

THE ASSOCIATION BETWEEN STUDENT ENGAGEMENT AND CREATIVITY OF UNDERGRADUATES IN CHINA

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Abstract

The purpose of the study aimed to: (a) determine to what extent undergraduates expect their college courses; (b) measure the degree to what extent what degree undergraduates engage in their college courses; (c) measure the degree to what extent undergraduate feel their capability of creativity; and (d) examine the degree to which student engagement and their creativity are associated. The study applied a non-experimental, correlational design and used survey responses from 431 randomly selected undergraduates to address the research questions. The findings are as follows. First, the majority of the students have high expectation on their courses and they put feedback as their first priority. Second, most of the Chinese students still attach great importance to their homework. However, the low percentage in reflection shows that the students still lack the habit of doing self-reflection. Third, Chinese undergraduates have fair creativity ability and the students scored their creativity on behavior highest and the creativity on knowledge system lowest. Fourth, student engagement has a positive relation to their creativity on knowledge system, creativity on behaviors, creativity on personalities and creativity on innovative thinking. Among which, the students' enhanced engagement has a most direct impact on their creativity on behaviors.

Keywords: *Higher education, student engagement, creativity, undergraduates.*

1. Introduction

The development of students' creative thinking is imperative for college students in China. Previous research has demonstrated students' active engagement as a facilitator to creative thinking development for Chinese college students (Shen 2003; Yuan & Yan, 2009). However, the great enthusiasm stands in sharp contrast to the limited research in this field. In China, the relevant study is still at a primary stage and there is a great need for in-depth quantitative analysis. Therefore, this study is conducted to fill the methodology gap and to provide a deeper understanding in this field.

This paper has four research questions listed as follows. Research questions 1 to 3 are descriptive questions. Research question 4 aims to find out the association between two variables, student engagement and their creativity.

Research Question 1 (RQ1): To what extent do undergraduates expect their college courses?

Research Question 2 (RQ2): To what degree do undergraduates engage in their college courses?

Research Question 3 (RQ3): To what extent do undergraduate feel their capability of creativity?

Research Question 4 (RQ4): Is there an association between student engagement and their creativity?

2. Literature review

One of the most important fundamental theoretical frameworks on creativity is the Four P framework which focus on the Four Ps, namely, person, product, process and press (environment). In 2007, Four C framework has been developed based on the previous theory. This theory were proposed by Beghetto and Kaufman (2007) who distinguished the little C with the Big C with the former referring to the everyday creativity and the latter means the eminent creativity. In 2009, Beghetto and Kaufman added Pro-C to their framework and supported the idea that years of hard-working and practice could sharpen one's creative abilities and therefore lifted him or her to the position of experts. This process echoes Richard Paul's critical thinking theory which illustrates the way from a "unreflective thinker", "challenged thinker", "beginning thinker", "practicing thinker", to "advanced thinker" to the "accomplished thinker" (Paul & Elder, 2009, p. 20).

As for the key ingredients necessary for creativity, Amabile and Pratt (2016) point out the Componential Model of Creativity, which includes three interconnected variables, namely domain-relevant skills, creativity-related process and intrinsic and extrinsic motivation. Besides studying the key components to creativity, others have researched the driving force for people to become creative (Forgeard & Mecklenburg, 2013; Gruber, 1998). According to Csikszentmihalyi (1996), one of the most important motivator to creative is Flow which refers to achieving sense of fulfillment just by doing the things.

In terms of the assessment of creativity, Guilford's Presidential address marks the beginning of the scientific research of creativity. Since then, many assessments have been developed to test the participants' creativity skill and creative personality. Among the instruments of creativity, Getzels and Johnson's (1962) DT test, Guilford's structure of Intellect (SOI) divergent production tests and Torrance's (1974, 2008) Test of Creative Thinking (TTCT) stand out. For the reliability for the SOI, TTCT, and TTCT are quite convincing. Getzels and Johnson's DT test (1962) requires the participants to give multiple responses and their answers would be valued based on fluency, originality, flexibility and elaboration. In other words, the uniqueness and the extension of ideas matter a lot in the test. In a reanalysis of Torrance data found the DT tests were 3 times better than the IQ test for predicting the creativity ability.

As for the students' engagement, there are many variables affecting to students' engagements, such as age (Finn, 1989); gender (Finn & Cox, 1992); scores (Zen, 2001); teachers (Shen, 1994) and etc. As to age, researchers in China have found one interesting fact that might contrast to the previous findings of Finn (1989) who proposed that the level of students' engagement would increase according to their age. In 2009, Tsinghua University has introduced and modified the NSSE. Scholars have proved the reliability and validity of the Chinese version of NSSE based on Classical Test Theory (CTT), Item Response Theory (IRT) and Confirmatory Factor Analysis (CFA) (Guo, Tu, & Shi, 2013). Studies have found that the more time and energy students are willing to put in their academic study, the more likely they will get satisfactory results.

3. Methodology

3.1. Research design

The study applied a non-experimental, correlational design and used survey responses from undergraduates to address the research questions. The target population was undergraduates (including freshmen, sophomores, juniors, and seniors) in education major in Shanghai universities. Due to practical constraints, convenience sample was employed.

3.2. Instrumentation

A web-based survey was used to collect the data for this non-experimental study. The contents of the survey included four sections: (a) demographic information (i.e., gender, grade level, and birthplace); (b) students' course expectation (i.e., expectation of course planning, class delivering, formative assessment, and summative assessment); (c) student engagement; and (d) students' capability of creativity.

The scale of students' course expectation was developed by the authors and is based on a powerful and meaningful learning cycle. The scale aimed to assess to what extent that students expect the provided college courses. The scale used a 5-point response option for each item.

The student engagement scale was also developed by the authors to assess the extent to which students would like to participate in the courses: (1) previewing course content, (2) concentration in lectures, (3) responding questions in class, (4) group discussions, (5) peer work, (6) homework, (7) reflection, and (8) call for assistance in office hours. The scale used a 4-point response option for each item, with anchors at 1-not at all, 2-seldom, 3-sometimes, and 4-often. Higher scores corresponded to higher class engagement.

The scale of undergraduate capability of creativity was based on Zhu, Li, and Zuo's (2010) study. The scale aimed to examine the extent to which undergraduates perceived their capabilities of creativity. This scale includes four subscales: (1) system of knowledge, (2) characteristics of behaviors, (3) personalities, and (4) innovative thinking (see Table 1 for details). The scale applied a 5-point response option for each item, with anchors at 1-not at all, 2-seldom, 3-sometimes, 4-often, and 5-always. High scores corresponded to higher perceptions of creativity ability.

3.3. Data analysis and presentation

Descriptive analyses provided information as to students' expectations on their college course, student engagement, and undergraduate creativity ability. The study also used correlational analysis

methods to identify whether student engagement were associated with each aspect of undergraduate creativity ability. SPSS 25.0 was used to analyze the collected data using an alpha level of .05 for identifying statistically significant results.

4. Results

The study applied a non-experimental, correlational design and collected 431 survey responses from undergraduates in China to answer the research questions. The target population was undergraduates (including freshmen, sophomores, juniors, and seniors) in Shanghai, China. Demographic information regarding the respondents reveal that the ratio of females and males were nearly 91.88% to 8.12%, respectively. The respondents' ages were in the range of 18 to 22. The percentage of freshmen, sophomores, juniors, and seniors was 33.41%, 29.23%, 23.67%, and 13.69% respectively.

4.1. Research question 1 (RQ1): Description of undergraduates' expectation to their college courses

RQ1 determines to what extent undergraduates expect their college courses. Table 1 below shows the descriptive statistics for the measure of undergraduates' expectation mean and its sub scales.

Table 1. Descriptive statistics for the overall scores and subscales of the measures of undergraduate's expectation.

	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
Undergraduate's expectation (Average)	4.23	.71	1	5
Planning (item1, 2)	3.99	.86	1	5
Delivery (item 4, 7)	4.04	.73	1	5
Assessment (item 5)	3.99	.65	1	5
Feedback (item 3, 6, 8)	4.06	.71	1	5

4.2. Research question 2 (RQ2): Description of student engagement

RQ2 examines to what degree undergraduates engage in their college courses. Table 2 below shows the descriptive statistics for the measure of student engagement mean and its subscales.

Table 2. Descriptive statistics for the overall scores and subscales of student engagement.

	<i>Cronbach's Alpha</i>	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
Student engagement (8-item mean)	.79	3.17	.40	1	4
Item 1: Preview	-	2.80	.71	1	4
Item 2: Concentration in lectures	-	3.05	.70	1	4
Item 3: Responding questions in class	-	3.38	.65	1	4
Item 4: Group discussions	-	2.90	.71	1	4
Item 5: Peer work	-	3.53	.54	1	4
Item 6: Homework	-	3.88	.35	1	4
Item 7: Reflection	-	2.93	.65	1	4
Item 8: Call for assistance in office hours	-	2.92	.67	1	4

4.3. Research question 3 (RQ3): Description of undergraduates' creativity

RQ3 measures the degree to what extent undergraduates' capability of creativity. Table 3 below shows the descriptive statistics for the measure of undergraduates' self-reported creativity mean and its subscales.

Table 3. Descriptive Statistics for the Subscales of Undergraduate's Creativity.

Undergraduates' creativity	<i>Cronbach's Alpha</i>	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	<i>Numbers of Items</i>
Knowledge System	.865	3.16	.78	1.00	5.00	4
Behavioral Characteristics	.923	3.59	.69	1.25	5.00	8
Personalities	.889	3.49	.76	1.50	5.00	6
Innovative Thinking	.935	3.41	.73	1.16	5.00	6

4.4. Research question 4 (RQ4): The association between student engagement and undergraduate's creativity

Student engagement was significantly correlated to each subscale of undergraduate creativity: knowledge system ($r = .311$), behavioral characteristics ($r = .405$), personalities ($r = .350$), and innovative thinking ($r = .373$). The overall student engagement was regressed on the subscale rating they gave regarding the undergraduate creativity across four components (knowledge system, behavioral characteristics, personalities, and thinking characteristics).

Table 4. Descriptive statistics and Pearson correlations between key variables in the regression models.

Variables	Correlations			
	2	3	4	5
1. Student Engagement	.311**	.405**	.350**	.373**
2. Creativity-Knowledge System		.648**	.451**	.560**
3. Creativity-Behavioral Characteristics			.719**	.736**
4. Creativity-Personalities				.798**
5. Creativity-Innovative Thinking				

*p<.05; **p<.01

In linear regression model, the undergraduate's creativity on knowledge system, behavioral characteristics, personalities, and creative thinking was respectively regressed on the total rating of student engagement across eight components in which they participated. The full model was statistically significant.

Table 5 reveals regarding student engagement explained 9.6% additional variance, $F(1,430) = 45.789$, $p < .001$, $\Delta R^2 = .096$, and was statistically significant and is considered to be a medium effect. When student engagement rating increased by a value of one point, their creativity on knowledge system would increase by .603 point ($b = .603$, $p < .001$).

Table 5. Summary of linear regression results predicting creativity on knowledge system from student engagement.

	b	SEb	β	t	p
Predictor Variable:					
Student Engagement	.603	.089	.311	6.767	.000

* $p < .05$ ** $p < .01$ Note: $R = .311$, $R^2 = .096$, $F(1, 430) = 45.789$, $p < .001$

Table 6 reveals regarding student engagement explained 16.4% additional variance, $F(1,430) = 83.95$, $p < .001$, $\Delta R^2 = .164$, and was statistically significant and is considered to be a large effect. When student engagement rating increased by a value of one point, their creativity on behaviors would increase by .693 point ($b = .693$, $p < .001$).

Table 6. Summary of linear regression results predicting creativity on behavioral characteristics from student engagement.

	b	SEb	β	t	p
Predictor Variable:					
Student Engagement	.693	.076	.405	9.162	.000

* $p < .05$ ** $p < .01$ Note: $R = .405$, $R^2 = .164$, $F(1, 430) = 83.950$, $p < .001$

Table 7 reveals regarding student engagement explained 12.1% additional variance, $F(1, 430) = 59.928$, $p < .001$, $\Delta R^2 = .121$, and was statistically significant and is considered to be a medium effect. When student engagement rating increased by a value of one point, their creativity on personalities would increase by .659 point ($b = .659$, $p < .001$).

Table 7. Summary of linear regression results predicting creativity on personalities from student engagement.

	b	SEb	β	t	p
Predictor Variable:					
Student Engagement	.659	.085	.350	7.741	.000

* $p < .05$ ** $p < .01$ Note: $R = .350$, $R^2 = .123$, $F(1, 430) = 59.928$, $p < .001$

Table 8. Summary of linear regression results predicting creativity on innovative thinking from student engagement.

	b	SEb	β	t	p
Predictor Variable:					
Student Engagement	.679	.082	.373	8.321	.000

* $p < .05$ ** $p < .01$ Note: $R = .373$, $R^2 = .139$, $F(1, 430) = 69.231$, $p < .001$

Table 8 reveals regarding student engagement explained 13.7% additional variance, $F(1, 430) = 69.231$, $p < .001$, $\Delta R^2 = .137$, and was statistically significant and is considered to be a large effect. When student engagement rating increased by a value of one point, their creativity on innovative thinking would increase by .679 point ($b = .679$, $p < .001$).

5. Discussion

As for RQ1, “To what extent do undergraduates expect their college courses”, results show the majority of the students have high expectation on their courses and their highest expectation is on the feedback.

In terms of students’ various forms of engagement in classroom, we have find that almost all students could complete and submit the assignments on time and over 90% of participants reported they “often” participate in responding questions and peer work. Findings show that the majority of the Chinese students still put the first priority on their scores, and therefore, attach great importance to the homework. However, the low percentage in reflection shows that the students still lack the habit of doing self-reflection, which might hinder them from achieving greater results in their future academic study.

As for the description of their self-reported creativity, we have found that across the four sections of undergraduate’s creativity, the mean is above 3.16, which reveals that undergraduates had fair creativity. the lowest one for creativity on knowledge system (mean = 3.16). This finding echoes with the previous research that a solid knowledge foundation is the prerequisite to creativity (Li & Tang, 2016).

Regarding the associate between student engagement and undergraduate’s creativity, we have found that When student engagement rating increased by a value of one point, their creativity on knowledge system would increase by .603 point ($b = .603, p < .001$), their creativity on behaviors would increase by .693 point ($b = .693, p < .001$), their creativity on personalities would increase by .659 point and their creativity on innovative thinking would increase by .679 point.

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