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## Total quality management with the integration of artificial intelligence in art and design pedagogy: An innovative era in creative fields

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### ABSTRACT

Total Quality Management (TQM) is an approach that considers customers as the centric point and employee empowerment with specific principles to emphasize continuous improvement in achieving organizational overall quality/excellence. These principles and approaches in higher education are applicable to enhance teaching-learning, research, and other administrative services. This paper emphasizes the TQM theoretical framework, practices, key principles, and application of other aspects in integrating Artificial Intelligence (AI) in art and design fields. In this connection, the paper also explores challenges, benefits, and recommendations for implementation in the higher education sector. In addition, with the fast growth of Artificial Intelligence (AI), the higher education sector's approach to teaching-learning is rapidly changing, including art and design fields. The paper focused on integrating varied AI tools/applications in art and design curricula by indicating their benefits and further stating challenges by maintaining total quality management in education. The paper researches pedagogical strategies, the use of AI applications, and ethical considerations that guide art and design fields for higher educators in the ethical and efficient use of AI for enhanced teaching-learning experiences.

**Keywords:** Total Quality Management, Artificial Intelligence, Art and Design Pedagogy, Ethical Considerations and Creativity.

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### 1. Introduction

TQM is important in all fields of education because it helps to promote a quality culture with continuous improvement in higher education institutions. This improves learning outcomes, enhances employee satisfaction, and creates an effective learning environment by maintaining active participation from faculty, administration staff, and students, focusing on achieving excellence in the educational process. The growth of AI has significantly impacted creative fields by developing new tools for generating ideas, automating repetitive tasks, and enhancing the creative process that allows

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artists and designers to focus on innovative aspects while exploring new creative possibilities. However, concerns are viable regarding originality and dilution of cultural expression. This leads to AI acting as a compelling tool rather than replacing human talent in creativity.

Higher education institutions (HEIs) are important in providing highly knowledgeable and skilled graduates to the global business sector. The technological shift in the competitive era led higher education institutions to face a very high level and continuous pressure from the industry sector by demanding highly skilled graduates. TQM and AI support the development of a comprehensive framework for achieving this goal by higher educators. This is possible because the concept of TQM focuses on continuous improvement by employee involvement, and mainly, a high value is given to customer satisfaction that helps to achieve organizational quality with high excellence. The advent of AI in education has steered the achievement of innovative possibilities by blurring the ideas between human intelligence and machine intelligence. In art and design education, AI gives various creative opportunities but adds challenges. However, a few believe it is a fear because AI might encroach on human creative skills, while others believe it serves as a machine-generated innovative tool for enhancing human creative/artistic expression and fosters innovative teaching-learning experiences. This research paper aims to study and provide a comprehensive overview of the integration of AI into art and design pedagogy while maintaining total quality by exploring its potential, ethical implications, and challenges in doing this by educators. AI can be used to enhance quality management in art and design fields by analyzing vast data to evaluate trends and potential issues, automating repetitive tasks, creating design variations, improving the image quality, and ultimately allowing artists and designers to value creativity and make appropriately informed decisions in the overall design process.

## 2. Literature review

TQM is key to customer satisfaction and organizational excellence, emphasizing continuous improvement. In the face of contemporary challenges in the educational field, the evolvement of AI made it more critical for educators to consider key themes/approaches to contemplate with the educational requirements and competition. This led to integrating AI into creative field curricula to escort an innovative era of creative possibilities by transforming the landscape of art and design fields. The literature in this paper explores the recent TQM cornerstones and the recent state of AI in creative fields to examine potential advantages, challenges, and ethical contemplations.

### 2.1 Sustainability and innovation

The principles of TQM are highly integrated with sustainability and economic and social conditions. Extensive research in TQM explores how the practices can promote ethical business, eco-efficiency, and waste reduction (Dahlgaard-Park et al., 2018). Further, it is an important compound for innovation and fosters an internal culture of experimental learning. This was researched, and studies proved that TQM practices enhance quickness, response to market demands, and innovation (Yang et al., 2019). Implementing AI in education reshapes the system, while the principles and approaches of TQM provide a framework to ensure quality ethical implementations in creative fields. Advanced AI tools are a robust system that provides students with new perspectives and inspiration for creativity. AI tools such as Dall-E2, Midjourney, Canva, etc., are helpful in creating visual concepts, helping educators and students to explore and overcome creative blocks (Elgammal et al., 2017).

### 2.2 Technical skills and digital transformation

Powerful and advanced AI programs and tools support the refinement of technical skills such as image editing and three-dimensional modeling, which allows the creation of high-level creative concepts (Huang et al., 2019). This rise in digital transformation with advanced technologies led to a re-assessment of quality practices. Research in this area examines using digital tools, AI, and data analytics to improve digital transformation's quality and overall effectiveness (Kumar & Shanmuganathan, 2019). Adopting AI helps personalize the learning experience by adapting to individual learning needs and styles. These advanced platforms also give customized critiques and suggest the most relevant resources. These rapid technological advancements give varied opportunities with high-level challenges in the implementation process. Nevertheless, the future of integrating TQM with new technologies such as blockchain and AI tools gives a good scope for integrating these in the curricula (Brusilovsky,

2001). Digital transformation and integration of AI foster interdisciplinary use of computer science in art and design by helping students increase their knowledge and skills in the world of creative professions (Cope & Kalantzis, 2009).

### 2.3 Employee engagement and leadership

Employees play an important role in achieving the set goals for quality management in an organization. Transparent procedures and implementation of quality culture help the organization enhance employee engagement, job satisfaction, and motivation, leading to high performance and innovative techniques (Kumar & Shanmuganathan, 2019). However, this must be supported by training and professional development activities that support the effective integration of AI and allow educators to develop knowledge and skills in the efficient use of AI tools for integration in teaching-learning practices (Cuban, 2001). This needs efficient leaders with high-level leadership skills to implement quality management and integrate AI into the system to empower employees and drive continuous improvement (Kaname, 2003).

### 2.4 Challenges and reflections

While resistance to change, adapting appropriate TQM practices, and employee engagement remain challenging, developing a transparent and effective system to measure the impact of quality initiatives supports organizational success. This is done by implementing the most appropriate AI tools, clear key performance indicators, and a tracking process for evaluation. On the other hand, ethical concerns are raised with the use of AI in art and design pedagogy. This includes the intellectual ownership of AI-generated art and designs and its impact on human creativity (Gunkel, 2018). This is because accessibility to AI tools can be a barrier for some students. Henceforth, to maintain equity, integration into the curricula by stating the use of mentioned AI tools and ensuring the provision of these resources leads to educational inequalities (Warschauer, 2003). This helps to redefine the role of creative fields by defining the role of the artist/designer in the creative process of a project. However, the possibility of replacing human talent is highly seen through the available data. On the other hand, fair and ethical use of AI will help to enhance human creativity skills efficiently (Jordan, 2018).

While literature in this context provides varied viewpoints and challenges, much data shows that educational institutions successfully integrate AI in art and design pedagogy by incorporating AI tools within the curricula and providing AI learning platforms. However, care must be taken in practices for AI integration, consideration of ethical concerns, equitable access to AI resources, and further continuous investigation of the impact of AI in the fields of art and design professions as a future for creative education, and it gives opportunities and challenges. Successful integration is possible by arranging adequate training opportunities in the use of technology and by giving equitable access to students, which helps to enhance learning and bring innovative art and design works in the digital age.

## 3. Research questions

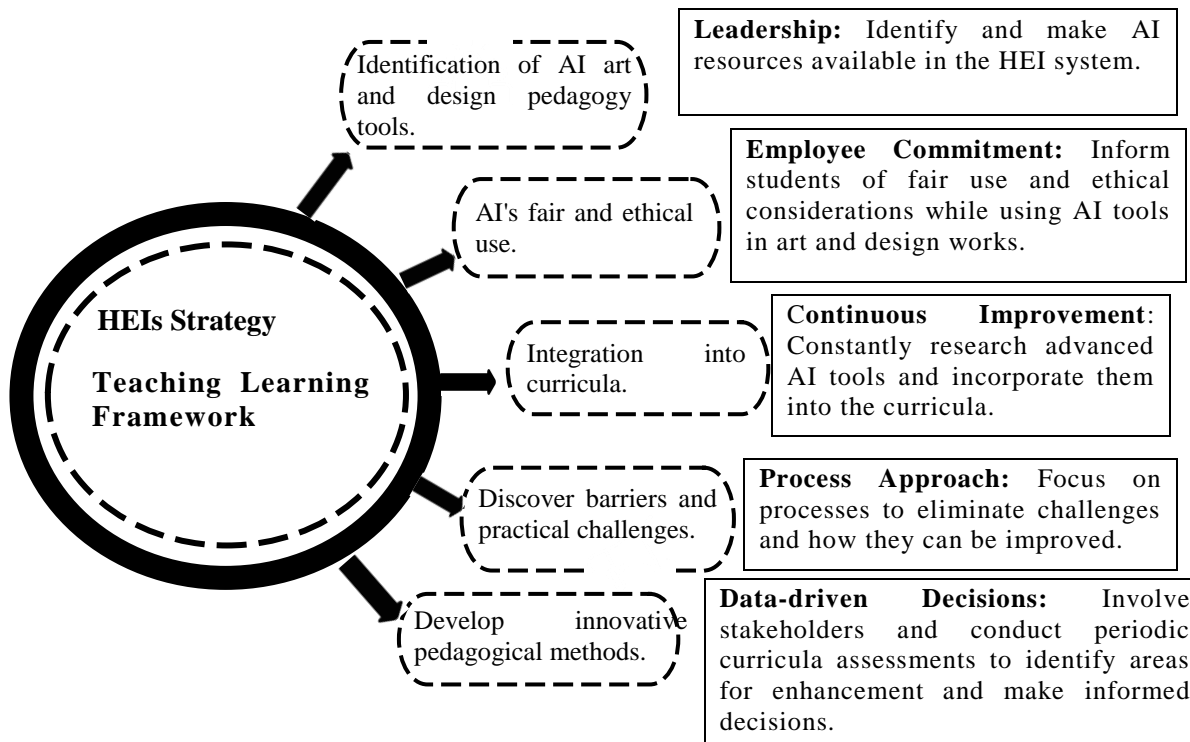
1. What practical challenges might educational institutions face in integrating AI into the art and design curriculum?
2. How can specific and advanced AI technologies be integrated into art and design pedagogy and enhance teaching-learning creative outcomes?
3. What are the applicable measures to ethically use AI in the art and design education system?
4. What are appropriate AI tools that facilitate new techniques and artistic/design styles?
5. How can AI assist in refining and developing technical skills in visual communication, three-dimensional modeling, animation, and digital painting?

## 4. Research objectives

1. To identify advanced AI techniques and art and design pedagogy tools.
2. To explore best practices for AI's fair and ethical use in artistic and creative works.
3. To investigate the effect of AI integration on the learning outcomes that specify technical skills, critical thinking, and creativity.
4. To discover barriers and practical challenges and inform best practices for policymakers and educators.

5. To develop innovative pedagogical methods for effectively integrating AI into teaching-learning.

## 5. Research Framework



Source: Diagram 1: Template adapted from Canva and the framework proposed by the researcher.

### 5.1 A quality-driven approach for integration of AI in art and design pedagogy

AI integration into art and design pedagogy offers exciting possibilities and opportunities but presents significant challenges. However, considering total quality management principles and relevant ethical considerations will help educators harness AI's potential and mitigate its associated risks. To achieve this, educators must consider defining specific objectives that are SMART (specific, measurable, achievable, relevant, and time-bound). In addition, these objectives should be aligned with the intended learning outcomes of AI integration by indicating critical thinking, technical skills, ethical understanding, fair use, and enhanced creativity. In addition, a well-designed curriculum that specifies and integrates the seamless use of AI tools and techniques may include (Huang et al., 2019):

1. Specialised courses on AI art, design, and ethical considerations.
2. Provide students with AI literacy by educating them with AI concepts, algorithms, and ethical considerations.
3. Get the needed licenses for AI software by having a specific budget for integrating AI-related equipment into the HEIs system.
4. Provide adequate training sessions to give needed technical support.
5. Integrate AI into student coursework (projects) that allows them to explore AI technical applications and their support for creativity.
6. Develop appropriate assessment methods with specific rubrics to assess learning outcomes. This includes evaluating coursework that includes AI tools by critically analyzing students' understanding of the ethical use of AI concepts and tools and using a peer feedback approach on AI-generated art and design projects.
7. Regular and continuous assessment of the curriculum to refine teaching approaches and assessment methods.

8. Provide faculty professional development in AI to help them integrate AI correctly in art and design.

### 5.2 Integrating quality management and AI ethical contemplations – faculty and students

In using AI and adhering to ethical considerations to maintain quality in the education system, (Dahlgaard-Park et al., 2018) and (Gunkel, 2018) suggest:

- Critically examine AI-generated text and designs to ensure that AI tools are from free biases which may perpetuate stereotypes
- Data collection methods and use them by emphasizing the importance of collected data privacy and security.
- Value intellectual property by explaining ownership rights, copyright issues, and legal and fair use of ethical implications while using AI-generated text, artwork, and designs.
- Foster human creativity by balancing the unique creation of human-centered designs and critical thinking with AI tools.
- Enlighten the societal impact in broader implications of using AI and its impact on culture and jobs.
- Develop an institutional framework integrating quality management principles with AI integration in the curricula.
- Ensure equitable access to AI tools and resources.
- Inform accountability and data privacy in using AI tools by indicating the use of AI and explaining the creative process.

### 5.3 Comprehensive list of art and design AI tools

1. Adobe Sensei is integrated into Adobe Creative Cloud with AI tools.
2. AutoDraw is a simple drawing tool that helps to create basic shapes and illustrations.
3. Artbreeder tool helps to mix and match images to create unreal and unique artwork.
4. Canva is a user-friendly AI-powered design tool with text effects.
5. Crayon is an open-source, user-friendly tool used for image generation.
6. DALL-E tool helps create beautiful images by taking text descriptions.
7. Dream by WOMBO is a mobile application for art creation.
8. DeepArt is a website that creates artistic images using an algorithm.
9. Deep Dream Generator tool helps to transform images into dream-like images/artworks.
10. Freepik is a website with images, illustrations, and vector images.
11. Imagen was developed by Google's Deep Brain AI team, which helps in image generation.
12. Kaiber changes images/photos and videos into AI-generated artwork.
13. Khroma is a tool to develop color palettes based on the artist's mood or inspiration.
14. Let's Enhance is a tool to improve the quality of images.
15. Leonardo.ai is a tool with advanced image generation and editing options.
16. Looka is a tool to create logos and brand identities.
17. Luminar AI art tool that works with Photoshop and Lightroom.
18. Midjourney tool creates images from photorealistic to artistic in various styles.
19. NeuralStyle Art is an artistic tool that supports applying artistic styles to images.
20. NightCafe is an art generator application with varied features for creating AI art.
21. Pikazo is an application with AI integration that transforms photos into digital artworks.
22. Stable Diffusion is an open-source program to generate images from text.
23. Runway ML is a platform for creating videos and animations.
24. Stable Diffusion tool is an open-source image creation model.
25. Sunthesia is a tool to develop realistic AI-speaking avatars.
26. Uizard helps turn screenshots and sketches into communicating models.

However, these tools can be considered a starting point because this field is rapidly growing with the addition of new tools and techniques, and many other advanced AI tools are being explored and developed.

#### 5.4 Application of TQM and AI in art and design fields

Teaching-learning: Developing an effective teaching-learning process by opting for suitable teaching approaches, creating a student-centered learning environment, creating projects with specific rubrics to assess learning outcomes, and providing students with timely and constructive feedback. In this process, AI tools used in art and design education support automating tasks by generating creative ideas. Generative AI tools like DALL-E-2, Midjourney, and others are used to give text input and generate images, expanding students' creative horizons and inspiring them to the new era of creativity (Brown et al., 2021). In addition, design software that is supported by AI, such as Adobe Sensei and Autodesk Dreamcatcher, helps automate the design process by allowing students to emphasize high-level conceptual thinking (Adobe, 2023; Autodesk, 2023). Other professional AI learning platforms can be used according to the student's individual needs in the creative process by providing feedback and customized learning paths (Siemens & Baker, 2012). This leads to enhanced AI technologies, and AI virtual reality creates an impressive and motivating learning environment that enables students to interact and create art and design concepts in innovative and exciting ways (Billinghurst et al., 2002). In addition, educators' professional growth can be achieved by promoting professional development through AI research and using advanced AI tools to provide adequate research activities and resources. Further, effectively disseminate research findings and integrate them into curricula. These AI technologies also augment student services by restructuring the student administrative processes by adopting relevant technology in student services and ensuring the effective and efficient use of provided AI-related student support services.

#### 5.5 AI ethics

AI ethics is one of the key issues because of the field's rapid growth and complexity. While AI is a human-created system or tool, the same AI can also learn and evolve independently. The very valid question is who takes responsibility for AI's actions, and who owns the intellectual property created by AI? However, there is no clear-cut answer yet. Some of the key considerations to be taken by the designers using AI artists:

##### **Copyright**

Human authorship is required to protect copyright. Since AI is not a person, it cannot be given as an author of copyrighted work. However, the user who gives the prompts or inputs to the AI system should be considered the author as they are the ones who make the creative decisions. Nevertheless, the extent of human prompts or inputs may vary considerably, making this a challenging issue. The legal development or landscape related to AI-generated art and designs is still developing as legislation grapples with these new issues. It is likely to develop laws in the coming time.

##### **Impact on original creativity**

It is complex when AI is used to augment creativity. It can be used for idea generation by analyzing vast datasets and identifying patterns a human eye might miss. This helps to assist in technical challenges by freeing human creators to focus on high-level expression and conceptualization. Furthermore, AI enables the creation of art forms that were previously impossible. The concerning issue is that the ease of using AI to generate creative outputs might diminish the value of human expertise and skills. If many rely on the same AI tools, there is a high risk of similar creative output and a lack of individualistic expression in designs.

##### **Can AI replace humans, and what can AI not do?**

The changing AI landscape is a big question in human minds in this AI era. While AI excels in automation, problem-solving, and creation, it cannot truly understand as it mimics human language, cannot make complex decisions even though it can analyze data, and struggles to make nuanced judgments and ethical considerations and adapt to unpredictable situations. AI can generate new things, but it depends on existing information. Looking at the big picture, AI is a tool like any other technology and can be used as good or bad. It is up to the human/user to ensure AI is used responsibly and ethically. In inference, AI is a powerful system/tool that will continue to change the world in all fields. While it may replace some human jobs, it is improbable to replace humans altogether. Instead, the future could be humans and AI working together by complementing each other's strengths.

## 5.6 Pedagogical approaches for integration of AI and TQM

**Learning with AI:** Use AI platforms to provide customized learning resources and feedback and track student progress. Encourage students to use AI technology or tools to create initial ideas, explore styles, and overcome creative blocks.

**Critical engagement with AI:** Teach the use of AI software as a design assistant to automate repetitive tasks and free students to focus on more complicated design challenges. Furthermore, it encourages students to use AI in their critical thinking process. Teach ethical and fair use considerations while using AI in art and design by addressing the responsibility of citation/authorship and AI's impact on human creative thoughts.

**Institutional Reputation with AI:** Institutional planning and strategic implementation of selective AI tools into the curricula demonstrate the commitment to quality aspects and are steps towards continuous improvement. This is effective because it streamlines processes and eliminates unused resources. Further, employee training in this area empowers employee morale and recognizes their contributions by allowing experimentation and maintaining a culture of continuous improvement. Furthermore, focusing on student needs and providing high-quality education by implementing AI into curricula and needed AI resources improves student satisfaction.

## 6. Challenges and recommendations

Challenges	Recommendations
Resistance to change and skills to adopt new technologies.	Strong leadership and overcome resistance to change.
Lack of funds and training for successful implementation.	Planned budget and training and development opportunities.
Implement effective quality measures for evaluation and improvements.	Data-driven decision-making is used to identify areas for improvement and inform decisions.
Maintaining sustainability.	An effective communication system is needed to collaborate with all stakeholders and make necessary technological advancements.

Many higher education institutions are exploring ways to adopt AI. However, challenges exist with AI-powered tools, student support, and personalized learning. Some of the AI platforms to offer services include:

- Chatbots to answer student queries such as admissions, course registration, etc.
- Personalised learning platforms to analyze student performance and tailor course contents.
- Identify students at risk and give an early alert.
- Cost constraint to develop sophisticated AI-driven tools, especially for small institutions
- Faculty resistance to change and adoption of new techniques by updating their digital literacy.

On the other hand, the potential benefits are evident in careful planning, training, budgeting, and addressing ethical considerations.

## 7. Practical implications

Future research in this field will likely focus on the advancements of AI-powered tools that support the analysis of customized learning paths by catering to individual student strengths and weaknesses, generating new creative paths to push artistic boundaries, and inspiring other approaches to design problems. Research in this area might also investigate using AI to foster critical thinking by encouraging students to question the technology's limitations. Further, ethical considerations addressing authorship and copyright need more research into AI's ethical implications in art and design education. In addition, research on the power of AI in critical thinking and personalizing the learning experiences to enhance creativity supports the higher education sector art and design institutions to delve into new areas and eras of creativity. Suggested step-by-step strategies to educators for effective integration of AI in art and design curricula, empowering students to explore creative possibilities in the era of AI, include:

1. Familiarize faculty with AI tools and provide hands-on exploration or training.

2. Complement existing traditional curricula with the gradual integration of AI to enrich creative process and exploration.
3. Develop effective prompts by enhancing skills in crafting specific prompts that direct AI to achieve specific outputs in styles, themes, and techniques.
4. Provide students with hands-on experiments that allow them to interact with AI tools and foster a deeper understanding of AI functionality.
5. Develop ethical considerations of AI in art and design, focusing on originality, data use, and authorship.
6. Provide prompt feedback on coursework by evaluating the process and assessing students' use of AI tools as a creative medium, not the output.
7. HEIs must stay updated by ongoing learning and exploration of new AI tools and techniques.
8. Stay connected with the community by participating in forums to share knowledge and best practices.

## 8. Conclusion

Planning and implementing a TQM framework is important in enhancing institutional quality in academic and administrative terms. This is possible by focusing on continuous improvement, employee involvement, and customer satisfaction. Art and design higher educational institutions must develop a quality culture that benefits faculty, staff, students and the community. Implementing TQM is challenging; however, it has potential advantages and transforms an institution into a more efficient and effective higher education system. On the other hand, the drastic transformation of AI-driven technologies in art and design education offers exciting platforms and opportunities with complex challenges if they are not well-planned and integrated into the educational system. A thorough analysis by adopting appropriate AI tools and pedagogical approaches helps educators empower students to enter the new era of AI creativity and innovative world by having skills to advance themselves in using AI-powered tools and following ethical contemplations by using these systems responsibly and ethically to enhance the creative work rather than replacing human critical thinking and creativity with machine creativity.

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