

A Study on the Relationship among the Characteristics of Students of Creativity Courses in Universities of Science and Technology, Creative Knowledge Learning, and Creative Teaching Effectiveness

Shen, Tsui-Lien

Professor, Center for General Education, National Formosa University, Taiwan.

Chang, Chia-Lin

Doctor, Department of English, Hong Kong Polytechnic University, Hong Kong S.A.R.

Abstract

One of the purposes of this study mainly aimed at exploring the relationship among the characteristics of students of creativity courses in universities of science and technology, creative design knowledge in products, and creative teaching effectiveness. Moreover, the researchers, analyzed the work “Fun Electric Doll” about the Award of Best Entrepreneurship of the National Contest of Creativity. And, to observe and record students’ learning performance of transformation of creative knowledge was another purpose of this study. The methodology adopted by this research consists two approaches: 1. Using quantitative questionnaire to investigate 84 students about creative knowledge learning management; 2. Using qualitative analysis to examine teachers’ file of creative instruction and measure the performance of students’ products.

The conclusions as following: 1. The creative characteristics of students of creativity courses are different from those of people who are highly creative. 2. Students of creativity courses have best creative knowledge learning in ‘management of team knowledge’. 3. The experience of attending clubs of students of creativity courses enhances students’ performance of team work. 4. The level of bond of teams in the quality of teamwork is different from the one in the performance of team knowledge management. With the regard of all the above conclusions, the following suggestions included: 1. Encouraging teams in creative courses to discover, share and practice creative learning. 2. Consolidating instructors’ beliefs and strategies of creative instruction. 3. Promoting students’ capability of tacit and explicit knowledge transformation.

Keywords: Courses of Creativity, Creative Knowledge Learning, Design of Creative Product, Creative Instructor Teaching.

Introduction

In this boundless, ever-changing globalized market, in which knowledge is the niche for competition and cooperation, creative knowledge has already become an index that leads civilization into a continuous advance. In 1994, “Developing a nation of creativity” became the cultural development policy in Australia. In “Renaissance City Report” at 2000, Singapore government clearly indicated that cultivating every Singapore citizens to become innovative, having multidisciplinary learning ability, and competitive individuals to enhance the country's sense of beauty and taste, and national competitiveness. According to the United Nations Conference on Trade and Development (UNCTAD) in 2008, the creative economy in the world's major exports are still in the possession of the United Kingdom and the United States and other developed countries, in particular the services related to creativity.

For example, to cultivate cultural and creative-talented individuals, and to develop the country as the international culture and creativity nation, the United Kingdom established National Skills Academy for Creative & Cultural Skill (NSA) in 2008. (<http://www.ceskills.org.uk/> ; <http://www.artsinform.com/>). In Taiwan, the Ministry of Education (MOE) announced the future creativity education vision and its planning principles and implement ([http:// www.creativity.edu.tw](http://www.creativity.edu.tw)).

Vista (2000) stated teachers must develop more creative teaching methods to educate students of this generation because traditional approaches are no longer sufficient and effective teaching tools. It is especially true that valuing individual differences and creativity and emphasizing creativity investment, process, production, and function will improve the creativity output. The traditional role of teachers are the knowledge transferors and advertiser, students are knowledge receivers and reproducers. Applying tacit knowledge and explicit knowledge will enhance creativity learning.

The study investigates Technology University students' creative personality traits, creative learning, and the effectiveness of creative teaching.

Theoretical Framework

University is the headquarters for cultivating the innovative social workers; the

creative curriculum in university can nurture the students effectively to identify problems, to create ideas, to have concrete actions, to do problem solving, and to have innovative knowledge. It will be also helpful for the creation of new products, services, new jobs and the social development advantages. Hope (2010) pointed that the creative work requires creativity, knowledge, skills and the ability to make choices. The term creativity was firstly proposed by Guilford in 1950 at the American Psychological Association. Guilford (1967) stated that creativity represents the behaviors of divergent thinking, and the fluency, flexibility and creativity are its three features. In the era of knowledge economy, creativity has become a valuable resource. University is the center of the knowledge economy. It represents not only the source of vitality and creativity, but the bridge to connect students with industrial society. Necka (1986) indicated that the environment, motivation, personality, potential, and skills are factors to shape various typology of creative talent.

Through collecting, organizing, sharing, adopting, using, creating, and confirming the creative knowledge learning, a university faculty member is able to encourage students to adjust or apply new knowledge for running creative teams, giving play to the team potential, enhancing working quality, and managing team knowledge, which will develop students' creativity and enhance teaching effectiveness.

Description of Study Design

The subjects are 105 of two classes students who took "creative thinking and design" class. A questionnaire, creative personality and knowledge learning survey, was distributed to the subject near the end of semester. 84 responded surveys were collected and the return rate is 80%. SPSS was used to analyze data.

Also, three university faculty members who are specialties at patented invention, creative teaching, and product design were invited as evaluators to evaluate 17 products students made through the whole semester along with students' writing reports, verbal inquiries and discussion logs, and the researcher's teaching portfolio. Table one presents the statistical findings of the subjects' background. Table two presents the 17 products and priorities..

Table 1
Subjects' background

Category	Property	Student number(n)	Percentage (%)
Gender	Male	76	90.5
	Female	8	9.5
Organization experience	Yes	50	59.5
	No	34	40.5
Major	Engineering	54	64.3
	Management	4	4.8
	Computer Engineering	23	27.4
	Liberal Arts and science	3	3.6
Grade Level	Freshman	9	10.7
	Sophomore	62	73.8
	Junior	7	8.3
	Senior	6	7.1

Table 2
Student products evaluation

Team	Product	Evaluator A	Evaluator B	Evaluator C	Sum	Rank
Golden knife	Ashes & dust	91	84	86	261	5
Wizard	Fun Electric Doll	88	95	86	269	1
G • K	Thunders	81	86	85	252	8
J & C	Teleport door	94	91	83	268	2
Dragon	Super markers	82	89	83	254	6
Combo	Brothers	85	82	79	246	12
LDS	Magic space	83	88	77	248	10
Money	Saving collar	78	78	82	238	16
East	Glasses	77	87	87	251	9
Lion	G cup	79	82	84	245	13
Light	X pot	75	75	76	226	17
Chicken	Coaster	80	80	80	240	15
God	X markers	87	89	88	264	4
Combination	Belt	90	88	89	267	3
Extreme	Water	86	85	83	254	6
None	Fans	88	75	85	248	11
National	Xmas bulb	85	79	80	244	14

Results and Discussion

1. Creative personality traits analysis

The result showed the top 10 creative personality traits are interest in a wide range

(N = 47), love to think (n = 44), honest (n = 41), informal (n = 39), humorous (n = 37), insightful (n = 36), polite (n = 35), sincere (n = 34), capable (n = 33), and ordinary (n = 32).

The top 10 creative personality traits showed in this study are different from the findings of Davis and Subkoviak (1975), Woodman, Sawyer, and Griffin (1993), and Bobic, Davis, and Cunningham's (1999) studies. Davis and Subkoviak (1975) believed the creative personality traits are confident, independent, willing to take risks, energetic, enthusiastic, bold, curious, having an innocent heart of a child, loving aesthetics, idealistic, and being emotionally sensitive. Woodman, Sawyer, and Griffin (1993) believed intelligent, independent, confident, risking taking, self controlling, and be able to tolerance of ambiguity are the creative personality traits. Bobic, Davis, and Cunningham's (1999) claimed that interest in a wide range, attracting by the complex of things easily, having sensitive instinct, having high level aesthetic standards, able to tolerate to the blurred situation, and having strong confidence are the creative personality traits.

The study indicates the four creative personality traits that are different from other studies: honest, polite, sincere, and ordinary. It might be due the reason that the creativity performance in this study is presented via team work while the study focuses on personal performance. To work as a creative team, students would have to think reflectively and discuss and practice from various perspectives to make their own products. Data collected from students' writing reports and verbal inquiries indicates that students believe a good creative teamwork relies on being honest, being polite to accept others opinions, and being sincere and ordinary to achieve the group harmony.

2. Learning creative knowledge

Table three presents the analysis of the creative knowledge learning of students. By analyzing the creative knowledge of students, the study found that students' best performance is at team knowledge management, then giving play to the team potential, and the last is teamwork quality.

Table 3 Student performance in creativity learning

Team Items Data Background		Team potential		Team performances		Team knowledge management	
		M	SD	M	SD	M	SD
Major	Engineering	37.7037	5.2003	32.4444	5.8814	21.3704	4.6836
	Management	35.7500	4.1130	29.5000	4.7958	21.2500	2.8723
	Computer Engineering	38.4783	7.4947	29.9130	7.1599	20.6957	5.0040
	Liberal Arts and science	36.0000	6.2450	33.6667	3.7859	24.0000	4.5826
	F value	.357		1.170		.457	
Grade level	Freshman,	37.6667	4.7958	30.8889	6.7165	22.5556	4.8505
	Sophomore,	37.5806	6.1818	31.2581	6.2932	20.7581	4.8101
	Junior	38.0000	3.6056	34.0000	5.1962	23.2857	2.8115
	Senior	39.5000	6.6558	34.1667	5.7067	22.3333	4.4121
	F value	.196		.786		1.014	
Team coherence level	Very high	40.7500	7.6858	34.2500	4.9497	21.8750	5.4100
	High	37.3810	6.8226	35.9048	5.1760	23.5238	4.8541
	Medium	37.0851	4.9818	30.3617	5.3178	19.7872	3.9228
	Low	39.0000	5.9330	27.5000	7.0640	22.3333	4.9666
	Very low	42.0000	5.6569	19.5000	4.9497	27.0000	4.2426
	F	1.035		7.882***		3.695**	
	SF (Multiple Comparison)			Very high>very low high>medium, low, very low		high>medium	

Note. ** $p < .01$ *** $p < .001$

While analyzing the survey items, we found the five items “I will fully concentrate on the activities I love to do, and I will try my best to do it”, “the instructor welcomes creative and interesting concepts”, “I will share my creativity with others”, “the way our instructor teach us is less control but more support”, “I want to do the things I love to do, and I do care about the rewards but to achieve the goals” were the top five items mostly selected by students.

Torrance (1972) stated that the creativity is teachable. The study showed that the instructor could be influential to the creative instruction. The instructor who

applied creative concepts in teaching, students will have higher motivation. In other words, the teacher who is able to use creative teaching approaches and materials will enhance learning motivation of students as well as their creativity production.

3. Products analysis: Fun Electric Doll

From a social experience sharing point of view: The product “Fun Electric Doll” was inspired by team members experiences of the inconvenience of connecting electronic appliances to the power socket, and their observations of Russian doll’s collectibleness(Shen,2010). Their innovation was driven by the explicit knowledge from the team members’ sharing of creative knowledge and ideas. From the point of view of social resource integration, the creative team integrated the information collated from the information network, the hypermarkets marketing resources, and the patent search to meet both product specifications and cost requirements to achieve the feasible innovation.

From an external resolution point of view, the creative wizard team once designed their organizer products utilizing the idea of stacking inspired by the famous Japanese Tarepanda plush. However, their divergence thinking frequently failed to find solutions when it came to issues such as junction box and wiring problems, wiring configurations, power issues, and price issues. To deal with this difficulty, team members applied convergent thinking instead to improve the external production process to reach solutions to particular problems. By searching related information for product making and problem solving, evaluating procedures, preparing materials, consulting professionals, writing teamwork plan, implementing working plan, solving problems, running tests, coloring, assembling three funny dolls, and recording, the team effectively using their both tacit and explicit knowledge. The product picture and patent are indicated as the follow figure 1- 4.

Conclusion

First, there is significant difference between student personality traits and traits of highly creative people. The result showed the top 10 creative personality traits are interest in a wide range, love to think, honest, informal, humorous, insightful, polite, sincere, capable, and ordinary. These creative personality traits showed in this study



Figure 1 The Fun Electric Doll-division



Figure 2 The Fun Electric Doll-all in one

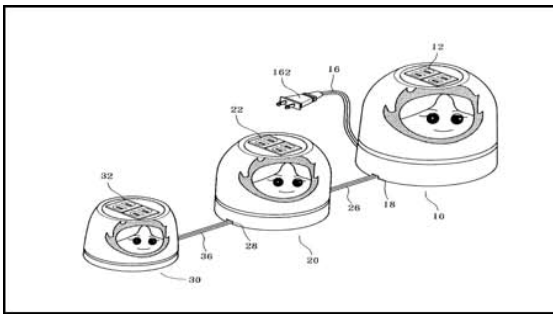


Figure 3 The Fun Electric Doll's patent-A

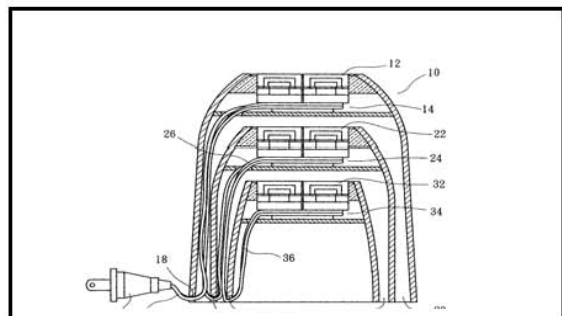


Figure 4 The Fun Electric Doll's patent-B

are different from the findings of Davis and Subkoviak (1975), Woodman, Sawyer, and Griffin (1993), and Bobic, Davis, and Cunningham's (1999) studies. The reason can be due to the reason that a team creative work requires the teamwork among leaders, facilitators, organizers, collectors, and executors. Individual creative works, however, merely needs an individual thinker, which is associated with personality traits related to confidence, individualism, and risk taking.

Second, students' best performance is at team knowledge management. The study found that students' best performance is at team knowledge management, then the team potential, and the last is teamwork quality. While analyzing the survey items, researchers found items such as "I will fully concentrate on the activities I love to do, and I will try my best to do it", "the instructor welcomes creative and interesting concepts", "I will share my creativity with others" are meaningful and important for students. The creativity is teachable, and therefore student creative learning achievements will be benefit from appropriate team knowledge management. Also, we found the creative team knowledge management can be benefit from group discussion, idea sharing, and peer recommendations in class.

Third, in terms of the team coherence, there is significant difference between teamwork quality and team knowledge management. The study found that there is no

significant difference between student major and grade levels in terms of creative knowledge learning performance. However, the team with high coherence level can be beneficial for teamwork quality and team knowledge management. And last, excellent student works are affected by tacit knowledge and explicit knowledge.

Suggestions

The teamwork creativity can happen to everyone, and it is not similar to traditional personality traits with highly creativity such as interest in a wide range, love to think, informal, insightful, and capable. While teaching a creative course, a teacher should promote team probing, sharing, and practicing. The study indicates the team creative performance is affected by teacher and student attitudes, there is significant difference between teamwork quality and team knowledge management in terms of team coherence, and the teacher-student interaction is critical for creative knowledge management. An effective teacher should know how to teach, what to teach, the reasons of applying specific teaching techniques, and the resources for teaching. Promote students' competence in the explicit and tacit knowledge transfer, it would be significantly impacts on the manufacturing of the innovative products. It would help to promote products' overall creativity if instructors could provide students with more guidance about transferring the explicit and tacit knowledge.

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科技大學創意課程學生人格特質、 創意知識學習和創意教學成效關係之研究

沈翠蓮

國立虎尾科技大學通識教育中心教授

張家麟

香港理工大學英語系博士

摘 要

本研究旨在探究科技大學創意課程學生的人格特質、知識學習和創意教學成效的關係，以及探析研究者經過一學期創意思維與設計課程實際教學後，指導學生組隊參加全國創意的發想與實踐競賽，榮獲最佳創業獎【Fun電娃娃】作品在創意知識轉化的學習表現。本研究方法採行量化問卷調查統計 84位修課學生的創意人格特質和知識學習管理，質性分析教師教學創意課程檔案和學生創意作品成果。

綜合研究成果獲致以下結論：1. 創意課程學生創意人格特質和高創造力者人格特質表現有差異。2. 創意課程學生創意知識學習以團隊知識管理最佳。3. 有社團經驗的創意課程學生有助於團隊工作品質表現。4. 團隊凝聚力在團隊工作品質和團隊知識管理表現有差異。據上結論提出以下建議：1. 鼓勵創意課程團隊探索、分享和實作創意學習。2. 增強教師創意教學信念和策略。3. 充實學生顯性和隱性知識轉化能力。

關鍵辭：創意課程、創意知識學習、創意產品設計、創意教師教學