

Overtaken by Creativity: A Look at the Emergence of AI Into the Graphics and Animation Industry

Dr. Rao, Sam V., Dr. Pandey, Vishnupriya, Dr. Yadav, Ritu

Abstract:

The Graphics and Animation Industry, zealously guarded by the self-acclaimed custodians of creativity, is now being seriously threatened by the emergence of Artificial Intelligence tools, techniques and algorithms, that automate, simplify and produce graphics, animations, videos and visual effects which in times past, would take hours, or maybe even days, to execute. Many myths and hyperbole straddle the gap between precept and practice, further obfuscating currently prevalent creative endeavours. How do students, content creators and die-hard industry professionals react to this new, disruptive and seemingly disorienting technology? This paper looks at multiple reactions from the pluralistic perspective of the amateur and the professionals' viewpoint. Simple Random Sampling was used to select respondents who completed a 5-point Likert scale which was quantitatively analysed using SPSS and JASP software.

Keywords: AI, Disruptive, Virtual Reality, Creativity, Visual Effects, Copyright

INTRODUCTION

More bouquets abound than brickbats, more accolades than accusations against the new super intelligent "AI" kid around the block. The reason for these virulent debates, especially amongst those engaged in creative pursuits is that there is a looming, not entirely baseless fear, that Artificial Intelligence, which will be henceforth referred to as AI, will dissolve many esteemed bastions of artistic creativity and innovation that was until now, the greatest strength and pride of all those in creative arts. Be it print, web, video film making or the ubiquitous Youtube podcasts, professionals who were putting out excellent and original content in a systematic, diligent fashion feel justifiably rattled by a technology which achieves in seconds, what traditionally took hours to conceive and execute.

In times of value-based health care and also because of the high share of the health care industry in the overall economy, economic impact assessment is of increasing importance. For instance, health care expenditures account for approximately US \$3.5 trillion out of US \$19.4 trillion (18%) of the overall gross domestic product (GDP) in the United States and for approximately US \$0.4 trillion out of US \$3.7 trillion (11.5%) of the overall GDP in Germany. Accordingly, the cost impact of digital health applications has also been analyzed in several studies.

This paper looks at the design and animation industry; the concerns and reactions of both students as well as industry professionals regarding possible vocational curtailment, displacement and dissolution of existing jobs, with the advent and dispersion of this new technology that is advancing at an unheard-of pace and translating abstract science fiction concepts into a post-modern concrete reality.

REVIEW OF LITERATURE

Defining the Creative Process

The domain of creativity is rife with dissenting opinions; some seeing it as a divine gift that one is "born" with and that cannot be cultivated, while others believe that creativity like any other skill, is one that can be cultivated and that grows and refines itself with usage. Like sacrosanct religious texts, it has been meticulously and zealously guarded down the ages by self-appointed custodians of creativity, who, convinced that they have been endowed with this "gift" by divine appointment, are extremely reluctant to share their repository with others. Many make a clear distinction between artificial intelligence and artificial creativity. For example, Runco places a greater emphasis on processes by supplementing it with two more dimensions - authenticity and intentionality (Runco, 2023)¹. Vinchon et al. (2023) pointed out that,

"the positive future of creativity and AI lies in a harmonious collaboration that can benefit everyone, potentially leading to a new level of creative productivity respecting ethical considerations and human values during the

creative process².”

A definition is proposed by Drevdahl who defined creativity as “the capacity of persons to produce compositions, products or ideas of any sort which are essentially new or novel and previously unknown to the producer”. According to Passi,

“Creativity is a multidimensional attribute differentiate distributed among people and includes chiefly the factors of solving problems, fluency, flexibility, originality, inquisitiveness and persistency³.”

It is evident from the quote of so many authors, some from the creative field and others outside it, that society places an inordinately high premium on creativity and originality. While proponents and promoters of AI eulogise about how inventive and how “creative” AI images can be, detractors of this new technology reiterate the fact that AI is only reproducing what has been fed into it (inputted) quoting that “Garbage in equals Garbage out”, no matter how aesthete or appealing the permutations and combinations materializing from text prompts may be. Initial wariness about generative AI, has escalated into heated global debates and now hints of a full-scale war with both sides deploying jargon loaded missiles to substantiate their claims and their stance.

A review of literature reveals three distinct schools of thought and attitudes. Those who are outraged at the advent of this new technology and see AI as a vicious intrusion into creative domains and as nothing but a disruptive and displacement-oriented technology. Many are in favour of AI, seeing it as a welcome helper tool and one to end what they feel was dominance and turf protection by the giants in the creative fields. A third category has emerged which sees AI neither as a threat or as a welcome tool but are neutral about it and see it as an inevitable outcome of the trajectories that scientific research and development have embarked upon in the last few years.

AI as an invasive and disruptive force

It appears, on the surface, that how vehemently one is in favour of, or against AI, is largely dependent on the vocation and trade of professionals in the industry. Casual observations and interviews with people in the field revealed that newcomers in the industry and youth in general seem both more open, as well as willing to accept and use the new AI tools to achieve desired targets and objectives while the older more experienced designers who learnt the trade from the bottom up and spent many years mastering different design tools to deliver creative outputs, view the introduction of a plethora of new tools as an intrusion into creative spaces.

“The fear of being replaced is at the center of the opposition coming from creatives in regard to AI as it currently exists, but there still both passive acceptance of this technology and staunch defenders of it on the other side of the aisle⁴.”

Many senior professionals, who have gone through the grind, are unwilling to passively accept the inclusion of AI which they see more as an intrusion rather than as an entrance. Arguably, the greatest insecurity seems to be related to their profession and of being displaced from their comfort zone, by a malevolent force, far superior to them, and with whom they cannot even contemplate pitting their wits or skills against. There is also presently a deep rooted mistrust of what AI can ethically deliver and how safe and trustworthy is the information that is churned out by AI chatbots in a matter of seconds.

We are all living in the era of fake news, dis and misinformation and the facile ease with which generative AI applications can mass produce fake videos, text messages and social media content, has only added to the general hostility against AI. Applications seem to be categorised into two large broadbased categories, depending on function and scope.

They are - Generative and Predictive. Each type serves a unique function and is suited to different tasks, making them useful in various ways for businesses.

Generative, as the name suggests, deals with all types of content creation. These could be images, video, text and word processing functions, even the creation of serious as well as popular music.

The other kind of AI is Predictive AI which is capable of making predictions and recommendations. Based on a set of calculated and informed choices, it can even take basic decisions and control systems. It can generate very

realistic, futuristic and accurate data, based on the data that is fed into it. This is deployed to a fair extent in predicting market behavior, fluctuating patterns in the stock market, demand forecasting and in other areas where trends and patterns need to be projected, based on current prevalent data.

In the field of generative AI, doubts, misgivings and distrust and for some, even active hatred of the new technologies, are rampant. Although results are speedy and accurate, they cannot ever rival the creativity and artistic touch of a human designer (Debergh, Duflou, and De Meyer, 2019).

“Automated designs lack depth, originality, and emotional resonance. AI operates on algorithms and learned patterns, so its products tend to be copies of existing styles rather than genuine innovations⁵.”

Many are in agreement also, that even if one were to assume that AI is producing high quality creative output, in the long run, AI will diminish the ability of individuals, especially those engaged in creative pursuits, to think independently and develop higher order cognitive skills that are essential to creative writing, image and video creation and research.(Kasneji et al., 2023; Malinka et al., 2023; Wild, 2023)

But by far, ethical considerations seem to rank the highest in the corridors of fear, instigated by generative AI. Many feel that the creation of false propaganda and misinformation has been accelerated by generative AI. Misinformation and disinformation has emerged to the biggest scourge of the 21st century. There is also the huge issue of Intellectual Property and copyright. At present, the legal framework for AI generated content is questionable and subject to the vicissitudes of a confused judicial system. Patent laws are problematic and there is no general consensus of the method or processes involved in attaching copyright tags to AI generated content, be it art, academic writing or research. Legal experts propose that a “Sui Generis” right of short duration, would be the best option. One that is specifically adapted to the peculiar requirements and functioning of AI.

In the European Union there is still an ongoing debate whether the supposedly “original work” in question is one where the AI system was mere carrying out commands inputted by the author or whether actually creative and original decisions were taken by the AI system in question. Only if the author had complete control over the creative process and contributed original and creative decisions to the finished piece of work, could the plea for copyright or a patent to be granted could be considered. In the UK, Section 9 of the Copyright, Designs and Patents Act 1988 uniquely states that,

"in the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken". This provision potentially allows for copyright in AI-generated works if a human can be identified as making the necessary arrangements⁶.”

Thus, we see that the legal framework and laws that exist, or those that are in the process of being formulated, are subject to change and adaptation, being still at a nascent stage.

AI and the Animation Industry

Animation, unlike AI, has a long history. The production of the early animation films was a time consuming laborious process, but perhaps because so much intense and sustained effort was needed to come up with even a very short film (the early animation films were in fact known as “animation shorts”), the result was an aesthetically appealing, emotive and relatable film that tugged at the heartstrings of viewers. During the 80s and the 90s, the move began from 2D animated films to 3D and Hollywood legendary studios like Pixar, released the film “Toy Story” now hailed as a classic 3D animated film. Although new films lacked the expressiveness and saucy personalities of the early cartoon characters, these films equipped with new tools and resources enabled the mass production of films with visually stunning scenes incorporating special effects and artificially created sets and backgrounds, which hitherto was simply not possible. Many agree that while AI does decentralize and simplify the process of film or video production, costs are often expensive. The hardware and software needed to run dedicated AI systems are often out of the reach of the small budget filmmaker. Making them revert to time tested and reliable traditional techniques, which albeit slower, are effective in translating conceived stories into viewable content.

A consensus exists, that production workflows and pipelines will see massive restructuring and reordination, forcing media and creative professionals to seriously rethink how they they approach the subject of creative content generation.

"Post production workflows will therefore see increased use of AI, including enhanced tools for denoising, colorization, segmentation, rendering and tracking⁷."

New kinds of "Avatars" modeled sometimes on existing actors are being developed and introduced constantly; animation artists can now use pose estimation and employ Vid2Vid Cameo software to map their own real-time movements or those of an actor directly onto a virtual character. With the assistance of GANs or Generative Adversarial Networks, AI can generate a large number of models and 3D assets, incorporating meticulous detail on 3D objects.

"... for example, by integrating with 3D modeling software such as Blender, AI can help users convert the movements of an actual character into the movements of a 3D character, resulting in realistic motion effects in animated scenes. Automation is also a major advantage of AI in the processing of special effects in space⁸."

Motion capture technology is of immense help in ensuring authenticity of a character as well as smoothing jerky movements and making all stages of movement much more natural and aesthete and less synthetic and artificial. Other areas of application of AI tools in animation are the medical industry where 3D models and animation are extensively employed for imaging, simulation and diagnostic procedures. Virtual Reality and Augmented Reality. These two fields which are rapidly overtaking each other, have made tremendous technological strides with the onset of AI tools and algorithmic assistance.

In the movie "Ice Age: Dawn of Dinosaurs", many AI techniques were used to create storyboard, plot the characters, create complex walk cycles and other traditional animation techniques which take hours to animate, so that the chief animators could focus more on the plot, character personality creation and smoothness of the film rather than spending time exclusively on the actual animation creation process. The movie makers also resorted to the use of a machine-based learning system named as "Hyperion" which allowed animators, the directors and other creative professionals engaged to see immediate feedback during the rendering process.

3. Ethics, Authenticity and Copyright

While many agree that AI and the application of sophisticated AI tools does indeed reduce time consuming tasks in creative processes like animation, it does raise issues of ethics, authenticity and copyright.

Trust issues often surface as AI users are unable to comprehend their inner workings, unpredictable behaviour and incomplete LLMs (Language Learning Models) that are still being fed massive data streams, and that are still evolving.

The other danger is that AI is evolving at such a high speed that it is pushing users to dangerously high levels of "artificial creativity" and performance, leading one to false sense of urgency and displacement. Such rapid technological development appears to benefit more the proponents of the AI meritocracy and entrepreneurs driven more by profit motives than altruistic ones, to spur on the creative craftsman to strive to achieve more than is humanly possible in a given timespan. Artificially created artwork raises concerns regarding the worth of human capital and labour.

Furthermore, digitization of creative works of art, as well as manipulation of it, leads one to the thorny question of copyright, and if a work of art has been completely fashioned from generative AI process, then where does the claim of authorship lie ?

After all no image is created out of thin air. Unless data in some form, spatial, digital or linguistic has been fed into the AI system an output cannot be generated. So even if say, a sketch has been converted through AI technologies into a beautiful painting through generative AI, does the onus of ownership lie with the creator of the sketch or the final composite output ? Patent laws as formulated and applied in the present legal framework are obtuse, incomplete and often obsolete and works of synthesised art cannot be objectively evaluated to arrive at a decision as to whether a patent or copyright should be attributed or not.

Objectives and Hypothesis

After extensive review of literature as well as casual personal interviews, ten pertinent research questions emerged. These were then crystallized into four main objectives which then naturally led to the evolution of four hypothesis which can be empirically tested

Research Questions

1. How is AI in general affecting all industries
2. How is AI affecting the creative industries
3. Is the accelerating pace of AI development completely undermining the role of the designer?
4. What are the most dominant emotions in the creative industries. Does it range from skepticism and deep gloom to optimism?
5. How will the changing landscape of the design industry evolve to meet the new challenges?
6. Is the impact of AI seen as an intrusion or as a super competent guide?
7. How is the design job market affected by the onset of AI?
8. How much of content creation will be automated in the future and how much manual work will still be done or preferred.

These eight questions were then scrutinised, simplified, polished and merged into the following three main objectives.

Research Objectives

Objective #1. What will be the extent of AI penetration into the graphics and animation industry in the future ?

Objective #2. What areas of Animation and Visual effects are directly affected by AI applications

Objective #3. Is there a relation between increasing use of AI tools and diminishing jobs in the Gaming and Animation Industry?

From these five (3) objectives, four constructs were arrived at which will be used to test the above objectives. The constructs have been delineated below:

Construct #1: Penetration of AI into the graphics and animation industry

Construct #2: Usage of AI tools in the animation and visual effects industry

Construct #3: Perceived Job decline in Animation, Gaming and Visual Effects industry

Construct #4: Willingness of professionals to adapt to AI tools and workflow

Hypothesis Testing

Three hypothesis based on the three, are delineated below and these hypothesis will be tested quantitatively through various statistical tests using SPSS (Statistical Package for Social Sciences). Since the tests that will be conducted will be of sufficient statistical rigour, the need for further affirmation of results through triangulation with qualitative tests was not evinced.

H1₀: AI penetration into the graphics and animation industry in the future will be mild and non-intrusive

H1_a: AI penetration into the graphics and animation industry in the future will be deep and intrusive

H2₀: All areas of animation and Visual graphics will be affected by AI

H2_a: Only limited areas of animation and Visual graphics will be affected by AI

H3₀: The more AI tool usage increases in the animation industry, the more difficult it will be to find jobs in this sector

H3_a: Increasing AI usage for graphics and animation will increase the extent of jobs in this industry

Research Design and Methods

A proper and comprehensive research design necessitates the synthesis of both qualitative and quantitative research methods with extensive triangulation to collate and corroborate the results, but paucity of time coupled with a pressing need to formulate highly objective quantifiable conclusions that can be arrived at through collection of empirical data, led the researcher to focus only on a quantitative approach. The questionnaire consisting of four constructs with approximately 5-6 questions to test each construct was designed. The questionnaire was formulated using a 5-point Likert scale with many questions reverse coded to ensure validity. The four constructs that were postulated were as follows:

1. Penetration of AI into the Animation Industry (**AIP**)
2. Tools and Usage of AI in animation (**T&U**)
3. Perceived Job Decline in Animation and Gaming (**JD**)
4. Willingness to adapt to AI (**WA**)

To obtain a balanced view of sentiments revolving around the impact of AI on the animation industry, it was decided to administer approximately one third of the final questionnaire to industry professionals and two thirds of the questionnaire to students of animation. Thus constructs #1 and #3 were primarily targeted at those already absorbed into the industry and using AI tools in everyday decision making while the others were more general in nature and would be more relevant to students of animation gaming and visual effects. This kind of internal segregation would ensure a well-represented holistic response and generate results and conclusions that could be extrapolated, with greater accuracy, to a wider section of the graphic and animation industry.

Sample Size and Data collection

The universe from which the sample would be collected is students currently studying animation as well as those working in the industry for some time (typically those working between 5-7 years). Simple Random Sampling was the method adopted for collecting samples. Since the Universe was quite large (All animation undergraduate students from Delhi NCR), there were two options open for the researcher. Either utilize an online Sampling Calculator or resort to use of Cochran's Formula for unknown populations which yielded the following sample size. It was decided rather than resort to an online sample size calculator, which could possibly produce erroneous results, to arrive at a figure using the time-tested Cochran's formula.

After conducting a pilot study and viewing the questions, it was decided to rephrase and simplify the wording of the questions, without losing out on meaning. The results after rephrasing and reduction were subjected to unidimensional reliability analysis, construct wise as well as for the whole survey. It was also desired, although this is not always necessary, that the number of questions being posed to address each construct follow a uniform number of four (4), to simplify post-survey quantitative analysis. The table below summarises the results that were obtained:

Constructs and Alpha Values

| S.No | Measured Construct | No. of Questions | Alpha Value |
|------|---|------------------|-------------|
| 1 | AI Penetration (AIP) | 4 | 0.735 |
| 2 | AI Tools Usage in Animation & VFX (T&U) | 4 | 0.738 |
| 3 | Job Decline in Animation & Gaming (JD) | 4 | 0.777 |
| 4 | Willingness to Adapt to AI (WA) | 4 | 0.759 |

Table 1.1. Summary of the four measured constructs

As we can infer, reliability of individual constructs as well as combined reliability are well over 0.7, the desired coefficient of reliability, so our survey is not lacking in any way in the area of unidimensional reliability

Results and Analysis

The initial pilot study consisted of a quantum of 35 questions. However, it was found that while students were somewhat open to the idea of answering a more than usual lengthy questionnaire, those who were already working (or freelancing) had far less time at their disposal and would either not attempt the questionnaire at all, or only partially fill it. From the larger number of questions of pilot study, a total of 28 questions was arrived at which was found to be more than adequate to elicit the information that was needed for the purposes of the study.

The survey instrument was divided into six sections, with each section seeking to procure data pertinent to the variable under study. These are outlined in the table below along with their abbreviations which was used in SPSS (and JASP) which do not respond well to lengthy worded text

Sections in Questionnaire

| S.No | Section Name | Construct | No. Of Questions |
|------|--------------|--|------------------|
| 1 | B1 | AI Penetration (AIP) | 5 |
| 2 | B2 | AI Tools Usage in Animation & VFX (T&U) | 6 |
| 3 | B3 | Perceived Job Decline in Animation & Gaming (JD) | 6 |
| 4 | B4 | Willingness to Adapt to AI (WA) | 6 |

Table 1.2. Sections in Questionnaire

Source: Created by author

Testing of Hypothesis:

H₀1: AI will have only limited penetration into the graphics and animation industry

H_a1: AI will penetrate all sectors of the graphics and animation industry

To test the hypothesis of limited penetration, 5 questions, each pertaining to a particular construct were formulated that approach the subject from various angles. Also all the questions for all the constructs were addressed to not just students but working professionals as well so that a mix of responses could be obtained and a sample extracted that contained a truly heterogeneous set of responses, and free from professional bias.

All constructs were tested using a 5-point Likert scale response to examine perceived attitudes and behaviour patterns.

The first question explored participant response to the general feeling that AI will be increasingly adopted by studios and production houses to implement priority tasks where creativity within tight deadlines is demanded

The second construct examined perceived responses to dependence on AI content in the future.

Since each variable (for example “limited penetration of AI) was being measured by four or five constructs, rather than have individual responses to each question, the constructs were grouped together in SPSS using the compute variable function and then the combined mean of gendered responses was evaluated to determine the “average response” to the variable under consideration.

Grouping of constructs

| Descriptive Statistics | | | | Average |
|--|------|----------------|----|---------|
| | Mean | Std. Deviation | N | Mean |
| Grouped constructs for Limited Penetration | 3.70 | .634 | 59 | 4 |

| | | | | |
|---|------|------|----|---|
| Grouped constructs for Decline | 3.38 | .773 | 59 | 3 |
| Grouped constructs Willingness to Adapt | 3.64 | .770 | 59 | 4 |

Table 1.3. Grouping of constructs

Source: Created by author

If we convert the mean responses to Likert scale points it means that:

Average response of all the constructs for Limited Penetration of AI is 4 or Agree

Average response of all the constructs for decline in jobs because of AI is 3 or Neutral

Average response of all the constructs for Willingness to Adapt is 4 or agree

| Statistics | | AI will become a standard tool in most graphics and animation pipelines within the next five years. | The majority of studios will rely heavily on AI-generated content in the near future. | The future growth of the animation industry will be largely driven by AI adoption. | Without AI, the graphics and animation industry can still grow significantly. |
|------------|---------|---|---|--|---|
| N | Valid | 59 | 59 | 59 | 59 |
| | Missing | 36 | 36 | 36 | 36 |
| Mean | | 3.95 | 3.58 | 3.64 | 3.63 |
| Median | | 4.00 | 4.00 | 4.00 | 4.00 |
| Mode | | 4 | 4 | 4 | 4 |

Table 1.4. Measures of Central Tendency for the four constructs

Source: Created by author

We can see that the mean here for the all the four questions to test the first construct, viz limited penetration is 4 (rounded off) and so is the mode. Which means that the average response to the four questions lies in the *agree* region.

A gendered response to question #2 viz. that most studios will rely heavily on AI content in the future showed that females in general, believed more strongly on the notion of dependence on AI content than males, as indicated in the bar chart below:

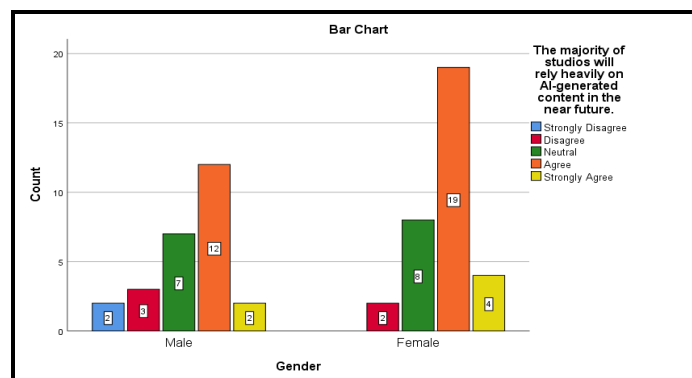


Fig 1.1. Reliance of studios on AI Source: Created by author

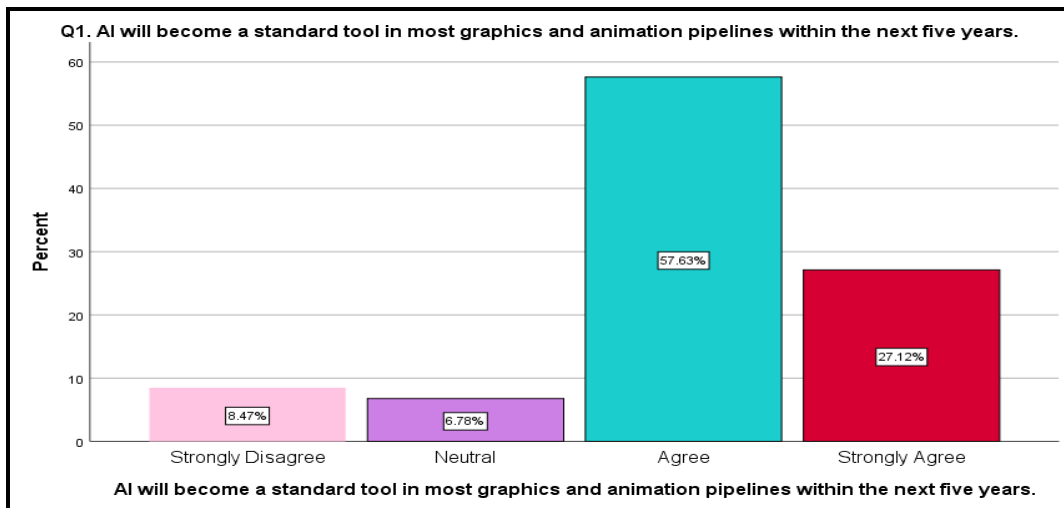


Fig 1.2. AI acceptance in Graphic and Animation pipelines in the future

Source: Created by author

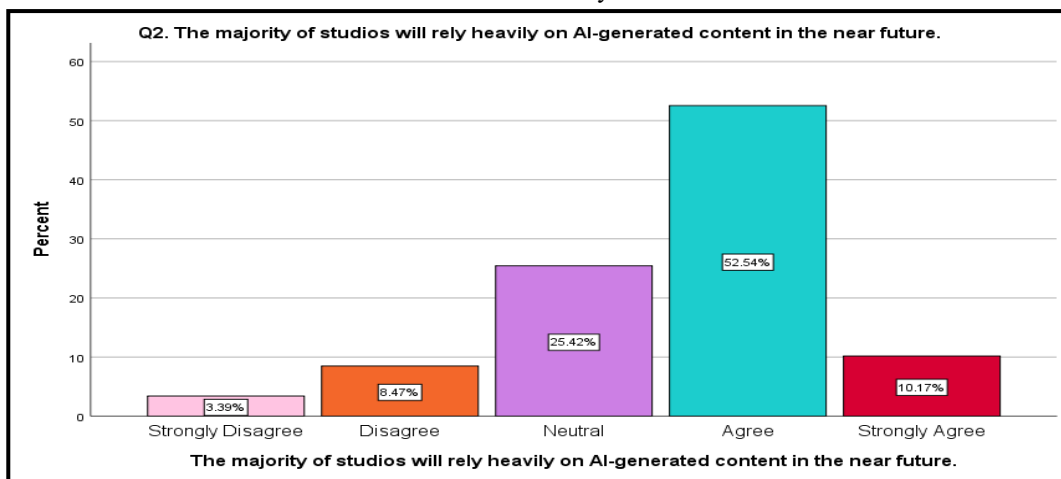


Fig 1.3. Studios relying on AI generated content in the future

Source: Created by author

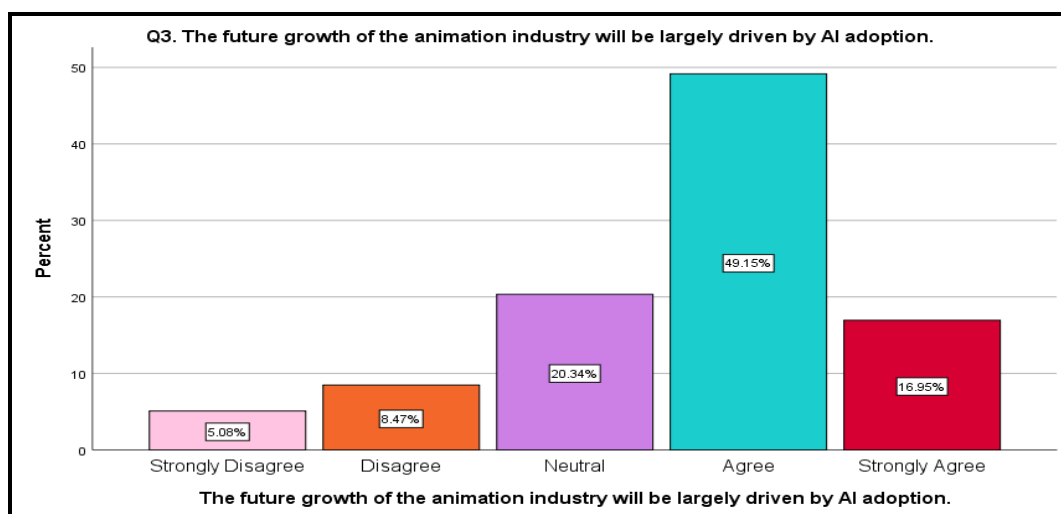


Fig 1.4. AI driven growth in the animation industry

Source: Created by author

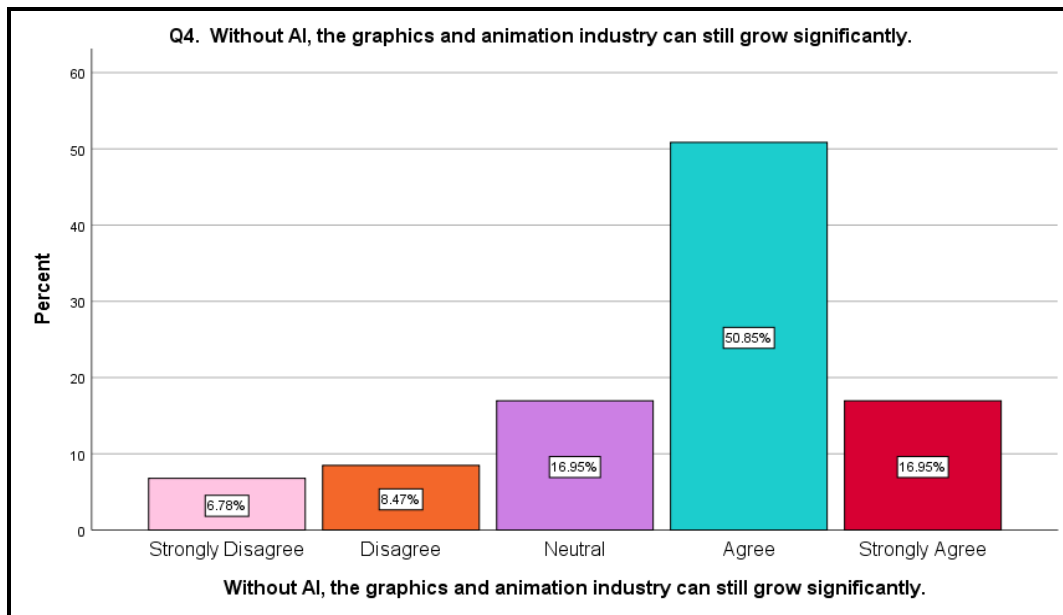


Fig 1.5. Independence of the Graphic and Animation industry from AI

Source: Created by author

To further test the first hypothesis, the combined means was taken of the four items that constituted construct #1. Below is the mean and 95% CI (Confidence Interval) for each item; the dashed line is the neutral point (3). All CIs sit above 3, reinforcing the statistical results.

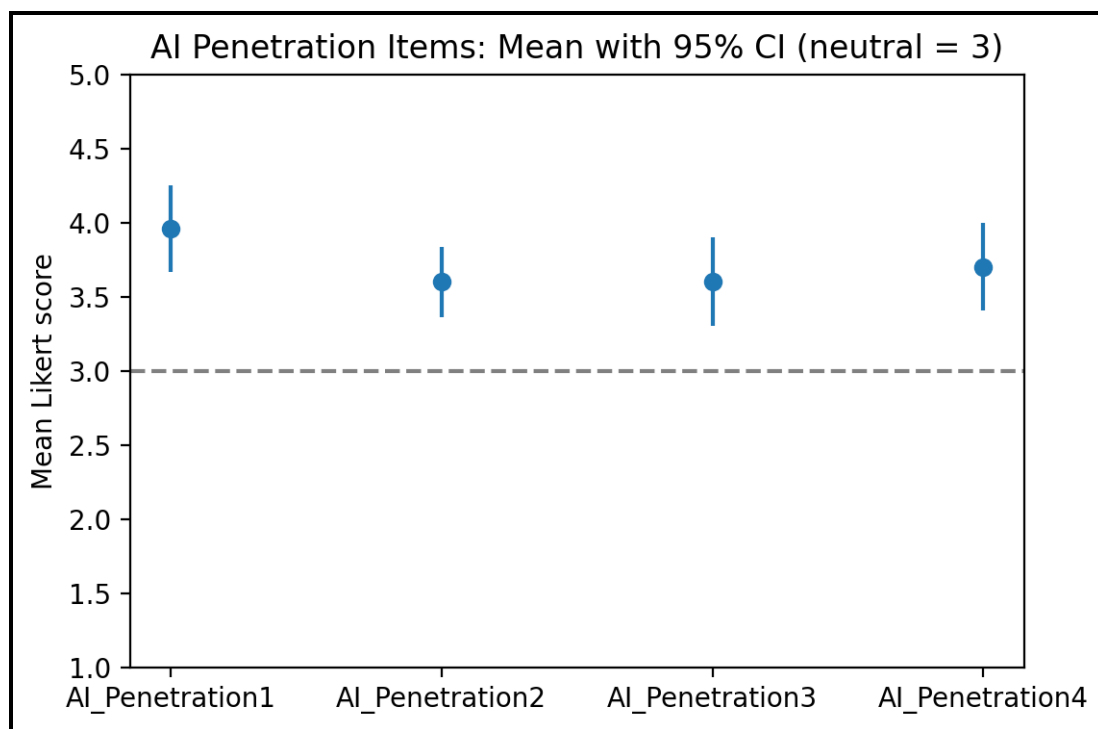


Fig 1.6. Mean Likert score of AI penetration

Source: Created by author

All four AI penetration items showed means above the neutral midpoint and are statistically significant at conventional thresholds ($p < .001$ to $p < .0002$). In short, respondents report AI penetration levels significantly greater than neutral across items 1–4.

All the above data suggested that the null hypothesis that there is no or at the very best limited AI penetration is not to be accepted, but to further substantiate research findings, a one sample t-test was conducted with the four items being tested.

One Sample t-test - findings

| Item | n | mean | t | p |
|-----------------|----|------|----------|------------|
| AI_Penetration1 | 50 | 3.96 | 6.594577 | 2.8185E-08 |
| AI_Penetration2 | 50 | 3.6 | 5.093248 | 5.6142E-06 |
| AI_Penetration3 | 50 | 3.6 | 4.041452 | 0.00018706 |
| AI_Penetration4 | 50 | 3.7 | 4.78191 | 1.6273E-05 |

Table 1.5. Findings of one sample t-test

Source: Created by author

Against the neutral midpoint (3), the test showed that all four AI penetration items have means significantly above neutral, with very small p-values. In other words, across items AI_Penetration1–4, respondents report AI penetration levels that are significantly greater than neutral. So, statistically, these columns refute the null hypothesis of no AI penetration.

This conclusion is also borne out through the visual interpretation of frequencies calculated for the scaled responses to each question, shown above.

That means we **reject** the null hypothesis of “no AI penetration” for each item, and accept the alternate hypothesis that there is **significant** AI penetration in the industry being studied

Hypothesis #2

H₀2: AI applications and tools have only indirect effects in the field of animation and visual effects

H_a2: AI applications and tools have direct effects in the field of animation and visual effects

| Mean Values | | | | | | |
|-------------|---------|--|---|---|--|---|
| | | AI will significantly improve efficiency in character animation processes. | AI tools will enhance the speed and accuracy of VFX production. | Pre-production tasks such as storyboarding and concept art will be transformed by AI. | AI-generated outputs cannot match the creative quality of traditional software like Maya or Houdini. | AI will play a central role in post-production workflows such as editing and compositing. |
| N | Valid | 59 | 59 | 59 | 59 | 59 |
| | Missing | 0 | 0 | 0 | 0 | 0 |
| Mean | | 3.75 | 3.80 | 3.66 | 3.56 | 3.20 |
| Median | | 4.00 | 4.00 | 4.00 | 4.00 | 3.00 |

| | | | | | |
|------|---|---|---|---|---|
| Mode | 4 | 4 | 4 | 4 | 3 |
|------|---|---|---|---|---|

Table 1.6. Comparison of Mean values

Source: Created by Author

In the table above, n=59 i.e. there are fifty-nine respondents and no missing values.

This table clearly shows the average (mean) response to question 6 is very close to the response for question #5, but significantly higher than the responses to the other questions. Below are charts that indicate the visual frequency response to the five questions framed above:

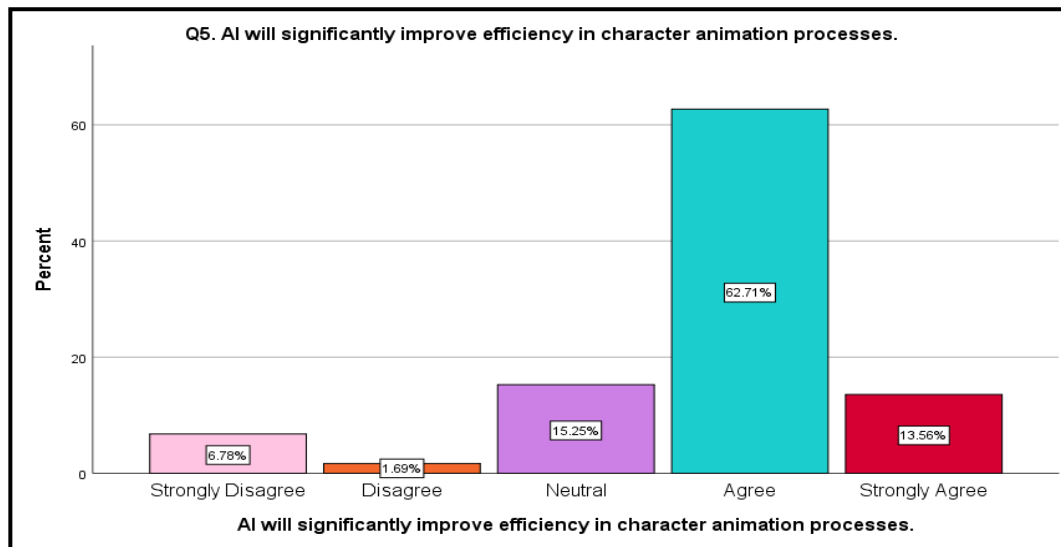


Fig 1.7. Will AI improve efficiency in character animation process?

Source: Created by author

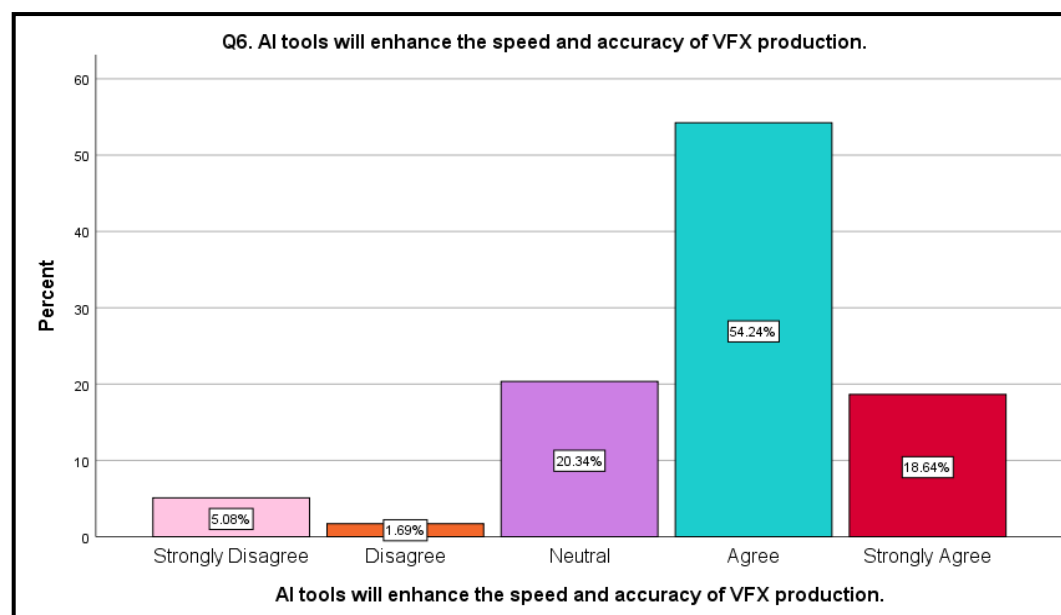


Fig 1.8. AI tools increase speed and accuracy of VFX

Source: Created by author

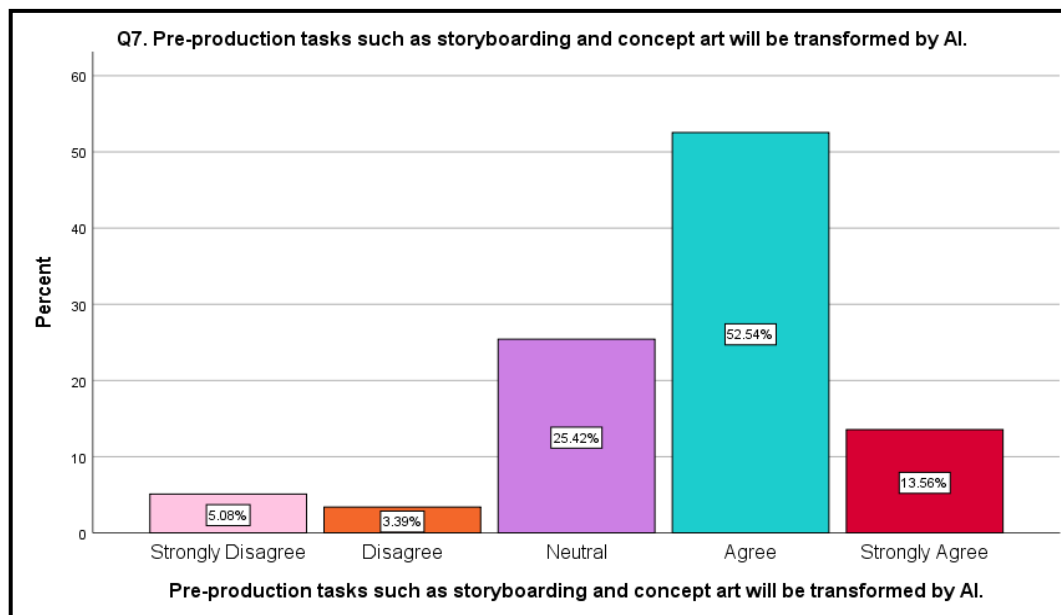


Fig 1.9. AI tools can transform pre-production tasks

Source: Created by author

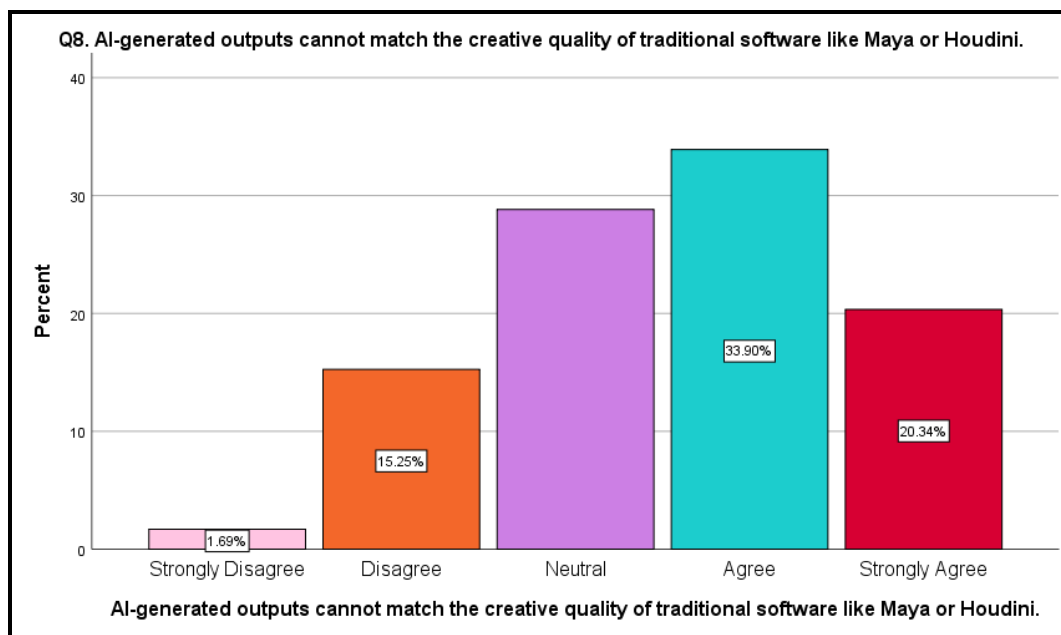


Fig 1.10. AI generated output cannot match the creative quality of traditional software

Source: Created by author

All the above figures clearly indicate that the majority of respondents clearly vote in favour of using AI tools since they feel that efficiency of character animation, visual effects and storyboarding and concept art conspicuously improve with the addition of AI tools. Many respondents were of the view that traditional software like Maya or Houdini were unmatched in terms of quality or creativity, but this was perhaps because not all the respondents had used such high end software and hence were not able to generate true experiential feedback.

For the response to construct #2, from a sample size (n=50) it was found that the composite mean was 3.76 with a standard deviation of 1.02. The t-test that was conducted showed the

t-statistic to be 5.2613 with a two sided p-value of 3.1380

Interpretation of the above data reveals that the mean Likert score is significantly above neutral (3), and the one-sided p-value is extremely small. This provides strong statistical evidence that respondents agree AI tools improve efficiency in character animation. To better understand and visualise the data, a histogram for the Likert data was plotted to show both distribution as well as skewness. The red dashed line shows a neutral value of 3. Since the highest bar lies to the right of the neutral value of three, this clearly indicates a high count of survey participants agree that tools and usage of AI contribute positively to the creation of high end graphics and animation, which involves visual effects and character animation.

A violin plot was also generated to depict both density as well as central tendency relative to the neutral value. Cohen's $d \approx 0.74$ indicates a medium-to-large effect size versus neutral, meaning the improvement is not just statistically significant but also practically meaningful.

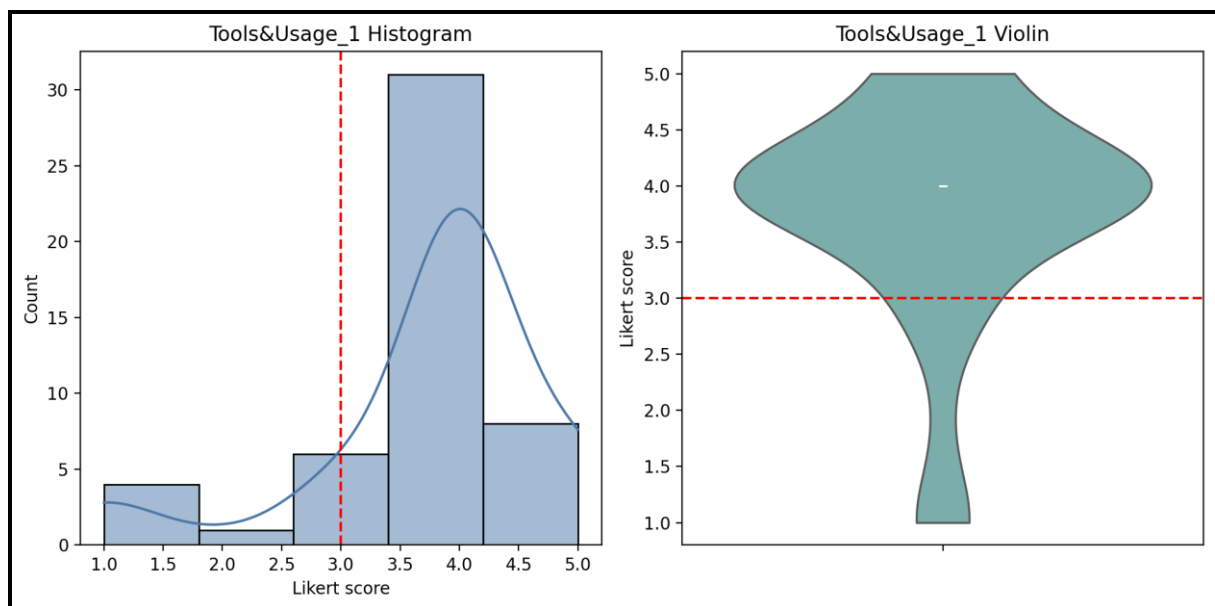


Fig 1.11. Tools and usage – Histogram and violin plot

Source: Created by author

Thus keeping all the above tests conducted in mind, we reach the conclusion that the

Null hypothesis that AI applications and tools have only indirect effects in the field of animation and visual effects is incorrect or false. So we **reject** the null hypothesis and accept the **alternate** hypothesis that AI applications and tools have direct and positive effects in the field of animation and visual effects.

Hypothesis #3

H₀3: Widespread usage of AI tools will not lead to a decline in traditional animation industry jobs and job profiles

H_a3: Heavy usage of AI tools will cause a decline of animation industry jobs and job profiles

| Measures of Central Tendency – Construct #3 | | | | | | |
|--|---------|--|--|--|--|--|
| | | Increased AI use will reduce demand for entry-level animation artists. | AI adoption in the gaming industry will reduce workforce requirements. | AI-driven tools will make certain traditional design skills less relevant. | The growth of AI will change to tend to favor younger professionals. | AI will create as many new roles as it eliminates in the animation industry. |
| N | Valid | 59 | 59 | 59 | 59 | 59 |
| | Missing | 0 | 0 | 0 | 0 | 0 |
| Mean | | 3.53 | 3.34 | 3.32 | 3.24 | 3.46 |
| Median | | 4.00 | 3.00 | 4.00 | 3.00 | 4.00 |
| Mode | | 4 | 3 ^a | 4 | 4 | 4 |
| a. Multiple modes exist. The smallest value is shown | | | | | | |

Table 1.7. Measures of Central Tendency – third construct

Source: Created by author

In the above table there are no missing values, with total number of cases equal to fifty-nine (n=59). The mean value tends to revolve around 3 which means that most of the respondents as contrasted with the previous constructs, are of a neutral opinion to most of the questions posed in this particular section. Further visual analysis follows:

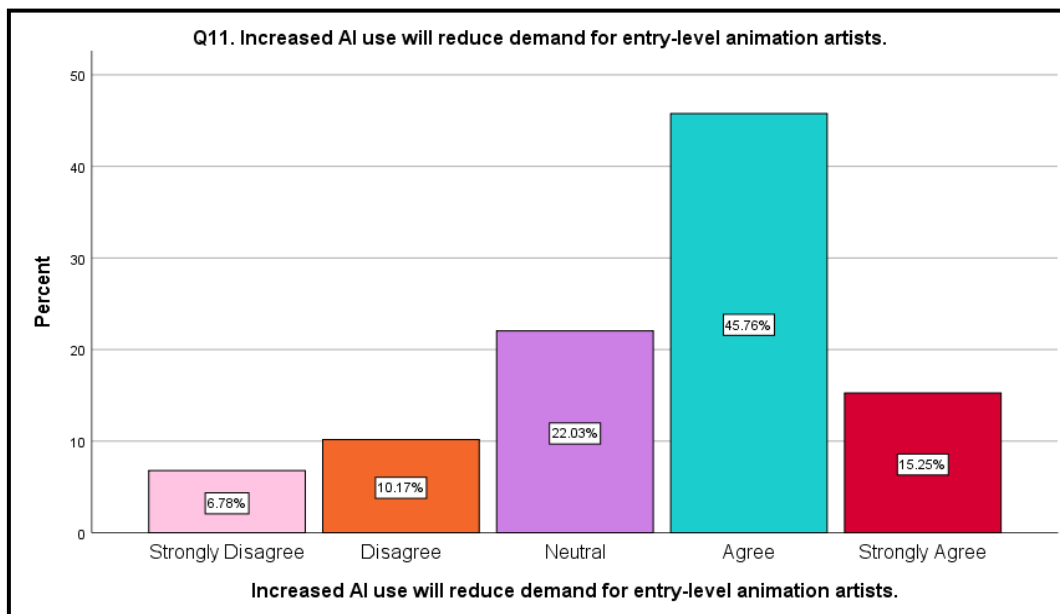


Fig 1.12. Increased use of AI in industry will reduce demand for animation artists

Source: Created by author

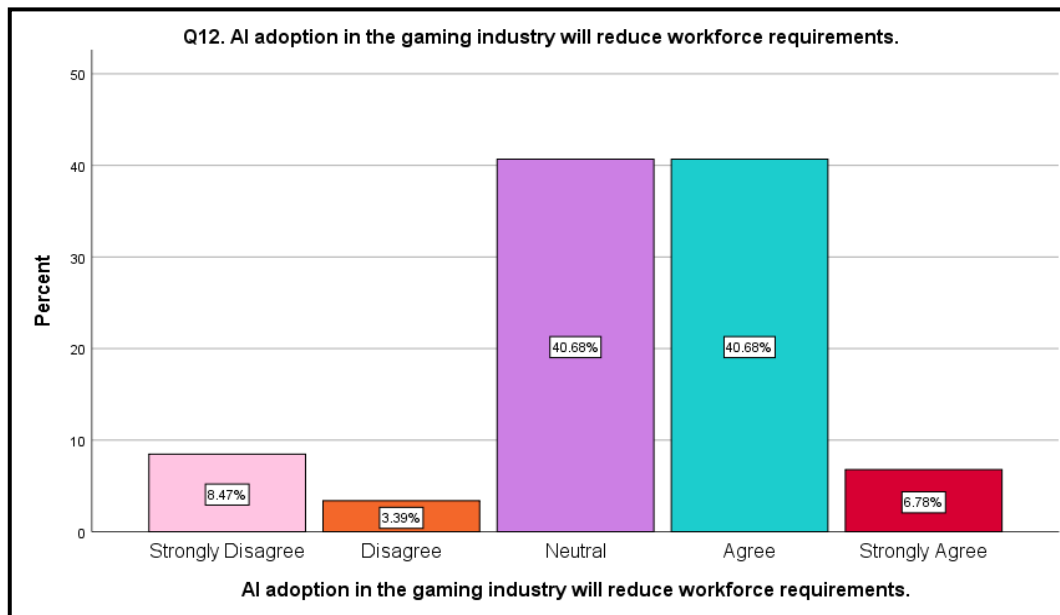


Fig 1.13. AI adoption in gaming industry will reduce workforce requirements

Source: Created by author

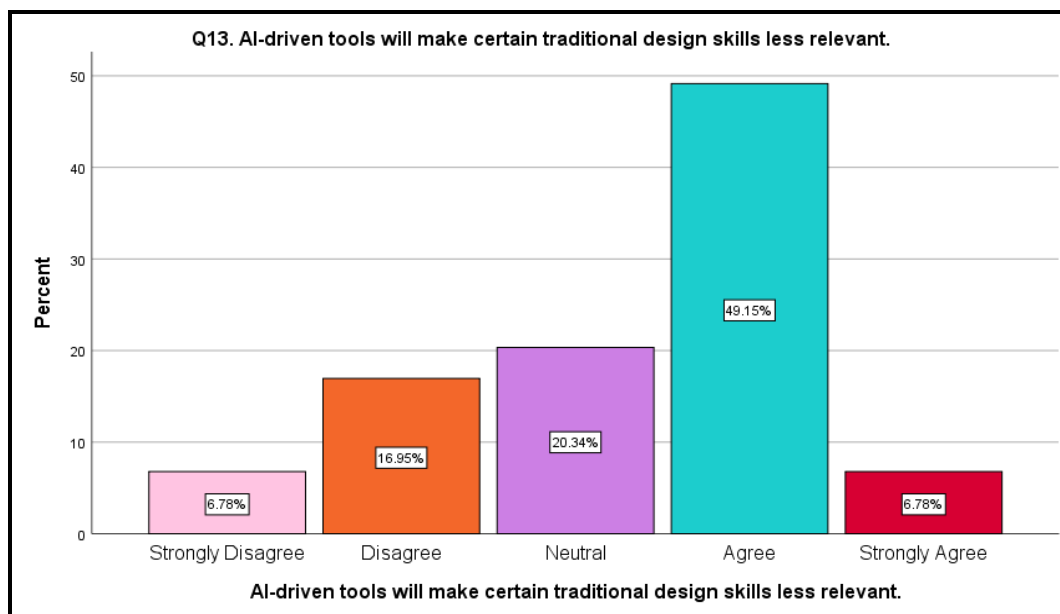


Fig 1.14. AI driven tools will make some design skills irrelevant

Source: Created by author

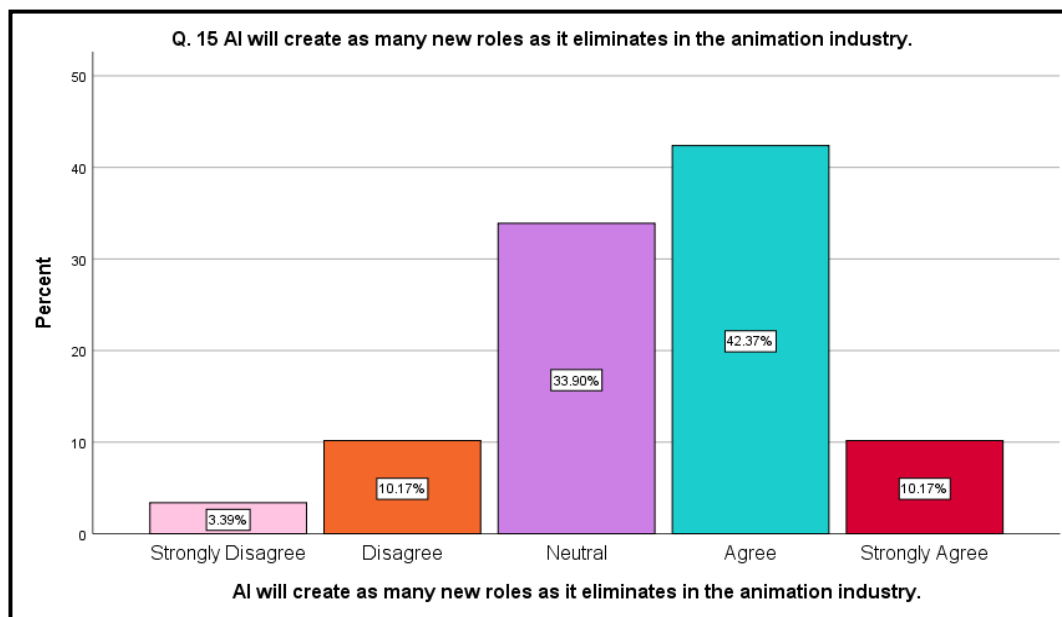


Fig 1.15. AI will create as many new roles as it eliminates

Source: Created by author

For Questions 10-14, tests were conducted which yielded the stacked Likert scale bar chart shown below:

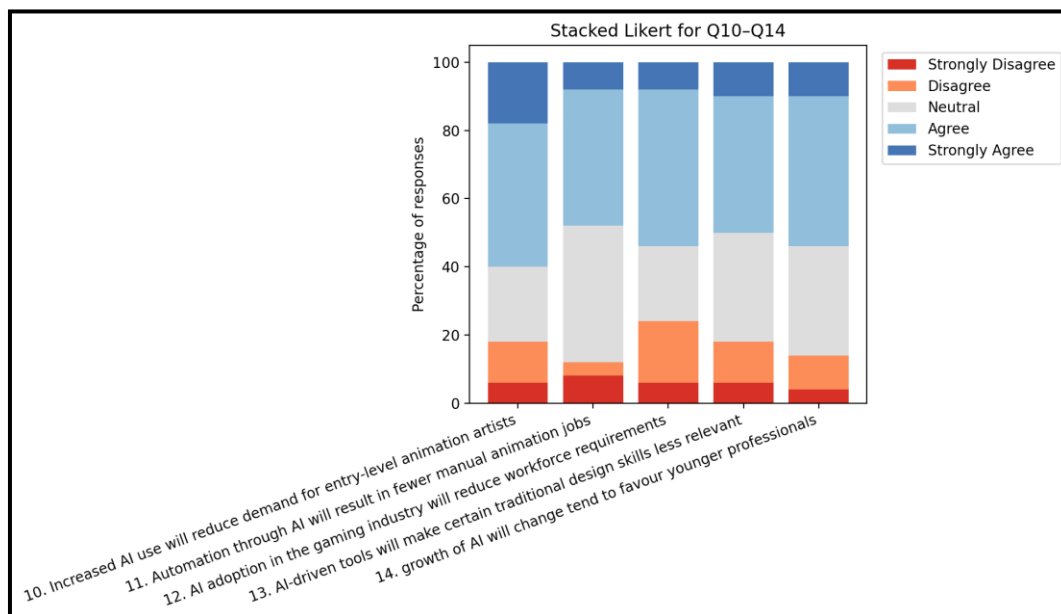


Fig 1.16. Stacked Likert scale bar chart for Q10-Q14

Source: Created by author

Examination of the chart above shows clearly that Q10–Q13 explicitly frame reductions in demand, fewer manual jobs, reduced workforce requirements, and declining relevance of traditional skills—all pointing toward job declines or at least displacement in specific functions. Q14 suggests demographic shifts in advantage, implying disruption and potential displacement rather than outright net job creation. The stacked bars skew toward Agree/Strongly Agree across most items, consistent with perceived decline in manual roles and workforce needs as AI tools spread.

After carefully sifting through the questions addressing this particular construct, it was felt that question #11 viz that increased usage of AI would lead to a decline in the absorption of workforce in animation at entry level. Hence to further corroborate our findings, it was decided to do a T-test analysis for this question. The analysis after running produced a test t-statistic of 3.439, indicating a significant deviation from the neutral value of 3.0. The p-value was 0.0012, which is less than the typical significance level of 0.05. This suggests that the null hypothesis can be rejected.

In terms of patterns and trends, we find that the above visualization clearly highlights that the majority of respondents lean towards agreeing with the perception of job decline, **refuting** the null hypothesis that there is **no** decline in the job market after the introduction of AI into the animation and graphic sector driven industry. Thus, we accept the alternative hypothesis that there will be a decline of jobs in the animation industry which tend to lean heavily of traditional software and manually driven production process. However, at the same time, the histogram response to question #15 viz. that the introduction will cause a displacement of a certain number of jobs, but at the same time will also create new ones, produced a high degree of respondents who agreed with this statement (42.37%). This clearly shows that there is a somewhat mixed reaction to this construct in that while many feel that AI will most certainly cause a disruption in the job market, yet at the same time there is the possibility that an equal number of jobs may be created that fill up the gap in the workforce created by the introduction of new technologies.

Future Trends and Policy recommendations

All around the world, policy makers are adopting standards, regulatory frameworks and guidelines as to the adoption of AI in the graphics and animation industry, balancing innovation with protection of creators' rights.

In India, there is no stand-alone AI law yet — instead, regulators are extending existing frameworks like the Information Technology Act and the Digital Personal Data Protection Act to cover generative AI issue. Governments are in the process of drafting laws around AI that would be more efficient in safeguarding content creators by ensuring transparency, fair rights, and also considering the possibility of revenue sharing between AI developers and artists.

The European Union has also commenced implementing rules revolving around generative AI, as it has of recent, come under so much debate. Under the EU's AI Act, synthetic content must be transparently disclosed, and developers are obliged to document the data used for training their models⁹.

Intellectual property rights and copyrighted works is another area of debate which has come under the governments' radar on numerous occasions, and it particularly pertinent to the graphics and animation industry. Debates rage on whether, and how, AI-generated art can be owned, licensed, or monetized — or whether existing copyright regimes are sufficient.

At present, policies, regulations and guidelines are vacillating in the evanescent ether of changing technology standards and the meteoric rise of incumbent and immersive technologies. But one trend that we can clearly foresee, is increasing hand shaking between AI and the animation industry which can no longer exist in the esoteric, exclusive professional bubble it was once ensconced in.

Conclusion:

The dramatic “forced entry” of AI into all spheres of creative endeavours, notably those engaged in creative pursuits, has resulted in a veritable explosion of outbursts from professionals as well as amateurs in the graphics and animation industry. Many are of the opinion that this is only a temporary “upsetting of the apple cart”, while corporate monoliths maintain that AI is here to stay and are going to henceforth “revolutionise” the animation industry. A plethora of fears abound, not entirely unfounded, that this will, without a shadow of doubt, cause a massive displacement of jobs, workflows, production pipelines and standard industry budgets. The debate rages on... only time will tell in which direction and to what extent AI is impacting the work force in the creative industries and whether this undeniable influence is welcome or hated by all. That remains to be seen.

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