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| RESEARCH ARTICLE

Investigating Creativity and Resiliency amid Networked Learning in Morocco 2050 Educational Project

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| ABSTRACT
This study examines the networked learning model within the Morocco 2050 (M2050) educational project and its influence on creativity and resilience among students and teachers across six schools in five Moroccan academies. Encompassing 100 middle and high school participants, the study aims to investigate the experiences, satisfaction, innovation, and resilience cultivated through M2050's networked learning approach. Utilizing quantitative methodology, data were collected via questionnaires to assess the effects on collaboration, creativity, and resilience. Findings indicate a positive impact, emphasizing M2050's role as a pioneering initiative in addressing 21st-century skills and supporting sustainable educational practices. The project cultivates an ecosystem that promotes adaptability and innovation within educational communities. By examining the potential of networked learning within the M2050 initiative, this study elucidates its contribution to enhancing students' learning outcomes, advancing teachers' professionalism, and reimaging the Moroccan educational provision.

| KEYWORDS
Networked Learning, Creativity and Resiliency, collaborative professionalism, Morocco 2050 Educational Project.

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1. Introduction

Morocco 2050 (M2050) is an educational initiative aimed at fostering networking among schools and supporting collaborative, networked learning communities. Aligned with Morocco's broader educational policies that promote autonomous, lifelong learning and sustainable development (High Council for Education Training and Scientific Research, 2015), M2050 seeks to enhance creativity and resilience among students and teachers. This study examines the impact of M2050 activities, focusing on whether its networked learning approach can cultivate essential 21st-century skills such as creativity, resiliency, collaboration, adaptability, and innovation. The growing need for 21st-century competencies underscores the significance of collaborative learning and networking in preparing students for the contemporary workforce (Huang et al., 2019). By incorporating these skills within M2050's design, this initiative encourages students and teachers to develop resilience, creativity, and teamwork, fostering an innovative mindset within educational institutions. Through this study, we investigate how these networked learning experiences impact participants, seeking insights into M2050's role in enhancing both student learning outcomes and teacher professionalism.
Through the lens of networked learning, both students and teachers underwent a transformative process. Their interactions and integration yielded results that invite diverse interpretations, opening avenues for further exploration. The nascency of this experience motivates this study to examine the case in greater depth and investigate the utility of networked learning in fostering creativity and resilience in M2050, as well as to gain further insights into the implementation and usability of M2050

activities. To the best of our knowledge, these variables have not been investigated previously. Thus, this study aims to evaluate how M2050's networked learning approach supports creativity, resilience, and professional growth among participants, thereby contributing to a sustainable and adaptive educational ecosystem in Morocco.

2. literrature Review

2.1 General Context

The recent technological advancements have significantly transformed the pedagogical landscape. The term "digital natives" has been employed to describe technologically proficient young individuals who perceive learning and communication differently from previous generations (Prensky, 2002). Others have referred to this cohort as "Generation Z", defined by the Oxford Dictionary as individuals born between 1996 and 2012. This contemporary learning paradigm, which utilizes the internet, raises questions about the learning process as "cognitive achievement and as social practice," where individual and collective goals can be attained and issues of belonging, conflict, change, continuity, and identity can be addressed. Furthermore, it creates novel opportunities for addressing challenging situations and demonstrates a variety of teaching and learning modalities that are relatively difficult to perceive, articulate, and comprehend (Goodyear et al., 2004). Moreover, "the Twenty-first-century skills comprise three main knowledge domains: (1) innovative thinking; (2) information, media, and ICT (information, communication, and technology) skills (collectively referred to as "digital literacies"); and (3) life and career skills" (Trilling & Fadel,2009, as cited in Chu et al.,2021:8). These new skill sets are associated with the challenges and opportunities we all encounter (Chu et al.,2021).

Within the innovative trends in the Moroccan educational system, which address new pedagogical approaches and the development of 21st-century skills in learners, networked learning is a method proposed to foster collaborative learning as a crucial factor in working with joint responsibility and contributing to the construction of learning goals. A strategic vision of reform 2015-2030 was published by the High Council for Education, Training, and Scientific Research (HCETSR) in 2015. The vision calls for quality in education and highlights the importance of collaboration and innovative practices as essential components of a modern educational framework that "considers the learner as a real partner by involving him in teamwork, assigning him research, innovation, and management tasks, and helping him develop a sense of belonging and duty towards the institution" (2015, p. 13). However, there is a paucity of research reporting on this approach. This method, networked learning, was implemented in M2050 using play-based learning techniques, not only to emphasize connection via technology but, more importantly, to highlight social or human interaction as elaborated by Goodyear et al. (2004), who stated that "the use of online materials is not a sufficient characteristic to define networked learning. Human-human interaction, through computer-mediated communication, or CMC, is an essential part of networked learning" (p. 2). Consequently, it is pertinent to inquire: What is M2050?

2.2 Morocco2050 Educational Project

The Morocco 2050 initiative, implemented in six Moroccan middle and high schools across five academies, is an innovative educational project aimed at fostering creativity and resilience among students and educators. Developed from Inventors' Playground activities, this program comprised ten sessions for students and teachers, five collaborative Zoom meetings between educators, and two in-person workshops to initiate the project with both cohorts. During the project, students utilized wooden blocks to design miniature models of intelligent, sustainable urban areas, conceptualizing Morocco's urban landscape in 2050.

This innovative project incorporates a multidisciplinary and human-centered pedagogy, rooted in Paulo Freire's concept of a "humanizing pedagogy," which emphasizes both academic achievement and social resiliency (Freire, 1970; Fránquiz & Salazar, 2004; Reyes, 2007, as cited in M. del Carmen Salazar, 2013). Additionally, the initiative draws from African traditions of collective ethics and morality, aligning with an Africanized approach to education that promotes societal good, ethical behavior, and decolonized learning (Mazonde, 2001; Anyanwu, 1983; Falola, 2016; Dickson, 1985, as cited in Amponsah et al., 2018). Play-based learning methods are central to Morocco 2050's approach, facilitating resilient, engaging learning through collaborative activities. This aligns with global education goals, particularly in preparing students to address contemporary challenges in a volatile, uncertain, complex, and ambiguous (VUCA) world (United Nations, 2015; Johansen,2012; Pyle & Danniels, 2017; Dewar, 2017; Weisberg et al., 2013).

The project encourages students to develop skills that are essential in times of disruption, such as those caused by the COVID-19 pandemic, fostering adaptability and innovation for a sustainable future. Morocco 2050 also aims to enhance students' STEM skills, preparing them to address sustainability issues in rapidly evolving environments. The program integrates storytelling and intangible heritage as tools to stimulate imagination and problem-solving skills, consistent with UNESCO's emphasis on intangible cultural heritage for fostering creativity (UNESCO, 2019; UNESCO, 2021). The main objectives of the Morocco 2050 Project are (1) Boosting Imagination, Creativity, and Innovation: To unlock learners' creative potential in addressing sustainability challenges. (2) Learning Through Collaboration and Collective Intelligence: Enhancing problem-solving by promoting teamwork among students with diverse perspectives. (3) Developing Intercultural Awareness and Resiliency: Building empathy and adaptability to effectively navigate global challenges through intercultural dialogue. This initiative has long-term objectives for a significant, positive reimaging (Ng, 2017) of the future of education in Morocco.

In the M2050 course, participants from diverse academic backgrounds and geographical locations engaged in virtual classes through the Zoom platform. Each phase of the project was designed to cultivate a specific set of skills, progressing participants

from imagination to inspiration, creativity to invention, collaboration to resiliency, and communication to sustainability. They are divided into the following phases:(1) From Imagination to Inspiration: Imagination serves as the foundation for all subsequent skills in the course. Initially, it is imperative to inspire learners before they engage in tangible projects. Imagination functions as the catalyst that fuels innovative thinking, rendering it essential to stimulate creativity and invention. (2) Creativity to Invention: Creativity in this context is defined as the capacity to transform ideas into tangible prototypes, exemplified by students' utilization of wooden blocks to model their visions. Through this hands-on process, students attain the highest cognitive levels, as outlined by Bloom's taxonomy, by applying creative thinking to real-world challenges. This approach underscores that creativity transcends art and encompasses problem-solving, environmental navigation, and future-oriented solution-building. (3) Collaboration to Resiliency: Collaborative learning fosters teamwork skills vital for students' future career trajectories, emphasizing mutual intellectual efforts between learners and educators (Coyle, 2007, as cited in Chu et al., 2021). This collaborative practice not only nurtures resiliency and well-being but also promotes professional growth and adaptability (Hillmann & Guenther, 2021; Hargreaves & O'Connor, 2017; Hargreaves & Fullan, 2012). (4) Communication to Sustainability: In the final phase, students communicate their ideas about sustainable visions through storytelling.

By articulating their missions and concepts, students develop communication skills that are increasingly valuable in today's sustainability-focused job market. Effectively conveying sustainability principles enhances their employability in roles requiring advocacy and community engagement in sustainable practices. The educators in M2050 designed tasks to stimulate creativity, active learning, and practical problem-solving. The program is structured to simplify complex technical issues, encouraging students to engage deeply with sustainability topics. This paper will investigate how networked learning within M2050 facilitated the development of resiliency and creativity.

2.3 Networked learning

In contemporary networked society, interpersonal relationships are of paramount importance. It represents an international commitment to enhancing the sense of coexistence, reliability, and belonging. Digital communications technologies are reshaping relationships, endeavors, and the understanding of justice by enabling technological appropriation and accessibility. Individuals are collaboratively working and sharing thoughts, values, and actions. The significant concern with how education provision could develop methods to improve learning and foster innovation predominantly views networked learning as 'the method that has a great deal to offer to teachers and leaders who want a distinctive label for a more ambitious conception of education moving forward' (Peters et al. 2020, cited in Gourlay et al., 2021:314). Over time, research has redefined the concept of networked learning in a manner that frames and includes criteria advocated in the educational field. The network and networked learning theories date back to the 19th century, as defined by McConnell (1998). "Networked collaborative learning (NCL) is, therefore, the bringing together of learners via personal computers linked to the Internet, with a focus on them working as a "learning community', sharing resources, knowledge, experience, and responsibility through reciprocal collaborative learning" (McConnell, 1998, as cited in Gourlay et al.,2021:315).

This definition is further extended to include the social dimension of learning by creating opportunities for learners to interact in community settings and build a virtual agency with each other, as described in L. Gourlay et al. (2021): "Networked learning involves processes of collaborative, cooperative and collective inquiry, knowledge-creation and knowledgeable action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies. Networked learning promotes connections: between people, between sites of learning and action, between ideas, resources, and solutions, across time, space and media" (p.328).

This paper, however, seeks to elucidate how networked learning promotes social learning, facilitates connections between students and teachers, and creates a resilient and creative space for learning (Shirley et al., 2020). Despite the global acknowledgment of networked learning's benefits, local research in Morocco remains limited. This case study aims to address this gap by exploring the experiences of those involved in M2050, utilizing a case study methodology supported by descriptive quantitative analysis to assess the initiative's effectiveness in enhancing educational outcomes.

3. Theoretical framework

This study draws on the theoretical foundations of networked learning (NL), a transformative educational model particularly suited for the digital age. Grounded in constructivist and social learning theories, NL prioritizes collaboration and relational connections between students and educators, facilitated by digital technologies. As P. Goodyear et al. (2014) highlight, NL promotes essential educational outcomes such as trust, resilience, and innovation by enabling a framework for shared knowledge creation and social learning.

Since the 1990s, the NL framework has evolved to integrate advanced digital communication tools that help build collaborative networks (Siemens, 2005). Central to NL are two principles: (1) the role of technology in mediating interpersonal relationships, and (2) the cultivation of learning communities where learners collectively share resources, experiences, and goals (Gourlay et al.,2021). Through digital connectivity and technological appropriation, NL redefines traditional educational boundaries by promoting access and engagement across physical and virtual spaces. Digital platforms allow for the creation of dynamic learning communities that connect people, ideas, and actions, thus reshaping patterns of interaction, collaboration, and shared agency (Gourlay et al., 2021).

NL also encourages understanding of student perspectives, interaction patterns, and the influence of contextual factors in learning environments (Goodyear et al., 2011).

The social dimension of NL is crucial, as it fosters learning communities driven by trust and mutual responsibility. This community-centered model of learning promotes "knowledgeable action" through shared challenges and collective purpose, enhancing resilience and adaptability among learners (Lave & Wenger, 1991; Lave, 1991, Elboussaidi&Ennam,2025). NL reframes the educator's role, positioning them as facilitators of enriched, socially meaningful learning experiences. By fostering reflective practice and promoting continuous innovation, NL encourages adaptable and sustainable educational practices essential for modern reform efforts (Siemens, 2005; Goodyear & Carvalho, 2014; Gourlay et al., 2021)

Thus, Networked Learning offers a robust, community-driven framework that leverages digital and social elements to enhance knowledge creation while cultivating resilience and adaptability within educational contexts (Goodyear et al., 2014; Lave & Wenger, 1991). This theoretical framework guides the development of survey items in this research, aiming to explore the experiences of students and educators involved in the M2050 Initiative. Subsequently, it aims to investigate the experiences of students and teachers who took part in the M 2050 Initiative amid networked learning and try to understand how satisfied, creative, and resilient they were in this experience.

4. Method

4.1 Research Design

A case study is the chosen research methodology to address research questions, as this method is considered a viable approach for social research. R. Yin (2009) defined a case study as "a strategy for doing research that involves an empirical investigation of a particular contemporary phenomenon within its real-life context using multiple sources of evidence." (Yin, 2009, cited in Robson and McCartan, 2016:150). The selection of this methodology aligns with the research perspectives and intended points of investigation. In this regard, L. Cohen et al. (2007) observed that "case studies strive to portray 'what it is like to be in a particular situation, to catch the closeup reality and 'thick description' (Geertz 1973b) of participants' lived experiences of, thoughts about, and feelings for a situation. They involve looking at a case or phenomenon in its real-life context, usually employing many types of data (Robson 2002:178). They are descriptive and detailed, with a narrow focus, combining subjective and objective data (Dyer 1995: 48–9)." (Geertz 1973b; Robson 2002; Dyer 1995; cited in Cohen et al., 2007:254). The method implemented in this study involved quantitative data collection. To obtain results, a descriptive quantitative design was applied to examine the perspectives of participating students and teachers in the M 2050 Initiative within the context of networked learning and to assess their satisfaction, creativity, and resilience in this experience.

4.2 Research problem

Despite the increasing emphasis on networked learning (NL) as a transformative educational model, there exists a limited understanding of how NL practices specifically foster resilience, trust, and social connectivity within educational communities. Furthermore, while NL is positioned as a means to bridge physical and virtual learning spaces, there is a need for research to examine how collaborative, digitally facilitated environments influence educational innovation, social learning, and the development of community agency among students and educators. This study seeks to address these gaps by investigating how NL practices impact the social dimensions of learning, particularly in constructing resilient, adaptive, and interconnected learning communities in educational settings.

4.3 Research Questions

This study aims to address the following questions:

RQ1: What are the students' and teachers' perceptions of the M2050?

RQ2: How do students experience networked learning? To what extent were they creative and resilient in M2050?

RQ3: How do teachers perceive the influence of their participation in the M2050 on student learning outcomes and teacher professional development?

4.4 The Survey

The survey instrument was designed to address research questions. Two questionnaires were constructed, one for teachers and the other for students, comprising different sections. Both commenced with demographic questions, followed by items for students regarding their perceptions of M2050 and their engagement in "networked learning," "creativity," and "resiliency." The teachers' questionnaire focused on educators' perceptions of this initiative and its implementation in their classes, specifically addressing "their professional development" and "the encountered challenges and constraints." Questionnaires were distributed via WhatsApp to the participants using Google Forms. The data were collected, systematically recorded, and analyzed using the Statistical Package for Social Science (SPSS) version 26.

The student survey utilized in this study consisted of a 22-item questionnaire, structured to gather demographic information and measure the research variables. Three items were dedicated to demographic information, allowing for the identification of participants by gender, school level, and age. The remaining 19 items were organized into three distinct scales designed to assess

key areas of the study, with a demonstrated overall reliability (α =.77), indicating good internal consistency across items. The survey measured the following variables: (1) Student well-being and resilience at school (SWRQs): This measure included 5 items that assessed students' sense of emotional expression, belonging, and satisfaction within their school environment. (2) Students' perceptions of the M2050 (SPQs). This section included six items that measured and evaluated student engagement, interest, and satisfaction with activities specific to the Morocco 2050 project. (3) Creative and Resiliency via Networked Learning in the IPM2050 Project: This scale included nine items focusing on the application of creative and resilient activities (CRQs) and networked learning experiences (NLQs). This scale examined aspects such as creativity and resiliency, collaboration, engagement, and awareness of sustainability within the project framework. The survey was specifically designed and distributed by the researcher to address the aims of the study.

The teachers' survey in this study is a 27-item questionnaire designed to collect demographic information and measure key research variables. Three items covered demographic details, including gender, years of experience, and study level, to capture participant characteristics. The remaining 24 items are categorized into four main sections: (1) TPWRQs, which assess teachers ' perceptions of well-being, resilience, and active learning; (2) TPQs, which focus on teachers ' perspectives on the M2050 Initiative; (3) EPQs, which address effective practices in M2050; and (4) TPEQs, which measure professional experience in IPM2050.

4.5 Description of the Sample

The research population was selected based on their involvement in implementing the M2050 program. The study participants comprised students, teachers, schools, cooperative extension educators, assistants involved in the educational system, parents, and associations. A total of 100 third-year public middle school and first-year high school students participated, along with six teachers representing five different academies: Sous Massa, Marrakech Safi, Orientale, Rabat Sale Kenitra, and Fes Meknes. The students engaged in collective learning via Zoom platforms. Responses were obtained from 76 students. Project M2050 commenced in the second semester. Regarding students' demographic profiles (Table 1), there were 54 girls (71.1%) and 22 boys (28.9%). 41 students were aged between 13 and 15 years (53.9%), and 35 students were aged between 16 and 19 years (46.1%). 24 students were from middle schools (31.6%), and 52 students were from high schools (68.4%), N = 76 who completed the questionnaire from 100 participants. Regarding teachers, there were three females (50%) and three males (50%). One teacher had less than five years of experience, while five teachers had more than ten years. Three teachers held bachelor's degrees, and three others held master's degrees. N = (6) (Table 1).

Table 1.
Frequency description for participants

Teachers 'demographic information			N%	Students 'demographic information			N%
Gender	female	3	(50.0)	Gender	Female	54	(71,1%)
	Male	3	(50.0)		Male	22	(28,9%)
Years of experience	More than 10 years	5	(83.3)	Age	Btw13and 15	41	(53,9%)
	less than 5 years	1	(16.7)		Btw 16& 19	35	(46,1%)
educational level:	BA	3	(50.0)	educational level	High school	52	(68,4%)
	MASTER	3	(50.00)		Middle school	24	(31,6%)

The descriptive statistics provide an overview of the demographic composition of the student sample, summarizing the gender, school level, and age of 76 respondents (Table 2). The gender mean of 1.29 indicates a slight majority of female respondents (coded as 1) compared to male respondents (coded as 2), with a standard deviation of 0.457. This suggests some variability but shows a relatively balanced gender distribution. Concerning school affiliation's mean of 1.32 and a standard deviation of 0.468, the data suggests a slightly higher proportion of high school students (coded as 1) than middle school students (coded as 2). This distribution implies that high school students represent most of the sample, although the difference is modest. The mean age score is 1.46, with a standard deviation of 0.502. Since ages are coded as either 1 (for ages 13–15) or 2 (for ages 16–19), the mean indicates a more even split between the two age groups, leaning slightly toward the younger cohort (13–15).

	N	Minimum	Maximum	Mean	Std. Deviation
Gender	76	1	2	1.29	.457
school	76	1	2	1.32	.468
Age	76	1	2	1.46	.502

Table 2

Descriptive Statistics of Participants

Thus, the data reveals a balanced sample across gender, school type, and age group, with a slightly higher representation of females, high school students, and younger students aged 13–15.

4.6 Ethical considerations

The participants in this study included middle and high school students, necessitating the prioritization of ethical measures such as informed consent, confidentiality, and voluntary participation, particularly given the involvement of minors. To safeguard all participants, data were securely stored with transparent reporting, ensuring that they were apprised of the study's purpose and rights throughout the process. A post-study debriefing was conducted to reinforce ethical standards, maintain transparency, and validate the integrity of this study.

4.7 Data analysis

The data analysis employed a descriptive statistic approach, utilizing a combination of numerical and graphical tools to elucidate the core characteristics of the dataset. This approach facilitates the creation of clear summaries and provides a foundation for more comprehensive analysis. By examining both the strengths and limitations of the M2050 experience, this study aims to investigate the potential impact of innovative practices on the educational system. The analysis yielded key insights into the utility of these practices, offering a more nuanced understanding of how the program may enhance educational outcomes.

5.Results

5.1 Descriptive Analysis of Participant Engagement and Perceptions in Morocco 2050

This study employed a descriptive quantitative design to investigate participants' opinions. Table 3 illustrates the descriptive statistics for the students' views about M2050. The data revealed an overall mean score of 1.107 (SD = 0.260), reflecting an overall favorable opinion of the M2050 activities and experience. The overall mean being close to 1.0, on a scale where 1 represents high engagement and positivity, suggests that the participants had a positive perception of the Morocco 2050 initiative. The questions (SOQ1) "How frequently do you find M2050 activities interesting and amusing" and (SOQ2) "How frequently are you satisfied with Morocco 2050 activities" had the highest mean value, indicating that students found the M2050 activities engaging and enjoyable. Both questions had an identical mean score of 1.20 (SD = 0.589).

Table 3.

Descriptive Statistics of Students' Opinions about M2050

Students 'perceptions	N	Minimum	Maximum	Mean	Std. Deviation
SPQ1 How frequently do you find M 2050 activities interesting and amusing	76	1	4	1.20	.589
SPQ2 How frequently are you satisfied with M2050 activities	76	1	4	1.20	.589
SPQ3How were the activities in M 2050	76	1	2	1.04	.196
SPQ 4Did you learn any new things from M 2050	76	1	2	1.16	.367
SPQ5How were you during the activities	76	1	2	1.04	.196
SPQ6 How do you find the topics of the M 2050	76	1	2	1.01	.115

Overall mean	76	1.00	2.33	1.1075	.26063

These values suggest that the participants generally found both interesting and satisfying activities. The relatively low standard deviation indicates consistency in responses, with most participants similarly rating their interests and satisfaction. Participants consistently rated Morocco 2050 activities and topics highly, with mean scores near 1, indicating strong engagement and positive perceptions. Most reported engaging activities (mean = 1.04, SD = 0.196) and learning new things (mean = 1.16, SD = 0.367), although there was slightly more variation in learning experiences. The topics themselves were viewed as highly appropriate and engaging (mean = 1.01, SD = 0.115), reinforcing the overall positive reception of the project's content and structure. Additionally, table 4 presents further results about the teachers' opinions regarding M2050.

Table 4

Descriptive statistics of teachers' opinion about M 2050

Teachers 'opinion	N	Minimum	Maximum	Mean	Std. Deviation
TPQ1: Do you find M 2050 activities joyful, meaningful effective, and sustainable	6	1	1	1.00	.000
TPQ2: Do you agree with the use of collaborative learning strategies in the M 2050	6	1	2	1.17	.408
TPQ3: Do you think that M 2050 can create a strong sense of trust and community in your class	6	1	1	1.00	.000
Overall mean	6	1.00	1.33	1.0556	.13608

Data reveal an overall mean score of 1.055 (SD=0,136) across these items, suggesting that teachers possess a highly positive perception of the M2050 activities in terms of impact, collaboration, and community-building, with minimal variation among respondents. TPQ2(Do you agree with the use of collaborative learning strategies in the M 2050) exhibited the highest mean value, indicating that teachers value the utilization of collaborative learning strategies in the M 2050 project. Teachers' responses demonstrate a unanimous and highly positive perception of the M2050 activities, with all teachers concurring that the activities were enjoyable, meaningful, effective, and sustainable, as well as fostering a strong sense of trust and community within the classroom. Collaborative learning strategies were also well-received, with a generally favorable view and slight variability, indicating overall alignment with the project's collaborative approach.

5.2 Results on Networked Learning, Creativity, and Resilience in M2050

5.2.1 Networked learning in M2050

The M2050 course comprised ten Zoom sessions for students and teachers, supplemented by five additional meetings exclusively for teachers to enhance networked learning among teachers. Table 5 presents a summary of the participant responses.

Table5.

Frequency Analysis of Networked Learning in M2050

		NLQ1	NLQ2	NLQ3	NLQ 4
N	Valid	76	76	76	76
	Missing	0	0	0	0
Mean		.95	.88	.88	.99
Std. Deviation		.225	.364	.325	.115

Analysis of the dichotomous variables, with "No" coded as 0 (interval range 0.00-0.50) for negative responses and "Yes" coded as 1 (interval range 0.50-1.00) for positive responses, revealed significant trends in participants' responses regarding engagement and comfort with group activities in the M2050 project. For NLQ1(Did you share materials and information with your groups?), a mean score of 0.95 (SD = 0.225) indicates widespread group collaboration, as the majority of participants frequently shared resources. Regarding NLQ2 (Did you find it easy to connect with your classmates and peers from other schools?), the mean score of 0.88 (SD = 0.364) suggests that most participants found connecting with classmates and other accessible schools, although a

minority encountered connectivity issues. NLQ3 (Did you manage to do the activities well in groups?), the mean of 0.88 (SD = 0.325) implies that participants generally managed group activities effectively, although responses exhibited slightly more variation in this domain. Finally, NLQ4(do you feel comfortable working with your groups?) demonstrated a near-universal positive response, with a mean of 0.99 (SD = 0.115) and minimal deviation, indicating that almost all participants felt comfortable collaborating with groups. In conclusion, these findings suggest high levels of group collaboration and comfort in group dynamics within the M2050 networked learning framework with minor connectivity challenges reported by a small subset of participants.

5.2.2 students' well-being and resilience

To address the second part of the research question, which examines students' emotional well-being and its relationship to resiliency within the M2050 project, this study assessed students' connection to their school environment as an indicator of their resilience. The Student Emotional Well-Being Scale comprehensively evaluates students' emotional landscapes, closely linked to their resilience. By analyzing students' sense of safety, belonging, satisfaction, and interest, this scale offers critical insights into how effectively students manage and adapt to their school experiences. In this study, students' well-being was measured using a four-point Likert scale, which served as an interval scale, by assigning numerical values to five distinct items. The mean scores derived from each item offer meaningful data, revealing nuanced patterns in student well-being. This measurement approach supports a thorough analysis of students' emotional well-being, highlighting the key resilience aspects essential for thriving within the M2050 project. Table 6 presents more results about students' well-being at school.

Table 6.

Student Well-being at school

Items	Always	sometimes	never	rarely
I can say how I am feeling when I need to in all courses (SWRQ1)	58.3%	41.7%	0.0%	0.0%
I feel belong to school (SWRQ2)	53.8%	46.2%	0.0%	0.0%
I feel safe and amused at school (SWRQ3)	54.9%	45.1%	0.0%	0.0%
How frequently are you satisfied with the school's activities (SWRQ4)	55.6%	44.4%	0.0%	0.0%
How frequently do you find school activities interesting and amusing (SWRQ5)	58.3%	41.7%	0.0%	0.0%

The data in Table 6 indicated strong positive perceptions among students regarding their sense of belonging, safety, and engagement at school. More than half of the students (ranging from 53.8% to 58.3%) consistently reported feeling a sense of belonging, safety, and the ability to express their feelings in class, with the remainder selecting "sometimes," indicating no negative responses ("never" or "rarely" rarely'). Additionally, 55.6% of the students were always satisfied with school activities, and 58.3% found them interesting and enjoyable. The absence of negative responses underscores the supportive school environment in which students feel valued and engaged. These results suggest an environment conducive to student well-being and resilience.Table 7 shows further descriptive analysis of students' well-being.

Table 7.

Descriptive statistics of student Well-being at school

		SWRQ1	SWRQ2	SWRQ3	SWRQ4	SWRQ5	Overall mean
N	Valid	76	76	76	76	76	76
	Missing	0	0	0	0	0	0
Mean		1.61	1.42	1.47	1.68	1.70	1.5763
Median		2.00	1.00	1.00	2.00	2.00	1.4000
Mode		1	1	1	1	1	1.40
Std. Deviation		.713	.753	.808	.836	.849	.58421

The analysis of Table 7 indicates that students generally report high levels of engagement and emotional well-being, with mean scores across items ranging from 1.42 to 1.70, suggesting frequent positive experiences. The overall mean of 1.57 corresponds to "Always" to "Sometimes" on the scale, reflecting a consistent sense of well-being, interest in subjects, and satisfaction with activities. While students typically reported a strong sense of belonging (mean = 1.42) and safety (mean = 1.47), their responses

exhibited some variability, particularly regarding satisfaction with school activities (mean = 1.68) and interest in subjects (mean = 1.70). Standard deviations, ranging from .713 to .849, indicate that while students generally shared positive sentiments, there were diverse experiences within the sample population.

	N	Minimum	Maximum	Mean	Std. Deviation
CRQ1 Did you use imagination and creativity in M2050 activities?	76	1	2	1.04	.196
CRQ2 Did you enjoy working in a collaborative team?	76	1	2	1.01	.115
CRQ3 How do you approach preparing for the project activities?	76	1	2	1.99	.115
Overall Mean	76	1.33	1.67	1.3465	.06534

5.2.3 Creativity and resilience in M2050

The main objectives of the M2050 course were to know the opinions of the learners and teachers who took part in the M 2050 Initiative amid networked learning and to understand how satisfied, creative, and resilient they were in this experience. Thus, exploring creativity and resiliency in M2050 revealed an overall mean score of 1,346(SD=0.065). Table 8 represents these results

Table 8.

Descriptive Statistics of students' creativity and resiliency

Further descriptive statistics showed that students responded favorably to items regarding imagination, creativity, teamwork, and project preparation. For creativity in solving the M2050 activities (CRQ1), a mean of 1.04 and a low standard deviation (0.196) indicate strong consensus in favor of utilizing creativity. Collaborative teamwork (CRQ2) received an even closer mean to 1 (1.01) with a minimal standard deviation (0.115), highlighting a nearly unanimous appreciation of teamwork. CRQ3, where most participants' responses were "I Create and share original ideas," had a mean of 1.99, suggesting slightly less uniformity in approaches but with low variability (SD = 0.115). The overall mean of 1.346 confirmed generally positive responses with a low overall standard deviation (0.065), indicating consistent experiences across the group.

5.3 Effectiveness Practices in M2050 and Teachers' Professional Experiences

The results related to teachers' perceptions of the M2050 project, highlights their evaluations of extracurricular activities, networked learning, and collaborative skill development in relation to enjoyment, belonging, and well-being. Table 9 illustrates these findings

Table 9.

Effective Practices and Teachers' Professional Experiences in M2050

	To a minimal extent N	To some extent N	To a considerable extent N	To a great extent N
EPQ1	0	0	2	4
EPQ2	0	0	3	3
EPQ3	0	0	3	3
TPEQ1	0	2	4	0
TPEQ2	0	0	3	3

The majority of respondents to EPQ1(To what extent does M2050 provide extra activities that meet students' needs for enjoyment, belonging, and well-being?) evaluated M2050's extracurricular activities as fulfilling students' requirements for enjoyment, belonging, and well-being "To a Great Extent" (80%). The absence of ratings for "To a Minimal Extent" or moderate levels suggests a high degree of satisfaction with these activities. EPQ2(To what extent do you feel that using networked learning in M2050 helps build students' abilities to connect positively with each other and with their school?) received a considerable evaluation of "To a Considerable Extent" (50%) with an additional 50 % assessing it "To a Great Extent," indicating that respondents perceived networked learning as positively influencing students' social connections. The lack of responses in the lower and moderate categories demonstrated consistent satisfaction in this domain. Similarly to EPQ2, responses for EPQ3 (To what extent were collaborative learning, imagination, communication, critical thinking, and creativity present in the M2050?) concentrated at "To a Considerable Extent" (50%) and "To a Great Extent" 50%), reflecting positive perceptions of the presence of collaborative learning,

creativity, and critical thinking skills. The absence of lower ratings suggests a consistent perception of these skills being effectively incorporated into the program.

Responses for TPEQ1(To what extent were you able to design inspiring activities and foster a strong sense of trust and community in your classroom?) were diverse, with 80% indicating that they were able to design inspiring activities and foster trust "To Some Extent." The absence of higher ratings suggests variability in teachers' experiences in building trust and communities within their classrooms. Respondents to TPEQ2 (To what extent do you feel that your professional experience in Project M2050 will impact the development of your students' learning outcomes?) evaluated their professional experience in M2050 as having a "Considerable" impact on students' learning outcomes, suggesting that educators generally view their participation in the program as positively influencing student growth. Consequently, a clear trend emerges, with most responses clustering around "To a Great Extent" and "To a Considerable Extent." This indicates that the M2050 initiative is widely regarded as beneficial, effectively meeting students' needs for enjoyment, fostering social connections, promoting key skills, and creating inspiring learning environments. The analysis revealed that M2050's practices are perceived as both valuable and impactful across multiple aspects of student and teacher development.

6. Discussion

This study presents a comprehensive investigation into the integration of networked learning as an innovative methodology to enhance the Moroccan educational system. Focusing on the M 2050 Initiative, this research examines how students and teachers experience networked learning and assesses their satisfaction, creativity, and resilience within this context. The study aims to explore how collaborative learning helps in establishing a resilient learning environment, with hypotheses and research questions exploring the initiative's impact on creativity, resiliency on student learning outcomes, and teachers' professional development. A case study research design was employed to provide an in-depth understanding of the real-life setting of the M 2050 Initiative and its effects on students and teachers. The utilization of questionnaires facilitated comprehensive data collection. The results underscore a consistent and positive response from participants regarding the Morocco 2050 (M2050) initiative, as both students and teachers reported high engagement, enjoyment, and satisfaction with the program's activities. For students, the overall mean of 1.107 (SD = 0.260) reflects a favorable perspective, with most respondents finding M2050 activities engaging, enjoyable, and conducive to learning new concepts, as evidenced by the low variability in responses. Teachers also shared a notably positive outlook, with an overall mean of 1.055 (SD = 0.136), emphasizing the effectiveness of collaborative learning strategies, which they perceived as reinforced by community building within the classroom. Networked learning activities further supported group collaboration, with students generally expressing ease in managing group tasks and comfort sharing resources and information. In terms of resilience and creativity, descriptive analysis suggests that students not only engaged in collaborative and imaginative problem solving but also developed a sense of agency in preparing project activities, with a highly consistent response pattern. Finally, regarding professional experiences, most teachers reported that M2050 had a considerable impact on student outcomes, facilitating the integration of creativity, critical thinking, and social connections within their teaching practices.

Overall, the findings indicate that M2050 has achieved its objectives by creating a learning environment that enhances both student well-being and teacher development. In analyzing the findings of the M2050 initiative, our results align with the foundational principles of networked learning (NL), which emphasize collaboration, relational connections, and shared responsibility (Gourlay et al., 2021). M2050 participants, both students and teachers, demonstrated increased resilience, trust, and satisfaction, which is consistent with Goodyear et al.'s (2014) assertion that NL fosters trust and adaptable learning communities. Our study further supports the value of the NL framework in bridging the educational and social learning gaps, particularly in settings such as Morocco, where similar initiatives remain scarce (Elboussaidi&Ennam,2025). Some participants expressed challenges with digital adaptability, potentially reflecting the variance in accessibility and digital fluency as identified by Goodyear and Carvalho (2014). This discrepancy suggests that while NL is transformative, its successful implementation may depend on contextual factors such as technological infrastructure and digital literacy. Our findings highlight the importance of networked learning (NL) in enhancing educational outcomes across diverse settings, emphasizing the need for localized research to contribute meaningfully to the broader global discourse on NL. Furthermore, student learning outcomes are closely linked to the professional growth of teachers (Stoll et al., 2006), raising the question: does teachers' professional development within this network translate to measurable improvements in student achievement?

In conclusion, this study elucidates the potential of networked learning to cultivate collaborative learning, creativity, and resilience within the Moroccan educational context. The outcomes of the M2050 Initiative provide a framework for development and advocate for the broader adoption of networked learning strategies. These findings establish a foundation for further research and global implementation, advancing a dynamic and resilient approach to innovative education. M2050 aligns with the Kingdom's vision of cultivating globally aware students ready to address local and international challenges. By leveraging networked learning (NL) centered on shared knowledge, community involvement, and collaboration, M2050 prepares students with essential skills like adaptability, innovation, creativity, and resilience. This approach fosters effective practices that empower learners to navigate rapid global connectivity changes and address critical global issues within Morocco's context (Ennam, 2020), supporting a forward-looking, globally integrated educational system.

7. Conclusion

This study aims to investigate the experiences of students and teachers participating in the M2050 Initiative within a networked learning environment, specifically examining their levels of satisfaction, creativity, and resilience. The data indicated positive effects on students' learning outcomes and teachers' professional development. The findings revealed that both teachers and students experienced high levels of satisfaction; They reported feeling engaged and comfortable, demonstrating creativity and collaboration throughout activities focused on designing smart city prototypes. These prototypes reflected their vision and reimagined the architecture of Morocco in 2050.

This study contributes to the literature by elucidating the role of networked learning in fostering resilience and creativity within African educational environments grounded in collectivist values. Drawing on the traditions of collective "humanness," the M2050 Initiative embodies a philosophy centered on shared experience and growth. This study provides theoretical insights and empirical evidence for integrating networked learning into educational systems, particularly in Morocco, enhancing our understanding of how such an approach influences creativity, resilience, and learning outcomes. These findings offer practical guidance for educational practices and policies that enhance student engagement, foster experiential learning, promote creativity, and encourage interdisciplinary and play-based approaches to create resilient learning spaces. Additionally, this study brings forward new perspectives on the interconnection between creativity and resilience, where creativity is seen as a catalyst for resilience (Metzl & Morrell, 2008) and resilience, in turn, as a foundation for fostering creativity. This interconnection between creativity and resiliency, along with the positive impacts on teachers' professional development, opens avenues for further research to examine how teacher growth within such networks may influence student achievement. These insights provide a valuable basis for exploring the potential of networked learning to reshape educational outcomes in similar settings.

This study also presents actionable recommendations for educational leaders, policymakers, and administrators. Moroccan educational institutions and school leaders can utilize these findings to develop strategies that effectively integrate network learning, the managerial implications of which are substantiated by their positive impact on teachers' professional development, emphasizing the necessity for targeted training and support for the successful implementation of networked learning approaches. The key components of the M2050 model that demonstrate potential for broader applications include strategic course planning, effective cross-regional communication among schools, collaborative engagement between students and teachers, and commitment to fostering innovative and engaging learning environments.

Notwithstanding significant results, this study is not without limitations. The small sample size, particularly among teacher participants, constrains the generalizability of the findings. Additionally, the exclusive reliance on quantitative methods restricts the study from capturing deeper insights that a qualitative approach could have provided. Technological and time constraints pose further challenges for both teachers and students, underscoring the need to reassess the time allocated to extracurricular activities. Both groups navigated novel, imaginative learning activities that fostered creativity and resilience but were also constrained by limited technological resources and unfamiliar tasks. Despite these limitations, the chosen quantitative approach allowed for a structured empirical analysis of networked learning in Morocco's educational context, establishing a foundation for future studies to explore these findings more comprehensively.

The M2050 Initiative is implemented in a period of significant disruption, thus underscoring the need for adaptable and resilient learning spaces. As a pioneering project, it highlights the essential role of networked learning in educational evolution, particularly as technology and AI reshape learning experiences. This study emphasizes the need for educational systems to adapt and foster environments that are both resilient and conducive to active, creative learning for both students and teachers. Furthermore, M2050 offers a promising vision for reimagining education in Morocco. These findings support the standardization and expansion of innovative approaches in schools, with actionable recommendations that can enhance the impact of this strategy across educational contexts.

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