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Challenges of creativity education in the age of digital transformation through the lens of public high school principals and teachers in Egypt

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Abstract

In today's tech-driven society, characterized by the rise of digital transformation, it is crucial to prepare students for the constant changes and unforeseen challenges they may encounter. Recognizing the significance of creativity in this context, educators have increasingly emphasized its integration into the classroom and school curriculum. The proliferation of digital tools has heightened educators' awareness of the necessity of enhancing creativity. Spurred by the sounds of educators, this study aims to investigate the challenges that impede creativity education as a pedagogical technique, exploring the impacts of digital transformation on students' skills. For this purpose, data were collected through a survey design from 300 educators in public high schools. Participants' responses regarding the challenges and barriers of creativity education revealed certain issues such as assessment barriers, a lack of emphasis on fostering a creative culture within schools, a deficiency in material resources essential for adapting to digital transformation, and a lack of professional development programs for a digital environment conducive to creativity. The current research deepens our understanding of the deeply rooted barriers that hinder the processes of energizing student creativity. This study also sheds light on valuable insights that can direct future strategies in the realm of creativity education.

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Keywords: *Creativity education, public high school, the digital transformation age*

Introduction

With the advent of the age of digital transformation and the proliferation of the "Internet of Things" in today's technology-centric society, digital competencies and skills have become essential tools for people's global endeavors (Castells, 2009). The development of 'twenty-first-century skills' that reflect the needs of a digital world, such as creative thinking, problem-solving, and innovation, underlines the importance of integrating creativity into education across all disciplines (Newton, D. P., & Newton, L. D., 2020). Several studies have highlighted the importance of integrating creativity into the learning process. A recent study by Yan et al. (2022) on the effectiveness of visual mind mapping strategies for improving English language learners' critical thinking and creativity found positive outcomes in students' creative self-efficacy and learning performance.

Additionally, scholars have recognized the significance of a creative learning environment in fostering student creativity, emphasizing the value of encouraging sensible risks and supporting students in reaching their creative potential (Fan, M., & Cai, W., 2022). Accordingly, creativity scholars have revealed

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that the classroom learning environment can shape students' perceived goal orientation, which in turn can lead to various educational outcomes and practices (Peng et al., 2013). According to Van Den Hooff & De Ridder (2004), enhancing the creativity of students relies on knowledge management, which encompasses the conversion of knowledge and the generation of new knowledge. In their recent review, Li, Y., Kim, M., & Palkar, J. (2022) not only asserted that internet-based apps like Facebook, Wikispaces, and web- based courses promote idea-sharing and interaction, thereby enhancing creativity and engagement in learning but also recommended focusing on crafting a consistent format for indicating the process of implementing or utilizing technology to enhance creativity, allowing readers to understand the strategies and techniques involved in incorporating technology into the educational process so as to promote successful outcomes for students (Richardson, C., & Mishra, P., 2018).

Therefore, it is essential to navigate the balance between creativity and productivity in the digital age, ensuring that students are equipped with the necessary creative skills to thrive in an increasingly digital and innovative world. Accordingly, the study was designed to answer the following research questions:

Q1: What characterizes public high school teachers' and principals' epistemic beliefs about the barriers of creativity education?

Q2: What characterizes public high school teachers' and principals' beliefs about nurturing creativity with technology in the digital transformation age?

Accordingly, the current study provides insights into the barriers and enablers teachers and principals perceive when fostering creativity. Therefore, this study responds to scholars' call for clear evidence of the challenges hindering creativity education by theorizing about the positive influences of the digital transformation era on public high school students' creativity. Spurred by the sound of teachers, principals, and administrators, this research deepens our understanding regarding the challenges and deeply rooted barriers that hinder the processes of energizing student creativity in which a creative learning environment can increase students' learning goal orientation, network ties, and knowledge sharing concurrently to further boost their creativity.

Literature review

Creativity Education

Individual creativity involves the capacity of individuals to generate and cultivate novel ideas within organizations, contributing to the operational effectiveness and advancement of the organization, and translating those ideas into tangible actions (Shalley et al., 2004). Importantly, nurturing creativity has become increasingly crucial as an educational imperative (Kaufman, J., & Baer, J., 2006; Wagner, T., 2014). The increased emphasis on creativity in educational settings is driven by two forces: the satisfaction of students' particular needs and preparing them for success in a complicated and uncertain realm (Craft, A., 2003). Creativity in education has been linked to various benefits (Fazelian, P., & Azimi, S., 2013). Conceptually, education plays a central role in fostering creativity for all learners, not just elites, and schools need to focus more on fostering creativity in educational settings despite the value placed on creativity (Ritter et al. 2020). In this sense, some authors have affirmed that promoting creativity in schools involves the development of characteristics such as self-motivation, confidence, curiosity, and flexibility.

A recent study revealed the positive impact of emerging technologies on students' creativity in interactive learning (Li et al., 2022). Tan, O. S. (2015) revealed how pedagogy in an information-rich environment offers opportunities for teachers to encourage personal building on and extending the skills and interests of learners. Additionally, Lemmetty et al. (2021), presented, focusing on the links between creativity and learning in formal contexts such as the classroom, teachers' narratives that discursively reconstruct not only their professional but also their personal identities, and investigated the Finnish National Core Curriculum and its impacts on the creativity required, which catalyzes educational change in whole-school contexts. Accordingly, Bulut et al. (2022) found that assigning game design tasks to students turns out to be a potent way to raise individuals who can innovate. Therefore, the evidence suggests that integrating creativity education across various subjects is crucial for the development of students' creative thinking skills.

Digital transformation

Digital transformation is grounded on the Unified Theory of Acceptance and Use of Technology (UTAUT), which postulates four key factors: performance expectancy, effort expectancy, social influence, and facilitating conditions (Trenerry et al., 2021). This theory is used to understand the acceptance and use of technology in the context of digital transformation, which is an evolutionary process leveraging digital capabilities and technologies to create unique value for business models (Jayawardena et al., 2023). Successful digital transformation requires integrating knowledge within the enterprise's productive resources and business systems, as well as integrating digital platforms to gain a competitive advantage and achieve business goals (Hoang, H., & Le Tan, T., 2023). The digital revolution requires a response to the new public demand for cultural content in digital communities and social networks (Lazzeretti et al., 2022).

Several studies have explored digital transformation in educational settings, particularly in response to the challenges, attitudes, and opportunities arising from the integration of digital technologies. These studies have examined the experiences of students, faculty members, and teachers in public schools and higher education institutions. Digital transformation in schools is of great importance as it enhances teaching and learning and determines the future roadmap for sustainable education management (Mohamed Hashim et al., 2022).

Therefore, embracing digital transformation in schools, in the context of creativity education, is essential for keeping up with the evolving educational landscape and providing students with the skills and knowledge they need to access inclusion and equity education (Ambarita, J., & Sentanu, I. G. E. P. S., 2024).

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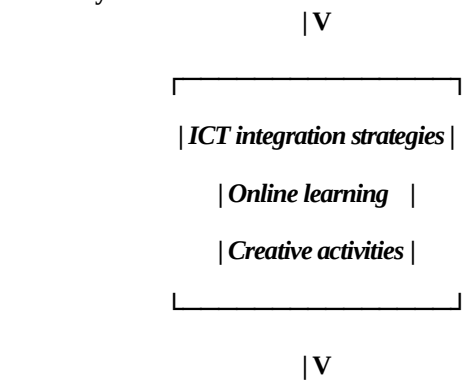

Figure1. creativity education tools to digitally revolutionize school

Digital technologies have changed the nature and scope of education, prompting education systems worldwide to adopt ICT integration strategies and measures (Timotheou et al., 2023). Emerging technologies have a positive impact on students' creativity, particularly in interactive learning (Li, Y., Kim, M., & Palkar, J., 2022). In Fig. 1, "Creativity Education" is positioned above "Digital Transformation Requirements," indicating that creativity education is an essential component in meeting the demands of the digital age. Both are connected to "Schools ICT integration strategies, online learning and creative activities," suggesting that schools play a crucial role in fostering creativity to prepare students for the requirements of the digital age. The link between creativity education and digital transformation has been the core tent of several studies. A recent study discussed the digital transformation of universities as a means of framing an environment for creativity and creative activities to attract and develop talented individuals (Timokhova et al., 2022). Dashkina et al. (2021) pointed out the positive effects of corpus technologies on creative thinking skills and their efficiency in English learning.

Method Study design

The study employed a cross sectional research design with online survey in order to better explore students' perceptions of the challenges that hinder creativity education, navigating previous studies spurred by the digital transformation realm. For data analysis, this study utilized quantitative method based on statistical analysis of the results of assessing the challenges facing public high schools in Al Gharbia Governorate in fostering students' creativity spurred by the power of digital transformation.

Participants

The research instrument used for data collection was a questionnaire designed to identify the challenges facing public high schools in Al Gharbia Governorate in fostering students' creativity spurred by the power of digital transformation. The questionnaire was applied to (300) individuals, including (10) principals, (39) administrators, and (251) teachers in public high schools, totaling (10) schools belonging to the educational administration of Gharb Tanta, Kafr El Zayat, Zefta, Samannoud, and Qutour in Al Gharbia Governorate, selected randomly in July and August of the academic year 2022-2023. Study participants are indicated, by their individual characteristics, in Table 1.

Table.1 Study participants by their individual characteristics.

Respondents' demographic profile		N	Percentage
	Male	137	45.67%
Gender	Female	163	54.33%
	Total	300	100%
	Urban	91	30.33%
School location	Rural	209	69.67%
	Total	300	100%
	Principal	10	3.33%
	Administrativ estaff	39	13%
Occupation			
	Teacher	251	83.67%
	Total	300	100%
	40-45	45	15%
	46-50	117	39%
Age	51-60	83	27.67%
	Above 55	55	18.33%
	Total	300	100%

Data collection: Instruments and procedures

Initially, the purpose of the survey was defined, aiming to assess the challenges facing public high schools towards boosting students' creativity spurred by the power of digital transformation. The questionnaire was created in its primary form, which is consistent with the research objectives and addresses the questions it is intended to answer, while also focusing on the expected outcomes of the research. The survey was validated and piloted on a sample of 100 public high school teachers. Reliability of the Questionnaire
has been well-established, with internal consistency of 0.944. Additionally, to determine the validity of the instrument, the preliminary questionnaire was submitted to a panel of eleven experts knowledgeable in foundations of education. This process was designed to ensure clarity of vocabulary and wording. A number of questions were then reformulated based on feedback from the experts. The Pearson correlation coefficient was calculated between each item in the questionnaire and the total score of the scale, in order to determine the consistency and correlation of the questionnaire items with the total score. As shown in Table (2), the correlation of all questionnaire items with each other, with positive and statistically significant correlations at the 0.01 level, which indicates the reliability of the questionnaire items. It can also be seen that the correlation coefficient of the entire questionnaire with the total score of the

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questionnaire is significant at the 0.01 level, indicating a good level of internal consistency for this questionnaire.

Table (2) Correlation coefficients between each scale item and the total score

n	correlation coefficient	n	correlation coefficient	n	correlation coefficient	n	correlation coefficient
1	**0.590	**4**	**0.528	**7**	**0.673	**10**	**0.624
2	**0.528	**5**	**0.645	**8**	**0.657	**11**	**0.702
3	**0.532	**6**	**0.702	**9**	**0.566	**12**	**0.562
Overall questionnaire correlation coefficient				**0.761			

Data analysis

Means and standard deviations were computed for all of the items used in the current study. Changes in participants' attitudes were calculated using t-tests. The t-tests for independent samples were examined for their ability to detect true differences between populations, as the degree of differences and the number of loci vary (Archie, J. W., 1985).

The t-test for independent samples is used to measure the differences between the two groups, i.e., teachers and administrative staff. The degree of fulfillment of each item was calculated using a Likert scale that provides the following levels of verification for three-point responses:-

- If the weighted average is between (1-1.67), the item role is weak.
- If the weighted average is between (1.68-2.33), the item role is moderate.
- If the weighted average is between (2.34-3), the item role is significant.
- The scale items were also arranged according to the weighted average for the entire sample. The weighted average determines the rank value by averaging the attribute of each data point (Mahmud et al., 2012). All analyses were conducted using IBM SPSS v. 24.0.

Results

To assess the participants' attitudes towards the challenges of fostering students' creativity, the weighted averages for each scale item in the study and the overall weighted average for the sample as a whole in each axis of the survey were calculated. The statistical differences were then calculated using the T-test for independent samples and the axes were ordered according to the weighted average for the entire sample

Table (3) indicates the perspectives of the participants regarding the challenges that hinder fostering students' creativity

	Scale Item	participants	N	Mean	Standard Deviation	Item Order	Impact Level	T -value & sig.	
1	Inadequate delegationof authority hampers school administration in adapting to digital transformation demands.	Principals & administrators	49	2.04	0.705	12		T - value	0.335
		Teachers	215	2.07	0.749		**moderate**		
		Total sample	300	2.07	0.741			Sig.	No Sig.
2	Lack of resources and technological means in public high schools.	Principals & administrators	49	2.10	0.797	8	**moderate**	T - value	0.736
		Teachers	215	2.19	0.813			Sig.	No Sig.
		Total sample	300	2.18	0.810				
3	Lack of qualified teachers to develop students' creative skills.	Principals & administrators	49	2.20	0.676		**moderate**		0.251
		Teachers	251	2.17	0.743			T -	
		Total sample	300	2.18	0.732			value	

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		Total sample	300	2.31	0.741			valueSig.	No Sig.1.40
8	Emphasis of School Tests on Memorization and Rote Learning.	Principals & administrators	49	2.12	0.780		**moderate**	T -	
		Teachers	251	2.24	0.689			value	
		Total sample	300	2.22	0.704			Sig.T -	No Sig.1.13
9	Lack of conviction of school leaders regarding digital transformation and its requirements.	Principals & administrators	49	2.04	0.815	1	**moderate**	valueSig.	
		Teachers	251	2.13	0.724			T -	
		Total sample	300	2.12	0.739			valueSig.	No Sig.
10	Inflexible Teaching Methods in the Classroom	Principals & administrators	49	2.38	0.639		**moderate**	T -	0.819
		Teachers	251	2.20	0.760			valueSig	
		Total sample	300	2.23	0.744			Sig.	
11	Lack of a Supportive Creative Culture in Schools.	Principals & administrators	49	2.30	0.795				No Sig.

4	Lack of qualified teachers to develop students' creative skills.	Principals & administrators	49	2.26	0.836		**moderate**	Sig.T -	No Sig. 0.013
		Teachers	251	2.26	0.822			valueSig.	
		Total sample	300	2.26	0.823			T -	
5	Insufficient availability of curricula aligned with digital transformation and creativity. .	Principals & administrators	49	2.20	0.706		**moderate**	valueSig.	No Sig.
		Teachers	251	2.22	0.691			T -	0.176
		Total sample	300	2.22	0.692			value	
6	Lack of dedicated training programs for creative education	Principals & administrators	49	2.32	0.746			Sig.T -	
		Teachers	251	2.22	0.736		**moderate**	value	No Sig.
		Total sample	300	2.24	0.737			Sig.T -	0.897
7	Lack of strategic plans for creativity-related goals and development.	Principals & administrators	49	2.44	0.737			value	
		Teachers	251	2.28	0.741		**moderate**	Sig.T -	

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		Teachers	251	2.21	0.807		moderate		1.59
		Total sample	300	2.23	0.804			T -	
12	Neglecting Community Partnerships to Foster Student Creativity.	Principals & administrators	49	2.20	0.763	0	moderate	value	
		Teachers	251	2.16	0.756			Sig.T -	No Sig. 0.692
		Total sample	300	2017	0.256			valueSig.	

According to data given in Table.3, it is revealed that the participants' consensus on the challenges impacting the fostering of students' creativity is moderate, evidenced by an overall average score of 2.20 for the entire sample, with no statistically significant difference observed between research samples. This collective viewpoint arises from the belief held by some administrators and teachers in certain public high schools that these institutions struggle to fulfill their role in nurturing student creativity amidst the demands of the digital transformation era. Among the identified challenges, Scale item

(7) "Lack of strategic plans for creativity-related goals and their development" takes precedence, ranking first with an average score of 2.31 and a moderate effect size, though lacking statistical significance. Additionally, Scale item (4) "Insufficient budget for digital transformation in school" secures the second position with an average score of 2.26 and a moderate effect size, indicating a shared perspective within the research sample that public high schools face financial constraints hindering the establishment of an infrastructure conducive to the digital transformation era and the development of capabilities, including creativity.

In the assessment of factors influencing creative education, Scale item (6), highlighting the "Lack of dedicated training programs for creative education," secured the third position with an average score of 2.24, demonstrating a moderate effect size and no statistical significance. Following closely, Scale item (11) and the assertion (10) addressing the "Lack of a supportive culture for creativity within the school" and the "Inflexible teaching methods in the classroom" claimed the fifth and fourth spots, respectively, both garnering an average score of 2.23. These factors exhibited a moderate impact, yet lacked statistical significance. Moving on to the sixth rank, Scale item (8) addressing " Emphasis of school tests on memorization and rote learning." And Scale item (5) tackling the " Insufficient availability of curricula aligned with digital transformation and creativity" shared an average score of 2.22, displaying no statistically significant difference. Finally, in the eighth position, Scale item (3) spotlighting the "Lack of qualified teachers to develop students' creative skills" and Scale item (2) addressing the "Lack of general higher education resources and technological resources" both received an average score of 2.18, indicating a moderate level of impact with no statistical significance.

Additionally, in the assessment of key factors affecting educational institutions, the tenth position goes to Scale item (12) highlighting" Neglecting Community Partnerships to Foster Student Creativity." It obtained an average score of 2.17, signaling a moderate level of impact with no statistically significant difference. Following closely in the eleventh spot is Scale item (9), shedding light on the "Lack of conviction of school leaders regarding digital transformation and the provision of its requirements," scoring an average of 2.12. This issue carries a moderate impact and, like its predecessor, exhibits no statistically significant difference. The twelfth position is occupied by Scale item (1), which received an average score of 2.07, addressing the " Inadequate delegation of authority hampers school administration in adapting to digital transformation demands." This concern also registers a moderate impact and shows no statistically significant difference, emphasizing the need for empowering administrators in the realm of digital transformation.

Discussion and conclusion

The data provide a picture of how teachers and educational administrators in public high schools view the challenges that hinder creativity in their schools. Participants agreed that the obstacles faced by public high schools have a moderate impact on fostering student creativity, as schools are unable to fulfill their role in fostering student creativity in the face of the demands of the digital transformation era, as several challenges hinder this role and affect the effectiveness of public high schools in fostering student creativity.

In scrutinizing scale item (7), highlighting the glaring concern about the lack of strategic plans for creativity-related goals, it is clear that respondents collectively believe that public high schools fall short in cultivating a creative culture. It is possible that some school administrators harbor the misconception that creativity is merely a talent and neglect its potential as an educational goal. This underscores the urgent need to nurture students' creativity and enhance their talents by recognizing creativity and curiosity as essential skills for future readiness. This aligns with the findings of Scott- Barrett et al. (2023), Li (2023), and Bolden & DeLuca (2022). Meanwhile, scale item

(4) illustrates the consensus within the sample regarding insufficient budgets for digital transformation in schools. This suggests that a lack of funding is hindering the development of infrastructure suitable for the digital age, including the

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enhancement of creative skills. The deficit also extends to the lack of funding for professional development for teachers in exploring interdisciplinary skills (Allina, B., 2018).

In the survey, respondents highlighted the "lack of specific training programs for creative education" as the third most critical concern. This reflects a shared belief that public high school teachers are not adequately equipped with professional development opportunities in the realm of creativity, a crucial aspect in the era of digital transformation. This assessment mirrors the observations of Czaja-Chudyba, I., et al. (2018). Interestingly, "Schools lack a culture that fosters creativity" (scale item (11)) was ranked fourth, indicating a deficiency in the overall educational environment. In addition, scale item (10) dealing with the "rigidity of teaching methods used in the classroom" ranked fifth, highlighting the respondents' perception that the prevailing school culture discourages creative education and hinders the acquisition of essential 21st-century skills. This aligns with the idea that school climate plays a pivotal role in fostering creativity, as explored by Gao et al. (2020). In the great symphony of educational challenges, the eighth item on the scale deals with the pervasive problem of schools fixated on the drudgery of memorization, indicating a systemic reluctance to progress beyond traditional assessment methods. This is closely followed by the fifth scale item, which bemoans the lack of curricula focused on digital transformation and creativity, coming in sixth rank. This ranking highlights a noticeable gap between educational elements and shows a skeptical attitude of certain circles towards the integration of modern curricula and alternative assessment methods that foster creative skills. In a move away from traditional assessments that dampen creativity, education is undergoing a dynamic shift towards innovative online approaches. By breathing new life into assessment through examining knowledge organization, promoting real-world application, nurturing self-directed learning, and fostering subject-specific communication, these innovative online methods empower students to not only learn but also think critically and apply their knowledge effectively, ultimately enriching the entire learning journey (James, M., 2010).

Descending through the hierarchy of concerns, the third scale item bemoans the scarcity of qualified teachers dedicated to nurturing students' creative skills, securing a position in third place. In the eighth spot, the second item on the scale addresses the dearth of general college resources and technological means, underscoring a collective sentiment among respondents that education authorities are remiss in furnishing public high schools with the necessary material and human resources for a digital environment conducive to student creativity. Empowering students through the thoughtful incorporation of technology in their learning environment not only stimulates the development of critical thinking skills but also nurtures social and emotional growth, fostering a mindset of readiness for acquiring lifelong knowledge and skills crucial in the 21st century (Ejikeme, A. N., & Okpala, H. N., 2017).

Shifting focus to the 12th criterion, which pertains to the activation of community partnerships for fostering student creativity, it claims the tenth rank. This lower ranking is attributed to a perceived lack of interest from school administrators in recognizing the value of community involvement and its pivotal role in providing digital resources to cultivate a digital environment supportive of students' creative education. This aligns with the assertion made by Meyers et al. (2013) that a lack of digital literacy not only hampers one's ability to reach their full potential as a competent student but also diminishes the capacity to be an empowered employee or an engaged citizen in our digital age. The ninth scale item delves into the readiness and provision of digital transformation by school management, finding itself in the eleventh position. The reluctance of some school leaders, fueled by a lack of awareness regarding the importance of digital transformation, leads them to view its implementation as unnecessary or even impossible, with a palpable aversion to change as they adhere to traditional methods. This resonates with Tusiime et al. (2022) argument.

At the pinnacle of the scale, the first scale item laments "The lack of sufficient authority for school management to meet the demands of digital transformation," securing the second rank. This is attributed to decision-making centralization and a lack of confidence in certain school managers' ability to shoulder the responsibility of implementing digital transformation, owing to their perceived lack of experience or skills in navigating this technological evolution. This aligns with the finding made by Hirst et al. (2011) that there were stronger positive associations between learning goal orientations and creativity, as well as weaker negative connections between "performance avoid" goal orientations and creativity, particularly in situations characterized by low centralization.

The current study unveiled several key findings regarding the challenges faced by public high schools in nurturing students' creativity amidst the era of digital transformation. Teachers and administrators collectively acknowledged significant obstacles, ranging from a lack of emphasis on fostering a creative culture within schools to a deficiency in material resources essential for adapting to digital transformation. The study also highlighted the absence of professional development programs for teachers in creativity education and a general dearth of interest from educational authorities in equipping schools with the necessary resources for a digital environment conducive to creativity. Additionally, respondents identified a gap between educational processes, such as curricula and assessment methods, and creativity education. Furthermore, there was consensus on the overall lack of interest from school administrations in community participation and its role in supporting digital skills to foster creativity in students. Hence, integrating creativity education, a core characteristic of social entrepreneurs, into teacher training programs is essential for instilling qualities such as pioneering innovative ideas, catalyzing social change, embracing risk-taking, and creating novel educational opportunities—all of which empower career adaptability behavior (Elwakil, F. R., 2023).

Ultimately, integrating creativity in teaching and learning will require profound changes in policy and practice. Educational policies will need to place a higher value on creativity education, supporting techno-centric schools, then it must be in keeping with the following aspects: (1) Ensure that teachers have the necessary feedback and support to improve practice; (2)

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Encourage collaboration among school leaders, teachers, and creative professionals; (3) Develop clearer definitions of creativity in education; (4) design novel and stimulating tasks; (5) Rethink curricula.; (6) Support research to gather more empirical evidence on effective approaches to nurturing creativity in and beyond classrooms. Additionally, exploring new approaches to assessment can also be helpful; and (7) rely on integrating digital literacy and citizenship skills into the curriculum.

In a nutshell, this study not only explored, navigating challenges, how teachers and principals value the importance of integrating technology into creativity-fostering instruction in real-world classrooms, but also developed a practical framework based on their experiences. This framework, applicable across public high school spheres, emphasizes a novel approach: supporting creative intent with technology. The study highlights that even experienced teachers benefit from support when implementing creative assessment and tech-based practices within regular curriculum timeframes and achieving higher levels of technology integration. Furthermore, it identifies valuable insights, paving the way for future research on the effectiveness of technology- enhanced creativity with practical relevance

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