

The relationship between the playfulness climate in the classroom and student creativity

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Abstract The main purpose of this study was to determine whether the spontaneous playfulness that occurs in the classroom and contributes the class climate influences the creativity of students. The study found that the management and creation of fun-loving and happy class atmosphere was important to vocational high school students. Data collected to test the study hypothesis showed a positive correlation between the class climate related to playfulness and students' graphic and linguistic creativity. The "cooperation and intimacy" feature of the class climate was able to directly predict student creativity.

Keywords Creativity · Class playfulness climate · Playfulness

1 Introduction

Porter (1980) concept of building a national competitive advantage underscored the importance of continuous change and innovation. Cummings and Oldham (1997) indicated that only by considering the dynamic nature of people and work contexts can a business ensure that it is maximizing its potential for innovation by capitalizing on the creativity of its employees. The government has initiated many policies to improve the creativity of the citizenry to increase the country's competitiveness. Ministry of Education (2002) published *The White Paper on Creative Education*, which presented a vision of Taiwan as a "Republic of Creativity." It also promoted the *Medium-range Development Plan of Creative Education*, which

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proposed education strategies for 2005–2008 aimed at establishing a “Creative Taiwan” that cultivated worldliness in the service of helping citizens perform to the best of their abilities. The government also encouraged schools to stimulate creativity by participating in international competitions and engaging with the international community (Ministry of Education 2004). Additionally, Taiwan’s vocational education plays an important role in developing the personnel required for national economic development. Indeed, the recent decades of economic development represent the best proof of the effectiveness of this strategy. However, vocational educators face the challenge of determining how to inspire student creativity. Through continuing research, development, and improvement, experts have identified their ultimate goal as inspiring students’ creative potential and activating their creative thinking to facilitate the emergence of their creativity.

In the context of this research, creativity is defined as the creative human attributes and qualities involved in imagination, inventiveness, improvisation, insight, intuition, and curiosity—the natural ‘artful’ genius and talent of people (Lloyd 2007). Recent contextual theories of creativity have attempted to identify dimensions of environments that are related to creativity. Amabile et al. (1996) brought out that the social environment can influence both the level and the frequency of creative behavior. Lin (2002) indicates that it is necessary to consider the impact of environmental factors on student, and to create an atmosphere helping creativity learning, making students happy. According to the theory, the learning environment and climate should affect individual creativity.

However, in addition to those factors that can affect students’ creativity, is there any other factor affecting creativity that has been overlooked or inadequate? For example, in the past, research has emphasized that playfulness can affect creativity. Lieberman (1965) and Barnett (1990) reported significant relationships between playfulness and creativity among American children. The importance of play among children is widely recognized (Barnett 1991; Lieberman 1977). Although, Yu (2004) has proposed that adult playfulness not only brings fun but also helps break old rules, relax the employees, and creative performance in the workplace. And playfulness refers to a kind of spontaneous, imaginary, expressive, funny, and indulgent attitude that can spur individuals’ work and creativity and brings work satisfaction and positive moods (Yu et al. 2003). They believed that having playfulness properties can make people pleased with their work and have more creativity. Anderson and West (1998) indicate that the group playfulness climate is building on the relaxing and joyful atmosphere of everyday mutual interaction between the group members. And it makes people feel their work is interesting and they are supported. However, few studies have focused on an understanding of how playfulness is related to high school students’ creativity. No studies analyzing the correlation between playfulness climate and creativity at the same time. What kind of class environment makes students able to show their playfulness and creativity? The goal of the present study is to address this important yet relatively unstudied topic. Therefore, the researcher aims to clarify this association—and examine potential moderators of the association—by conducting a quantitative study considering the class playfulness climate effect on students’ creativity performance. Basing on the above research background and motivation, the main purposes of this study are as follows:

1. Analyzing the individual playfulness, class playfulness climate, and creativity performance of vocational high school students.
2. Understanding students’ class playfulness climate and creativity performance and the correlation between the two.
3. Analyzing the prediction that class playfulness climate has on students’ creativity performance.

2 Literature review

2.1 Creativity and creativity theories

Since Guilford's emphasis on creativity related study in American Psychological Association in 1950, this wake seems to open the pioneer of creativity research in recent years (Amabile 1996). In Webster dictionary, the definition of creativity contains "fabricating" and "originating". Guilford (1965) holds that creativity is the ability of cognition, and can be regarded as one of the divergent thinking which is consisted of flexibility and originality. Williams (1972) considered creativity has features of fluency, flexibility, originality, and elaboration in cognition side, and curiosity, adventure, challenge, and imagination in affection side. Amabile (1983) regards creativity as the creative response and work output assessed by experts, and this output is the result of interaction between "domain-relevant skill", "creativity-relevant skill", and "task motivation". Csikszentmihalyi (1990) indicates "creativity" the interacting result between "individual", "domain", and "field". Zhou and George (2001) hold that creativity is the new and useful idea comes from the individual worker, and is produced by sharing his or her opinions. Sternberg (2003) considered creativity consisted of abilities of discovery, imagination, suppose, complex, invention. Creativity is regarded so important that it should help early childhood's development and education field (Williams 2002).

2.2 Investment theory

Sternberg and Lubart (1995) defined creativity as "When a product is novel and appropriate, we call this a creative product." Novel and appropriate are two necessary condition of creativity. The six personal resources-elements which have impact on creativity of the theory are wisdom, knowledge, thinking patterns, personality, motivation, and environmental situation. Among these, "wisdom" comes from Sternberg's long concerning topic, Triarchic Theory of Intelligence. The wisdom dimension has three functions: integration, analysis, and practice (the three wisdoms from Triarchic Theory of Intelligence). According to investment theory, creativity is a key decision. Asking students to be more creative in moderate way helps make them be more creative if they consider a creative decision will gain them reward rather than punishment. (O'Hara and Sternberg 2001) To be creative, the first thing is to decide generating new ideas, analyzing the ideas, and selling them to others. In other words, a person can have ability in integration, analysis, and practice, but cannot be applied to solve their problems with creativity. For example, a person could be (a) accordant to other ideas rather than integrating him or herself, (b) not restrained by one and evaluating carefully, or (c) expecting others to listen to him or her own opinion, and deciding not to convince others' value.

2.3 Component theory of creativity

Amabile (1983) starts form the angle of product, proposing the componential theory of creativity to describe the elements affect creativity in workplace. Amabile (1983); Amabile (1996) creative componential model firstly consists of domain-relevant skill, creativity-relevant skill, and task motivation (Amabile 1996, p. 84), and each plays different roles in creating process. However, Amabile (1996) once described creativity as a puzzle that her twenty years of researching on creativity is like a wonder journey of putting up the every pieces of the puzzle. By continuing studying and revising after 1983, nowadays, Amabile's component theory of creativity indicates: expertise, creativity-thinking skills, and task

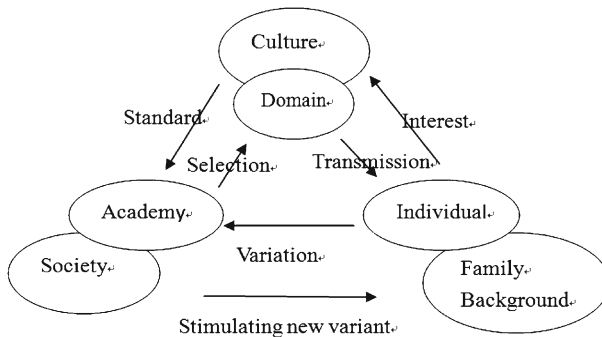


Fig. 1 Csikszentmihalyi & Wolfe's creativity evolution model

motivation. One's creativity is the overall performance of the three components, and it is also influenced by work environment.

2.4 Three-pronged system model of creativity

Csikszentmihalyi (1988) developed DIFI (domain, individual, field, interaction) system model (see Fig. 1) according to the definition of creativity. The model shows that creativity exists in the interaction between subsystems of individual person, domain, and field. The first subsystem is individual, including individual, gene, and background elements which influence individual. The second subsystem is domain, which means culture aspect or symbolic. And the third is field, standing for gatekeepers, because he emphasizes that creativity should be mutually dragged between the above powers, and these cannot be separated from social context.

Source: Zhan, Z. Y.: Creativity experience and family factors of Taiwan's higher-grade children in elementary school, *NCCU. Educ. Psychol. Res.* **28**(4), 597–615 (2005).

Wu (2002a,b) research finds that creativity proposed by Csikszentmihalyi can be divided into "big C" and "small C". The so called "big C" indicates great invention or creation which can change human civilization and life, such as computer and internet. And the "small C" stands for the ideas come up from daily life, such as the ingenuity of housewives to decorate living environment, and the creative cuisine made by the cook. Although the "small C" may not be cumulated into "big C", the "big C" is definitely accumulated from "small Cs".

2.5 Amusement park theory of creativity

Kaufman and Baer (2005) proposed "The Amusement Park Theory", using the topic of "amusement park" as metaphor to describe the latest creativity theory of the five levels of creativity learning. Although this theory is still in its early stage, the development can be predicted from its features and contents, especially the assistance to teaching creativity thinking (Kaufman and Baer 2005). The Amusement Park Theory consists of the following topics: the necessary terms of creativity, general subjects, domains, and special tasks, or micro-domains and special connections.

3 Playfulness and class playfulness climate

Lieberman (1965) is the first to name and construct playfulness according to the research on divergent thinking of kindergarten children. He holds that playfulness is the quality of play,

and is the necessary spontaneous personality during children's playing and leisure activities. In his later study shows that, both adolescents and adults will convert the playfulness in their minds into a personality. Lieberman's research contributions trigger the follow-up study on playfulness. Though there may not be the same terms and name on defining playfulness, the founding of its features are similar (Trevlas et al. 2003). In the study analyzing the class behaviors of kindergarten children, Dunn (2004) finds out that the characteristic of playfulness consists of imagination, humor, emotion expression, taking the initiative exploring new things, curiosity, openness and communicating ability, which is similar to Lieberman's dimensions.

Csikszentmihalyi (1975) considers the interaction of playfulness is enjoyable, participating, and is not relying on external requiring. Rubin et al. (1983) define playfulness by behavior, background context, and tendency, holding that playfulness consists of the following six elements: intrinsic motivating behavior, process-orientation, non-exploratory behavior, neoliberal, free form external rules, and being initiative.

Aguilar (1985) further explains playfulness by the point of social context, accounting that playfulness is an innate disposition, while social environment stimulates playfulness to show up. He points that in the social environment, individual will be influenced by social elements (important others, community and society, and invention and innovation). Therefore, the showing of individual playfulness is the interaction between personality and external environment, mixing the perspectives of traits theory and context theory, and proposes theory of reciprocal action of playfulness.

Staempfli (2005) regards the research in the past using traits, situation, and interactive perspectives according to each topic and objective difference. Therefore, it will be a great challenge to confirm or compare different research on playfulness with a regular pattern. Glynn and Webster (1992) defined playfulness as a kind of attribute that were imaginary, less serious, or a metaphorical attitude to define or participate in activities for increasing inner enjoyment, immersion, and satisfaction. Woszczyński et al. (2002) compiled research about playfulness and found that it is an enduring personal characteristic. Playfulness represents an important variable in the prediction of behavior and is affected when the environment changes. This finding contradicts the opinion that playfulness constitutes an enduring quality, regarding it instead as one state or situation in which the interaction between subjects and the external environment plays an important role. playfulness is defined as the extent of engagement in play itself and the resulting pleasurable feelings experienced by the participants. Finally, scholars have combined considerations of character and situation in their construct of playfulness as a steady and long-term personal characteristic that incorporates environment as well as character.

From above, it can be seen that no matter playfulness study focusing on adults or children, spontaneity, pleasure, humor, curiosity, imagination, and creativity are regarded as important traits. Besides, many studies points out that playfulness can not only be observed by external and interesting behaviors, but potential intrinsic motivation, and getting into with happy status (Fix 2003; Rubin et al. 1983; Trevlas et al. 2003; Woszczyński et al. 2002).

Chang (1999) indicates that class is a small community, containing mental group activities, social group activities, and work activities. There would be an atmosphere after the group members get along with each other for a while, which can affect its members' activities into the features of the group. Senge (1990) holds that playing can stimulate the creative ideas required by the rapidly growing market, reduce the pressure, and help to maintain the insight of successful decision under pressure. Besides, group can provide safe environment to nurture innovative ideas. Berg (1995) considers that playing is one way to explore oneself, letting us remove the existing boundary, using new methods to learn new skills. Therefore, playing and pleasure help increase the communiting opportunities for the members to open

their mind and share their visions. Playfulness makes work interesting and lifting up one's performance. [Anderson and West \(1998\)](#) regard that group playfulness is the independent and relaxing atmosphere that the group members build by everyday interaction in workplace, which making people feel the work is interesting and they are supported.

3.1 The study on the correlation between class playfulness climate and students' creativity performance

[Yu \(2004\)](#) indicates that playfulness is helpful for creativity performance. The factors affecting organization playfulness climate are: playfulness and humor in workplace, flat organizational management, free and open, leader's supports, and encouragement of innovating, good communication between colleagues, relaxed interaction, and comfortable environment which help communicating. Also, employees use playing and recreation to generate inspiration, reduce working pressure, and produce cohesion. Besides, [Amabile \(1993, 1996\)](#) finds out that it may increase creativity by participating a task with intrinsic motivation. The study of [Deci and Nezlek \(1981\)](#) indicates the supporting forces of students' inner-oriented behaviors come from creative class atmosphere. When the students' inner-orientation is incited, their creativity would be elevated. Therefore, when the students are more aware of the creative atmosphere in class, the better their creativity performance would be produced.

[Tseng \(2002\)](#) finds significant correlation between graduates' "playfulness" and creativity performance. Among the items, "relaxed attitude and joyfulness", "romantic and free", "humorous and interesting", and "creative life experience" account the most part of the total scale. Therefore, she considers playfulness and humor are positive attitudes to creativity. People with this kind of personality tend to accept the new ideas. Playfulness and humor also help to sophisticate divergent thinking and solve creative problems. [Hamza et al. \(1996\)](#) proposed that the class atmosphere created by both teachers and students would influence students' development of creative thinking according to theory of social perspective. The theory holds that class atmosphere is generated by the interaction between teachers and students. Therefore, the output of the consequent interaction between teachers and students is students' creativity. [Furman \(1998\)](#) holds that the creative class atmosphere is an important variable on increasing or decreasing students' creativity. Only when students are in a free and carefree environment can they be urged to attend activity that exploring questions by their intrinsic motivation.

To integrate the above document review and empirical research, this study lead to the following hypothesis:

Hypothesis 1 There is significant correlation between class playfulness climate and students' creativity performance.

Hypothesis 2 There is direct prediction between class playfulness climate and students' creativity performance.

4 Methodology

4.1 Research hypothesis

The research purpose is aim to discuss the relation between playfulness and climate in class and students' creativity performance, and the population aims to the second grade in business administration branch in vocational high schools. According to the above research purpose,

literature review, which generates the relation between the research variable, we propose the following hypotheses: Hypothesis 1 and 2.

4.2 Research object

The research scope aims to discuss the relation between playfulness and climate in class and students' creativity in business administration branch in vocational high school in Taiwan. The research's population aims to north, central, and south area, at second grade in business administration branch in vocational high school, including Department of Business Management, Department of Data Processing, Department of Accounting Affairs, and Department Of International Trade. We use sampling method to choose sample based on the name lists of 97 school year's *List of technical and vocational institutions—Vocational School* which is published by Department of Technological and Vocational Education.

5 Operational definition and the use of scale of research variable

(1) Operational definition of students' creativity performance

This study defines students' operational creativity performance as "having curiosity, adventure, challenge, and imagination in creativity's affective aspect."

(2) Students' creativity performance scale

The creativity defined in this research is based on the scores of the subscales and total scales of fluency, flexibility, originality, and elaboration in the New Test of Creativity. The higher scores indicate the better creativity. This scale is compiled by the chairman Wu (2002a,b), providing as a tool to test students' creative thinking. The test contains linguistic test and graphic test, and seven rating scales. The former consists of fluency, flexibility, originality, and elaboration. The later includes fluency, flexibility, and originality. However, the reliability of the re-test is 0.34 ~ 60, and the validity sets "line" activity in "Torrance Tests of Graphics Creative Thinking A-type" and "empty bottles" activity in "Torrance Tests of Text Creative Thinking B-type" as criterion. The validity is between 0.08 and 0.75.

(3) Operational definition and the use of scale of research variable

Class is a team. This study defines operational class playfulness climate as "building on the relaxing and joyful atmosphere of everyday mutual interaction between the team members. And it makes people feel their work is interesting and they are supported."

(4) Scale of class playfulness climate

In recent years, the measurement in playfulness of documents at home and abroad includes "Individual Playfulness scale", "Adult playfulness Scale", "Children Playfulness Scale", and "Organizational Playfulness Climate Scale". Only class playfulness climate scale has poor development. This study focus on class playfulness climate, and since class is the first micro-society organization a person contact in their life, the study bases on Glynn and Webster (1992) The Adult Playfulness Scale, APS, and references (Yu et al. 2003) *The Development of Adult Playfulness Scale and Class Playfulness Climate Scale*, adopting eight dimensions in the scale. After revising, we name it "class playfulness climate scale". The scale consists eight dimensions and 35 items, including: (1) Cooperation and intimacy (seven items), (2) Teacher's support and relaxed interaction (five items), (3) Having fun together and stimulation of creativity (five items), (4) Free from trifles and humor and happy (five items), (5) Serious and rigid and competition and criticism (five items), (6) Leisure and relaxation (three items), (7) Environment and

helping casual (three items), and (8) Casual wearing and independently working (two items). The scale is self-report questionnaire; the subject's students choose one item from five according to their actual situation. Applying Likert Scale, we mark from 1 to 5 according to "strongly not agree", "slightly agree", "agree", "mostly agree", and "strongly agree".

(5) Data analysis

Adopting quantitative research methods, this study coded and established the effective questionnaires after deducting the invalid responses. SAS SPSS12.0 for Windows is applied to statistical data analysis. The statistical methods include descriptive statistics analysis, item analysis, reliability analysis, validity analysis, correlation analysis, and regression analysis.

6 Results

6.1 Data analysis

690 questionnaires were sent at 14 May 2010. One week later the reminding E-mail was sent, and another week later the reminding phone call. The whole test is done at 31 May, and 410 of the questionnaires are responded. Deducting 22 invalid responses, the valid were 388, and the response rate is 56%, showing the good responding rate of the questionnaire.

In this study, the descriptive statistics of the students' backgrounds show as Table 1. The total numbers of the sample is 388, females account for 63.1% with 245 people in gender variable, while males account for 36.9%. In department variable, the Department of Data Processing is the top by accounting for 60.8% with 236 people. The second is Department of Business Management which accounts for 17.8% with 69 people. The Department of International Trade accounts for 13.9% with 54 people, and the final is Department of Accounting Affairs, accounting 7.5% with 29 people. In the school type variable, the private accounts for 53.1% with 206 people, while the public accounts for 46.9%. In the locality variable, the south stays on the top with 35.8% with 139 people. The second is north which accounting 35.1%

Table 1 Distributing analysis table on variable of subjects students' personal background ($n = 338$)

Variable	Option	Sample numbers	Valid percent (%)	Result
Gender	Male	143	36.9	Main females
	Female	245	63.1	
Department	Department of data processing	236	60.8	Main department of data processing
	Department of business management	69	17.8	
	Department of international trade	29	7.5	
	Department of accounting affairs	54	13.9	
School type	Public	182	46.9	Main private school students
	Private	206	53.1	
Locality	North	136	35.1	Main north and south
	Middle	113	29.1	
	South	139	35.8	

Table 2 Table of descriptive analysis on students' graphic creativity ($n = 388$)

Dependent variable	Minimum	Max	Average	Standard deviation
Fluency	0	24	11.94	6.910
Flexibility	1	17	8.13	3.807
Originality	0	24	5.77	4.376
Elaboration	1	175	49.88	34.906

Table 3 Table of descriptive analysis on students' linguistic creativity ($n = 388$)

Dependent variable	Minimum	Max	Average	Standard deviation
Fluency	1	42	7.65	6.443
Flexibility	1	17	5.06	3.158
Originality	0	30	2.30	3.412

with 136 people. And the last is middle with 113 people of 29.1%. The students of Business and Management branches this study set are mainly girls, and most of the testees are from Department of Data Analysis, while there is no huge gap between school's type and locality.

6.2 Correlation analysis between class playfulness climate and students' creativity performance

(1) Analysis of the status of students' creativity performance

a. Descriptive analysis on students' graphic creativity

According to Table 2 and the answers the students respond in the *New Test of Graphics Creativity Thinking* (people), and after a carefully counting, we conclude the result that, in the test of graphics creativity thinking, the testees score in the following four scopes: graphic fluency, graphic flexibility, graphic originality, and graphic elaboration. The average scores of fluency are 11.94, and the standard deviation is 6.910. The average scores of flexibility are 8.13, and the standard deviation is 3.807. The average scores of originality are 5.77, and the standard deviation is 4.376. The average scores of elaboration are 49.88, and the standard deviation is 34.906.

b. Descriptive analysis on students' linguistic creativity

According to Table 3 and the answers the students respond in the *New Test of Linguistic Creativity Thinking* (chopsticks), and after a carefully counting, we conclude the result that, in the test of linguistic creativity thinking, the testees score in the following four scopes: linguistic fluency, linguistic flexibility, and linguistic originality. The average scores of fluency is 7.65, and the standard deviation is 6.443. The average scores of flexibility is 5.06, and the standard deviation is 3.158. The average scores of originality is 2.30, and the standard deviation is 3.412.

(2) Analysis of the status of class playfulness climate

a. Descriptive analysis on dimensions of class playfulness climate

The "class playfulness climate scale" of this study is adopted form Likert Scale. It can be seen, in Table 4, the average scores of the overall class playfulness climate

Table 4 Lift of the average and standard deviation of factors of class playfulness climate

	Average	Standard deviation	Question
Cooperation and intimacy	3.554	0.010	01, 02, 03, 04, 05, 06, 07
Teacher's support and relaxed interaction	3.285	0.003	08, 09, 10
Having fun together, stimulation of creativity	3.529	0.036	11, 12, 13, 14, 15
Free from trifles and humorous and happy	3.581	0.025	16, 17, 18, 19, 20
Overall class playfulness climate scale	3.514	0.026	

Table 5 Lift of the average and standard deviation of items of class playfulness climate ($n = 388$)

Dimension	Question number	Item	Average	Standard deviation
Cooperation and intimacy	Cp01	Intimacy, friendliness, and pleasing communication	3.67	0.931
	Cp02	Good interaction and accompanied	3.69	0.963
	Cp03	Free and non-restricted interaction within group	3.57	1.002
	Cp04	Comfortable and mutual recognition	3.48	0.976
	Cp05	Mutual assistance and cooperation	3.51	0.990
	Cp06	Mutual familiarity and sharing interest	3.53	0.979
	Cp07	Comfortable and pleasing surroundings	3.43	1.025
Teacher's support and relaxed interaction	Cp08	Less controlling, more supporting	3.31	1.202
	Cp09	Welcome innovate and interesting concepts	3.33	1.202
	Cp10	Support the relaxed interaction in class	3.22	1.168
Having fun together, stimulation of creativity	Cp11	Doing recreation together	3.69	1.058
	Cp12	Sharing the same hobbies	3.65	1.017
	Cp13	Feeling bonded	3.65	1.036
	Cp14	Talking about academic	3.26	1.085
	Cp15	Come up with new ideas in leisure time	3.39	1.022
Free from trifles and humorous and happy	Cp16	Able to see many happy people	3.61	1.035
	Cp17	Not bothering with trifles	3.48	1.060
	Cp18	With a sense of humor	3.83	1.018
	Cp19	Enjoying learning	3.41	1.057
	Cp20	Good-intentions jokes show up often	3.57	1.055

is 3.514, belonging to middle level. Among the options, "Free from Trifles and Humorous and Happy" is the highest with the average scores 3.581. It shows that a class will have higher playfulness climate if the class is not bothering with trifles, and being humorous and happy, while "Teacher's Support and Relaxed Interaction" scores 3.285, which is the lowest.

b. Descriptive analysis of each items of class playfulness climate

The "class playfulness climate scale" consists of 20 items as Table 5. Each item scores between 3.22 and 3.38 belongs to middle level. Among them, the highest items are: "Classmates have sense of humor (3.83)", "I engage in leisure activity

Table 6 Correlation analysis summary table of class playfulness climate and graphic creativity performance

	Overall graphic creativity	Graphic fluency	Graphic flexibility	Graphic originality	Graphic elaboration
Overall class playfulness climate	0.427**	0.398**	0.329**	0.383**	0.146**
Cooperation and intimacies	0.473**	0.329**	0.415**	0.148**	0.127**
Teacher's support, and relaxed interaction	0.231**	0.129**	0.130**	0.138**	0.111**
Leisure together and stimulation creativity	0.405**	0.359**	0.281**	0.231**	0.376**
Not bothering about trifles and humorous joyful	0.375**	0.271**	0.317**	0.353**	0.274**

** When the level of significance is 0.01, (double-tailed), the significant correlations

with my classmates (3.69)", "There is good interaction between classmates, and I'm accompanied (3.69)". It shows that the most important to produce a high class playfulness climate is the humors and happy atmosphere between classmates. The three items with the lowest average are: "Teacher supports the relaxed interaction in class (3.22)", "Teacher controls less, and giver more supports (3.31)", "Teacher is welcome innovate and interesting idea (3.33)". This shows that in the students' concept, the teachers' management toward class remains regularization, and they expect the teachers to be more aware of the cognitive of lifting up the class playfulness climate.

6.3 Analysis of the correlation between class playfulness climate and students' creativity performance

This section applies Pearson Product Moment Correlation to get the relevance of each level's and overall between class playfulness climate and students' creativity performance to analyze if the two have the significant positive relation.

- a. The correlation between "the overall level of the class playfulness climate" and "the overall level of students' creativity performance"

It can be seen, in Table 6, the correlation between "the overall level of the class playfulness climate" and "the overall level of student's graphic creativity" reaches significant positive correlation ($r = 0.427$, $P < 0.01$), and is moderately correlated. In other words, there is significant positive correlation between "the overall level of the class playfulness climate" and "the overall level of student's graphic creativity performance". Therefore, the higher the class playfulness climate is, the better the students' graphic creativity performance.

In Table 7, the correlation between "the overall level of the class playfulness climate" and "the overall level of student's linguistic creativity" reaches significant positive correlation ($r = 0.573$, $P < 0.01$), and is moderately correlated. In other words, there is significant positive correlation between "the overall level of the class playfulness climate" and "the overall level of student's linguistic creativity". Therefore, the higher the class playfulness climate is, the better the students' graphic creativity performance.

- b. The correlation between "the overall level of the class playfulness climate" and "the factors of students' creativity performance".

According to Table 6, there are significant positive correlations between "the overall level of the class playfulness climate" and "graphic fluency", "graphic flexibility",

Table 7 Correlation analysis summary table of class playfulness climate and linguistic creativity performance

	Overall linguistic creativity	Linguistic fluency	Linguistic flexibility	Linguistic originality
Overall class playfulness climate	0.573**	0.453**	0.485**	0.510**
Cooperation and intimacies	0.510**	0.445**	0.415**	0.388**
Teacher's support and relaxed interaction	0.193**	0.120**	0.106**	0.140**
Leisure together and stimulation creativity	0.464**	0.351**	0.316**	0.419**
Not bothering about trifles and humorous joyful	0.412**	0.357**	0.406**	0.410**

** When the level of significance is 0.01, (double-tailed), the significant correlations

“graphic originality”, and “graphic elaboration”. The related index ranges between 0.146 and 0.398, $P < 0.01$. Among them, “graphic fluency” has the highest correlation ($r = 0.398$), while “graphic elaboration” has the lowest correlation ($r = 0.146$). It shows that the higher class playfulness climate lifts up students’ creativity of “graphic fluency”.

According to Table 7, there are significant positive correlations between “the overall level of the class playfulness climate” and “linguistic fluency”, “linguistic flexibility”, and “linguistic originality”. The related index ranges between 0.453 and 0.510, $P < 0.01$. Among them, “linguistic originality” has the highest correlation ($r = 0.510$), while “linguistic fluency” has the lowest correlation ($r = 0.453$). It shows that the higher class playfulness climate lifts up students’ creativity performance of “linguistic fluency”.

To sum up the previous statistical results, there is significantly positive correlation between class playfulness climate and students creativity performance. Therefore, H1 is valid: “The correlation between class playfulness climate and students creativity performance is significantly positive.”

3. Regression analysis of class playfulness climate and students’ creativity performance
The study applies regression analysis to test the perdition that class playfulness climate has on students’ creativity performance. In Table 8, it shows the four variables inputting in “Corporation and Intimacy” make the regression model reach significant level. ($F = 31.862$, $P < 0.01$) In other words, among the variables of class playfulness climate, only “Corporation and Intimacy” attains the significant level. Therefore, “Corporation and Intimacy” has prediction, and its prediction can be explained to be 26%. From the standardized regression coefficients’ point of view, the “ β value” of “Corporation and Intimacy” is positive. It means, when the dimension which represents the class is higher, the students’ creativity performance is higher, too. Therefore, the second assumption of this study is partly valid: class playfulness climate has direct prediction on students’ creativity performance.

7 Discussion

This study finds that the testee students’ achieve the most obvious performance in elaboration of graphic creativity aspect, showing that students will add new concepts and interesting details to the original idea. Their ability of compose the group of related concepts is obvious. However, the details they adding to the original idea should be related to the topic. On

Table 8 Stepwise regression analysis summary table of class playfulness climate dimension and students' graphic creativity performance ($n = 388$)

Order of the selected variables (R)	Multiple correlation coefficient (R)	Coefficient of determination (R^2)	Adjusted (R^2)	F value	Original regression coefficient (β)	T value	Tolerance (λ)	Condition index (CI)
Intercept (constant)								1.000
Cooperation and intimacies	0.510	0.260	0.251	31.862**	0.145	-2.605**	1.000	19.761

** $P < 0.01$

the other hand, the students outstand the most in fluency among linguistic creativity aspect, but the average of the performance has no big difference with flexibility and originality. The whole class playfulness climate met the standard of upper intermediate, and the highest average among all aspects was “relaxed, casual, humorous, and happy.” It can be seen, to vocational high school students, managing and creating a fun and happy class atmosphere is important. Csikszentmihalyi (1975) holds that, in a rather free atmosphere, playfulness tends to occur, and it’s also helpful to stimulate positive situation. Thence, the humor, laughter, supports, self-guidance, and expecting of challenge and pleasing environment in workplace have importance implications to the members. In the various performance aspects of class playfulness climate, “humorous classmates” tops. Sense of humor is indeed an important element and lubricant for class playfulness climate.

During the verification of the hypothesis, we know that there is significant positive correlation between the overall level of class playfulness climate and students’ graphic and linguistic creativity performance. That is, the higher class playfulness climate indicates the higher graphic and linguistic creativity of the students. Wu (2002a,b) research finds that there is significant correlation between “creative classroom atmosphere” and technological creativity. An ideal creative classroom atmosphere should consist of concepts such as freedom, finding, independence, and high-level thinking. (Sak 2004) Tseng (2002) discovers that students no matter have high or low playfulness can perform better creativity as long as they are aware of the higher environmental supporting. Aiming 197 employees in the creative department of 27 advertising companies as subjects, Kuo (2002) finds that the correlation between the organizational innovation climate and the organizational innovation performance is significantly positive. Huang (2007) chooses the employees in Taiwan’s service and gold industry as subjects, and finds there is positive correlation between the team innovation climate and the creativity of the origination. However, this study can indicate more clearly that the better class playfulness climate brings up better creativity performance of the students. If so, we can encourage the teachers to manage good class playfulness climate and find a feasible way to improve the students’ creativity, making them achieve higher creativity naturally by the everyday interaction between the members, which is a mutual built atmosphere of free, pleasing, interesting, and supporting.

Tseng (2002) indicates that there is interaction between “playfulness” and “creative climate”. Graduates have higher playfulness will perform more innovate behaviors due to the aware of higher creative climate. This study applies multiple regression analysis to test the prediction of class playfulness climate to students’ creativity, showing among the four variables, “Corporation and Intimacy” reaches the significant level. Therefore, “Corporation and Intimacy” has prediction. On the other hand, if a class playfulness climate with cooperation, mutual recognition, and open group atmosphere between the members is created, the students’ creativity would be lifted.

8 Conclusion

Creativity performance is the precondition required for organizational innovation, in the contemporary volatile especially under circumstances of rapid change, development of new technologies, rapid changeover, and global competition, working environments (Amabile 1988; Egan 2005; Hargadon and Sutton 2000; Malakate et al. 2007; Shalley and Gilson 2004; Tierney et al. 1999; Zhou and George 2001). Although prior research has identified enhancing the creative performance of employees has been suggested as critical for remaining competitive in a rapidly changing environment and for improving the overall innovativeness

of a firm (e.g., Amabile 1988; Kanter 1988; Shalley 1991), this research focused on clarify this association-and examine potential moderators of the association-by conducting a quantitative study considering the class playfulness climate effect on students' creativity performance.

Despite researchers have responded to the growing significance of creativity by attempting to identify factors that influence the creative performance at work, social, personal and contextual factors, such as intrinsic motivation (Amabile 1996; Eisenberger and Shanock 2003; Prajogo and Ahmed 2006); work-related and non-work-related sources of support (Egan 2005; Madjar et al. 2002); social and contextual factors (Shalley and Gilson 2004); assessing job candidates' creativity (Malakate et al. 2007); individual characteristics (McIntyre et al. 2003); supervisory style (Oldham and Cummings 1996); Stress (Byron et al. 2010); internal competition between teams (Baer et al. 2010; Birkinshaw 2001; Kanter et al. 1997; Marino and Zbojnik 2004); psychological well-being (Wright and Walton 2003), humor (Chen and Shu 2006) and work environment features, such as job characteristics and organizational control (Kets de Vries 2001; Lewis and Moultrie 2005; Shalley et al. 2000) have all been demonstrated to influence creative performance, summarized the employees' creative performance at work of researchers, the researcher finds that the factors that affect their creative output in addition to the individual's own characteristics, and the environment in which individuals, work characteristics and work groups are also concerned, the creativity document has only focus on single factor exploration and yet to explore what factors influence employee creativity completely and systematically. Therefore, it is important to integrate related document and relative factors exploration systematically and build an adequate and definite model. This study was tried to examine the extent to how playfulness contributes to creativity, obviously. Many vocational students have to enter workplace after graduate immediately. By understanding vocational students' creativity performance and exploring the method to improve their performance, it would be undoubtedly helpful to the vocational students who are ready to enter the workplace. This study is different from other previous research which focusing on employees. To aim the vocational students who are possible entering the workplace early, and to understand the vocational students' creativity performance and to explore lifting up the students' creativity performance are the points of this study.

This study firstly reviews the related documents in the past, integrating different scholars' concepts of definition of creativity, finding that creativity consists of fluency, flexibility, originality, elaboration, and so on features. And with this reference, we introduce *New Test of Creativity* to survey the dimensions of the scale in the operation of research tools, and test students' creativity performance of graphic and linguistic respectively. Te new measurement is more concrete and direct to comprehend the students' creativity performance than the normal measurement in the past.

Besides, reviewing the past, most studies focused on the behaviors of children. This study broke through the tradition, extending the object to vocational high school students. Basing on Glynn and Webster (1992) theory of adult playfulness, we further integrate and develop into "class playfulness climate scale" to apply in this study. However, few studies have focused on an understanding of how playfulness is related to creativity performance. No studies analyze the connection between playfulness climate and creativity at the same time. Comparing to the study in the past, this study made different breakthrough and approach by attempting to analyze the correlation between class playfulness climate and students' creativity.

Finally, the result indicates that when the class playfulness climate is well, the students' creativity performance is better. The "cooperation and intimacy" variable of class playfulness climate has directing prediction on students' creativity performance.

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