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PAPER

# The Influence of Midjourney AI on Animation Character Design: A Case Study of Multimedia Design Students at The University of Jordan

**Fuad Khasawneh[1], Muhannad Al-Shboul[2](✉), Ra'ed Al-Saaideh[1]**

[1]Department of Design and Visual Communication, School of Arts and Design, The University of Jordan, Amman, Jordan

[2]Department of Curriculum and Instruction, School of Educational Sciences, The University of Jordan, Amman, Jordan

malshboul@ju.edu.jo

**ABSTRACT**

This study aimed to reveal the influence of teaching using the Midjourney artificial intelligence (AI)-based intelligence platform on developing the animation character design skills among students of the multimedia design course at the University of Jordan. The study used a quasi-experimental methodology with a sample of 60 male and female students of the Multimedia Design course from the Department of Visual Arts at the University of Jordan. The study participants were intentionally chosen and randomly divided into two groups: the experimental group, which consisted of 32 male and female students who utilized the educational application based on AI Midjourney, and the control group, which consisted of 28 male and female students who used the conventional method of studying. The findings indicated that there were statistically significant differences, at a significance level of ($\alpha = 0.05$), in the average scores of the two groups regarding their post-performance in animation character design skills. The experimental group, which utilized the AI-based application Midjourney as a teaching method, demonstrated superior performance compared to the control group.

**KEYWORDS**

Midjourney, artificial intelligence (AI), animation character design, multimedia design, The University of Jordan

## 1 INTRODUCTION

On the one hand, artificial intelligence (AI) is one of the main products and promoters of the Fourth Industrial Revolution. It is one of the prominent sciences that are routinely mentioned today. It has become an integral part of the modern era of scientific and technological progress due to its various applications in all aspects of life in general and in education and learning in particular. On the other hand, AI is defined as the ability to manufacture intelligence by a human being in a machine

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or a computer; that originates primarily from the human and is then given to the machine [1].

Furthermore, AI has the ability to make decisions based on many improved and pre-trained models, which can be used in the field of animation character design, as AI is playing an increasingly important role in developing and improving the design of animation character. Using machine learning and natural language processing techniques, AI can analyze the physical, psychological, and behavioral traits of characters, guide the design process, continuously improve the animation design, and then create designs that fit their unique characteristics. It can also add and generate diverse and complex expressions and reactions that enhance the audience's experience [2].

Additionally, AI is based on techniques such as deep learning, which has witnessed great development in recent years due to technological advances, such as neural networks dedicated to computer vision, such as convolutional neural network (CNN), and floating neural networks such as recurrent neural network (RNN) and long short-term memory (LSTM) for natural language processing. In 2017, Google presented a revolutionary model called Transformer, which is used in very powerful tools such as GPT, which can automatically learn very complex problems, such as image processing and language processing [3].

However, in the world of design and creativity, animation plays a vital role in conveying an interesting and purposeful visual message in the form of stories and ideas and delivering them to the target audience. With the advancement of AI technology in recent years, animation design methods have evolved significantly from the traditional methods based on hand drawing to become more complex and lead to more creative results, allowing artists and designers to create unique and interesting 3D animation designs. As a result of the ability of AI applications to analyze huge amounts of data and provide suggestions for improving the design, this has led to an increase in the quality of artistic work and an improvement in the creative experience of the designer, as the strengths of AI are particularly evident in its ability to continuously improve and increase the speed needed to complete tasks [4].

From this perspective, it is important to mention the historical context of the application of AI in animation. The animation industry has developed significantly over the years, moving beyond its roots as a niche form of entertainment to the integration of AI into animation. What was once limited to hand-drawn cartoons has now extended to include a variety of techniques such as 3D modeling, stop-motion, and computer-generated imagery (CGI). Animation has emerged as a powerful storytelling medium used not only in film and television, but also in advertising, games, and virtual reality. In the 19th century, a new form of creativity in animation emerged with the introduction of optical devices such as the zoetrope and the phenakistoscope. Despite their fancy names, these were groundbreaking tools that harnessed the phenomenon of persistence of vision to create the illusion of movement using still images. Fast forward to the early 20th century, and Winsor McCay left an indelible mark by bringing "Gertie the Dinosaur" to life through hand-drawn animation, marking a classic moment in the history of the art form. As time progressed, animation witnessed the entry of major players such as Disney and Warner Bros, each contributing iconic characters such as bugs bunny and mickey mouse. These industry giants mastered the intricacies of hand-drawn animation, while other innovators explored techniques such as stop-motion and rotoscoping. The evolution of animation became a dynamic journey, marked by continuous experimentation and creativity with each passing decade [5].

Moreover, Pixar revolutionized the animation landscape in 1995 with the groundbreaking release of "Toy Story." This marked a significant turning point as it was the first full-length feature film created entirely through computer-generated animation. The advent of CGI allowed animators to harness the power of computers, constructing 3D worlds that felt remarkably real. Animation transcended the traditional hand-drawn magic to become a realm of digital wizardry. Fast forward to the present day, and AI is at the center of the animation world. AI collaborates with 3D designers, simplifying the creation of 3D models for animation and enhancing the creative process. AI 3D animation involves streamlining tasks such as interpolating frames and generating backgrounds. In motion capture, AI adds a futuristic twist. Going beyond mere mimicry, it learns and adapts, giving characters a heightened sense of realism by capturing human-such as features in movement. In addition, AI extends its influence into content creation by crafting 3D models and textures, allowing 3D designers to easily create 3D models to be used in animation. Overall, AI-generated animation has brought gains in terms of efficiency and creativity [6].

Despite the fact that recent research emphasizes the importance of AI applications as supporting tools for students in higher education, there has been a noticeable increase in the use of AI applications by students in higher education over the past two years. Numerous projects are proposing and developing AI applications to support students' learning in higher education [7]. One of these AI applications used by students in higher education institutions worldwide is Midjourney.

Therefore, Midjourney is one of the AI applications that contributes to developing the design process for students of the multimedia design course through advanced algorithms that gradually replace the traditional methods of processing the design of animation characters and generating unique ideas. This allows the immediate processing of designs and automatically improves them to reach amazing results that previously required the designer to spend long hours working on regular software to achieve [8].

In conclusion, the dynamic combination of AI and animation has brought in a transformative era, changing the way animation is done. From the evolution of animation techniques to the integration of AI-generated 3D models, the collaborative possibilities are changing storytelling and visual experiences. Also, the emergence of several AI image generation software programs, represented by Midjourney, has given great impetus to the development of AI-assisted art creation compared to the traditional hand-painted digital painting with the help of electronic equipment. Hence, this paper analyzes the application of AI technology in the field of animation character design. However, it is worth noting that there is a lack of existing research on this topic, which further highlights the significance of this study, specifically in the Jordanian context.

Based on the above, the researchers conducted this study to determine the influence of using the Midjourney AI on developing the animation character design skills among students of the multimedia design course at The University of Jordan.

## 2 THE STUDY PROBLEM AND ITS QUESTIONS

The integration of AI technology, specifically the application of Midjourney, brings a new dimension to animation character design, and the use of AI image generation software facilitates streamlined workflows, sparks creativity, and

improves the overall quality of animated characters. Furthermore, AI is having a significant influence on productivity and innovation in animation design and character modeling. The key results of several studies, such as Xi and Chung [4], indicate that AI technology, particularly through the use of Midjourney, enables the automation of certain design tasks, provides innovative approaches, and generates visually appealing and realistic characters. Thus, as the animation industry continues to evolve, AI-assisted tools such as Midjourney hold great potential for further advancement and innovation. Therefore, the above reasons and features of the Midjourney AI application justify conducting such a study to measure the influence of using AI in education in general and in developing animation character design skills in particular.

Additionally, through the academic work of the researchers as faculty members at the University of Jordan, they noticed that the students of the multimedia design course actually suffer from a significant and clear deficiency in the animation character design skills that the students acquire through their hand drawing skills or their use of graphic drawing software, directly or indirectly, which is reflected in their academic performance. The current study was an attempt to investigate the influence of using AI and its various applications through the Midjourney application in developing the skills of drawing and developing animation characters. It is hoped that this study, through its expected results, will contribute to highlighting the importance of using AI applications in the educational process, which may enrich the theoretical literature on the subject of the study.

This study was conducted in response to the recommendations of educational research, which emphasized the importance of incorporating AI tools in the learning process to enhance student achievement, improve learning skills, and increase awareness of the electronic learning environment [9]. The study specifically focused on the influence of using the Midjourney platform in the artistic design process and its effectiveness in teaching multimedia design in Arabic studies.

This study aims to examine the effects of utilizing the AI-based program Midjourney on the development of animation character design skills among students enrolled in the multimedia design course at The University of Jordan. The problem of this study is defined by addressing the following primary inquiry: Is there a statistically significant difference, at a significance level of $\alpha = 0.05$, in the development of animation character design skills among students of the multimedia design course at the University of Jordan, based on the teaching method (using the AI-based application Midjourney versus the traditional method)?

This question leads to the following sub-questions:

1. What is the influence of using the Midjourney AI on developing the animation character design skills among students of the multimedia design course at the University of Jordan?
2. What is the level of animation character design skills among students of the multimedia design course at the University of Jordan?

## 3 SIGNIFICANCE OF THE STUDY

The importance of this study stems from the fact that the educational process has become closely linked to AI, its applications, and tool, both now and in the future

Therefore, the importance of this study revolves around a number of important points. as this study derives its importance from the results it will reach and the extent of the benefits expected from it. The importance of this study also highlights the importance of using AI platforms in developing students' skills related to animation character design at the university level, and it addresses the latest strategic methods in university teaching regarding multimedia, and its role in improving students' designing skills related to multimedia, which helps in raising the level of their animation design skills.

The importance of this study is that it is hoped to help achieve the following:

1. Providing a comprehensive vision of how AI technology can be used to expand the boundaries of artistic creativity and achieve new levels of embodiment and expression through the design of animation characters.
2. Paving the way for subsequent studies that will address this topic, as this study is one of the recent studies that will address the use of the Midjourney AI platform in developing the skills of animation character design among students in Jordan in a way that contributes to an accumulated research and knowledge investigation, as it was noted that there is a lack of research in the Arabic language in the field of this study. Also, it is one of the few and rare studies—according to the researchers' knowledge—that dealt with the influence of using the Midjourney AI platform in developing the skills of animation character design, which makes it important as a reference for future studies that address the subject to complement the current study.
3. Highlighting the potential benefits of using Midjourney AI techniques in developing the animation character design skills, which contributes to the improvement of the target audience's experience and developing the animation industry in general.
4. This study derives its importance from the results it will reach and the extent of the desired benefits from it, as this study will be a reference for researchers in Jordan and researchers in the Arab world in the field of using AI in multimedia in the teaching and learning process, which will enrich the Arab library with references on this subject and in the Arabic language. Through their review of previous studies, the researchers noticed the scarcity of research published in Arabic and foreign languages on this topic.

## 4 THE THEORETICAL FRAMEWORK AND PREVIOUS RELEVANT STUDIES

This part of the study deals with the theoretical framework of the study topics and reviews previous studies related to these topics.

### 4.1 The theoretical framework

This section of the study includes a review of the theoretical literature pertaining to the topic of the study. The influence of using the Midjourney application, which is based on AI, in enhancing students' skills in designing animated characters in the multimedia design course at the University of Jordan. This text presents an analysis of the topics and factors of the study.

### 4.2 AI Multimedia and higher education

In today's world of technology, the hardware, applications, and online computing services have transformed instructional approaches and classroom changes. In various ways, AI has shown its function as a trigger of transformation in the multimedia educational platform in an unimaginable manner [10]. Furthermore, multimedia is a confluence of various forms—text, images, videos, and audio—interacting to create a rich, structured learning experience. Multimedia identifies the important features and patterns of interactions that provide an optimal set of data for further processing in an application. Multimedia plays a major role in art education and the representation process. Multimedia access to images and videos during teaching improves students' comprehension. A certain set of learning algorithms and techniques are used in multimedia that provide necessary ideas and data to perform a particular task in art teaching; it also reduces the latency rate in understanding certain topics in art appreciation. AI text and graphics are used in multimedia-based art education to increase the comprehension of students [11].

However, AI has many characteristics that have made it effective in many fields, including AI applications on devices and machines that enable them to plan and analyze problems in a logical manner. Devices built with AI can understand inputs and analyze them well to provide outputs that meet the user's needs with high efficiency. AI detects similar patterns in data and analyzes them more effectively than human brains and finds solutions to unfamiliar problems using its cognitive abilities and the ability to process the huge amount of information it is exposed to [12].

The advances and progress in AI and machine learning, and the numerous availabilities of mobile devices and Internet technologies, together with the growing focus on multimedia data sources and information processing, have led to the emergence of new paradigms for multimedia and edge AI information processing [13].

In addition, AI is widely formulated and applied in various ways in education, particularly by universities. AI is primarily established as an information technology, a shift to Internet-based and online intelligent education systems, and eventually integrated computer systems, other technologies, robotic devices, and Internet talkbots to perform teachers' roles and duties individually or through instructors. The real-time communication and AI multimedia service support for the learners and instructors helps education attain a higher level of performance [14].

However, many universities are now fully involved in digital education; the features of multimedia education, such as variety, sensitivity, and interactivity, have enhanced teaching forms and attracted students in a certain way. It has promoted students' interest in learning, increased students' engagement, and reinforced students' memory. At the same time, teacher education in the digital world has expanded the teaching ability of colleges and universities. Furthermore, it helps teachers continuously extend the essential and challenging issues and the targeted teaching of individual students. Multimedia education has been demonstrated in many cases, to a certain degree, that it can provide better teaching outcomes that give students more knowledge than conventional teaching methods [15].

Moreover, universities have vigorously adopted multimedia teaching methods and modified their standard teaching methods, emphasizing more multimedia methods in universities. The digital teaching approach is a popular way of teaching in many universities. The value and quality estimation of digital lectures has been an important part of universities. Measuring the quality of multimedia teaching is

often intended to recognize multimedia education issues from different perspectives to enhance the quality of multimedia teaching more effectively [16].

### 4.3 Animation and higher education

Animation has long been perceived as an effective tool in teaching and learning. While students' reception towards animations has often been studied, the literature also covers how instructors perceive and incorporate animations into their classes. In addition, characters and examples of animations can be implemented as class facilities to increase students' interest and perception.

Animation can be defined as a sequence of moving images used to create realistic or imaginary movement. It is also an effective way to convey a visual message to the user in the form of a digital story, where characters are embodied in colorful and innovative worlds. Historically, animation was based on hand drawing, but with the advancement of technology, it has become possible to produce it digitally using computers and advanced software [2].

Animation is characterized by its ability to communicate with the audience in innovative and interesting ways, and it can be used for a variety of purposes, from education and awareness to entertainment and advertising. Animation is also used to simplify complex concepts and present them to the audience in a visual and comprehensive manner. Animation plays an important role in entertaining children and adults alike, as it can create an emotional impact and make viewers feel fun and entertained [17].

The process of designing animation characters is a vital element that contributes to the success of animated films by: achieving communication, providing humor, conveying values, and enhancing emotional interaction with the audience; and it is of great importance for several reasons, including [18]: enhancing interaction and emotional connection, conveying values and lessons, highlighting diversity, entertaining the audience, enhancing creativity and imagination, and facilitating communication and understanding.

As for the importance of AI in animation design, the techniques for designing animation characters using AI have experienced great development, which has improved the efficiency of the production process and provided new creative possibilities. They have become more realistic and attractive, and the possibilities for creativity in this field have expanded to include the following [19]: improving movement and facial expressions, automating movement production, optimizing visual details, improving color combination and designs, delivering intelligent interactions, creating virtual characters, improving production processes, automatically-directed stories, and personalizing the viewing experience.

Consequently, three-dimensional (3D) animation techniques have emerged as a powerful tool for teaching and learning across many educational levels. 3D animations enable educators to create visual and interactive learning materials. There is a need to understand the concept of 3D and how it improves student learning [20]. Therefore, this qualitative research study explores the types of 3D animations and computer technology that are integrated into teaching in higher education settings; moreover, the study aims to examine the way in which 3D animations support student learning and engagement, in addition to exploring how AI animation can develop the skills of designing animated characters among students of the multimedia design course at the University of Jordan.

### 4.4 Midjourney

There are several modern applications related to AI in the field of animation design, including Midjourney. The Midjourney application is an open-source AI laboratory for creating digital designs of various kinds, as well as images, and generating them from textual descriptions written by users. It works to expand the imaginative powers of humans through designs outside the usual framework and is supervised by a group of programmers led by David Holz, which was created in 2022 by an independent research laboratory [21].

Several studies [4, 7] have focused on character design using the Midjourney application to explore its potential for character design. The Midjourney application, powered by AI technology and extensive datasets, provides designers with a fast and effective method for character design. The application offers diverse creative ideas and customization options by analyzing existing character design works and generating new design suggestions. Designers can interact with the application, saving valuable time and effort in the design process. The Midjourney application enables a faster, more flexible, and more creative design process compared to traditional methods. It offers designers a wide range of design possibilities and stimulates their creativity. Integrating AI technology into character design opens up new avenues for innovation and inspiration in the animation, gaming, and film industries.

A variety of high-quality designs can be created that can be used for multiple purposes, such as animation design, multimedia designs, or animation characters and it does not require any prior experience in design. As such, it is a great tool for designing with the highest quality, automatically, and at the lowest possible cost. For example, a text description can be written for a specific character in terms of age group, clothing, psychological state, type of work, and accessories. Midjourney also creates an image that shows this character in the specific situation, and it can be determined whether it is two-dimensional or three-dimensional. AI can be useful in various fields, such as game development, creating animation backgrounds, designing animation characters, and others [22].

To use the Midjourney platform, it is necessary to create an account on the (discord) website, which is a platform specialized in social communication in the field of communications that enables users to create and join servers, chat with others, and participate in audio and video conversations.

Midjourney uses a technology called (stable diffusion), as this technology works by relying on an artificial neural network that learns how to produce digital images and designs from the provided textual description. This network is trained using a wide range of diverse images and texts to learn the relationships between them, and then this knowledge is used to automatically produce the design [23], according to the following steps:

1. Go to the Midjourney tool, then click on (join the beta), after that, you will be automatically redirected to (discord).
2. Log in to your account on (discord), or create a new account, then accept the invitation to join the Midjourney tool for designing images with AI, then click on (accept invite).
3. From the main menu, click on the Midjourney icon, which is in the shape of a boat, then search in the list for the (newbies) options, which are rooms for new users, then click on one of them to open the chat page where you can start using Midjourney.

As for the digital design process with AI through the Midjourney application, that is dealing with the Midjourney platform, below you will find an explanation of how to deal with the Midjourney platform, and then some of the work of students from both the control and experimental groups will be discussed:

1. After entering one of the rooms named (newbies), go to the chat box (imagine) within the chat box.
2. After the (image prompt) command, type a description of the design you want the AI to design (the image description must be in English).
3. Imagine Prompt: It is the key to the imagination request from the site, where the student can unleash his imagination of designs.
4. Description box (text prompt): where details can be written that will serve the design idea to get the best results. The description includes the following:
   - Required design type (web site, web application, animation, mobile application, picture, logo, announcement, business card).
   - Required design style (digital drawing, digital illustration, vector graphic, digital portrait, oil painting, water color).
   - Design elements: (lines, shapes, texture, space, typography, image).
   - Design foundations: (symmetric, balance, contrast, unity, rhythm).
   - Required color systems (coloring mode): Aspect ratio, art quality ratio, and type of server (robot version) on which the work must be completed, as the latest version was (V5.2).

The AI of the Midjourney tool takes a few minutes to complete the desired design according to the description entered, and then it will send four images for you to choose from. By selecting (U), you will get the designed image in full size, and by selecting (V), you can create a new design based on the chosen image. In addition, you can request a new and different set of designs by clicking the (update) button. The design can be saved and exported once you are satisfied with the final design.

In conclusion, the Midjourney application demonstrates significant potential in character design, providing designers with a valuable resource for creative ideas and inspiration.

## 4.5 Previous studies

The researchers consulted several papers pertaining to the subject matter of this study. This section aims to outline these studies in chronological order as follows:

Mohamed [24] conducted a study investigating the use of AI techniques in the creation of animated characters within the field of animation. The study also examined the ethical implications surrounding intellectual property rights and the psychological effects of designing advanced animated characters produced by AI. Additionally, the study emphasized the significance of designing animation character as a crucial form of artistic communication, as they encompass creativity, expression, and conveying messages in captivating and inventive manners. The study applied a descriptive analytical approach to demonstrate the application of machine learning and natural language processing techniques to the development of animation characters. It also highlighted the potential of AI in analyzing the physical and behavioral traits of characters and subsequently designing characters that align with their distinct characteristics. The study also suggested supporting

ongoing research and development of AI approaches in the animation business, as it may facilitate the creation of novel tools and processes that increase the creative quality of works.

Yang [25] conducted a study aimed at identifying the effectiveness of AI technology in enriching the creative imagination of the animation artist and virtual reality animation-assisted production, saving time and effort, and the contribution of AI in enriching the creative imagination of the designer in designing characters and backgrounds; it also aimed at developing various solutions in terms of: manipulating fonts and colors, proposing solutions for animation, and opening different horizons and ideas in a high-precision manner that keeps pace with contemporary technical development through the use of AI applications and platforms such as (Midjourney, DALLE-2, adobe animate).The study used the descriptive analytical approach to study the degree of impact on the animation field with various AI applications. The study recommended the need to expand the use of AI applications in the design of: characters, backgrounds, and scenes to save time and effort, as well as obtain creative results for animation artists. It also recommended conducting more research to study AI applications by applying studies that combine arts and industrial intelligence and their impact on the field of animation.

Jie, Shan, and Chung [26] conducted a study that aimed to explore the impact of the most accepted AI drawing tools for designing animation characters (Midjourney, stable diffusion) and to make a comparison between the two applications to lay the foundation for more in-depth research on the content generated by AI. The study used a comparative approach. The results indicated that both applications can create animation designs with great features with some differences in the final product, and the results showed that stable diffusion provides advanced features such as details regarding character control, parameter customization, and more customization options, making it a more preferred option for those looking for greater flexibility and control. On the other hand, Midjourney excels in providing more opportunities to explore different artistic styles in character illustrations, which contributes to the development of content created by AI and enhances the experience of AI drawing by choosing the program that best matches the desired results.

Xi and Chung [4] conducted research to investigate the use of AI in animation and design, specifically focusing on its use in 2D animated character creation. The goal was to assess the effects of AI on productivity and creativity in animation design and character modeling. The study used a descriptive analytical method. The results showed that AI technology, particularly with the use of Midjourney, facilitates the automated creation of animated characters, offers novel techniques, and produces visually captivating and very lifelike figures. Integrating AI techniques, particularly with the Midjourney application, enhances the design of animated characters, streamlines the workflow, and increases the overall quality of the characters compared to traditional hand-drawing methods. The study suggested that future research on AI applications should be expanded, with a focus on improving the capabilities of AI and its applications to meet the necessary level of design assistance in the animation industry.

Kim [27] conducted a study that aimed to identify the use of text and images resulting from AI applications using the latest language models and AI image generation services such as ChatGPT and Midjourney in creating animation for fairy tale stories and interactive customized multimedia and to measure the impact of AI applications in the era after hand-drawn art, where the value of art is under

threat and AI is on the rise. The study explores whether computers and AI have a value of a shroud in the era of multimedia art, examining the relationship between art and future technology. The study use a descriptive analytical approach. The results showed that AI has the ability to generate and create attractive and personal content for readers. The study recommended the need to expand research on AI art, or the new multimedia art that uses AI technology in the future, and also its impact on developing interactive educational materials.

Lee [8] conducted a study aimed at identifying the impact of using AI applications such as ChatGPT and Midjourney on the efficiency of producing and designing animation (storyboards) and comparing their production with traditional methods that require time, cost, and specialized expertise. The study was conducted in South Korea using the AI soft actor critic (SAC) platform, which represents the forefront of storyboarding platforms that uses AI intelligence in design and is characterized by the ability to create realistic images based on open databases. The results showed that AI increases the efficiency of creating a storyboard and enhances the director's vision in telling stories through this improved method of AI integration. It has become possible for directors of this type of videos to depict the imagined movie scenes in a more complex and professional manner. The study recommended increasing future research on the application of advanced AI techniques to facilitate the automatic generation of customized content in creating storyboards and to increase the efficiency of the process of creating this type of videos.

## 5 RESEARCH METHODOLOGY

The study used a quasi-experimental approach and employed a two-group design consisting of a control group and an experimental group. The experimental group received instruction using the AI-based application Midjourney, while the control group received instruction using the traditional teaching method. The purpose of this study was to investigate the influence of implementing the Midjourney application, which is based on AI, on improving the animation character design skills of students enrolled in the multimedia design course at the University of Jordan. The traditional method of teaching animation character drawing by hand was supplemented with the use of the Midjourney application to further develop the students' design skills. The researchers mainly used the Midjourney program with the experimental group, in addition to using the traditional way of hand sketching with the control group.

### 5.1 Participants

The study sample consisted of 60 male and female bachelor's students enrolled in the multimedia design course at the Department of Visual Arts, School of Arts and Design, the University of Jordan, during the first semester of the academic year 2023/2024. Two sessions of this study course were intentionally and randomly allocated. The experimental group, consisting of 32 male and female students, received instruction using the Midjourney application. The control group, consisting of 28 male and female students, received instruction using the traditional method of hand drawing.

## 5.2 Study instrument (note card)

To answer the study questions, the researchers prepared a notecard to measure the influence of using the Midjourney AI application in developing animation character design skills among students of the multimedia design course at the University of Jordan. The tool included various sub-dimensions related to performance skills associated with design skills. The notecard contained several items that encompassed the fundamental graphic drawing skills taught in the second-year course for multimedia design majors. These skills include sensitivity towards design challenges, adaptability in graphic design, proficiency in design execution, creativity in design, and the aptitude to creatively implement computer-based technical drawing. Parameters were established for each item to ensure accurate comprehension. The items of the tool were all constructed using a 5-point Likert scale.

The final iteration of the tool had 11 items and was divided into two domains: The first domain pertains to the aptitude for accomplishing the practical component of character design, and it comprises six components. The second section focuses on the ability to achieve attractive and inventive proportions in character design. It has a total of five components. The researchers utilized three levels to assess the extent of skill availability as follows: the first level is considered low if the estimate is between 1 and 2.33; the second level is considered moderate if the estimate is between 2.34 and 3.67; and the third level is considered high if the estimate is between 3.68 and 5.

## 5.3 The validity of the study tool

In order to confirm the apparent credibility of the study tool, it was administered to a panel of experts in various fields, including education, measurement, evaluation, curriculum and instruction, and arts and design. These experts were faculty members from the School of Educational Sciences and the School of Arts and Design at the University of Jordan. This was done to ensure that the tool is appropriate for its intended purpose, that the items are accurately formulated, that each item is relevant to the specific field for which it was designed, and that their validity is assessed in terms of wording, content, suitability to the relevant fields, clarity of the method used, applicability, and the extent to which the teaching method is suitable for the students' level.

The arbitrators' opinions were considered with respect to clarity, linguistic and scientific accuracy, relevance to the intended field of measurement, suitability to the study's objectives, coverage of the required skills, and any proposed amendments or additions they deemed necessary. Unnecessary items were also deleted. The researchers incorporated the feedback from the arbitrators to refine the tool by removing certain items, altering others, and introducing new items. This resulted in the final version of the instrument.

The construct validity of the instrument was assessed by computing the correlation coefficient for each item with both the overall score of the tool and the corresponding domain using the Pearson correlation coefficient. The results are presented in Table 1.

**Table 1.** The degree of the correlation of each item in the measurement tool with the total degree of the tool and between the items and the domain to which it belongs

| Number | Correlation Coefficient with the Field | Correlation Coefficient with the Total Score of the Tool |
|---|---|---|
| 1 | .632** | .593** |
| 2 | .704** | .638** |
| 3 | .771** | .706** |
| 4 | .722** | .714** |
| 5 | .732** | .706** |
| 6 | .698** | .650** |
| 7 | .719** | .684** |
| 8 | .713** | .711** |
| 9 | .547** | .489** |
| 10 | .771** | .726** |
| 11 | .737** | .670** |

*Note:* **Correlation is significant at 0.01.

Table 1 reveals that all correlation coefficients between the items and the total score, as well as between the items and their respective domains, were positive and statistically significant. This indicates that the scale has construct validity, as all values were high. The internal consistency validity values ranged from 0.489 to 0.771, which are deemed to be high and adequate for the objectives of this study [28].

## 5.4 Reliability of the study tool

To verify the reliability of the study tool (the digital design skills notecard), the internal consistency coefficient between its items was extracted by calculating the Cronbach alpha equation for the total score of the notecard and its two fields; the results are shown in Table 2.

**Table 2.** Consistency coefficient (reliability) using the Cronbach alpha equation

| Number | Field | Cronbach Alpha |
|---|---|---|
| 1 | First | 0.944 |
| 2 | Second | 0.932 |
| **Total Score** | | 0.965 |

The data in Table 2 indicate that the reliability coefficients for the overall score of the questions/items of the notecard were 0.965, while the reliability coefficients for its two domains varied from 0.932 to 0.944. These values are deemed satisfactory for the objectives of this study [28]. Reliability was also calculated using Cronbach's alpha for each of the domains of the tool and for the two domains, and the reliability of the two domains estimates was also calculated by calculating the coefficient; Table 3 shows the results.

**Table 3.** Reliability coefficient using the Cronbach alpha method and reliability using the repetition method for notecard items (digital design skills)

| Dimension for Each Domain | Cronbach Alpha | Reliability of the Evaluators |
|---|---|---|
| The foundations of design and its elements | .800 | .840 |
| The functional aspect of design | .780 | .780 |
| Aesthetic and innovative proportions | .730 | .750 |
| Performance in digital design | .810 | .850 |
| **Total Score** | .830 | .820 |

Table 3 shows that the Cronbach Alpha coefficient for the notecard (digital design skills) had a total score of 0.83. The evaluators' reliability had a total score of 0.82. The Cronbach alpha coefficients for the different aspects of the tool ranged from 0.73 to 0.81. The evaluators' reliability, measured on a scale of 0.75 to 0.85, indicates that the instrument has a satisfactory level of reliability for practical use in the field.

## 5.5 Equality of both groups

In order to assess the similarity of two groups in terms of their animation character design skills, the mean scores and standard deviations were calculated for both the experimental and control groups of students enrolled in the multimedia design course at the University of Jordan. This analysis was conducted during the pre-test phase, focusing on the overall score of developing animation character design skills. In addition, a t-test was conducted on independent samples, and the findings are presented in Table 4 below.

**Table 4.** Arithmetic means and standard deviations of the performance of both study groups (experimental and control) on the overall score of the scale of developing the skills of designing animation character among students of the multimedia design course at the University of Jordan in the pre-test phase, and the t-test for independent samples

| Group | Number | Arithmetic Mean | Standard Deviation | Calculated (T) Value | Significance Level |
|---|---|---|---|---|---|
| Experimental | 32 | 17.81 | 6.07 | –0.787 | 0.435 |
| Control | 28 | 16.65 | 5.22 | | |

The data in Table 4 shows that there is no significant difference in the mean scores and variability between the experimental and control groups in terms of their performance on the overall score for designing animation characters among multimedia design students at the University of Jordan during the pre-test phase. This is supported by the T-value of –0.787, which is not statistically significant at a significance level of 0.435. Therefore, both groups are considered equal prior to the study.

However, in terms of statistical validity, it is important to highlight that the researchers have chosen a sample size of 60 students because they represent the entire population, it is finite, and it is possible to measure almost every entity

in the population. In other words, there were only two sections of the multimedia design course when the study was conducted; thus, the researchers used all available data.

### 5.6 Statistical analysis

To answer the first question, the arithmetic means and standard deviations were extracted, and a one-way ANCOVA was used for the total score of the scale, and a one-way MANCOVA was used for the dimensions. To answer the second question, the arithmetic means and standard deviations were extracted, and the ranks and degrees were determined, as the degrees were determined as follows: low degrees (1–2.33), medium degrees (2.34–3.67), and high degrees (3.68–5.00).

The following statistical methods were also used: the Cronbach alpha equation to verify the reliability of the study tool, the Pearson correlation coefficient to verify the structural validity of the study tool, and the independent samples t-test to verify the equality of both groups on a scale of animation character design skills among students of the multimedia design course at the University of Jordan, and Eta squared to measure the effect size.

## 6 RESULTS AND DISCUSSION

The following are the findings of the study and discussions of the results:

### 6.1 Research results

**First:** The findings related to the first research question, which inquired about the influence of using the AI-based program Midjourney on improving the animation character design skills of students enrolled in the multimedia design course at the University of Jordan?

To address this inquiry, the arithmetic means and standard deviations were obtained for the performance of two study groups (experimental and control) in relation to the overall score on a scale measuring the development of animation character design skills among students enrolled in the multimedia design course at the University of Jordan. The results are presented in Table 5.

**Table 5.** The arithmetic means and standard deviations of the performance of both the experimental and control study groups on the total score measuring the development of animation character design skills among students of the multimedia design course at the University of Jordan were calculated for the pre- and post-test phases

| Group | No. | Pre-Test | | Post-Test | |
|---|---|---|---|---|---|
| | | Arithmetic Mean | Standard Deviation | Arithmetic Mean | Standard Deviation |
| Experimental | 32 | 17.81 | 6.07 | 40.75 | 6.33 |
| Control | 28 | 16.65 | 5.22 | 21.32 | 8.10 |
| Total | 60 | 17.27 | 5.67 | 31.68 | 12.11 |

The data in Table 5 clearly show significant disparities in the average performance of the experimental and control groups in terms of their overall scores on the scale measuring the development of animation character design skills among students in the multimedia design course at the University of Jordan. Specifically, the post-test phase revealed that the experimental group had the highest average score of 40.75, while the control group had the lowest average score of 21.32.

The one-way ANCOVA test was used to determine the statistical significance of the difference between both arithmetic means. The findings are presented in Table 6.

**Table 6.** One-way ANCOVA for the difference between the arithmetic means of the performance of both study groups on the scale of developing the skills of designing animation character among students of the multimedia design course at the University of Jordan in the post-test phase

| Source of Variance | Sum of Squares | Degrees of Freedom | Mean Sum of Squares | (F) Value | Significance Level | Eta Squared Value |
|---|---|---|---|---|---|---|
| Pre-Test | 713.299 | 1 | 713.299 | 17.671 | 0.000 | 0.237 |
| Group | 5174.95 | 1 | 5174.95 | 128.204 | 0.000 | 0.692 |
| Error | 2300.808 | 57 | 40.365 | | | |
| Adjusted Total | 8650.983 | 59 | | | | |

Table 6 indicates that there is a statistically significant difference in the performance of the study individuals in both groups post-test, based on the calculated (F) value, which was 128.204, and is significant at the level of 0.000. With this result, the null hypothesis is rejected, which states: "There are no statistically significant differences in the development of animation character design skills among students of the multimedia design course at the University of Jordan, which is attributed to the teaching method (AI-based application Midjourney and the traditional method)."

The two modified arithmetic means and their standard deviations were calculated for the performance of members of the study in both groups on the post-test, as it was found that in favor of the mean range of the experimental group, which was 40.42, which is higher than the modified mean of the control group, which was 21.70 with a difference of 18.72. This result confirms the effect of using the AI-based program Midjourney on improving the animation character design skills of students enrolled in the multimedia design course at the University of Jordan.

The eta-squared value was extracted, which shows the size of the influence caused by the use of the AI-based program Midjourney on improving the development of animation character design skills among students of the multimedia design course at the University of Jordan, which is equal to 0.692. This value shows that 69.2% of the variance in the development of animation character design skills is due to the use of the AI-based program Midjourney. In other words, the teaching approach using the AI Midjourney application has fostered the development of animation character design skills among the students of the multimedia design course at the University of Jordan in the post-test phase to a high extent.

The arithmetic means and standard deviations were calculated for the performance of both the experimental and control groups on the two fields of the scale measuring the skills of designing animation characters among students of the multimedia design course at the University of Jordan. The results are presented in Table 7.

**Table 7.** Arithmetic means and standard deviations for the performance of both study groups (experimental and control) on the two domains of the scale for developing the skills of designing animation character among students of the multimedia design course at the University of Jordan in the pre- and post-test phases

| Field | Group | Number | Pre-Test | | Post-Test | |
|---|---|---|---|---|---|---|
| | | | Arithmetic Mean | Standard Deviation | Arithmetic Mean | Standard Deviation |
| **First Field** | Experimental | 32 | 9.88 | 3.01 | 22.62 | 3.59 |
| | Control | 28 | 8.96 | 2.58 | 12.00 | 4.71 |
| | Total | 60 | 9.45 | 2.83 | 17.67 | 6.74 |
| **Second Field** | Experimental | 32 | 7.94 | 3.29 | 18.13 | 3.24 |
| | Control | 28 | 7.69 | 2.89 | 9.32 | 3.57 |
| | Total | 60 | 7.82 | 3.09 | 14.02 | 5.57 |

Table 7 shows clear disparities in the average performance of the experimental and control groups in the two areas of the scale used to assess the development of animation character design skills among students in the multimedia design course at the University of Jordan. The experimental group had the highest arithmetic mean of 22.62 in the post-test phase of the first dimension, whereas the control group had the lowest arithmetic mean of 12.00. Similarly, the experimental group had the highest arithmetic mean in the second field, with a value of 18.13 compared to the control group's arithmetic mean of 9.32.

The one-way MANCOVA test was conducted to determine the statistical significance of the differences between the arithmetic means. The results of this test are presented in Table 8.

**Table 8.** One-way MANCOVA of the differences between the arithmetic means of the performance of both study groups on the two domains of the scale of developing the skills of designing animation character among students of multimedia design course at the University of Jordan in the post-test phase

| Source of Variance | Domains | Sum of Squares | Degrees of Freedom | Mean of Squares | (F) Value | Significance Level | Eta-Squared |
|---|---|---|---|---|---|---|---|
| **First Domain (Pre)** | First Domain | 103.865 | 1 | 103.865 | 7.864 | 0.007 | 0.123 |
| | Second Domain | 26.977 | 1 | 26.977 | 2.897 | 0.094 | 0.049 |
| **Second Domain (Pre)** | First Domain | 3.149 | 1 | 3.149 | 0.238 | 0.627 | 0.004 |
| | Second Domain | 2.724 | 1 | 2.724 | 0.293 | 0.591 | 0.005 |
| **Group** | First Domain | 1372.944 | 1 | 1372.944 | 103.955 | 0.000 | 0.650 |
| | Second Domain | 987.682 | 1 | 987.682 | 106.080 | 0.000 | 0.654 |
| **Error** | First Domain | 739.595 | 56 | 13.207 | | | |
| | Second Domain | 521.403 | 56 | 9.311 | | | |
| **Adjusted Total** | First Domain | 2683.333 | 59 | | | | |
| | Second Domain | 1826.983 | 59 | | | | |

Table 8 shows that there are significant differences between the average performance of the two study groups in the post-test phase of the multimedia design course at the University of Jordan. These differences were observed in the two domains of the scale related to developing animation character design skills. The calculated

F-values were 103.955 for the first domain and 106.080 for the second domain, both with a significance level of 0.000. The null hypothesis, which claims that there are no statistically significant differences in the development of animation design skills between students of the multimedia design course at the University of Jordan using the AI-based application Midjourney and the traditional method, is rejected based on the obtained result.

To identify the group with statistically significant differences, we extracted the adjusted arithmetic means and standard errors. The findings are presented in Table 9.

**Table 9.** Adjusted arithmetic means and standard errors for the performance of both study groups on the two domains of the scale of developing the skills of designing animation character among students of the multimedia design course at the University of Jordan in the post-test phase

| Domains | Group | Number | Adjusted Arithmetic Mean | Standard Error |
|---|---|---|---|---|
| **First Domain** | Experimental | 32 | 22.27 | 0.65 |
| | Control | 28 | 12.41 | 0.70 |
| **Second Domain** | Experimental | 32 | 17.92 | 0.55 |
| | Control | 28 | 9.55 | 0.59 |

It is noted from Table 9 that the statistically significant differences were in favor of the experimental group that used the AI-based application Midjourney, because its adjusted arithmetic mean for the first dimension was the highest, since it was 22.27, while the arithmetic mean for the experimental group that used the traditional method was the lowest, since it was 12.41. Likewise, the arithmetic mean for the second field was the highest, as it was 17.92, while the arithmetic mean for the control group was the lowest, as it was 9.55.

The influence of the teaching method using the Midjourney application on the development of animation character design skills among students of the multimedia design course at the University of Jordan is confirmed by two eta-squared values. These values, 0.650 and 0.654, respectively, indicate the size of the influence. The use of the AI-based application Midjourney accounted for 65% and 65.4% of the variance in the development of animation character design skills among students in the post-test phase of the multimedia design course at the University of Jordan. The remaining percentages, 35% and 34.6%, were attributed to factors not examined in the current study.

**Second:** Results related to the answer to the second study question, which stated: What is the level of animation character design skills among students of the multimedia design course at the University of Jordan?

To answer this question, we extracted arithmetic means and standard deviations and determined ranks for the level of skills in designing animation characters among students of the multimedia design course at the University of Jordan. The results are presented in Table 10, listed in descending order.

**Table 10.** Arithmetic means, standard deviations, and rankings for the level of animation character design skills among students of the multimedia design course at the University of Jordan, ranked in descending order

| Number | Domain | Arithmetic Mean | Standard Deviation | Rank | Degree |
|---|---|---|---|---|---|
| 1 | The skills to achieve the functional aspect of characters design | 2.94 | 1.12 | 1 | Medium |
| 2 | The skills of achieving aesthetic and innovative proportions in characters design | 2.80 | 1.11 | 2 | Medium |
| **Total Score** | | 2.88 | 1.10 | | Medium |

Table 10 indicates that the level of animation character design skills among students in the multimedia design course at the University of Jordan was moderate. The mean score was 2.88 with a standard deviation of 1.10. The individual domains within animation character design also fell within the moderate range, with average scores ranging from 2.80 to 2.94.

The first domain, which measures the skills necessary to create the functional component of character design, ranked highest with an arithmetic mean of 2.94, a standard deviation of 1.12, and a moderate level of proficiency.

The second domain, which measures the ability to create aesthetically pleasing and original character designs, ranked second and had a mean score of 2.80, a standard deviation of 1.11, and a moderate level of proficiency.

As for the items of each domain, they are as follows:

1. **The first domain:** the skills of achieving the functional aspect of characters' design: Arithmetic means and standard deviations were extracted and ranks were determined for the level of animation character design skills among students of the multimedia design course at the University of Jordan in the first domain. Table 11 shows those results in descending order.

**Table 11.** Arithmetic means, standard deviations, and rankings for the level of animation character design skills among students of the multimedia design course at the University of Jordan in the first domain, ranked in descending order

| Number | Item | Arithmetic Mean | Standard Deviation | Rank | Level |
|---|---|---|---|---|---|
| 1 | Achieving balance, contrast, and proportion between design elements | 3.13 | 1.32 | 1 | Medium |
| 2 | Achieving coherence between the elements and foundations of design | 3.10 | 1.31 | 2 | Medium |
| 3 | Achieving the natural proportions of: personality, anatomy, drawing, and proportions | 2.97 | 1.29 | 3 | Medium |
| 6 | Achieving the visual identity of the story through costumes | 2.85 | 1.21 | 4 | Medium |
| 5 | Achieving the visual identity and the idea of the story | 2.82 | 1.17 | 5 | Medium |
| 4 | Choosing the color psychology that best suits the story | 2.80 | 1.15 | 6 | Medium |
| **First Domain** | | 2.94 | 1.12 | | Medium |

Table 11 indicates that the overall skill level of designing animation character among students in the multimedia design course at the University of Jordan was moderate. The mean score was 2.94 with a standard deviation of 1.12. The individual items also fell within the moderate range, with average scores ranging from 2.80 to 3.13. Item (1), which pertains to achieving balance, contrast, and proportion among design components, obtained the highest score. It had an arithmetic mean of (3.13) and a standard deviation of (1.32). Item (2), which pertains to achieving consistency in design components and foundations, ranked second with an arithmetic mean of 3.10 and a standard deviation of 1.31. Item (5), which pertains to achieving visual identity and conveying the story concept, ranked second to last. It had an arithmetic mean of 2.82 and a standard deviation of 1.17. Item (4), which pertains to selecting the color psychology that most effectively complements the story, had the lowest ranking with an arithmetic mean of 2.80 and a standard deviation of 1.15.

2. **The second domain:** the skills of achieving aesthetic and innovative proportions in characters design: Arithmetic means and standard deviations were extracted, and ranks were determined for the level of animation character design skills among students of the multimedia design course at the University of Jordan in the second domain. Table 12 shows those results, in descending order.

**Table 12.** Arithmetic means, standard deviations, and rankings for the level of animation character design skills among students of the multimedia design course at the University of Jordan in the second domain, ranked in descending order

| Number | Item | Arithmetic Mean | Standard Deviation | Rank | Level |
|---|---|---|---|---|---|
| 10 | Using unconventional ideas to design innovative characters | 2.85 | 1.18 | 1 | Medium |
| 9 | Character features suit the visual identity of the story | 2.83 | 1.25 | 2 | Medium |
| 11 | The design shows the ability to manage time and cost | 2.83 | 1.17 | 2 | Medium |
| 7 | Achieving realistic and imaginary personality types | 2.78 | 1.28 | 4 | Medium |
| 8 | Achieving the basics of character design, formation, and development | 2.72 | 1.24 | 5 | Medium |
| **Second Domain** | | 2.80 | 1.11 | | Medium |

Table 12 indicates that the level of animation character design skills among students in the multimedia design course at the University of Jordan was moderate. The mean score was 2.80 with a standard deviation of 1.11. The individual items also fell within the moderate range, with average scores ranging from 2.72 to 2.85. Item 10, which pertains to the use of unorthodox concepts for creating inventive characters, had the highest score. It obtained an arithmetic mean of 2.85 and a standard deviation of 1.18. Item (9), which indicates that character features align with the visual identity of the story, had a mean score of (2.83) and a standard deviation of (1.25). Similarly, item (11), which assesses the design's ability to manage time and cost, had a mean score of (2.83) and a standard deviation of (1.17). Both items ranked second. Item (7), which pertains to the attainment of both realistic and fictional personality types, ranked second to last. It had an arithmetic mean of 2.78 and a standard deviation of 1.28. Item (8), which pertains to the attainment of fundamental skills in character design, creation, and development, ranked last with an arithmetic mean of 2.72 and a standard deviation of 1.24.

## 6.2 Discussion

This part of the study deals with an interpretation of the results of the study supported by the results of previous studies. The results were discussed according to the sequence of the study questions. It also includes a presentation of the most prominent recommendations and suggestions. The discussion of the results is presented below.

**First: Discussion of the results related to the first question.** The first research inquiry is as follows: "What is the influence of using the Midjourney AI on developing the animation character design skills among students of the multimedia design course at the University of Jordan?" The findings indicated that the measurement tool (notecard) used in the multimedia design course had a significant effect on the students of the School of Arts and Design at the University of Jordan. This effect was

attributed to the teaching method variable, with the experimental group, which was taught using the Midjourney application, showing a favorable outcome. Additionally, the mean score of the students in the experimental group who were taught using the Midjourney application was higher than the mean score of the students in the control group who followed the traditional teaching method. This demonstrates the effectiveness of using the Midjourney program to improve the skills of students at the University of Jordan in generating animation character for the multimedia design course.

The results showed that the students in the experimental group who studied using the Midjourney AI-based application had a significant improvement in acquiring the skills of designing animation characters in both domains compared to the students in the control group who studied using the traditional way, so that the domain of functional skills in designing animation character achieved the highest improvement rate. The researchers attribute this to the ability of AI applications to help students provide solutions to design problems by analyzing the physical, behavioral, and psychological features of animation characters directing the development and improvement process for those characters, and then creating designs that suit their unique characteristics; also, their ability to generate complex and diverse expressions and reactions enhances students' experience achieves the expected ultimate educational goals of producing graphic characters that suit the target group and achieves the basic principles of animation design.

The researchers also attribute the superiority of the students in the experimental group to the fact that the use of the Midjourney AI-based application helped the students to link character design to the imaginary situation and to learn new design ideas for the graphic character through the entered commands and immediate feedback to the application, which expresses what is going on in the student's imagination, which helps in positive interaction and participation among students. In addition, the ability to create a variety of concepts of fictional and realistic characters, constantly modifying them and producing dozens, or even hundreds, of innovative animation character, achieved the stage of satisfaction with the final design of the character, so that students can transform these characters into multi-dimensional objects that interact with the audience in a deeper and more realistic way, which contributed to a deeper understanding of the principles of design, its basics and theories related to animation, and constituted a motivation to develop skills instead of designing in the traditional ways, which often give a limited number of designs based on the student's experience. This helps to enhance and improve students' levels of implementing the cognitive and skill aspects in the educational situation, which may contribute to accelerating the process of creating characters and providing greater flexibility in design, and thus, saving the cost of design.

These results are also attributed to the ability of applying Midjourney AI, through the tremendous diversity it provides, in customizing learning experiences according to the needs of individual students and their learning styles, so that they can interact with the content at a pace that suits them and achieve progress in various skills. Furthermore, it provides collaborative experiences to solve design problems in different situations through AI and exploring virtual scenarios, which enhanced students' spirit of cooperation, improved their communication and time management skills, and helped generate and create wonderful and innovative imaginary characters to provide the best solutions required for tasks.

The teaching method using the AI application Midjourney also contributed to developing the skills of two- and three-dimensional design of animation characters

and showing the depth of design with ease, with the ability to design in more than one style and to modify, delete, and add in a professional manner compared to the traditional method. This improved the students' skills in producing three-dimensional characters, which demonstrates the ability of the AI-based application Midjourney to develop the features and behaviors of characters in new and innovative ways that achieve the functional and aesthetic aspects of the character.

The AI application Midjourney also provided students with visual communication tools within the design platform, enabling them to share designs and creative ideas with ease, comment on them, criticize, justify, and analyze the graphic character instantly, and distinguish the strengths and weaknesses of the design. It becomes a strong partner for them in analyzing the design problem and choosing appropriate solutions, and thus, achieving better results and speed in making the appropriate design decision. Accordingly, the student becomes an active and interactive learner as he acquires his real experiences, skills, and knowledge through direct interaction with the reality to be learned. Thus, the student becomes able to link theoretical concepts with practical application, which indicates the possibility of applying Midjourney AI to improve all aspects of developing animation characters instead of the traditional methods, from design and physical features to expressions and behaviors, and thus, embodying more realistic details, which may result in more exciting viewing experiences and interactions with the characters.

This certainly indicates the potential positive impact of AI on art and design curricula and amending them to include the process of integrating AI into the educational process for their role in clarifying the extent of diversity and uniqueness that characterizes the use of AI in animation design and the extent of color, shape, and even functional diversity in students' products in the idea generation stage. As such, students are not only able to generate endless ideas, simulate real-world behavior, and make smart decisions with the help of AI, but also revolutionize the design of animation characters because of the ability of AI to provide high-quality visual representation, which is the main goal of learning with artificial intelligence.

Also, students who studied using AI developed many skills and creative aspects as a result of their real experience through the practical application of the elements and principles of animation design, so that the student becomes active and interactive with the educational position, depending on the visual view of knowledge, and becomes more able to visualize the psychological concepts of animation.

This was represented by the improvement of many skills, such as the skill of using the appropriate color psychology for each character in particular to achieve the visual identity of the digital story, as AI suggests advice and instructions to students related to their designs and generating new ideas, as it may be difficult for students to access them through traditional methods. In addition, it helped by explaining design concepts, theories. and methodologies in a digital environment rich in stimuli, based on strategies for learning how to speak and how to use them. For example, it suggests using colors and costumes based on previous experiences and expertise as a result of analyzing huge amounts of data, which enriches the viewers' experience in an exciting way, making it more vivid and realistic.

This result is consistent with the studies of Yang [25] and Mohamed [24] on the effectiveness of AI applications in developing animation character design skills and enriching the creative imagination of the designer. This result is also consistent with the studies of Waheed [29] and Mansour [30], which indicated that AI design, specifically using Midjourney, is very effective in enhancing the skills of designing high-quality animated graphic characters, and the reason is due to the ability of Midjourney to provide high-quality visual representation, which is the main goal

that AI learning seeks. This result is also consistent with the study of Hutson and Robertson [31], which confirmed that there is a positive influence of AI on art and design curricula and its effective impact in improving students' design skills.

**Second: Discussion of the results related to the second question.** The second study question states: "What is the level of animation character design skills among students of the multimedia design course at the University of Jordan?" In general, the results showed that students have a medium level in developing the skills of animation character design for the multimedia design course, especially with regard to achieving the functional aspects of the characters, and a higher level in the aesthetic and innovative proportions skills in the design of characters. This indicates the effectiveness of using the AI application Midjourney in general in teaching the design of animation characters, and in a better way than designing in the traditional ways.

Regarding the items of the first field (skills for achieving the functional aspect of character design), the skill of (balance, contrast, and proportions among design elements) achieved the highest rating among the items, which indicates that the students have a high level of competence in achieving balance and proportions among design elements. The researchers attribute this to the fact that AI has played a major role in improving these skills by providing design analysis tools that can provide guidance for improving aspects of character design. The skill of (coherence between elements and foundations of design) ranked second, which indicates that students now have a good understanding of the coherence between the elements and foundations of design. This can be attributed to the ability of AI to improve this skill by analyzing design data and providing guidance that suits the educational situation.

The skill of (natural proportions of personality, anatomy, drawing, and percentages) came in the medium level, and this can be attributed to the fact that students were able to use AI to understand the percentages and analyze the anatomy of the structural structure and understand the relationships between them.

The skills of (achieving the visual identity of the story, the visual identity and idea of the story, and color psychology) came in the last rank, indicating that there is an opportunity to improve the skills of achieving the visual identity of the story and choosing the color psychology, and this can be attributed to the fact that AI has helped in providing accurate guidance to improve these aspects. In general, the domain is at the medium level, and this indicates that the students as a whole show average performance in the field of designing animation characters.

The AI-based application Midjourney can be an effective tool to provide specific guidance and improvements to students of the multimedia design course at the University of Jordan in the field of animation character design.

Regarding the second domain (the skill of achieving aesthetic and innovative proportions in character design), the skill of (using unconventional ideas to design innovative characters) achieved the highest rating, which indicates that the students have a good ability to use unconventional ideas in designing innovative characters with the help of AI, especially in the field of 3D animation. The skill of (character features suit the visual identity of the story) came in second rank, and this indicates that the students have a good understanding of how to achieve the features of the characters and the visual identity of the story, which indicates the ability of applying AI to understand and analyze the prompts related to the type of character to be designed. The skill of (the design shows the ability to manage time and cost) came in third rank, and indicates that the students show an average ability to manage time and cost during the design processes. The skill of (achieving realistic and imaginary personality types) came in fourth rank, which enhanced the students' ability to imagine and simulate reality well.

This result is consistent with the studies of Kim [27], as well as Xi and Chung [4], which indicated that generative AI applications increase the efficiency of creating animated characters for the digital story in a more complex and professional way and achieve aesthetic and innovative proportions in character design. This result is also consistent with the study of Jie, Shaan, and Chung [26], which indicated that AI improves students' ability to understand and analyze proportions, shape the anatomy of the graphic personality structure, and then create designs that fit their unique characteristics. Also, this result is consistent with the study of Lee [8], which indicated the ability of Midjourney to improve animation design skills (storyboard), saving time and cost of producing graphic stories, and using unconventional ideas in innovative designs for 3D characters.

In general, it is clear from the results of the study that AI techniques contribute significantly to the development of animation character in terms of design, realism, and imagination, as these techniques are used to create precise details and natural movements that add fun and excitement to the viewers' experience. Moreover, the use of AI techniques reduces the time required to produce animation faster than a human could do alone [32–34].

## 7 RESEARCH CONCLUSIONS

This study conducted an empirical analysis to explore the specific effects of Midjourney intelligent drawing software on animation character design education, examining its influence on students' design skills and innovative thinking. The results demonstrate that the software provides significant benefits in several key areas.

1. Improvement of design efficiency and expressive capability: Midjourney AI significantly improves students' design efficiency by providing instant high-quality images. Students can explore more design options and modifications in a shorter time frame. This rapid iteration process is crucial for unlocking students' design potential and elevating the creativity of their work. The software allows complex design concepts and forms to be visualized quickly, thus boosting students' confidence and capabilities in both technical and artistic expression.
2. Promotion of innovative thinking and mastery of technology: Using Midjourney AI, students have shown considerable improvement in design thinking and technical proficiency. The software not only sparks their interest in unconventional design approaches but also provides them with a platform to test and realize their innovative ideas without restrictions. This technological support enables students to break through traditional design limitations and explore cutting-edge design models and strategies.
3. Improvement of teaching methods and student feedback: Midjourney AI has transformed traditional multimedia design teaching methods, offering a new platform for teacher-student interaction. Instructors can provide specific technical and stylistic guidance based directly on images generated by the software. This direct feedback mechanism is vital for students to understand and apply design principles. In addition, the tool enhances the interactivity and engagement in the classroom, making the learning process more dynamic and appealing.

In conclusion, while Midjourney AI provides a powerful tool for rapid visual-concept generation, its use should be complemented with VR or AR technologies to

offer a more interactive, immersive, and functionally detailed design experience. The integration of these technologies can significantly enhance the learning process, giving students a fuller understanding of the spatial and functional dynamics of their design. Future educational models may benefit from combining the visualization capabilities of Midjourney with the interactive qualities of VR and AR to provide a more comprehensive animation character design education.

## 8 RECOMMENDATIONS AND SUGGESTIONS

Based on the study findings, the researchers provide many recommendations, as outlined below:

1. Using an AI-based tool to facilitate teaching. Midjourney has a significant influence on the development of animation character design skills among students at the School of Arts and Design, especially those in the multimedia design course.
2. Training faculty members in the multimedia design program on the latest software in AI applications to keep pace with the technological progress, as investing in interaction between humans and AI may lead to achieving better results for creating amazing and innovative artistic content.
3. Developing study plans for digital design courses to activate the teaching of technology innovations and digital transformation; this is due to their clear influence on improving digital design skills.
4. Supporting continued research and development of AI technologies in the animation industry, hoping that these innovations will contribute to the development of new tools and technologies that enhance the quality of artistic works.
5. Conducting similar studies in other academic courses to examine the influence of using the AI-based application Midjourney on other variables, due to its positive impact on the teaching and learning process in general.
6. Future research should focus on enhancing the application's capabilities, expanding its range of applications, and elevating the level of design support it offers to designers. This may require revising the data collection methods and instruments used in this study.

## 9 THE LIMITATIONS OF THE STUDY

The study has the following limitations and delimitations:

1. The study is limited to the students of the School of Arts and Design at the University of Jordan who enrolled in the multimedia design course during the first semester of the academic year 2023/2024. Consequently, only two sections of this course (consisting of only 60 students) were available to conduct this study. Therefore, the participants who responded to the notecard items/questions were intentionally chosen due to the limited ability to gain access to the appropriate type or range of participants.
2. The study adopted the quasi-experimental design appropriate to its objectives; hence, data was collected through tools using a notecard to measure the development of skills related to designing animation character; therefore, the generalization of results depends on the psychometric specifications of the study tools.
3. Data was collected in November 2023, where there is a lack of previous research studies on the topic, specifically in the Jordanian context.

## 10 FUTURE RESEARCH DIRECTIONS

Although this study has revealed various positive applications of Midjourney AI in animation character design education, there are several non-negligible limitations that indicate some important directions for future research. Consequently, based on the study findings, the future researchers need to:

1. Expanding research samples and environments: The current study is primarily based on a limited sample within a single educational institution. Future research should include a broader geographical and cultural background to ensure the universality and reliability of the results. By expanding the research sample, it is possible to gain a deeper understanding of the effect of Midjourney in different educational settings and assess its potential for global educational impact.
2. Balancing the use of technology with basic educational needs: Future studies need to explore how to implement technological tools such as Midjourney without sacrificing the foundation of traditional design education. Research should focus on how technology can complement, rather than replace, fundamental design teaching, ensuring that students can maintain and develop crucial manual skills and creative thinking while mastering high-tech tools.
3. Exploring sustainability and socio-cultural factors in design: Given the increasing importance of socio-cultural and environmental impacts in design, future research should pay more attention to integrating these factors into education. Studies should assess the capabilities of Midjourney for supporting sustainable and culturally sensitive design and explore how the software can be improved to better meet these needs.
4. Developing integrated educational models: Future research should develop and test integrated educational models that combine Midjourney with other educational technologies and methods. This includes using mixed reality, virtual reality, and other technologies to enhance the interactivity and practicality of design education while also studying the specific impacts of these technological combinations on student learning outcomes.
5. Expanding the Midjourney AI applications to other design or educational fields; for example, exploring the integration of the AI-generated content tools of Midjourney into design systems to direct designers towards future-oriented innovation.
6. Investigate the role of Midjourney intelligent drawing software in architectural design education, particularly its impact on design efficiency and creativity among architecture students.

Through these extensive studies, we can more comprehensively assess the role of intelligent drawing technology in multimedia design education and provide educators with the knowledge and tools needed to support student development in a rapidly changing technological environment. These studies not only help to advance educational technology but also enable educators and students to meet future challenges in digital design more effectively.

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## 12 AUTHORS

**Dr. Fuad Khasawneh** is an Assistant Professor at the Department of Design and Visual Communication at the University of Jordan. His area of specialization includes graphic design, Islamic art design, and educational design. He received his B.A. degree in Graphic Design from the Faculty of Arts – Philadelphia University. Then, he received a Master's Degree in Islamic Art Design from the World Islamic Sciences and Education University in 2012. He earned his Ph.D. from the University of Jordan. He has published several research papers and articles in the fields of animation, graphic design, Islamic design, sculptural design, morphology of forms, and sounds in animation (E-mail: f.khasawneh@ju.edu.jo).

**Dr. Muhannad Al-Shboul** is a Professor of Educational Technology and e-Learning in the Department of Curriculum and Instruction at the School of Educational Sciences at the University of Jordan, Amman, Jordan. Prof. Al-Shboul's current research focuses are on e-Learning, Smart Learning, Multimedia Design, Instructional Technology, Web-based Learning, and e-Content Development. He presented many oral presentations at international educational conferences and conducted several workshops and training sessions. He appointed as an editorial member of national journals as well as a reviewer of several internationally reputed journals (E-mail: malshboul@ju.edu.jo).

**Dr. Ra'ed Al-Saaideh** is a technologist specializing in Information Technology, currently working in the Department of Design and Visual Communication of the School of Arts and Design at the University of Jordan. He earned his Doctorate in Educational Technology from the University of Jordan. With a rich background and over a decade of experience in Information Technology, Dr. Al-Saaideh has dedicated his career to exploring the intersection of technology and education. His research focuses on how artificial intelligence can enhance digital design skills among students, improve academic performance, and foster a deeper motivation for learning (E-mail: r.saaideh@ju.edu.jo).