: A Comparative Study. Applied Sciences, 14(3), 1050.

Pusey, M.Wong, K. & Rappa, N.(2022). Resilience interventions using interactive technology: a scoping review. Interactive Learning Environments, 30(10), 1940-1955.

Rachmawati, I., Multisari, W., Triyono, T., Simon, I. M., & da Costa, A. (2021). Prevalence of academic resilience of social science students in facing the industry 5.0 era. International Journal of Evaluation and Research in Education, 10(2), 676-683.

Ramdani, R . ,Hanurawan, F., Ramli, M., Lasan, B., & Afdal, A. (2021). Development and Validation of Indonesian Academic Resilience Scale Using Rasch Models.

International Journal of Instruction, 14(1), 105-120.

Ramdani, R., Hanurawan, F., Ramli, M., Lasan, B. B., & Afdal, A. (2021). Development and Validation of Indonesian Academic Resilience Scale Using Rasch Models. International Journal of Instruction, 14(1), 105-120.

Rashed, S. Seade, A. & Kamel, F. (2017). Nursing staff readiness toward advanced mobile devices utilization in nursing care in critical care units. Menoufia Nursing Journal, 2(1), 9-26.

Ravshanovna, K. (2025). Digital technologies in higher education in the 21st century: transforming learning and teaching. Modern problems in education and their scientific solutions, 1(4), 107-111.

Reis, I., Romeiro, A., Berg, C., & Ulbricht, V. (2024). Sociodigital experiences and creativity in the metaverse: An integrative review. Heliyon.

Salim, J. & Sarajar, D. (2024). social support and academic resilience in ethnic minahasa overseas students. counsenesia indonesian Journal Of Guidance and Counseling, 5(1), 46-55.

Sarikhani, R., Salari, M., & Mansouri, V. (2016). The impact of e-learning on university students'academic achievement and creativity. journal of technical education and training, 8(1).

Sundoro, S., Kalbuana, N., & Cahyadi, C. (2024). Strategic Trajectories: An In-depth Exploration of the Complex Landscape of Higher Education in Indonesia. International Journal of Teaching and Learning, 2(1), 236-250.

Terkes, N. Celik, F. & Bektas, H. (2019). Determination of nursing students' attitudes towards the use of technology. Japan Journal of Nursing Science, 16(1), 17-24.

Yulianti, E. Rahman, N. Rahmadani, A. Phang, F. & Suwono, H. (2025). Exploring Students' Creativity Using STEAM-Based Reading Texts. Journal of Advanced Research in Applied Sciences and Engineering Technology, 44(1), 181-187.

Zhang, X. Chen, Y.,Hu, L ., & Wang, Y. (2022). The Metaverse in Education: Definition, Framework, Features, Potential Applications, Challenges, and Future Research Topics. Frontiers in Psychology, 13, 6063

إستعداد طلاب التمريض تجاة إستخدام تكنولوجيا ميتافيرس الواقع المختلط وعلاقتة بالإبداع في التعلم والمرونة الأكاديمية

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يمثل الواقع المختلط نهجاً تحويلياً فى التعليم ويمزج بين العالمين (الحقيقى والرقمي) لخلق تجارب تفاعلية وغامرة تجمع بين عناصر كل من الواقع الافتراضي والواقع المعزز مما يسمح للمتعلمين بالتفاعل مع الكائنات الإفتراضية لتطوير ابداع الطلاب ومرونتهم الاكاديمية لذلك هدفت الدراسة إلى تقييم مدى إستعداد طلاب التمريض تجاة إستخدام تكنولوجيا ميتافيرس الواقع المختلط وعلاقته بالإبداع في التعلم والمرونة الأكاديمية. تم استخدام التصميم الوصفى الإرتباطى. تم إجراء هذه الدراسة على عينة عشوائية طبقية (١١٠٧) من أصل (٣٧٤١) من طلاب التمريض من المستويات الأكاديمية الأربعة في العام الدراسى (٢٠٢٤-٢٠٢٥م) في جميع الأقسام الأكاديمية بكلية التمريض جامعة بنها. كشفت النتائج أن أكثر من (٧٥,٧٪) نصف طلاب التمريض الذين شملتهم الدراسة لديهم مستويات عالية من الإستعداد الكلى (الذى يشمل الاستعداد والمعرفه) تجاة إستخدام تكنولوجيا ميتافيرس الواقع المختلط ، أكثر من نصف (٥٤,٥٪) طلاب التمريض الذين شملتهم الدراسة لديهم مستويات عالية من الإبداع في التعلم وأكثر من نصف (٥٢,٣٪) طلاب التمريض الذين شملتهم الدراسة لديهم مستويات عالية من المرونة الأكاديمية. وقد لخصت النتائج بوُجدت علاقة ذات دلالة إحصائية إيجابيه بين الاستعداد الكلي لطلبة التمريض تجاة إستخدام تكنولوجيا ميتافيرس الواقع المختلط والإبداع في التعلم وايضاً توجدعلاقة ذات دلالة إحصائية إيجابيه بين الاستعداد الكلي لطلبة التمريض تجاة إستخدام تكنولوجيا ميتافيرس الواقع المختلط والمرونه الاكاديميه. وأوصت الدراسة إلى أولاً: لإدارة الكلية إعداد ندوات بشكل دوري لزيادة معرفه أعضاء هيئة التدريس والطلاب بأحدث طرق التعليم والتدريس و كيفية دمجها ضمن مناهج التمريض لتعزيز إبداعهم. ثانيًا: لطلاب التمريض تحفيز الطلاب على تعزيز مهارات إستخدام جهاز الكمبيوتر ليكونوا أكثر استعداداً للتكيف مع التطور المستمر في التعليم التكنولوجي وزيادة قدرتهم الأكاديمية على مواجهة التحديات الأكاديمية المتغيرة.