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Developing Visual Design Creativity through Online Collaborative Learning: Insights from Activity Theory

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ABSTRACT
This study investigates the development of social creativity in visual design education through online collaborative learning, using Activity Theory as a framework. The research explores how digital tools, social interactions, and educational structures influence creative processes in an online setting. The study involved a qualitative analysis of collaborative activities among visual design students in a virtual learning environment. Findings indicate that the nature of online tools, the dynamics of the online community, and the distribution of creative tasks play crucial roles in fostering social creativity. The research highlights the importance of well-structured online platforms that promote effective communication, peer feedback, and collaborative problem-solving. It also underscores the need for educational frameworks that integrate these elements into the curriculum. The study contributes to the understanding of how digital environments can enhance creativity in visual design education and offers insights for educators to optimize online collaborative learning. It opens avenues for further research into the use of emerging technologies in creative disciplines and the development of more effective digital education strategies.

Keywords: social creativity; online collaborative learning; Activity Theory; visual design

INTRODUCTION

Visual design education in higher institutions teaches students skills in visual communication, graphic design, and digital media (Arslan & Dazkir, 2017; Ponijan et al., 2019). This education emphasizes creativity, technical proficiency, and interdisciplinary collaboration, preparing students for careers in design and related fields. Therefore, in light of 21st-century learning design principles that emphasize creativity, creative thinking, and collaboration, it is essential to ensure that visual design education empowers these characteristics (Rosar & Weidlich, 2022).

Enhancing social creativity in visual design education through online collaborative learning requires thoughtful instructional design that integrates collaborative techniques and acknowledges cultural diversity (Smucker & Nuss, 2022). Raymundo (2020) highlights the significance of utilizing online creative collaborative group projects as a practical and effective method for nurturing creativity, particularly within the context of fully online distance education institutions. This approach not only facilitates engagement and interaction among students but also promotes a deeper understanding of how collaborative learning activities can contribute to the development of creative skills (Aguilar & Turmo, 2019; Raymundo, 2020). By exploring the dynamics of instructional design within online settings, educators can leverage these insights to optimize collaborative learning experiences that foster social creativity and address the diverse needs of students (Liu, 2021).

Despite the growing recognition of the importance of creativity and technology skills in education, there remains a pressing need to understand how these skills can be effectively developed and integrated, particularly into visual design education through online collaborative learning (Aguilar & Turmo, 2019). While curricular reforms emphasize the integration of collaborative creativity skills, there is a gap in understanding how to leverage digital tools, social interactions, and educational structures to foster social creativity particularly in online learning

environments (Liu, 2021). Furthermore, the lack of clarity on the specific objectives and methods for enhancing creativity and technology skills through online collaborative learning presents a challenge for educators seeking to optimize visual design education in digital contexts (Ponijan et al., 2019).

This highlights the capacity of collaborative group projects to enhance social creativity in online learning environments. Furthermore, the importance of computer-supported collaborative learning (CSCL) as a developing field within the learning sciences, providing insights into the technological foundations of collaborative learning (Stahl et al., 2006). The exploration of cultural diversity online provides insights into how a culturally diverse cohort of students engages with organizational, technological, and pedagogical aspects of online learning, emphasizing the importance of understanding cultural nuances in fostering social creativity (Hannon & D'Netto, 2007). Robinson et al. (2017) conducted a study on the fundamental components necessary for creating meaningful online collaborative learning. Their research provides valuable recommendations and insights into the development and design of effective strategies for collaborative learning.

Purbasari and Carollina's research on stimulating student creativity through learning materials is highly pertinent in the field of visual design education. Their study specifically explores the domain of visual communication design education and the methods employed to foster student creativity (Purbasari & Carollina, 2023). The study on the Assessment Scale for Creative Collaboration (ASCC) highlights the significance of social creativity, or "creative collaboration," in generating more substantial outcomes compared to individualistic contributions. It emphasizes the value of collaborative creativity in online settings (Mavri et al., 2020).

This study aims to address these gaps by examining how Activity Theory can inform the development of visual design creativity within online collaborative learning environments, thereby contributing to the design of effective educational frameworks and practices that promote inclusive and equitable access to creative learning experiences. Specifically, the research objectives are as follows:

1. To investigate how digital tools influence the development of social creativity among visual design students engaged in online collaborative learning.
2. To explore the role of activity theory social within online learning environments in fostering social creativity processes in visual design education.

In conclusion, the introduction of a study on developing social creativity in visual design through online collaborative learning should encompass the technological, cultural, and instructional dimensions of collaborative learning. Researchers and educators can develop a comprehensive understanding of fostering social creativity in online visual design education by incorporating a range of different perspectives.

LITERATURE REVIEW

Unveiling The Collaborative Canvas: Navigating The Intersection of Social Creativity and Online Collaborative Learning in Visual Design Education

In twenty-first century education, creativity is recognized as a vital skill essential for preparing students to thrive in an unpredictable future (Rosar & Weidlich, 2022). This emphasis on creativity extends beyond individual innovation to encompass collaborative work, often referred to as "social creativity". Social creativity highlights the importance of not only generating novel ideas but also effectively working with others to turn these ideas into meaningful outcomes. In other perspective, Daskolia et al. (2016) stated that social creativity is a framework that helps us understand and support creativity within groups working in certain technology environments. This collaborative approach to creativity is integrated into higher education curriculum design, reflecting a broader shift towards equipping students with the ability to navigate complex challenges through innovative teamwork and collective problem-solving (Mahmud & Wong, 2022).

The advent of online collaborative learning has revolutionised educational paradigms, presenting novel prospects for nurturing creativity and enhancing skill acquisition. Muuro et al. (2014) have identified the difficulties that exist in an online collaborative learning environment. They highlight the importance of enhancing the quality of education to facilitate successful online collaborative learning in higher education institutions.

This emphasizes the importance of addressing challenges to enhance the efficacy of online collaborative learning. Vuopala et al. (2015) emphasised the importance of productive interaction in achieving successful collaborative learning. They emphasised the importance of incorporating instruction on proficient collaboration skills throughout the educational curriculum. This emphasises the importance of understanding interaction forms to facilitate successful collaborative learning. The study by Robinson et al. (2017) highlighted the fundamental components involved in creating effective online collaborative learning experiences. Specifically, it examined the tools employed to facilitate collaborative learning and the instructors' capacity to address the individual requirements of students. It is crucial to take into account both technological and pedagogical factors when creating successful online collaborative learning experiences.

A scoping review conducted by Luk et al. (2020) emphasises the necessity of scrutinising the quantity and characteristics of scholarly articles pertaining to collaborative online learning in undergraduate medical education. This emphasises the importance of understanding the existing literature to inform collaborative learning practices. The study investigated the utilisation of dark matter formation data in a hybrid immersive virtual environment for visual design purposes. It emphasised the application of scientific workflow theory and visualisation paradigms in addressing design problems (Hanula et al., 2019). This highlights the importance of visualisation theory in tackling intricate design problems.

Moreover, a case study on undergraduate students' perspectives of online collaborative learning in a project-based learning environment emphasises the cultural impacts on learning and

the adoption of collaborative learning methods in different cultural settings (Zhang et al., 2009). This highlights the importance of cultural considerations in implementing online collaborative learning. Liqin's investigation of emotional interaction and learners' knowledge construction in online collaboration mode emphasised the opportunities for practical training and knowledge building in online collaborative learning environments (Liqin, 2022). This underscores the significance of emotional dynamics in facilitating effective collaborative learning.

Additionally, Tsai's (2018) study on figural creativity and personality among fashion design undergraduates highlighted the challenges in developing a comprehensive list of personality variables across various domains of creative endeavours. This emphasises the complexity of understanding creativity and personality in the context of visual design education. To sum up, the research on online collaborative learning and visual design shows how important it is to deal with problems, understand different types of interaction, look at existing literature, use visualisation theory, think about cultural impacts, and know how emotions and personality traits affect collaboration and creativity in visual design classes.

Integrating Activity Theory in Visual Design Education

Activity Theory, when applied to visual design education, provides a thorough framework for comprehending the dynamics of collaborative learning and the enhancement of skills. Through an analysis of the elements of Activity Theory, such as the object, tools, community, rules, and division of labour, educators and researchers can acquire a valuable understanding of the complex nature of collaborative learning experiences. Activity Theory provides an explanation for the components in the following manner:

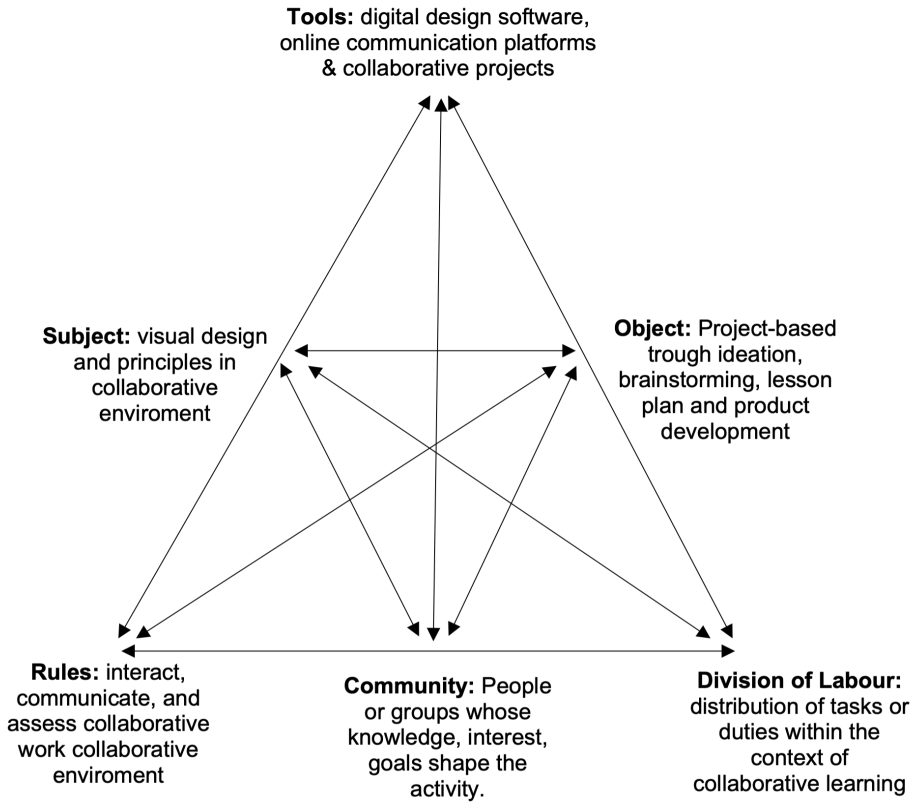

Figure 1: Integrating Activity Theory in Visual Design Education

1) **Subject:** The term "subject" is operationalized differently across various disciplines, reflecting the need for specific and tailored definitions to address the unique characteristics and requirements of each field.

2) **Object:** In the realm of enhancing visual design skills, the object pertains to the specific aim or issue tackled within the setting of collaborative learning. This entails determining the precise goals of the collaborative learning activity, such as enhancing visual design abilities, nurturing creativity, and facilitating efficient cooperation among students. The object also includes the issue or difficulty that the collaborative learning activity seeks to tackle, such as improving students' capacity to utilise visual design principles and techniques in a collaborative environment.

3) **Tools:** Tools encompass the techniques, technologies, and languages employed within a collaborative learning setting to facilitate the attainment of the intended result. This includes digital design software, online communication platforms, collaborative project management tools, and various instructional methods used to promote collaborative learning. The selection and utilisation of these tools play a crucial role in shaping the collaborative learning experience and influencing the development of visual design skills among students.

4) **Community:** Denotes the larger group or setting where the collaborative learning activity takes place. This encompasses a diverse array of individuals engaged in the practice of cooperative learning, including students, educators, industry specialists, and potentially even broader communities of professionals within the realm of visual design. The existence of a community has a substantial influence on individuals' social interactions, knowledge sharing, and collaboration, all of which enhance the development of visual design abilities in an educational setting.

5) **Rules:** The rules aspect of Activity Theory refers to the norms or guidelines that govern the collaborative learning activity. These encompass established procedures, instructional principles, evaluation standards, and ethical factors that influence the behaviour and results of collaborative learning in visual design education. The rules establish a structure for how people interact, communicate, and assess collaborative work, thus impacting the growth of visual design abilities and creativity in the educational setting.

6) **Division of Labour:** The division of labour aspect of Activity Theory pertains to the distribution of tasks or duties within the context of collaborative learning. This refers to the allocation of tasks, responsibilities, and knowledge among participants, which may include students, educators, and possibly external stakeholders. The allocation of tasks affects the organisation of work, the utilisation of individual abilities, and the combined effort towards accomplishing the goal of the collaborative learning task.

By integrating Activity Theory, educators and researchers can gain a comprehensive understanding of the multifaceted dynamics of visual design skill development and collaborative learning.

RESEARCH METHODOLOGY

To investigate how social creativity contributes to the development of visual design skills among education students through online collaborative learning, a qualitative research design was employed. Thematic analysis identified and interpreted patterns and themes within the dataset, facilitating a thorough investigation of the research objectives.

The research participants consisted of 49 education students enrolled in visual design courses within an online collaborative learning environment. The participants were purposefully selected to ensure diversity in experiences and perspectives related to online collaborative learning in visual design education. Criteria for participant selection included:

1. enrolled in visual design courses that incorporated online collaborative learning components.
2. had experience with online group discussions or collaborative projects in the context of visual design education.

Participants were drawn from undergraduate students enrolled in visual design courses within the Faculty of Education at a public university in Bandar Puncak Alam, Selangor. The sampling focused on this specific group to gather a comprehensive understanding of online

collaborative learning experiences in visual design education within a particular academic setting. The selection of participants from a single institution ensured a cohesive sample with shared academic contexts and course structures. This approach facilitated a focused exploration of how social creativity influences the development of visual design skills in an online learning environment tailored to undergraduate students.

Data was collected through online group discussions. Focus group discussions facilitated the exploration of shared experiences and interactions within the online collaborative learning environment. The data collection process was guided by open-ended inquiries formulated to elicit comprehensive and elaborate responses from the participants.

Thematic analysis was employed to analyze the qualitative data collected from the interviews and focus group discussions. The analysis involved the identification of patterns, themes, and categories within the dataset. Initial coding of the data was conducted to identify recurring patterns, which were then organized into overarching themes. The themes underwent a systematic review and refinement process to ensure a thorough examination of social creativity and the development of visual design skills in the context of online collaborative learning.

RESULTS AND DISCUSSION

The findings of this research present a comprehensive understanding of the dynamics involved in developing social creativity in visual design through online collaborative learning using activity theory as a contextual framework. The analysis reveals significant insights into the subjects, objects, tools and signs, community, rules, and division of labor within the online collaborative learning environment using the Padlet application.

Subject (Individual or Group Engaged)

The subjects, in this context, represent a community of educators collaborating to enhance teaching methodologies and strategies. All posts involve individual teachers presenting their lesson plans, and peers providing feedback. Participants share opinions on various aspects, including lesson structure, activities, assessment methods, and technology integration. In addition, the community is engaged in a collaborative effort where individuals contribute their expertise and insights. The engagement involves individual teachers presenting their lesson plans and peers actively participating in providing constructive feedback. Table 1 summarizes the finding for the subject indicator.

Table 1
Sub-Theme 1: The Subject Indicator and Online Collaborative Learning using Padlet Application

Activity Theory Indicator	Analysis	Selected Quotations
Subject (Individual or Group Engaged)	Individual teachers present lesson plans, and peers appreciate the detailed steps, fostering a supportive environment for sharing teaching strategies.	*"I think it's great how you've detailed each step for your students, making it easier for them to follow."* (Post 11)
	Feedback underscores the focus on individual lesson plans, with clarity and ease of understanding highlighted, emphasizing effective communication in teaching.	*"Your explanation is clear, and the flow of activities makes it easy for students to understand."* (Post 12)
	Emphasis on individual teachers presenting lesson plans, with peers valuing detailed instructions, emphasizing the importance of comprehensive guidelines in effective teaching.	*"I like the detailed instructions you provided, making it easy for students to grasp the concepts."* (Post 20)

Object (Goal or Problem Directed)

The primary objective is to evaluate and enhance lesson plans for effective teaching and student engagement. Participants offer constructive feedback, focusing on improving clarity, detailing instructions, incorporating technology, and optimizing assessment methods. The shared goal is directed towards continuous improvement in teaching strategies. Table 2 indicates the findings summary for the object indicator.

Table 2
Sub-theme 2: The Object Indicator and Online Collaborative Learning using Padlet Application

Activity Theory Indicator	Analysis	Selected Quotations
Object (Goal or Problem Directed)	Evaluation and improvement of lesson plans are the primary goals, with feedback focusing on clear objectives and well-rounded activities, emphasizing the importance of defined teaching goals.	*"You've set clear objectives and activities, creating a well-rounded lesson plan."* (Post 14)

Feedback directs attention to enhancing lesson plans, suggesting exploration of additional technology for variety, emphasizing the integration of diverse teaching tools.	*"Your use of technology is commendable; maybe you could explore more apps for variety."* (Post 16)
Objective centers on improving lesson plans, with specific feedback on peer interaction and group dynamics, highlighting the importance of refining collaborative activities.	*"I like how you use peer interaction for feedback; maybe consider specifying 'pair' rather than a group."* (Post 33)

Tools and Signs (Including Language)

Positive language is consistently used to appreciate well-structured lesson plans, creative activities, and effective use of technology. These tools serve as instruments for effective communication, collaboration, and improvement within the community of teachers. Positive language is coupled with the utilization of various tools, such as digital platforms (Google Slides, Padlet), quiz and game applications (Quizizz, Kahoot), and multimedia resources (YouTube). The tools commonly mentioned are in Table 3. The diverse set of tools enhances the feedback process, contributing to a comprehensive improvement in teaching methodologies.

Table 3
The Tools Selection

Tools	**Post ID in Padlet**
Google Slides	11
Padlet	14, 33, 35
Quiz games	15, 34
Quizizz	14, 35
Kahoot	21, 26, 30, 38
Hybrid apps	26
YouTube	26
Interactive notes	30

Furthermore, Participants suggest improvements through detailed comments, providing specific recommendations on incorporating technology, elaborating on materials, and refining assessment methods. Moreover, language was emphasized as a tool for encouraging collaboration and improvement. Table 4 summarizes the finding for the tools and signs indicator.

Table 4
Sub-theme 3: The Tools and Signs Indicator and Online Collaborative Learning using Padlet Application

Activity Theory Indicator	Analysis	Selected Quotations
Tools and Signs (Including Language)	Positive language appreciates engaging lesson plan language, emphasizing the role of language in maintaining student interest, as language serves as a tool for effective communication.	*"Your choice of words in the lesson plan is engaging and easy to follow; it'll keep students interested."* (Post 22)
	Acknowledgment of effective tools, like visuals, contributing to clarity in lesson plans, emphasizing the role of visuals in enhancing instructional clarity.	*"Great use of visuals in your lesson plan; it adds a lot of clarity."* (Post 26)
	Positive language commends the effective use of tools like Google Slides, emphasizing the role of technology in improving lesson comprehension.	*"Using Google Slides is an effective method for making the explanation more understandable."* (Post 34)

Community (Larger Group or Social Context)

A collaborative and supportive community is evident, with participants actively engaging in providing feedback to their peers. The social context emphasizes the importance of constructive criticism for professional development and improved teaching strategies. The community serves as a platform for shared learning and growth. Table 5 shows the summary of findings for the community indicator.

Table 5
Sub-theme 4: The Community Indicator and Online Collaborative Learning using Padlet Application

Activity Theory Indicator	Analysis	Selected Quotations
Community (Larger Group or Social Context)	Feedback indicates a sense of community, where sharing benefits the larger teaching community, emphasizing the communal aspect of knowledge sharing.	*"Thank you for sharing your lesson plan; it's insightful and can benefit the entire teaching community."* (Post 18)

	Recognition of a supportive community actively engaging in feedback for professional development, highlighting the role of community support in improving teaching strategies.	*"It's great to see the supportive community here, providing feedback to enhance teaching strategies."* (Post 29)
	The community is highlighted as collaborative and supportive in providing constructive feedback, emphasizing the communal effort towards continuous improvement.	*"A collaborative and supportive community is evident, with participants actively engaging in providing feedback."* (Post 37)

Rules (Norms, Conventions, Social Rules)

The feedback aligns with norms of effective teaching, emphasizing clarity in instructions, engagement through activities, effective use of technology, and thoughtful assessment strategies. The established norm includes providing positive feedback along with constructive suggestions. The rules of engagement are focused on enhancing teaching practices. Table 6 illustrates the summary of findings for the rules indicator.

Table 6
Sub-theme 5: The Rules Indicator and Online Collaborative Learning using Padlet Application

Activity Theory Indicator	**Analysis**	**Selected Quotations**
Rules (Norms, Conventions, Social Rules)	Feedback emphasizes adherence to norms of effective teaching, including clear explanations and engaging activities, reinforcing the importance of established teaching practices.	*"You've followed the norms of effective teaching by focusing on clear explanations and engaging activities."* (Post 13)
	Feedback norms involve positive reinforcement alongside constructive suggestions, underlining the importance of a balanced approach in feedback.	*"The established norm includes providing positive feedback along with constructive suggestions."* (Post 28)
	Feedback aligns with established norms, emphasizing clarity in instructions and engagement, highlighting the importance of adhering to established teaching principles.	*"The feedback aligns with norms of effective teaching, emphasizing clarity in instructions and engagement."* (Post 35)

Division of Labor (Roles and Responsibilities)

Roles include teachers (presenting their lesson plans) and peers (providing feedback). The division of labor reflects a collaborative effort to enhance teaching methodologies, with each participant contributing insights and recommendations. The distribution of roles ensures that the responsibility for improvement is shared among all participants. Table 7 summarizes the findings of the division of labor indicator.

Table 7
Sub-theme 6: The Division of Labour Indicator and Online Collaborative Learning using Padlet Application

Activity Theory Indicator	Analysis	Selected Quotations
Division of Labour (Roles and Responsibilities)	There's a clear division of labour, with teachers presenting lesson plans and peers offering feedback, emphasizing a collaborative effort towards enhancing teaching.	*"Roles include teachers presenting their lesson plans and peers providing feedback."* (Post 21)
	The division of labour involves a collaborative effort, with participants contributing insights to enhance teaching, emphasizing shared responsibility for improvement.	*"A collaborative effort to enhance teaching methodologies, with each participant contributing insights."* (Post 31)
	The division of labour involves teachers presenting lesson plans and peers actively participating in the improvement process, reinforcing a collaborative approach to teaching enhancement.	*"Roles include teachers (presenting their lesson plans) and peers (providing feedback)."* (Post 38)

In summary, the online collaborative learning environment using Padlet demonstrates a community-driven approach to continuous improvement in teaching. The findings underscore the importance of clear communication, detailed planning, diverse tool integration, and community support in fostering effective online visual design education. The insights gained from this study contribute to the broader understanding of how activity theory can inform and enrich online collaborative learning experiences in the field of visual design education.

Analysis in Educational Comments

A significant portion of the analysis focused on classifying the comments based on the specified elements of Activity Theory. The main conclusions derived from this analysis were as follows:

1. **Subject:** This category, which represents the involvement of individuals or groups in an activity, was the most significant, with a total of 932 mentions across the datasets. This suggests a significant emphasis on individual viewpoints and the interactions within a group in the commentary.
2. **Tools:** The second most referenced category, with 629 mentions, focusing on discussions regarding methodologies, technologies, and different approaches employed.
3. **Object:** With 83 mentions, this category suggested goal-oriented discussions, albeit less frequent than others.
4. **Community:** With 80 mentions, this category emphasised the importance of social context and group interactions in the discourse.
5. **Division of Labor:** This aspect, focusing on the roles and responsibilities within the activities, appeared in 16 comments, underscoring its significance in the dialogue.

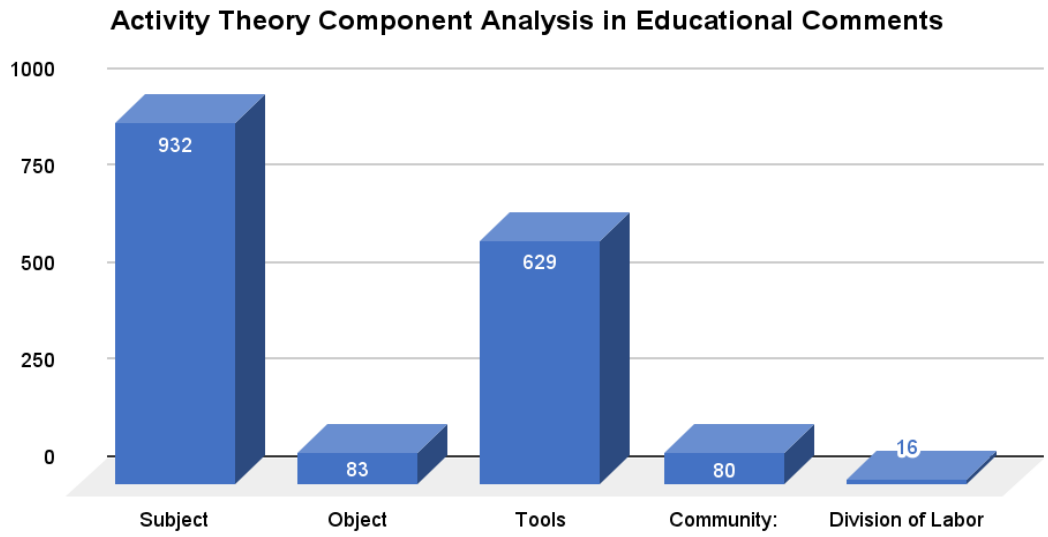

Figure 2: Activity Theory Component Analysis in Educational Comments

The study highlights a distinct emphasis on individual and group perspectives (subject) and the social context (community) within the comments. Conversations regarding tools, methodologies, and the allocation of roles and responsibilities (the division of labour) were also significant. Although less frequent, both objectives and goals (objects) were present and made valuable contributions to the depth of the discussions.

CONCLUSION AND RECOMMENDATIONS

The primary objective of this research was to explore how social creativity in visual design can be developed and enhanced through online collaborative learning environments. By applying Activity Theory as a framework, the study aimed to dissect the dynamics of such environments and understand their impact on creative outcomes. The findings of this research have met these objectives in several key ways.

Firstly, the understanding of collaborative dynamics. The study successfully illuminated the intricate dynamics of online collaborative learning. It was found that factors such as the nature of communication tools, the structure of the online community, and the distribution of tasks significantly influence the creative process. This aligns with the initial objective of understanding how these elements contribute to social creativity in visual design.

Secondly, the role of technology in creative collaboration. One of the research objectives was to examine the role of digital tools in facilitating creativity. The findings revealed that technology is not just a medium for interaction but also a catalyst that can either enhance or hinder creative collaboration. This insight is crucial for the development of more effective online learning environments.

Thirdly, the impact of social interactions. Consistent with the research objectives, the study provided valuable insights into how social interactions within online collaborative settings impact the creative process. Constructive interactions, peer feedback, and collaborative problem-solving were found to be critical in promoting a creative environment.

Lastly, the educational framework and creativity. Another key objective was to analyze the educational framework's role in shaping social creativity. The findings suggest that a well-designed curriculum, which incorporates collaborative projects and emphasizes creative thinking, is vital for nurturing social creativity among visual design students.

Integrating these findings with the research objectives, it is evident that the study significantly contributes to the understanding of social creativity in visual design, particularly in online collaborative learning contexts. The research highlights the multifaceted nature of creativity, highlighting the importance of a supportive technological infrastructure, effective social interaction, and an educational framework that encourages creative exploration.

These results have numerous implications. Firstly, they provide a roadmap for educational institutions and curriculum designers to enhance their online learning platforms, focusing more on interactive and collaborative tools that foster creativity. Secondly, these insights can guide educators in structuring their courses to maximize creative outcomes through collaborative projects and activities.

Finally, the study opens avenues for further research into optimizing online collaborative environments for creative disciplines, contributing to the evolution of digital education. Firstly, researchers might explore how teachers navigate the relationship between these Activity Theory domains, ensuring a balanced and effective teaching approach. Moreover, investigations into the impact of technology on student engagement and learning outcomes would be pertinent, especially given the widespread use of digital tools in the feedback. Lastly, studies focusing on collaborative learning and its role in community building could shed light on effective strategies for group activities and peer interactions.

In conclusion, this study not only meets its research objectives but also lays a foundational understanding of the complex interplay between technology, social interaction, and education in developing social creativity within the realm of visual design. The insights gained

here are pivotal for evolving online educational strategies that can effectively nurture creativity in the digital age.

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Conflict of Interest

The authors declare no conflicts of interest in relation to the research, authorship, or publication of this paper.

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