Journal of Design and Textiles (JDT)
Volume 3 Issue 1, Spring 2024
ISSN$_{(P)}$: 2959-0868, ISSN$_{(E)}$: 2959-0876
Homepage: https://journals.umt.edu.pk/index.php/jdt/index

Article QR

Title:	**Significance, Application, and Development Dynamics of Concept Art in Gaming Industry**
Author (s):	Fatima Shahzad, and Muhammad Abdullah
Affiliation (s):	University of the Punjab, Lahore, Pakistan
DOI:	https://doi.org/10.32350/jdt.31.04
History:	Received: February 01, 2024, Revised: March 24, 2024, Accepted: April 20, 2024, Published: June 03, 2024
Citation:	F. Shahzad and M. Abdullah, "Significance, application, and development dynamics of concept art in gaming industry," *J. Des. Text.*, vol. 3, no. 1, pp. 46–70, June 2024, doi: https://doi.org/10.32350/jdt.31.04
Copyright:	© The Authors
Licensing:	This article is open access and is distributed under the terms of Creative Commons Attribution 4.0 International License
Conflict of Interest:	Author(s) declared no conflict of interest

A publication of
School of Design and Textiles
University of Management and Technology, Lahore, Pakistan

Significance, Application, and Development Dynamics of Concept Art in Gaming Industry

Fatima Shahzad*, and Muhammad Abdullah

Department of Graphic Design, College of Art and Design, University of the Punjab, Lahore, Pakistan

ABSTRACT This study strives to explore and establish the initial steps involved in concept art development and opens the door for other gaming experts, clients, and artists for collab\orative communication. This research takes the help of specifically crafted descriptions and carefully selected examples to discuss the steps involved in concept development. These steps include sketching, value sketching, preliminary photo-bashing, rough shading, edited photo-bashing, and the final concept. The steps are established in terms of characters, props, as well as environment. For data collection, interviews were conducted with the artists in creative management to explore the first usable steps of concept art creation, with 'sketch' in the lead. The significance of value sketches for the environment has also been accredited. For further research, a questionnaire has been employed to determine the estimated time, amount of accepted major iterations, and accepted minor iterations for each character, prop, and environment. The questionnaire proved to be crucial in determining the value of various features discussed in this research. This study proved to be quite productive not only in framing the significance of concept art, but also because it opens avenues for further research carried by gaming experts and researchers who might find it helpful as they set out to approve or dispute the findings. Gaming researchers can employ these findings and apply it on a larger scale, with broader sample size as they determine the relation between company size and usability.

INDEX TERMS concept art, character design, dynamic, game mechanics, illustration, photo-bash, user experience, visualization, vector, 2D game play

I. INTRODUCTION

It is an undeniable truth that art is intertwined into the very web of life, encompassing all its facets. When it comes to expressing emotions, features, or attitudes, which are difficult to put into words otherwise, art comes to the

*Corresponding Author: fatimashdsa@gmail.com

rescue. In the world of design, art serves as the backbone of visual communication. In terms of the gaming dynamics, the preliminary idea in the mind of the designer is put to a visual representation using art. This helps in clarifying what the final product will be like, by formulating drawings and illustrations.

The primary function of art is to serve as a mean to communicate something new, rather than merely reflecting reality. However, Singh [1] established that gaming concept artists should realize the significance of art in practical dimensions, about materials, functionality, readability, and variations.

However, the difference between the concept and the full mood concept must be considered significant. For example, if the final look of a chair is required by a 3D artist, they must let the concept communicate its physical attributes, such as its texture, size, and shape. It shouldn't depict a full mood concept with complex elements of effects and lighting, which can affect the appearance of the defined object. The target audience is concept artists and graphic designers who are interested in character designing. Additionally, concept production takes less time and effort than full mood depiction. Precisely defining the purpose of the object also enhances its value [2].

This research serves to fill the gap that lies when it comes to the availability of jargon needed to describe the idea depiction with clarity. Between the management and the artists, the question remains of how to converse effectively on concept creation. Although this thesis primarily focuses on concept art in the gaming dynamics, it offers wider implications upon other fields which use similar modes of concept expression like architecture and sculpturing. Leonardo demonstrated his acute ability to discern facial expressions and emotions by noting that the only distinction between laughing and weeping in terms of facial movements is the presence of raised brows in weeping, while laughing involves more elevated and extended brows [3].

The existing research offers limited insight into bridging the gap through words, between the purpose and usability of concept art. Thus, this dissertation tends to serve as a significant contribution to this field. It will strive to define the applicability of concept art and will suggest possible structures to serve as basis for discussion regarding art, between clients and concept artists.

II. LITERATURE REVIEW

As highlighted in the previous chapter, the gap exists when it comes to communication about concept art. Therefore, this chapter tends to focus on the available literature which can help with recognizing the limitations in the knowledge, instead of finding contradictions.

To begin with, this review looks at the role of art in terms of prior research. Art can serve as a valuable tool in the field of research. When the drawing is re-examined in the research context, it can be understood in its functionality as a driving force that moves the research inquiry forward [4]. Hence, art can be employed as a driving force to generate inquiry into other scientific fields, other than just examining the knowledge of art itself.

Due to the limited prior research on communication and evaluation of concept art, the lack of available tools needed to aid in the process is another challenge. Rässa [5] discusses the dual approaches to concept art creation and implementation. The first approach called the median approach, which is more popular among art creators, has a defined story and the concept artist deals with designing, photo-bashing, or paint-overs. Contrarily, the outlying approach has a story which isn't entirely established and the artist's technique tends to focus on storytelling, speed-painting, and repetitions.

On the other hand, [6] believed that when it comes to creating hard-surface or mechanical objects, particularly in a non-orthographic pose, such as a two-point perspective, it is more efficient time-wise and produces a more accurate image, to use the paint-over technique. They also established that all artists employ the same steps in art creation, including idea generation, thumbnailing, contouring, rendering, and manipulation, across all traditional and digital art creation processes.

To help artists define their area of focus during art creation, [7] suggested that the key features to consider include, determining the target industry, format, storytelling, genre, topic, and the basic principles of art creation, such as movement and perspective. [8] appeared to agree that there is a direct relation of shapes and geometry with storytelling and human emotions.

Regarding the utility or usability of art, Singh [1] discussed that the presence of particular features makes art "useful" in a specified role and there are various indicators that help ascertain if something can be considered as 'good' art.

Conclusively, it can be observed that there's a lapse in the available literature when it comes to creating a comparative analysis of the identified steps of concept art creation, highlighted by various experts and researchers. Additionally, there's an unavailability of tools based on comparative analysis, which can aid artists and management to effectively discuss a particular task of concept art creation. Hence, this dissertation tends to bridge the aforementioned gap.

III. METHODOLOGY

The research focused on building a tool to facilitate communication between artists and clients regarding the required specifications of the concept art and defining the applicability of it. For this purpose, this research tends to answer the following questions.

1. Which of the often-employed development steps in terms of 2D digital concept art creation offers the best, most usable, and quickest results?
2. How can we craft a tool from the research that can facilitate effective communication between artists and management regarding concept art?

By employing the most used development tools and steps discussed earlier (environment sketch design, sketching, value sketching, photo-bashing, rough shading, edited photo-bashing, and final mood), the semi-realistic features of a character, environment, or a prop can be defined. The consensus here appears to be the use of value sketching as the primary 'useful' step, according to professionals. This is because sketching and value sketching offers a quick depth, while keeping the possibility of iterations limited, especially true in the case of environment concepts. Similarly, depth line sketches appear to be a quite useful preliminary step for character and prop concepts [9].

The current research unfolds through five basic steps (Figure 1). To begin with, the development step images and the final mood are established. With the visuals in hand, it goes through two checks, an inquiry form for the concept artist and an interview for the client or management. After this, the results were examined to provide satisfactory answers for the research questions mentioned above. Lastly, the images and data were compiled into a singular template, which helps in aligning the concept development step with the outcomes. This template can prove to be helpful for artists and management to discuss particular concept art.

Following are the summarized research steps.

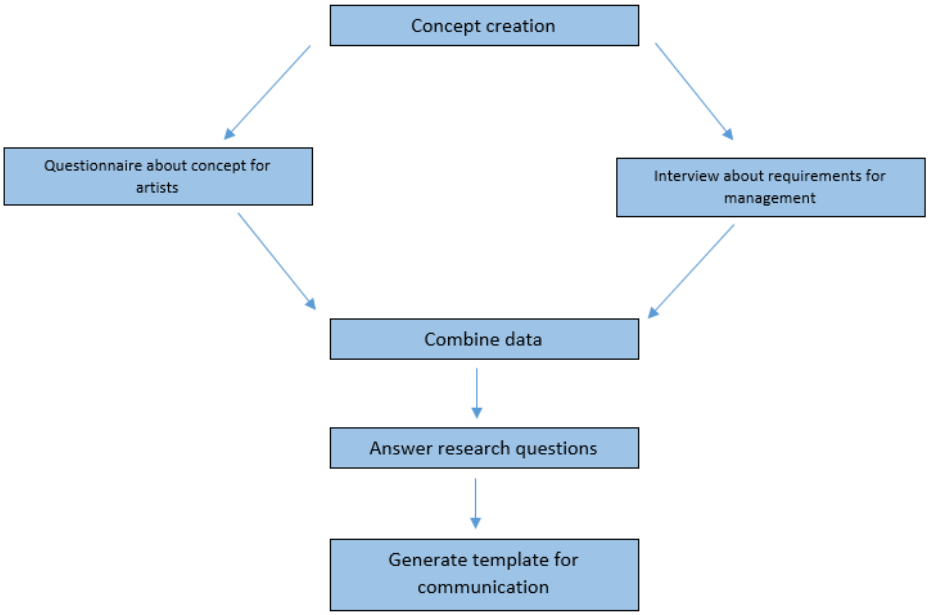


FIGURE 1. The research process

A. CONCEPT CREATION

The research aims to compile, compare, and contrast the most commonly used 2D digital concept art development steps. For this purpose, the concepts of character, environment, and prop were created and a few steps were identified for each of these. For comparison, three categories were made with specifically formulated definitions for each step [5]. They are described as follows:

1. The quick category contains steps that are simple and quick to make and give fast results. The steps in this category include:

- Sketch

This is a greyscale image made up of lines. It is a rather rough drawing, which leads to a more formal drawing.

- Value Sketch

This next step is also a greyscale image, made up of shapes but with varying values.

- Photobash

This can be a colored or greyscale image made up of elements of various photographs and environmental design [10].

2. The second category is average and takes a minimum amount of time. It consists of steps that are a bit more elaborate in terms of details. The steps in this category include:

- Rough Shading

This is a colored or grayscale image, with slight hints of lighting, shadow, and detail.

- Edited Photo-bash

This is a colored or greyscale image made up of elements of various photographs but possessing unity through editing and an integrated light source.

3. The final category, labeled as 'slow', is the most time-consuming step. This generates the final image possessing all the required details.

- Final (mood) Concept

This is a colored or greyscale image having complete details including light, visual effects, or any other required and aesthetically pleasing enhancements.

1) CHARACTER DESIGN

Character design art is a transformative process that takes a basic idea and brings it to life as a captivating character that commands attention in any creative endeavor. It is an enchanting journey driven by limitless imagination, with a colorful mood board serving as a roadmap. Moving beyond mere sketches, character design is a meticulous craft, resulting in a precisely detailed image that is polished to flawless perfection [10, 11].

Creating character concept art involves several key stages, starting from gathering references and ending with rendering. The goal is to design a character that is visually appealing and captivating. Following are the steps to create captivating character concept art.

Gather References: Begin by collecting inspiration from various sources, such as images, drawings, and other artwork to help shape your character design.

Brainstorm Ideas: Develop a concept for your character, including their backstory, personality traits, and distinguishing features that will make them unique and memorable.

Sketch: Start by sketching rough outlines of your character, focusing on their silhouette, proportions, and overall design. Experiment with different poses and expressions to bring your character to life.

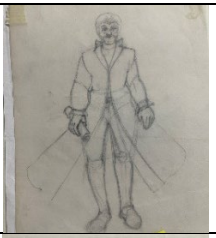
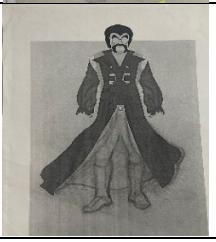
Refine Design: Refine your sketches by adding more details, refining the anatomy, and incorporating unique features or accessories that will enhance your character's design.

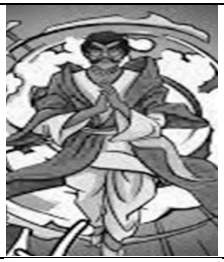
Color and Texture: Add color and texture to your character design, using a variety of techniques, such as shading, highlighting, and texturing to give them depth and dimension.

Finalize Rendering: Complete your character concept art by finalizing the rendering, adding any finishing touches, and ensuring that the overall design is cohesive and visually appealing.

A visual representation of the above-mentioned development steps can be seen in the following Table I.

TABLE 1
DETAIL OF DEVELOPMENT STEPS

Category	Phase	Picture	Outcome
Category 1	Sketch		Greyscale image composed of lines
	Value Sketch		Greyscale image composed of shapes of different values

Category	Phase	Picture	Outcome
	Photo-bash		Greyscale of color image composed of elements of different photographs
Category 2	Rough Shading		Greyscale of a color image with a rough indication of light, shadow, and detail
Category 3	Final (mood) Concept		Greyscale of color image having complete details including light, visual effects, or any other required and aesthetically pleasing enhancements.

In order to examine and compare various steps, with the consumption of time as a significant factor, the study avoided complicated steps or concepts. For this purpose, following restrictions were imposed.

- All images were made in (semi) realistic rendering style.
- Images created by artists following the same development steps were also observed and included in the research in order to study the wide application of techniques and gain a broader perspective.

B. THE INTERVIEW

As established earlier, interviews were conducted to gain a clear understanding of the management or client's perspective, requirements, and expectations. Some closed questions were asked in order to confirm or deny

certain statements. Managers, who directly deal with art, participated in the interview. Participants were asked their name, company's name, designation, and years of professional experience. Consent was taken and legal elements were also discussed, such as non-disclosure agreements, before conducting the interview. Participants were asked the following questions.

- What is your perspective on the applicability of concept art? How do you describe its function?
- When do you think is concept art 'usable'?
- What is your opinion on the significance of color in concept art?

(Here the participants were shown the images of development steps for each subject)

- (For each individual image) How do you describe the usefulness of this development step, in case of this specific subject?
- Do you think that the presence or absence of color in an image makes a difference? Why?
- (For the quick development steps) Which images do you think are the most useful as per the client's requirements?
- In what way do you communicate with concept artists regarding your requirements?
- Are you satisfied with the process of communication between artist and management? How do you think it can be improved?

C. THE QUESTIONNAIRE

The participant artists were given a questionnaire in order to gain information about their working process. Their basic details were asked, which included name, age, gender, ethnicity, company name, designation, and years of experience. However, it was not compulsory to answer all these questions. Participants were then asked to fill the following questionnaire.

TABLE II

LIST OF QUESTIONS

1. How long do you think you will take to create an image like this?
- Less than 10 minutes
- 10 minutes
- 30 minutes
- 1 hour
- A couple of hours
- 1 day
- A few days
- 1 week
- 2 weeks
- 3 weeks
- More than 3 weeks

2. If you were to make this image for someone, who would you choose?

3. How many complete re-drawings will you be willing to do at this stage?
- 1-2
- Up to 5
- Up to 10
- Up to 20
- Up to 30
- Up to 40
- Up to 50
- More than 50
- Other

A varied range of gaming artists were approached to gain a broader perspective and varied opinions on 2D digital concept art creation. To ensure a balance, artists were invited from both high-end studios and companies with large marketing and production budgets, as well as indie studios or smaller studios with limited resources and budgets.

D. ETHICAL CONSIDERATIONS

The identities of all participants were kept anonymous to avoid NDA problems and company-related concerns. They were informed about this

beforehand and were given a choice to reveal their identities by signing a consent letter.

For the use of original images, notes were sent to the original artists to inform them that their work was being featured in this research.

E. REVIEWING THE DATA AND REACHING A CONCLUSION

An overview was created to compare the answers obtained from both questionnaire and interview. After compiling the information, the research aimed to conclude the significance of the various development steps.

F. CRAFTING THE TEMPLATE

Estimations of different artists were collected regarding various images and the development steps associated with them. This helped in establishing a template that assisted management in guiding the artists about their requirements, while having realistic expectations, a defined time frame, and deciding the purpose of the concept art. This further aided in the communication between the two parties.

IV. DATA AND RESULTS

Experimentation began after the methodology was established. However, the methods developed required testing and modifications before applying them in final tests with gaming industry experts. This was due to the lack of standardized tests in this field. Furthermore, the length of the test run was modified to make the process more efficient.

A. INITIAL TEST RUN RESULTS AND MODIFICATIONS

The final test run comprised a questionnaire and an interview. With some modifications made to enhance the outcome of the final tests, the usefulness of the method was consistently observed.

1) QUESTIONNAIRE

While most answers collected from the six (06) questionnaires were varied, however, some commonalities were also observed. Among the participants, the answers of two (02) candidates indicated that the question, “If you were to make this image for someone, who would you choose?”, was vague and consumed the most time. Few responses indicated that the questionnaire was rather lengthy and repetitive in nature. One of the participating student

artists frequently chose the "other" option to refer to various unmentioned features (Figure 2).

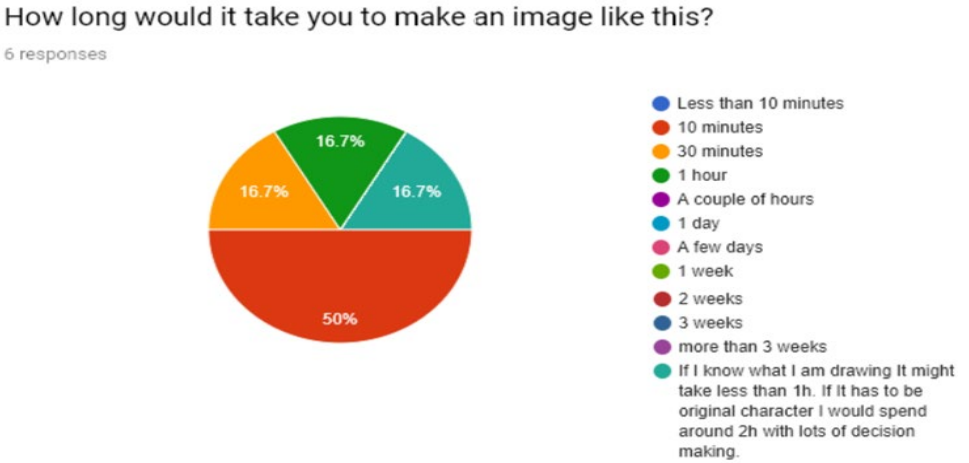


FIGURE 2. Example of 'depends' response in questionnaire

In terms of discussion regarding concept art, it was observed that the terms 'value sketch' and 'sketch' were not used in the same dynamics as the word 'render', which was most frequently used in terms of lighting, shadows, texture, and other image details.

The modifications were made to the questionnaire to enhance its usefulness and to attain specific and clear answers. The question, "Who can you think of yourself making this image for?" was removed, the term 'render' was changed to 'create' and the 'other' option was removed for all answers in order to get responses that could have comparability. Rather, another optional space was provided after each question for additional remarks on the development stage-related question. For questions pertaining to the number of days, a day was considered as 8 (working) hours and a week to be 5 days. Histograms were used to depict the findings, due to the ordinal nature of responses.

2) INTERVIEW

Three interviews were conducted in total, with a deviation in the answers. However, some features were common and comparable. The participants tended to compare the provided images with each other, which consumed a bit more time than estimated. Additionally, one participant regarded the 'flat

shading' category to be misrepresented. All the participants said that certain steps lacked further iterations, which they expected.

Modifications were made to the interview questions as well to attain more specific and clear answers. A note was provided at the beginning stating that the provided images were merely for illustrations and comparing them wasn't required. Furthermore, the term 'flat shading' was changed to 'rough shading', to avoid confusion. The names of artists were removed from underneath the images and were provided separately as references. Large-sized images were also displayed in slides for the participants who faced difficulty in viewing the details. The in-depth discussion was only limited to the first subject (the character) in order to save time. The succeeding subjects of prop and environment were discussed in terms of comparability with the character, under the question, "Does the view on the applicability of a certain development step change if the subject changes?"

B. FINAL TEST RESULTS

Final tests were conducted after changes were made to both the questionnaire and the interview. The final tests were comprised of interviews, modified questionnaire, first research question about the preliminary applicable development step in 2D concept art creation, and second research question for understanding the depths of the concept art creation process.

1) INTERVIEW

The four (04) participants of this test method were professionals working in the gaming industry and their years of experience ranged between 3 to 12 and even 23 years in one case. Some interesting themes emerged in the evaluation of the interview responses. It was unanimously agreed that color plays a vital role in concept art creation as it lends significant information in detail, which is important to the process.

Majority of the participants agreed that color is more useful than greyscale as far as value sketches are concerned. However, in environment value sketches, light exploration was useful. It was also agreed that value sketching of the environment was one of the most significant development steps of the subject. Three of the participants said that sketches are the first and most important steps, due to speed and iterations. The fourth participant argued the significance of photo-bashing as the first and most useful

development step. He said that the reason for this is that prior versions of the image before photo-bash aren't usually shared with the client [12].

A consensus was noticed on the significance of color, speed of concept creation, and the amount of detail crafted during that time Furthermore, they all concurred that a concept artist's primary role is to facilitate communication between the customer and the artist. A gist of all the themes involved is given in Figure 3, while most common themes and subthemes are compiled in Figure 4, sorted by color.

FIGURE 3. Word cloud of all themes and subthemes

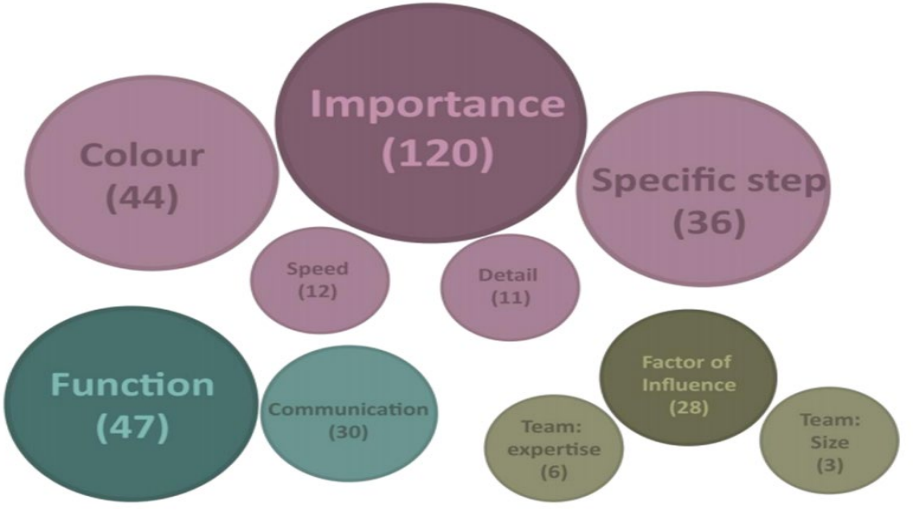


FIGURE 4. Most common themes found and their occurrence

The following image (Table III) illustrates each time a participant spoke about the significance of a certain step and whether they regarded as positive (useful) or negative (less useful).

All participants appeared to agree that communication regarding concept art between artists and clients is mostly verbal, as different unstructured dynamics need to be discussed. However, it was also suggested that the availability of more visuals can help aid the discussion.

TABLE III

IMPLIED IMPORTANCE OF DEVELOPMENT STEPS SORTED BY POSITIVE AND NEGATIVE MENTIONS

Variables	Character		Prop		Enviornment	
	Positive	Negative	Positive	Negative	Positive	Negative
Sketch	1	2	1	2	2	0
Value sketch	1	1	1	2	1	0
Initial Photobash	0	1	2	0	1	0
Rough shading	3	0	1	2	1	1
Edited Photobash	1	1	2	1	1	0
Final Mood Concept	1	0	1	2	1	0

2) QUESTIONNAIRE

Questionnaire consists of ninety (90) questions in total, where three questions are for each development phase and ten questions for each of the primary themes.

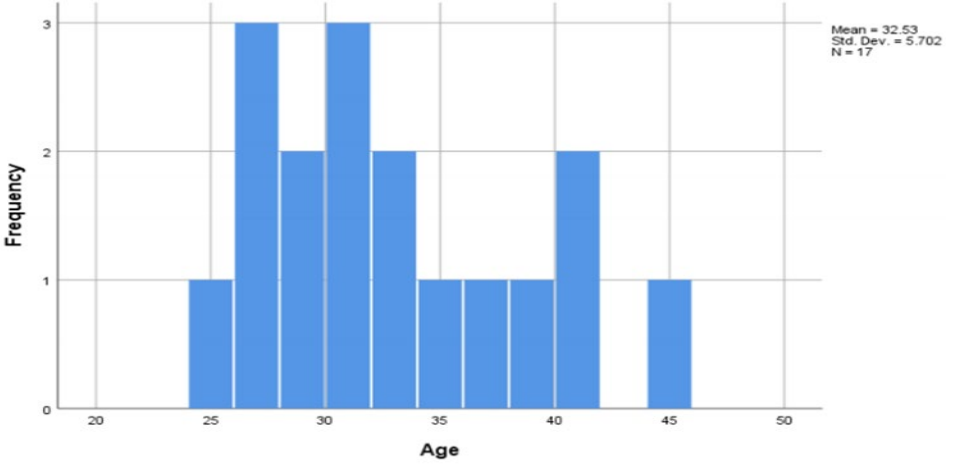


FIGURE 5. Age histogram of questionnaire respondents

The participants were 17 in number and their ages ranged from 25 to 45 years, as indicated in Figure 5. The population included 12 males, 3 females, while 2 of them did not provide an answer to this question. Respondents were 15 gaming industry professionals, one student, and one unidentified. Among them, six (06) identified themselves as artists and other nine (09) had senior positions.

The years of industry experience of the participants ranged from 0 to 25 years, with a mean of 10.06 years. In response to the question about years of specialization, answers ranged from 0 to 18 years, with a mean of 8.65 years of experience. This is indicated in the following Table IV.

TABLE IV

STATISTICS OF YEARS IN THE FIELD AND SPECIALIZATION

Variables	*N*	*M*	Median	Mode	*SD*
Years in Field	17	10.06	10.00	10	7.67
Years of Specialization	17	8.65	9.00	10	5.17

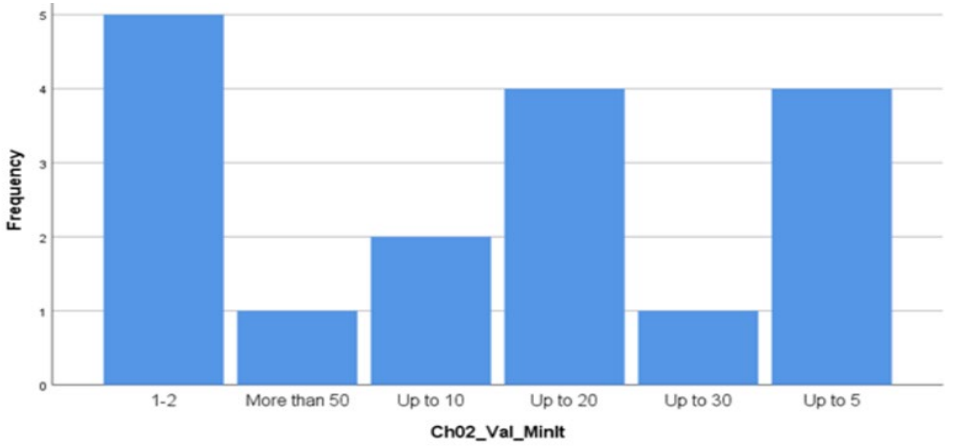


FIGURE 6. Minor interactions for a character value sketch

Responses were varied, with a large gap among the given answers . If the answers were equal in number or if the gap was smaller, in most cases the two frequently given answers were not close together (from the given options). For instance, in case of the question, “How many complete re-drawings will you be willing to do at this stage?”, the most chosen answers

were ‘1-2’, ‘up to 5’, and ‘up to 20’, which are all quite apart from each other as shown in Figure 6.

For the question regarding the time consumption of the character *sketch*, most responses were “30 minutes” and for the creation of the prop sketch, “10 minutes” was the most selected answer, as illustrated in Table V.

TABLE V

EXAMPLES OF CHOSEN ANSWERS FOR TIME SPENT ON CHARACTER SKETCH, PROP SKETCH, AND ENVIRONMENT SKETCH

Items	Less than 10 minutes	10 minutes	30 minutes	1 hour	A couple of hours	1 day
Character Sketch	2	3	6	5	1	0
Prop Sketch	8	4	4	0	1	0
Environment Sketch	1	4	3	5	3	1

However, consistent responses were observed for the question about the number of iterations the artists would be willing to conduct at a certain development stage. In case of both major and minor iterations, most artists opted for the option “1-2”. Furthermore, Kendall’s Tau was employed to observe the correlations in the data set, keeping in mind the rule of significance of a *p*-value (Sig. in the Table), for measuring the influence of years of experience.

TABLE VI

SECTION OF KENDALL’S TAU CORRELATION ANALYSIS REGARDING AGE, YEARS IN THE FIELD, AND YEARS IN THE SPECIALIZATION.

Variables	1	2	3
1. Age	-	.70**	.53**
2. Years in Field		-	.61**
3. Years of Specialization			-

**$p < .01$.

In the above Table IV, the correlations significant at 0.01 levels are highlighted. A high level of correlation (<0.01) was found between the age

of artists, years in the field, and years of specialized work. However, these three categories did not consistently correlate with the development steps. Character sketch time and character value sketch time with major poses are presented in Figure 7.

FIGURE 7. Character sketch time and character value sketch time with major poses

V. DISCUSSION

The compiled data was used to address the research questions.

A. DATA ANALYSIS

The research observed how different subjects get different priority treatment from the industry, with prop concepts being regarded as the least time-consuming to create and the environment being the most time-taking with character in the middle. Rarely do prop concept reach full mood stage unless it is a hero prop. In contrast, the character part is most focused upon by the artists and always gets fully developed [13]. A character's edited photo-bashing and the major iterations for the final mood (concept) of a prop are shown in Figure 8.

FIGURE 8. Character-edited photo-bash in major color iteration

The conducted interviews revealed that environment requires the most time and attention, although it appears to be so, it comprises lots of pieces that need to be developed and evaluated. Value sketching was established as a significant development step; however, it didn't apply to all subjects. The reason is that the value sketching proves to be more useful if colored, which goes against its definition as shown in Figures 9 (a, b). It also suggests that sketching is a useful step for both character and prop [3], [14], [15]. It is another derived hypothesis that value sketching will be the most useful step if a color option is given, however it is not proven yet.

FIGURE 9 (a & b). Useful step for both character and prop (most useful step if a color option is given)

As value sketching has depth and room for iterations, the proposition regarding its usefulness as a development stage held true for the environment, if the color in value sketching is considered. However, the theory is not applicable to other subjects (Figure 10).

FIGURE 10. Value sketching as a development step held for the environment

The research findings stood parallel to statement by [1], that the result should define how much time is spent on each step and the amount of rendering done. Except for one interviewee, none regarded photo-bash as the first useful step. They agreed that rarely ever does the need arise for something to be crafted within a few minutes and therefore, favored quality over time. It was the same thing as pointed out by [6], that paint-overs provide quick results and correct images, however, contrarily, they believed that most artists employ the same sequence of development steps, which are, thinking, thumbnailing, contouring, rendering, and manipulation [10].

For answering the first research question, it was observed from the responses that the first useful step varies from subject to subject. Except for one, who regarded photo-bash as first most useful step, the rest regarded sketching as the very first and most useful step for all the subjects. They also agreed that a value sketch with color will hold more detail.

For the second research question, which was about crafting a tool to generate discussion between artists and clients, the study recommends consulting [4] that states, "The concept art development support tool; for artists and clients," which gathers the pictures created to illustrate different stages of the development process. It can be used by both clients to discuss their requirements and by artists to explain their process of concept art creation.

B. REFLECTION ON METHODOLOGY

The research explored those visual aids assist in conducting clear conversations about concept art between clients and artists.

This research was conducted for a limited time. However, with the availability of more time, more questions can be added, which in turn can help uncover further insights into the creation of concept art. Few artists wrote, “I don’t use this method” under certain questions, which indicated that in future research such options can be utilized to obtain the preferences of the artists.

Moreover, multiple researchers can be involved to eliminate the possibility of biasness in selecting images and in compiling and reviewing the outcomes of questionnaires and interviews.

C. CONCLUSION

In conclusion, this study successfully delineates the initial stages of concept art development, offering a structured approach to enhance collaboration among gaming industry stakeholders. By identifying key steps such as sketching, value sketching, photo-bashing, and shading, it provides a comprehensive framework for creating characters, props, and environments. The findings from artist interviews and questionnaires revealed the critical role of these steps and the time and iteration required for effective concept art.

This research not only emphasizes the importance of a well-defined concept art process but also sets the stage for further exploration. Future studies could build on these insights by examining larger sample sizes and investigating how factors like company size influence concept art practices. Overall, this study contributes valuable knowledge to the field and opens avenues for ongoing refinement and application in the gaming industry.

D. FUTURE IMPLICATIONS

The current study opens doors for future research, especially regarding determining the first useable development step in concept art creation, with a broader scope and increased number of participants. Although majority of the artists (three out of four) regarded sketch as the first usable step, one also went with photo-bash as the first most usable step. Yet, the value sketch is another very significant candidate for the first and most usable step, which can be researched further.

Lastly, a few connections were found between various development steps. There isn't enough information to determine why these relationships exist, regardless of the connections being very solid, or to demonstrate causality, so this feature can be explored by future researchers. The literature review upheld the fact that creation and usability of concept art is a neglected area of exploration in the gaming industry. The methodological approach used by this dissertation can be applied to other fields of research, such as commercial arts and can assist in future client-artist discussions.

CONFLICT OF INTEREST

The authors of the manuscript have no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

DATA AVALIABILITY STATEMENT

The data associated with this study will be provided by the corresponding author upon request.

REFERENCES

[1] B. Singh. "What makes concept art useful from a 3D Character Artist's point of view." LinkedIn. https://www.linkedin.com/pulse/what-makes-concept-art-useful-from-3d-character-artists-baj-singh (accessed July 1, 2023).

[2] Clementine Creativ. "Environment design week 02: Value sketching." YouTube. https://www.youtube.com/watch?v=nVfzWPPdM-Y (accessed July 1, 2023).

[3] L. Da Vinci, *A Treatise on Painting*. Read Books Ltd, 2014.

[4] M. Mäkelä, T. Heikkinen, and N. Nimkulrat, "Drawing as a research tool: Making and understanding in art and design practice," *Stud. Mater. Think.*, vol. 10, pp. 3–12, 2014.

[5] J. Rässä, "Concept art creation methodologies: Visual development of 'Rock Boy,'" Bachelor's thesis, 2018. Univ. Appl. Sci. Finland, 2018. [Online]. Available: https://www.theseus.fi/handle/10024/146949

[6] V. R. Smith and J. Farrell. "Concept art best practices for the video game industry and classic illustration techniques." Victoria Rehfeld Smith. http://www.victoriarehfeldsmith.com/uploads/2/9/4/7/29470353/smithv_thesis_final.pdf (accessed July 1, 2023).

[7] A. K. Shamsuddin, B. Islam, and K. Islam, "Evaluating content based animation through concept art," *Int. J. Trends Comput. Sci.*, vol. 2, no. 11, pp. 818–830, 2013.

[8] A. K. Shamsuddin, B. Islam, and K. Islam, "A directional model of concept art," *J. Mod. Sci. Technol.*, vol. 2, no. 2, pp. 78–86, 2014.

[9] R. Benvie. "How value sketches improve your painting compositions." Hub Pages. https://discover.hubpages.com/art/Thumbnails-Value-Study-for-Painting-Composition (accessed July 1, 2023).

[10] A. Dutta. "Environment design week 02: Value sketching." YouTube. https://www.youtube.com/watch?v=E9zy0OOpT9oA (accessed July 1, 2023).

[11] Grady Frederick Art. “Concept art process - Part 2: Final illustration.” YouTube. https://www.youtube.com/watch?v=sqhgfsTBZtE (accessed July 1, 2023).
[12] Michael. “The ultimate guide of character concept art with 16 jaw-dropping examples.” Ideas Animation Studio. https://www.ideasanimation.net/ultimate-guide-character-concept-art-with-16-examples/ (accessed July 1, 2023).
[13] Concept Art Box. “Character concept art - Photo-bashing techniques cyberpunk style.” YouTube. https://www.youtube.com/watch?v=VhtmeT4Q4EQ (accessed July 1, 2023).
[14] Concept Art. “How to make character concept art: A step-by-step guide.” 3d-ace.com. https://3d-ace.com/blog/how-to-make-character-concept-art/
[15] Al Boicheva. “The basics of character design process: Insights and examples.” Graphic Mama. https://graphicmama.com/blog/character-design-process/ (accessed July 1, 2023).