

# Collaborative Creativity in Design Education: A Case Study of the Design Sketch Course

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## Abstract

Collaborative creativity has been widely adopted in design education, mainly from interdisciplinary, industrial, and online perspectives instead of traditional classrooms. However, there is a lack of research on integrating collaboration into teaching the essential craft and thinking ability in classrooms, such as the design sketch. In this study, the effect and critical factors of collaborative creativity were examined by applying the action research method to a design sketch course in university. Totally 52 students were enrolled and grouped with 3 - 4 members in each team to perform course tasks. The data was collected by class observation records, interviews, and questionnaire surveys. Then, the results show that integrating collaborative creativity into the design course can inspire students to generate more new ideas outside the box. Besides, students were more likely to clarify the motivation and dared to face challenges with confidence due to the assistance of teachers and team members. Finally, a model for collaborative creativity in design courses was proposed for the future development of design education at colleges and universities.

## Keywords

Creative Thinking, Collaborative Learning, Design Sketch

## 1. Introduction

In recent years, the procedure, influences, and approach of creativity have been widely explored in design practice and education. Studies on collaboration have further broadened creativity research (Gillies, 2016; Hocaoglu & Berkan, 2019; Pawson, 2016) and integrated it into courses in different fields (Kabukcu, 2015;

Lee et al., 2020; Noh & Yusuf, 2018; Shneiderman, 2016).

However, most of the collaborative methods in design education involve interdisciplinary, industrial, and online collaboration. In contrast, few studies focus on teaching the essential crafts and thinking ability in classrooms, such as the design sketch course, which does not have the above teaching environment. According to Hennessey and Amabile (1998), the typical classroom is fraught with teaching practices and program features that kill intrinsic motivation and creativity (Hsiao, 2011). Therefore, how to integrate collaborative creativity in the basic design course to improve students' creative skills should be discussed urgently.

In this study, a creative training course was implemented in design education, intending to explore the way of integrating collaborative creativity into the classroom. Our interest in investigating the impact of collaboration on students' creative thinking led us to the following research questions:

- 1) To investigate the effectiveness of integrating collaborative creativity into the design sketch course.
- 2) To apply the action research of the design sketch course to attain the creativity education goals and find the key factors affecting the process.

## 2. Literature Review

### 2.1. Creative Thinking and Design Process

The classic viewpoint of creativity involves problem selection, ideation, evaluation, and implementation, also exploration (idea generation) and exploitation (application of the ideas) (Bledow et al., 2009). Creativity is the ability to develop new ideas and to discover new ways of looking at problems and opportunities (Kabukcu, 2015) and it is also the essential ability of a designer. Motivation plays a crucial role in the creative process. In other words, people working in the intrinsically motivated state become more deeply engaged in an activity and are more likely to explore divergent cognitive pathways, take risks, and search for more novel and useful ideas (Amabile, 1985, 1993). Hennessey and Amabile (1998) divided the motivation into two types, namely extrinsic and intrinsic ones. To promote creative thinking, educators need to identify the motivation of their students and then structure the teaching around it.

Creative skills can be developed and internal abilities can be stimulated and cultivated through instructional activities. Creativity is a complex concept that can be defined in and applied to a wide range of human activities (Choi et al., 2019: p. 74). Except individuals, the research on creativity has changed from the single or partial dimension of creativity in the past to a convergence orientation that takes into account various related factors, such as the relationship between environment and individuals (Amabile, 1996; Csikszentmihalyi, 1998; Sternberg & Lubart, 1995), the awareness of self-ability (Ford, 1996) and environment and culture (Hsiao, 2011; Sternberg, 1999). Design education must not only foster problem-solving skills, but also the skills to better prepare students

for both analytical and creative thinking. Often, solutions produced by creativity thinking are unique and surprising (Lin et al., 2021).

Design is about products and services, but it is also about the process. Devise versions of the design process have been described by many scholars. The flowering results of design thinking often have entrancing colors, shapes, and symmetries, delighting the eye and mind (Shneiderman, 2016). UK Design Council (2005) developed an appealing two-phase design process called “The Double Diamond” with the terms of discover, define, develop and deliver, as one way of consciously seeking to combine divergent and convergent thinking to come up with a solution that is both novel and useful (Onarheim & Friis-Olivarius, 2013). According to Design Council, the first diamond-discover and define, helps people understand, rather than simply assume, what the problem is. It involves speaking to and spending time with people who are affected by the issues. Then, gathered from the discovery phase can help people to define the challenge in a different way. The second diamond-develop and deliver, encourages people to give different answers to the clearly defined problem, seeking inspiration from elsewhere and co-designing with a range of different people, as well as testing out different solutions at small-scale, rejecting those that will not work and improving the ones that will (Design Council, 2005).

Design processes are often highly social with discussions of design among students and teachers to consider the strengths and weaknesses of initial or mature design (Shneiderman, 2016). Compared with the approaches of those successful innovative designers, the common features in their portraits include strong personal motivation since youth, and positive attitude in the face of risks and even huge consequences for failure. In addition, it seems necessary to brim with self-confidence to carry through new ideas in a highly pressured environment (Cross, 2011).

## 2.2. Collaborative Learning in Education

Collaborative learning is an educational method of learning by groups; it is also popular in educational environments as students work together on various projects (Kanev, Kimura, & Orr, 2009). Collaborative learning is a process of shared creation which two or more individuals interacting to create a shared understanding of a concept, discipline or area of practice that none had previously possessed or could have come to on their own (Ni, 2019). Collaborative learning activities can provide students with the opportunity to compare their thinking with others, conduct small research projects, investigate subject matter with fellow students, and to practice using higher level cognitive thinking skills (Nagata & Ronkowski, 1998).

In previous studies, it was proved that the collaborative method could increase the positive attitudes towards learning. The results of meta-analyses performed by Lou et al. (1996, 2001, 2006) indicated that students achieved better outcomes when they worked in groups composed of four or less members, preferably in heterogeneous groups with mixed ability rather than homogeneous groups. Sato

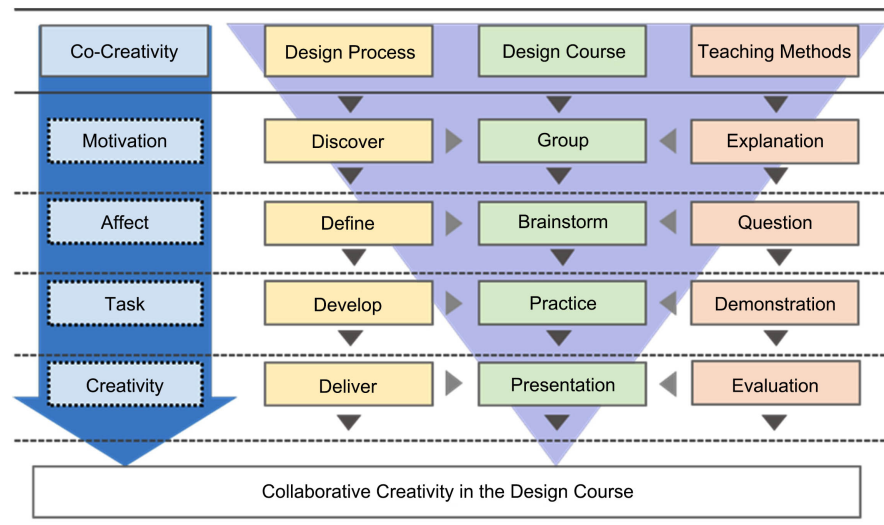
(2013) advocated that collaborative learning challenges the expansion of learning through dialogue among teachers, students, and themselves. Collaborative learning is based on a relationship of mutual learning. In a relationship of mutual learning, students who do not learn well actively seek support, while students who learn well respond sincerely, which is the basis for the effective development of collaborative learning. Collaborative learning pursues and respects the diversity of students' thinking and opinions. What is needed in the group is not a leader, but rather a mutual collision of the multiple learnings of each student. Every student equally participates in the study, shares the expression, finds the fun of learning, and then achieves the "jump" learning. Besides, it can play an effective role in teamwork and discussions and help carry out extended learning. Apart from that, the kind of learning has also been positively influenced by student satisfaction (Maxwell-Stuart et al., 2018; Zhong, 2019).

Furthermore, the teachers are indispensable from giving information to facilitating students' learning by establishing cooperative environment in their classrooms (Gillies, 2016). Through organizing the groups and the tasks, the students can understand what they are expected to do and how to behave. Except that, teachers also work to promote student interactions by engaging in dialogic exchanges (King, 2002). During a dialogic teaching experiment by Alexander (2008a, 2008b), teachers structured questions and encouraged members to answer and provide explanations, reflection and evaluation. As a result, students were challenged and provoked to provide thoughtful responses and answers built on previous dialogic interactions.

### 2.3. The Process of Collaborative Creativity in the Design Course

The work on group creativity is variously described as the social activity, collaboration, or co-creativity (Aragon et al., 2011; Chappell, 2007; Hung et al., 2019; Schmoelz, 2017; Noh & Yusuf, 2018). A broad range of factors can increase teams' innovation regarding the right people, the proper supporting, motivational and task contexts, and effective social and cognitive processes (Paulus et al., 2012). Sutton and Hargadon (1996) discussed the role of affect in how brainstorming allows designers to experience skill variety during the process of group creativity.

The double-diamond is a shared framework for creative thinking; it is a systemized way of exploring good ideas and executing the best ones. The process of collaborative creativity was shown in the left of Figure 1. By corresponding to each stage of creativity generation, under the guidance of step-by-step teaching methods, the course content can promote the students' creative thinking during the interaction of discussion and brainstorm in a group, and then the task can be developed by practice. Finally, the performance and presentation from students are the main items to evaluate the course's effect. The stages for student's design process and teacher's teaching methods in the design course can be seen in the right of Figure 1.



**Figure 1.** The process of collaborative creativity in the design course.

During the process of collaborative creativity in design course, the role of teacher should let students develop the habit of discussing problems with their classmates, pay attention to students or groups that cannot participate in group discussions successfully, and try to promote communication between groups. In addition, teachers should reduce speeches involving personal views and focus on speeches that keep to the topic and facilitate group discussion. It is hoped that the relationships among teachers and students will be built on the basis of trust.

### 3. Research Method

#### 3.1. Research Design

Following the action research method, in-depth interviews, and a Likert Attitudes Scale, this study focuses on improving students' creativity through collaborative interaction design, which consisted of six stages based on the process of collaborative creativity in the design course, as shown in **Table 1**.

Stage 1 was the standard sketch representation of objects to form the common goals and motivations in groups. From stage 2 to stage 3, the aim was to enhance the member's self-confidence. In the challenge of stage 4, students overcame difficulties through collaboration and then practiced their creative work in stage 5. Finally, interviews and attitude scales were used in research analysis to demonstrate the experiment results at the last stage.

The study and application of sketching not only should lie in the simulation of objects or reality. As the leading ability of design, it should assist students to express their creative ideas through design sketching which aims to show incredible power in the design process.

#### 3.2. Participants

The subjects were freshmen in the department of fashion design. The "Design Sketch" was a compulsory course in the second semester of the first year with 52

**Table 1.** Descriptions of the stages in the design sketch course.

Stages	Course Theme	Teaching Methods	Teaching Situation
<b>Stage 1</b> Discover Define	Sketch representation of objects (corn, pepper, mushroom, lotus)	Explanation Group discussion Teacher's blackboard Demonstration Student practice	Ask creative questions about the sketch representation concept of four objects, such as the question of similarities or differences.
<b>Stage 2</b> Discover Define	Sketch representation of objects easier than phase 1 (orange, apple, eggplant, cucumber)	Explanation Group discussion Teacher's blackboard Demonstration Student practice	Ask creative questions about the sketch representation concept of four objects, such as the question on the comparison.
<b>Stage 3</b> Discover Define	Sketch representation of objects more difficult than phase 1 (rose, lily, stainless steel cup, bowl)	Explanation Group discussion Teacher's blackboard Demonstration Student practice	Ask creative questions about the sketch representation concept of four objects, for example: in addition to...
<b>Stage 4</b> Develop	Creative thinking of combination portrait	Explanation Group discussion Student practice	Ask creative questions about the concept of a combination portrait: combination questions, imagination questions.
<b>Stage 5</b> Develop	Creative works drawing	Group discussion Student practice	Check the combination portrait sketch and give suggestions.
<b>Stage 6</b> Deliver	Evaluation	Presentation Discussion	<ul style="list-style-type: none"> <li>• Students express their ideas</li> <li>• Ask the students 6W questions about their works</li> <li>• Students fill in the feedback sheet and the mutual evaluation sheet</li> <li>• Comprehensive comments</li> </ul>

students enrolled; there were 8 male students and 44 female students, aged between 18-19 years old. They had acquired basic sketching skills before taking the course and the researcher had taught the basic sketch course in the previous semester and was familiar with the students who had studied the course.

The course action research lasted for nine weeks (3 hours per week). According to Lou et al. (1996) that small group learning had significantly more positive effects than individual learning on student individual achievement, group task performance, and several process and affective outcomes. Therefore, the students were divided into 13 heterogeneous groups (random grouping to avoid students choosing a group of familiar friends) with 4 members in each team. In addition, it should be noticed that they were informed of the stage content, as well as the scoring principles before the class began.

### 3.3. Data Collection and Coding

The data was collected in three ways: class observation records (the researcher and the observer), semi-structured interviews and questionnaire surveys.

As for class observation records, the researcher and the observer made observation records in class, with the label T\_01\_3-5 standing for the third line to the

fifth line in the first week of the teacher's record and C\_02\_2-5 representing the second line to the fifth line in the second week of the collaborative observer's record.

Semi-structured interviews were completed after the course and labeled by the researcher with S\_01, 02, 03..., etc. For example, the first student's interview record was marked as S\_01.

According to the collected data, the researcher further analyzed the text content, so as to understand the process of the students' creativity in the course. The researcher analyzed the class observation records, read the collected data repeatedly, coded the sheets, and used different data sources for triangulation corresponding to the teaching evaluation results.

## 4. Results

### 4.1. Effects of Collaboration in Creativity Generation

#### 4.1.1. Feedback from Students

**Table 2** shows the questionnaire survey results at the end of the course learning. Up to 94.3% of students thought the collaboration was very useful or extremely helpful for their composition creativity. Most of them also considered that discussion in the group was also conducive to flexible and precise thinking of details and inspiration of their adventure and challenge attitude.

Most participants thought that they gained a lot of valuable inspiration during the discussion with their team members. In continuous thinking and sharing of their views, they collected different opinions and were stimulated to produce more new ideas and styles, which can be evidenced by the following interviews:

*"Every member discussed actively and inspired me with many creative ideas."*  
(S\_1)

*"Along with the discussion, many ideas came to me from vague to clear."*  
(S\_31)

After putting forward sorting out ideas from brainstorm, the next boom of creativity was turned on. Students can jump out of the original mindset with the help of other students' suggestions to think from a new perspective.

*"I gradually changed my thinking angle and dimension because of the ideas shared by others."* (S\_27) *"After seeing their sketches and the group discussion, I can use a different point of view to conceive the work."* (S\_3)

**Table 2.** Questionnaire survey result at the end of the course learning ( $N=52$ ).

Composition Creativity	1	2	3	4	5	Mean	SD
1) Do you think the collaboration was helpful for your composition creativity?	2 3.8%	1 1.9%	17 32.7%	27 51.9%	5 9.7%	3.62	0.84
2) Do you think the collaboration was helpful for your flexible and precise thinking of details?	4 7.7%	2 3.8%	21 40.5%	23 44.2%	2 3.8%	3.33	0.92
3) Do you think the collaboration was helpful to the inspiration of your attitude of adventure and challenge?	0 0%	1 1.9%	15 28.8%	24 46.2%	12 23.1%	3.9	0.77

Note: This is a 1-5 scale, with the larger number representing the more helpful.



Overall, the results revealed that the students thought collaborative learning was helpful for the promotion of their creativity in the design sketch course. It was a key factor of creativity formation that students think out of the box, accept the suggestions of other students, and think further.

#### 4.1.2. Evaluation of Creativity by Teachers

To evaluate the students' creativity accurately, the researcher invited another full-time teacher in the department to judge their combination portrait sketches. Then, the results are shown in **Table 3**, indicating that both course teacher and co-evaluation teacher agreed that most of the students' works were featured with higher creativity. In the evaluation by the course teacher, the total number of students who scored above 3 points in the dimension of composition creativity was 47, accounting for 90.4%.

In the evaluation by co-evaluation teachers, the total number of students who scored above 3 points was 50, accounting for 96.2%. The results also showed that the average score of the course teachers' evaluations was 3.34; the average score of evaluation by the co-evaluation teachers was 3.65. Generally speaking, the number of students with more than 3 points was higher than 90%, indicating that the students performed well in composition creativity.

### 4.2. The Role of Teacher in Collaboration

#### 4.2.1. Building a Class Environment of Mutual Trust

The purpose of randomly grouping students in this course is to break their study habits. However, usually one or more members in each group seem to be bad at communicating with others, which results in less interaction within the group at the beginning, which can be proved by the following interviews:

*“After finishing the grouping (groups of four), the students' mood changed obviously, because the students in the same group might not be familiar with each other, and the classroom became quiet.” (T\_01\_7-9)*

In order to break the ice, teachers participate in the group discussion by questioning and guiding, which effectively enlivens the atmosphere.

*“The teacher began to guide for art appreciation and put forward some questions for the group students to discuss. Although the interaction among the group members was limited, they gradually started to give their opinions.” (C\_01\_10-15)*

The leading questions raised by the researcher in the class prompted the students

**Table 3.** Questionnaire survey result at the end of the course learning.

Composition Creativity	1	2	3	4	5	Mean	SD
Course teacher	0 0%	5 9.6%	21 40.4%	26 50%	0 0%	3.34	0.66
Co-evaluation teachers	0 0%	2 3.8%	14 26.9%	36 69%	0 0%	3.65	0.56

Note: This is a 1-5 scale, with the larger number representing the higher agreement.



in the group to communicate by speaking their ideas and understanding other members. They were also encouraged to ask other members if they had a problem, which helped every member to build up self-confidence.

*“The questions from the teacher stimulate me to have more discussions with others and discover my shortcomings.” (S\_30) “The teacher encouraged us to speak our minds. I was not used to it at first because I was afraid to be laughed at by others. Gradually I found that every idea I put forward was encouraged by the teacher. Now I think I have much confidence to speak more in class.” (S\_9)*

#### **4.2.2. Intervene in Discussions to Solve Students' Problems**

In the process of creativity generation, students may have ideas different from other group members. By listening to the discussion and observing their state, teachers can intervene in the discussion at an appropriate time to help clarify the problems.

*“By listening to the students' ideas, I can master the context of their thinking, so as to guide the students to think deeply about the facial feature structure of the portrait from the purpose of sketching.” (T\_04\_8-10)*

When the teacher paid attention to the members who did not participate in the discussion in time and helped them take part in the discussion, the smooth progress of cooperation can be effectively guaranteed.

*“The teacher first asked questions about the concept of design. During the group discussion, the teacher kept listening to the opinions of each group in class. Most of the time, the teacher just listens. Only when the group members had difficulties in the process would the teacher intervene in time.” (C\_04\_6-13)*

After the teacher helped solve the problems in the discussion, the atmosphere in the classroom was improved. Additionally, the communication between the students became smoother than before.

*“When discussing composition, our group had been hampered by the problem of face shape. After listening to our questions, the teacher asked us why the face needed to be round? This question inspired us instantly.” (S\_23)*

#### **4.2.3. Guiding and Planning in Teaching**

Under the guidance of a series of logical questions, students can clearly understand the learning motivation. Apart from that, the feedback from the teacher ensured that the discussion in the group was carried out in the expected direction to avoid digression.

*“At first, I didn't know where to start with the task of the course. But fortunately, by answering questions and thinking about the teacher's feedback, what to do and how to do gradually became in my mind.” (S\_21) “When some groups deviated from the theme obviously, the teacher intervened in the discussion in time to guide the topic back to this course.” (T\_05\_3-4)*

In order to build up students' confidence, the sequence of difficulty level as “medium—simple—difficult” is adopted in the setting of curriculum tasks to help

students experience building confidence, face challenges to creative practice.

*“When I start the second unit of sketch representation after complete the first unit, I felt very confident of finishing it well.” (S\_16)*

### **4.3. Key Factors of Collaboration with Team Members**

#### **4.3.1. Inspiration and Supplement in the Process of Discussion**

The students thought they had received different degrees of help from group members in collaborative learning and ventured to face their shortcomings. Moreover, they also were willing to challenge the original thinking for inspiration from mutual understanding and discussion.

*“The discussion, criticism, encouragement, support and cooperation are constructive. I am very moved to think and interact with my team members together.” (S\_2)* *“In each assignment, I can see the difference between us. With everyone’s help, I am more aware of my shortcomings and way to improve. The group discussion inspired me and stimulated me to challenge myself.” (S\_3)*

Regardless of the students’ basic knowledge and painting skills, they can get beneficial inspiration in the group discussion and make progress.

*“Thanks to my early start in art study, I have a better painting foundation than other members. However, after discussing with them how to create the theme of portrait painting, I was still inspired and had more great ideas.” (S\_27)*

The process of collaborative learning in class creates trust among group members in the learning community. Students can get more ideas through discussion, encouragement, and sharing. Students give each other advice, accept criticism, and thinking outside the box, which can make them more willing to try to change. Students support and learn from each other, accept help sincerely, provide help patiently, appreciate the works of others, and find their own shortcomings, which can make them have the motivation to accept challenges, become more integrated into group learning, and increase their understanding, thus promoting the formation of the learning community.

#### **4.3.2. Support and Company with Team Members**

The formation of creativity needs continuous brainstorming, which is a process of constant improvement. Therefore, mutual support, company and encouragement among team members become an essential guarantee for creative thinking.

*“Encouragement from team members is my primary motivation. Although my ideas and painting skills are not very good, the support and encouragement from them made me improve a lot.” (S\_7)* *“In the past, I thought that I just had to work hard to complete work. After this activity, I learned that the support and encouragement of others could make me have more ideas and help me make progress.” (S\_32)*

The mutual support, companionship, encouragement, and sharing of group members in collaborative learning can effectively improve students’ learning motivation and maintain their confidence.

#### 4.4. The Model for Collaborative Creativity in the Design Course

From the above interview and questionnaire survey results, it can be seen that there are four primary aspects in the model of integrating collaborative creativity into the design course, as shown in **Figure 2**.

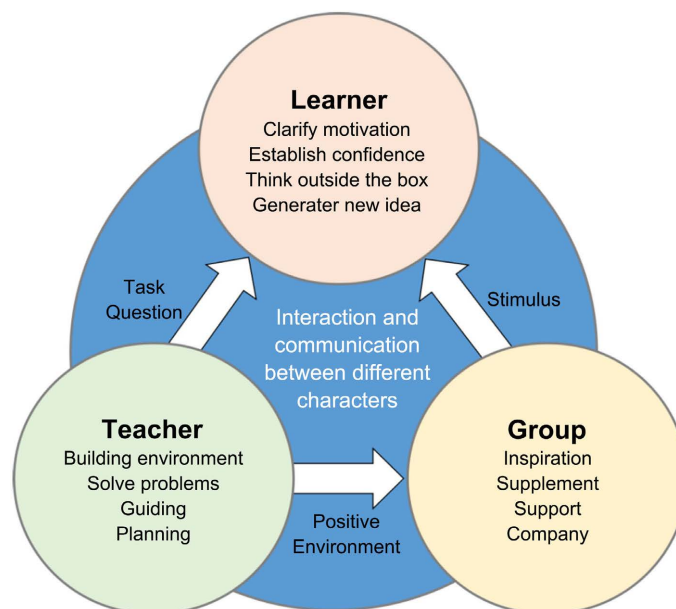
**The aspect of teacher.** Playing a crucial role in establishing a positive environment for group discussion in the classroom, teachers can solve all kinds of problems in time and effectively guide the cooperation by setting learning tasks.

Teachers should promote students' discussion and dialogue by constantly asking questions, listening to the students' discussions carefully, refraining from putting forward personal ideas arbitrarily and subjectively, and establishing a sense of trust between teachers and students. The formation of creativity requires logical thinking. The mutual trust among teachers and students can provide the required space for students to think.

**The aspect of group.** With the assistance of the teacher, group members can inspire and learn from each other while giving the necessary support and supplement as the stimulus of creativity.

The creative formation process is a challenge for students. The mutual help and support among group members can encourage the students, which is an important key in helping students face their challenges. The help of classmates, as well as discussion and sharing, inspiration, accepting criticism, facing shortcomings, thinking out of the box, taking risks to change, and learning to appreciate the advantages of others, are all motivation for creativity formation.

**The aspect of learner.** During the interaction with the teacher and team members, learners could clarify the motivation and establish their confidence. Effective communication can help them have the capability to jump out of their inherent thinking and generate more creative ideas.



**Figure 2.** A model for collaborative creativity in design course.

Most students thought that they were helped by their classmates to some extent. Through discussion and sharing, they had different views, ideas, and styles, and then formed creativity. The creativity formation was first generated by mutual discussion, and the ideas put forward by other members of the group stimulated the students' thinking, so different ideas could be collected through group discussion.

The mutual support, companionship, encouragement, and sharing of group members in collaborative learning can effectively improve students' learning motivation and maintain students' learning power. The positive improvement of learning motivation is one of the key factors for students' creative development.

***The interaction and communication between different characters.*** Through the collaborative process in a design course, learners, teachers, and team members are united. With a task as the target, they start by clarifying the motivation and aim to generate more new ideas for practice.

The collaborative learning environment encouraged the students to conduct group conversations and discussions. Opinions, ideas, inspirations, and solutions were generated from the teachers' questions as well as the group members' collective thinking and communication. This is the process of creativity generation. The results showed that the collaborative learning instructional model and class environment could help students get more ideas and gradually form a unique design creativity.

## 5. Conclusion and Suggestions

From the analysis of the collected data, the following conclusions can be reached. Firstly, integrating collaborative creativity into the design course can inspire students to generate more new ideas outside the box. From the questionnaire results and interviews, it can be found that students felt there was obvious progress no matter whether the foundation is solid or weak, while the course works were recognized as having more creativity in teachers' eyes. Secondly, the implementation of the integrating collaborative creativity into the design course has positive effects. In discussion with other members, students tend to clarify the motivation and dare to face challenges with confidence thanks to the assistance of teachers and team members. Finally, during the process of collaborative creativity in the classroom, the key factors are mainly learner, teacher, team members and the interaction among them. As the role of organization and guiding collaboration, teachers need to build a positive environment for students to communicate with the setting of tasks and questions. When there is any problem in the process, they could help to solve it in time. The relationship between members in the group is closely linked through inspiration, supplement, support and company. Every student could quickly find their motivation, build confidence during interaction with teachers and other group members, and then immerse into the generation of creativity from a unique angle.

The design students all hoped to have endless creativity; however they did not

know how to use methods to help them form their creativity. The researcher found that the students could communicate and learn from each other through collaborative learning, which helped the students form their own design creativity in the process of conception. Concerning long-term teaching goals, this study aims to propel teachers and students to pay attention to the power of teamwork. Collaborative creativity is a complex process that is easy to interfere with, thus further affecting the result. Therefore, the course should be “student-centered” when the interaction and communication among the different characters as the learner, group and teacher are considered.

In order to ensure that every student could make progress, the researcher designed the learning content with a higher standard according to the overall level of the students. Whether courses with different contents can have the same effect is worthy of further study. Class control, activity design, question guidance, and interactions among teachers and students all have an impact on the students’ learning interests. The design sketch course was a practical course, and it was easy for the students to learn from each other. Whether the same effect can be achieved in theory courses is worthy of further study and discussion.

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### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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