Structuring Interactive Stories: A Framework for Considering Storytelling in Art and Design

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The European Conference on Education 2023
Official Conference Proceedings

Abstract
Since identifying the challenges of enhancing students' creativity as the main research question, I aim to apply trans-disciplinary thinking by bringing some insights from physics into art and design practices. In the practices of art and design, the creativity is the most vital ingredient as its appearance is unpredictable just like quantum leaps (Koyama and Niwase, 2017, p.3). Referring to the String Theory, the eleven dimensions of space-time might show similar patterns with information exchanges of interactions. The physicist "sets out to break nature down into its component parts while the artist synthesizes different features of reality" (Shlain,1991, p.16). This deconstruction-reconstruction process is the core of structuring interactive stories, which might inform innovations for the art and design. In order to find opportunities that might encourage creativity in art education, I am looking for a way to analyze or untangle interactions and build up a framework for considering storytelling in art and design. Therefore, I compare the "quantum entanglement" to the "information loop of interaction" as analogy between the physics and phenomena of art. By identify the eleven dimensions of interaction, a theoretical framework called Interaction Hyperspace is proposed, which might create interactive stories and providing possibilities on innovated solutions. To testify the theory of the framework regarding Storytelling as Interaction, an interactive application is developed for art students and practitioners as a creative practical tool. The research is also engaged with professional practices, including academic teachings and interactive narrative design as case studies.

Keywords: Interaction, Creativity, Quantum Theory, Storytelling, Art Education

Introduction

In university teaching and creative industry, many students and practitioners usually face the same challenge of producing creativity. It is not a new topic, which many educators and artists have invented their own methods. The problems are still identified among my students of art and design, who frequently find themselves straying from the optimal path aligned with their personal inclinations. To attempt to offer a solution to the problems, I am developing a teaching tool and also a way of thinking by constructing storytelling to seek more possibilities for art and design. The idea started from my interests in discovering interactive design. In exploring the reality of interactivity, I found myself fascinated in *what is interaction in art and design*?

Beginning with these questions, my initial research target of interactive design has evolved into a sort of meta-design, which takes into account all inter-relationships within art and design and offers a potential solution for designers. In the exploration of enhancing creativity, the framework is based on structuring narrative structures, so that it might benefit the core of design and psychological and philosophical perspectives behind all art and design.

The pronouncement made by Koyama and Niwase (2017, p.3) that "the sudden emergence of an idea is akin to a quantum leap" has significantly illuminated my perspective by associating creative ideation with principles from quantum theory. Within this research endeavor, I strive to apply a multidisciplinary approach, drawing parallels between physics and aesthetics. Engrossed in the application of interactive art and design, my curiosity extends to the establishment and perpetuation of intricate connections. In the preliminary stages of research, certain concepts from quantum mechanics have been interwoven into the fabric of interaction design. Moreover, the narrative-driven framework named *Interaction Hyperspace* is harnessed as a creative methodology to engender narratives and groundbreaking concepts. In this article, I will expound upon the contextual backdrop of my research, the theoretical underpinning, and a case study centered around the pedagogy of Animation Performance.

Background and Research Questions

“Classical physics describes a world that is clear and determinate. Quantum physics describes a world that is cloudy and fitful” claimed by John Polkinghorne (2002, p.26). By analogy, the different interpretations of narrativity from the diverse perspectives of their readers could be seen as the possibilities within the multiverse from the term of physics.

Boje (2014, p. 201) also introduced the concept of Quantum Storytelling, delineating a tripartite model for the storytelling process: Empiric Stories, Epistemic Narratives, and Ontological Living Stories, interconnected through the antenarrative progression. He delved into the conversion of subjective experiences into narrative-based comprehension, concurrently highlighting his 11D's ontological approach.

According to Tang Li (2013, p. 11), the transdisciplinary quantum narrative infuses renewed dynamism into post-classical narratology and offers a novel approach and cognitive framework for crafting and elucidating literature. Analogous to the moment of revelation in Schrödinger's Cat thought experiment, the instant when a story's conclusion becomes discernible resembles the act of opening the metaphorical box. This isn't the juncture at which the fabric of the universe ruptures, but rather the instance when the observer attains consciousness of the universe within which the narrative unfolds.

Drawing upon certain facets of quantum theories, the concept of *Interaction as Storytelling*, as per my operational definition, exhibits parallels with patterns observed in information exchange. Consequently, I draw a comparison between quantum entanglement and the information loop inherent in interactions, such as phone conversations, online chats, or even moments of eye contact. To illustrate further, consider the photon – an elementary particle that serves as a quantum of the electromagnetic field. Analogously, it resembles the information theory concept of a "BIT," constituting the smallest narrative unit.

Within the realms of art and design practice, interactions frequently manifest as unpredictable entities, akin to the unpredictability inherent in quantum leaps. Notably, recent research suggests the detection of signals prior to quantum leaps, analogous to preludes preceding specific interactions. For instance, the ring preceding the answer to a phone call. Following this analogy, interventions designed to reverse quantum leaps might be likened to the act of severing an interaction or terminating a call abruptly.

The purpose of this practice-based research aims to build up a creative framework of storytelling to benefit the practices of art and design. Notably, this framework is based on "Interaction as Storytelling" combining some aspects of quantum theories. By outlining an eleven dimensional framework of *Interaction Hyperspace*, it might stimulate the creative process in producing innovations and analyzing the storytelling within artworks.

There are the Research questions:

1. What is interaction from the perspective of quantum theory?
2. How do the quantum theories relate to storytelling which builds the foundation of art and design?
3. How does the storytelling framework Interaction Hyperspace work for enhancing students' creativity?

The Theoretical Framework

I am putting forth a conceptual framework for storytelling, one that encompasses eleven dimensions. This numerical choice is grounded in the realm of space-time dimensions, where the maximum consistent formulation of a supersymmetric theory can be achieved – a notion initially recognized by Nahm (1999, p.7). In alignment with this theory, the framework delineates eleven dimensions of interaction and introduces the preliminary working title *Interaction Hyperspace* (depicted in Figure 1).

These eleven dimensions, referred to as 11Ds, encapsulate various facets of the interaction phenomenon. They comprise Location, Action, State, Time, Interaction, Entangled Results, Time of Interaction, Possibilities, Intensity, Result towards the external, and Memory. It's noteworthy that within this construct, consideration is also given to a zero dimension, signifying the identification of a principal entity responsible for instigating the interaction.

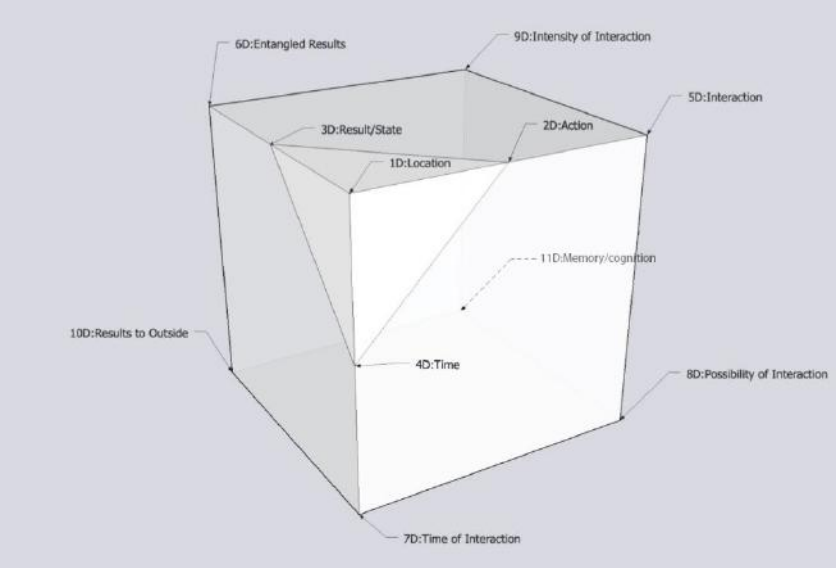

Figure 1: The Model of Interaction Hyperspace

As shown in this model, a tetrahedron is included in this model, which carries the most vital elements, the first four dimensions (4Ds). By changing the first 4Ds, the model would be altered into different stories. It is set to be encouraging possibilities and risks than seeking the one and only answer.

As we know, "the Five W's" of Communication helps create information in the context of meeting an audience's needs (Hart,1996,p.139). There are Who, What, When, Where, and Why, which are often used to direct storytelling as the basic structure. Compared with this classic strategy of structuring stories, my proposed 11Ds model emphasizes the relationships and impacts between objects instead of the main characters. The model could be deconstructed every single binary relationship including people with people, people with things, things with things, people with environments or even people with their own minds.

Based on my present comprehension and delineation of interaction, I am inclined to broaden the scope of its definition, encompassing a wider array of species and types. In doing so, my objective is to liberate the constraints on imaginative storytelling within design and foster a climate wherein individuals are emboldened to question conventions and their own boundaries. This research endeavor will find its foundation in tangible applications, spanning university instruction, industrial design, and even cross-disciplinary exchanges.

Given that the methodology is geared towards creative stimulation, it has the potential to furnish individuals from non-traditional creative domains with an entirely fresh perspective on innovative thinking that ventures beyond conventional norms.

Deconstruction and Construction

As aptly proclaimed by Jim Jarmusch (2013), "Originality is an illusion. Draw inspiration from wherever resonates with your creativity or ignites your imagination." Similarly, Jean-Luc Godard's counsel rings true: "The source matters less than the destination." This sentiment, I believe, aligns seamlessly with the principles inherent in both deconstruction and construction methods. In my working framework, the pursuit remains firmly tethered to the foundational principles of creative amalgamation. The process of dismantling and rebuilding

is grounded in the lens of interactions, with a central focus on the intricate interplay of relationships and outcomes.

By delineating the 11 dimensions (11Ds) of interaction, the aim is to empower individuals to scrutinize specific interconnections. This endeavor, to a certain extent, seeks to deconstruct narratives, products, or events, laying bare latent issues that might pave the way for innovative solutions.

The initial quartet of dimensions (tetrahedron) – Location, Action, State, and Time – serves as the foundation for birthing a fresh design narrative or reconstructing the original framework, infusing novel perspectives into the pre-existing ones. By modifying one or more parameters, subsequent interaction dimensions reshape into a reconfigured 11Ds framework.

This iterative process of deconstruction and construction can evolve through multiple iterations until the storytelling architecture emerges as both innovative and gratifying for designers and artists. Functioning as a tool for imaginative minds, the entities within the interaction can be swapped within diverse contexts. For instance, envision the design of a table as an interaction between the table itself and various stakeholders – consumers, producers, or sellers – along with the encompassing environment and the materials comprising the table. Diverse scenarios give rise to a myriad of interactions, ultimately yielding distinct design outcomes.

The Case Study: Animation Performance

Course: Animation Performance

Teaching aims:

Through creative thinking and physical expression to perform as references for animation works.

Steps:

1. Observe everything from your life though every senses of yours.
2. In the process of synesthesia, to try to feel as a human being, an animal, a plant, a imaginary being or the non-living.
3. Rest, relax and release the nature of yourself to feel free to express yourself.
4. Think critically and perform in the sense of a character.
5. Fulfill your character with a whole background story even you are only acting his walking.
6. Document your or others' performance.
7. Sketch out by each frame as later reference for animation.

Teaching content:

1. Basic actions (extending narratives)
2. Animal imitation performance
3. Non-living Personification
4. Fine motor movement
5. Facial movement
6. One-line imagination performance
7. Storyboard relay
8. Classic movie clips acting

9. Virtuality and reality combination performance (final assignment)

Teaching methods:

In the teaching, I tried to influence the students' creation by osmosis with the Framework

Interaction Hyperspace

Class training: Perform, Associate and sketch

Based on a given action, every student act out by their completed identities, background stories and right causes.In this part, I offered 4 basic actions as a start. There were "opening a book","standing up", "rising hands" and "crying". To stimulate creative thinking, the students were divided into 4 groups and random orders. Firstly, they were asked to simply act out these actions at the starting of the class. After a lecture about the rational the developments of animation performance, they were again asked to do the same action as earlier. However, I offered some suggestions to complete the original action.They are encouraged to give an identity to the action conductor, a location where this action happened, a state to describe how the action performed and the cause and result of it. There are 5 students in each group, the first batch of students were asked to act out the action only with a identity created by their own wish. The second batch of students were allowed to add location information with the exist identities. In the same manner, the next students were required to perform the action following the previous settings along with a new element. Thirdly, the differences between the stage performance and the animation performance are the vital part to be explained in this course. Realizing this, this round's task is to add more dramatic effects and fun to the action. Lastly, adding an unexpected result to complete a story and help to create an unforgettable experience (profound meanings).

Figure 2: My teaching note

Each round of acts were performed after certain lectures and examples in order to enrich the levels of performance and enhance the students' understandings of their characters.

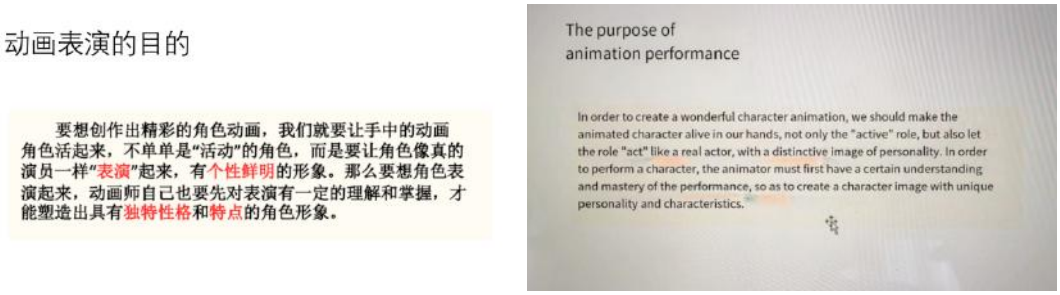

Figure 3: PPT Slides of Animation Performance (Chinese and English Translation)

The physical performances are an immersive and deep footage for later virtual character design and storytelling. By blending in the animated scenario, animation designers might have more empathy and understanding to their characters as they are real friends living together in the real world. Working for a better narrative and creative story, I tried to apply *Interaction Hyperspace* as a teaching guide to lead students. Compared with the framework and my teaching guidance, there is a table to show their relationships. The elements on green are those I specifically indicated in the class while the 4D time, 5D-interaction and 7D time of interaction were left out. But I have not worries because they are inevitable for an event.

	The Framework	Guidance on the teaching
0D	Object(People)	Identity
1D	Location	Location
2D	Action	Action
3D	Result(State)	State
4D	Time	Not specific
5D	Interaction	Necessary
6D	Entangled Result(to selfs)	Result
7D	Time of Interaction	Not specific
8D	Possibilities of Interaction	Cause
9D	Intensity of Interaction	Dramatic effects/Fun
10D	Result to the outside	Result/Unexpected Ending
11D	Memory/Cognition	Dramatic Process/Unexpected Ending

Table 1: The framework explained

To examine the story followed this framework well, there are some of the stories (sketches) created by the students in the class.

1. The Crying Story

	The Framework	The Crying story
0D	Object(People)	An old beggar
1D	Location	In the street/ hospital
2D	Action	Crying
3D	Result(State)	Paralysis sitting
4D	Time	Daytime
5D	Interaction	Interact with a bully and a doctor

6D	Entangled Result(to selfs)	Got hurt and hungry
7D	Time of Interaction	A period of time
8D	Possibilities of Interaction	Likely (the old beggar got bullied in the street and went to the hospital)
9D	Intensity of Interaction	Ordinary
10D	Result to the outside	The old beggar ends up in the street and happy only for a bit food
11D	Memory/Cognition	Not very dramatic but thought-provoking

Table 2: The Crying Story

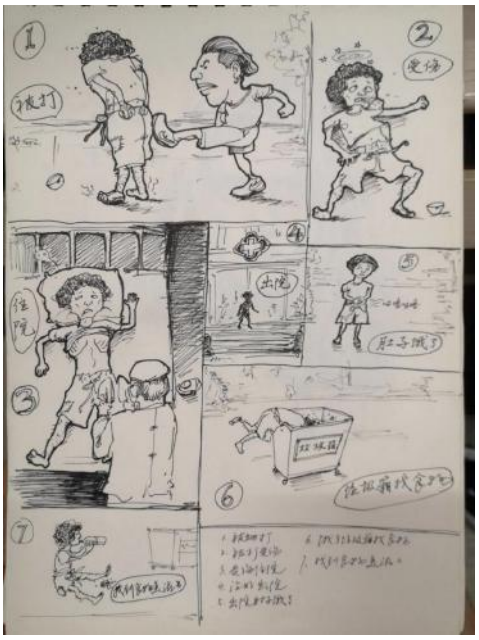

Figure 4: Sketch By L

Figure 5: Sketch By Y

2. The Standing-Up Story

	The Framework	The Standing-up story
0D	Object(People)	A female star
1D	Location	In the award ceremony
2D	Action	Standing up
3D	Result(State)	Surprisingly happy
4D	Time	During the ceremony
5D	Interaction	Interact with another female star whose name are the same
6D	Entangled Result(to selfs)	Embarrassed
7D	Time of Interaction	A period of time
8D	Possibilities of Interaction	Less Likely (the female's name is the same as the actual winner's)
9D	Intensity of Interaction	Strong
10D	Result to the outside	Other witness this farce
11D	Memory/Cognition	Dramatic and unexpected

Table 3: The Standing-up story

Figure 6: Sketch By W

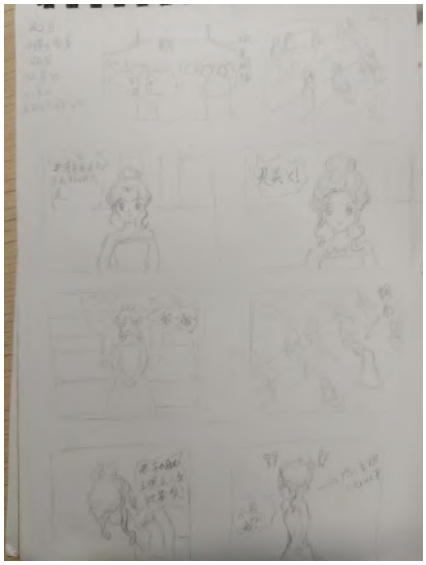

Figure 7: Sketch By Z

Figure 8: Sketch By O

3. The Rising-Hands Story

	The Framework	The Rising-hands story
0D	Object(People)	A secondary school student
1D	Location	In the classroom
2D	Action	Rising hands
3D	Result(State)	Actively
4D	Time	On the class
5D	Interaction	Interact with teacher and other students
6D	Entangled Result(to selfs)	A bit disappointing
7D	Time of Interaction	A period of time
8D	Possibilities of Interaction	Very Likely (it is a little daily story)
9D	Intensity of Interaction	not Strong
10D	Result to the outside	Might be encouraging to others
11D	Memory/Cognition	A ordinary one

Table 4: The Rising-hands story

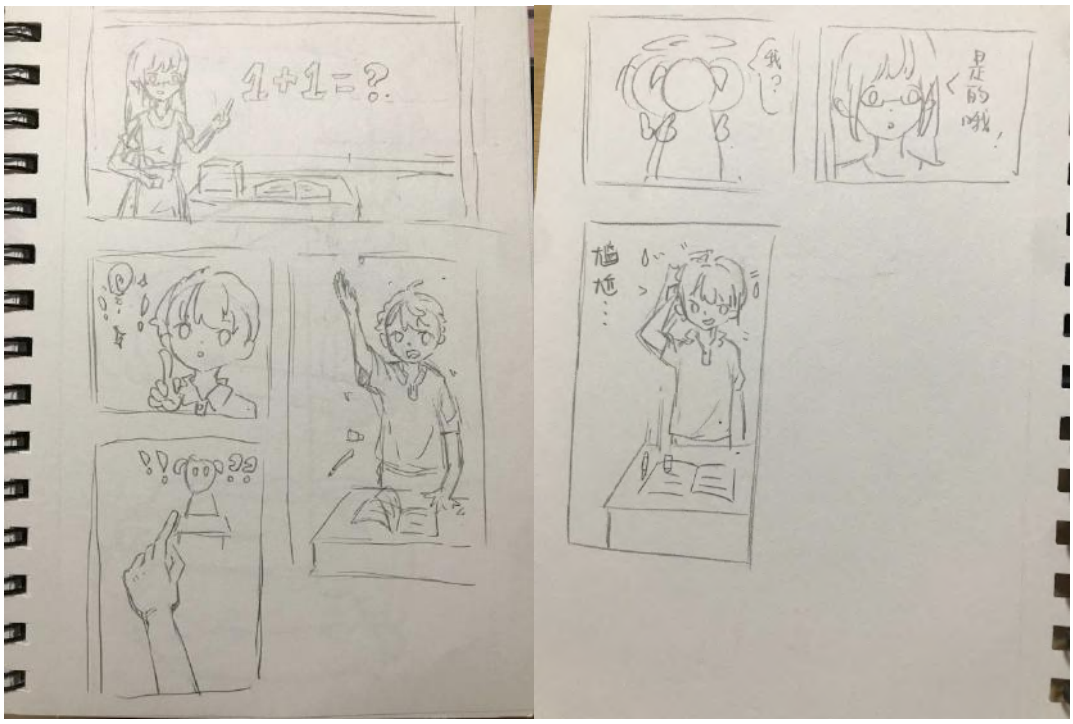

Figure 9: Sketch By X

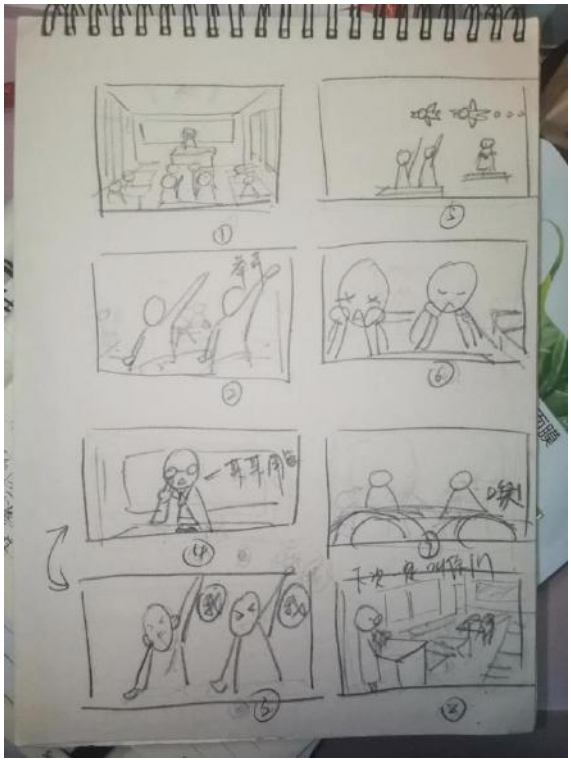
Figure 10: Sketch By La

4. The Opening-Book Story

	The Framework	The Opening-book story
0D	Object(People)	A teacher
1D	Location	In the office
2D	Action	Opening book(student's homework)
3D	Result(State)	Angry
4D	Time	Off work
5D	Interaction	Interact with students' homework
6D	Entangled Result(to selfs)	Angry and disappointing
7D	Time of Interaction	A period of time
8D	Possibilities of Interaction	Very Likely (it is a little daily story)
9D	Intensity of Interaction	Not strong
10D	Result to the outside	Got pissed off
11D	Memory/Cognition	A bit personal experience

Table 5: The Opening-book Story

Figure 11 Sketch By Li

Discussion

Finishing the teaching section, I administered an anonymous questionnaire survey to gather feedback from the students regarding their learning experience. The questionnaire consisted of four open-ended yet non-mandatory questions, strategically designed to encourage the students to share their subjective viewpoints. This process not only facilitated a condensed and introspective assessment but also laid the groundwork for future qualitative research through case studies.

It's important to acknowledge that while the questionnaire was administered voluntarily by the students, this approach presents both advantages and drawbacks. On one hand, students were unburdened by any obligation, which potentially fostered more candid responses and ethical positivity toward the questions. On the other hand, the quantity of feedback collected

was significantly fewer than the total number of attendees (12 out of 70), and certain responses were overly simplistic, lacking in detailed data.

Considering that this phase marked the initial stage of my case study research, I garnered valuable insights to refine my question formulation skills and enhance the efficacy of data collection from interviewees. Despite these challenges, a treasure trove of meaningful responses surfaced, underscoring the effectiveness of my teaching approach and its successful alignment with the intended educational objectives.

Conclusion

The framework *Interaction Hyperspace*, which serves as a structural guide for crafting narratives, is currently in its early developmental phase. The intention is for this framework to evolve into a novel methodology geared towards aiding individuals within the creative industry to scrutinize their artistic and design endeavors, while aligning these assessments with sociological and psychological perspectives.

In its current iteration, this framework has been incorporated into teaching practices centered around script writing and animation planning. The utility of this framework has become evident, particularly in its ability to stimulate students to generate a greater number of design concepts and in its provision of diverse avenues for fostering design thinking.

As the research advances, my subsequent focus will likely pivot towards investigating student responses across varied backgrounds and discerning the efficacy of the framework within multicultural classroom settings. This progression represents the next phase in my research journey.

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