

## A STUDY OF THE TEACHING AND ASSESSMENT FOR THE CREATIVE THINKING AND METHODS COURSE INTEGRATED WITH THE THEORY OF MULTIPLE INTELLIGENCES

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**ABSTRACT.** *This study is aimed at exploring the impact of integrating the teaching and assessment of the theory of multiple intelligences into the “creative thinking and methods” course on the students’ multiple intelligences tendency, professional theories, and practical capability learning outcome. This study adopted the nonequivalent quasi-experimental design for its experimental teaching. The target students were day school freshmen students of the Commercial Design Department of a four-year college in a technology university. There were a total of 107 research subjects (including 54 in the experimental group and 53 in the control group). According to the multiple intelligences tendency test results, both students in the experimental group and those in the control group showed improvement in their test performances, yet the former did better. In the aspect of the students’ knowledge of professional theories, both groups made some improvement, yet the experimental group did better. With regard to practical capability, aside from interpersonal intelligence, the experimental group showed better performance than the control group. Lastly, the teaching and assessment of the theory of multiple intelligences improved the practical capability of the students in the experimental group.*

**Keywords:** Multiple intelligences, Creative thinking and methods, Professional theory, Practical capability

**1. Introduction.** The concept of multiple intelligences came about in the mid 70’s when Gardner started to reflect on it. However, this theory was not established until the “Frames of Mind” was published in 1983 [5]. The greatest contribution of the theory of multiple intelligences to education is that it suggests that teachers must go beyond the classical methods of teaching languages and logical math and improve their professional knowledge, skills, and abilities so that they can utilize the best strategies or methods when teaching. Multiple intelligences can be used not only for one-way remedial teaching but also as a meta-model to organize and integrate all the educational reforms that seek to exceed the narrow limitation on learning methods, so that teachers and students can jump out of the box of text books and black boards and have a broader range of courses with various options. This way, their brains can start to function again [1,10].

This study explored the students’ multiple intelligences tendency before learning, their growth in multiple intelligences after learning, and the differences in outcomes of learning professional theories and practical capability based on the meaning and viewpoint of multiple intelligences by integrating the theories related to teaching and assessment in education into the “creative thinking and methods” course. The subjects were day school freshmen students from two classes in the Commercial Design Department of a four-year

college in a technology university in Central Taiwan who took the “creative thinking and methods” course. One of the classes was randomly selected as the experimental group. The students in this group were taught using the multiple intelligences teaching method. The other class was set as the control group. The students in this group were taught using the traditional teaching method. The experiment was performed 2 hours a week for 18 weeks (36 hours in total).

The following are the contributions of this research. (1) According to the multiple intelligences tendency test results, both the students in the experimental group and those in the control group showed improvement in their test performances, yet the former did better. (2) As for the students’ knowledge of professional theories, both groups made some improvements, yet the experimental group did better. (3) With regard to practical capability, aside from interpersonal intelligence, the experimental group showed better performance than the control group. (4) Lastly, the teaching and assessment of the theory of multiple intelligences improved the practical capability of the students in the experimental group.

## 2. Literature Review.

**2.1. Multiple intelligences.** Multiple intelligences include 9 different types: (1) linguistic intelligence: the capacity to efficiently use a language through speaking or writing; (2) logical-mathematical intelligence: the capacity to efficiently use numbers and make an inference; (3) spatial intelligence: the capacity to efficiently use, with good sensitivity, elements such as shapes, lines, and spaces and the relationships among them; (4) intrapersonal intelligence: the capacity to act appropriately based on good self-knowledge; (5) musical intelligence: the capacity to perceive, identify, modify, and speak through music; (6) interpersonal intelligence: the capacity to identify and make response to other people’s motivation, emotions, and intentions properly; (7) naturalistic intelligence: the sensitivity to efficiently identify features of living things, the nature, and others; (8) bodily-kinesthetic intelligence: the capacity to efficiently express feelings and thoughts through the whole body and skillfully create or change things with both hands; and (9) existential intelligence: the capacity to get inspiration, insight, and intuitive thoughts from things and their essence [5,12].

**2.2. Stimulation of human intelligence.** In the viewpoint of multiple intelligences, human beings have at least nine to hundreds of mental aspects. These aspects may combine or re-combine with each other to create countless number of intelligences in a short time. Moreover, every individual mind has its particular social and cultural scenarios and activities. This fact shows that an individual mind is very unique. A normal person has at least the 9 intelligences listed above and a unique combination of these intelligences. Each of these intelligences has its unique path of development, yet most of them operate together in a rather complex way. They have a specific symbol system, are distributed between individuals and tools, exist in different social and cultural scenarios, have no absolute morality, and can be improved through teaching. The theory of multiple intelligences not only challenges the traditional concepts of intelligence but also facilitates the development of multiple assessments of intelligence. It requires teachers to design a rich classroom environment filled with equipments that can attract students in order to stimulate their various intelligences [7,8,13].

**2.3. Multiple intelligences for the development of creativity.** The “creative thinking and methods” course was used for the experimental teaching in this study, with teaching materials being designed based on related books. Most of the contents of these materials suggest that creative thinking is an attitude, a habit, and a skill that can be learned through training, with observation being the key factor. Creativity is generated

through time consuming processes such as accumulating experiences, integrating what has been learned, and practicing. These steps have their specific principles and methods, yet a person's creativity is still based on his own experiences. Creativity is often about effective imitations, improved ideas, and new combinations of old elements [4,6,11,15].

To develop creativity, a person must train himself, be aware of his habits, and conduct self-examinations. He often has to analyze the creative ideas of other people to find out how they use their creativity, and in doing so, find his own creativity. A creative person often spends some time looking at familiar things around him in order to re-discover their position in the cognitive structure. This kind of introspection can usually lead to creative ideas. The core of creative teaching and learning is to inspire creativity because creativity and critical thinking are the foundation of ingenuity. The goal of innovative teaching is for teachers to adopt an appropriate teaching method, create an efficient learning environment to inspire their students' continuous thinking, and cultivate their students' capability of creative thinking [2,3,9].

**3. Research Design and Implementation.** This study adopted the nonequivalent quasi-experimental design for experimental teaching. The subjects were two classes of day school freshmen students from the Commercial Design Department of a four-year college in a technology university. There were a total of 107 research subjects (including 54 in the experimental group and 53 in the control group). The averages and standard deviations of the obtained data were calculated. Then the t-test statistical method was applied to compare pre-test and post-test data, examine the difference in the two groups' post-test data, and verify each research hypothesis [14].

This research assumes that (1) growth in multiple intelligences tendency, (2) knowledge of professional theories, and (3) practical capability learning outcome of the students taught using different teaching methods would be different. This study set up a research structure based on the research topic and designed tools such as multiple intelligences tendency checklist, evaluation form, professional theory pre-test scale, student basic information survey form, professional theory formal scale, practical design topics, and work grading form for the research object. It also proposed the design for the multiple intelligences teaching of the "creative thinking and methods" course and prepared teaching materials in order to implement experimental teaching and assessments, as well as to process data. Two professional teachers were invited to perform practical capability assessments. Furthermore, the students were also required to evaluate their own works and each other's in accordance with the spirit of multiple assessments.

#### 4. Results and Discussions.

**4.1. A survey on current situations.** A survey on current situations was conducted with the subjects being day school freshmen students from the Commercial Design Department (Visual Communication Design Department) of a four-year college in private technology universities in Northern, Central, and Southern Taiwan. The stratified random sampling method was applied. The sample size was about 1/2 of the population size. Four freshmen classes were selected from each university. A total of 12 classes were selected. 630 questionnaires were issued, and 551 were retrieved (response rate = 88%). 8 retrieved questionnaires were invalid and thus excluded. The number of valid questionnaires was 543 and the valid response rate was 86%. 136 of the respondents were male (25%) and 407 were female (75%). The data from the questionnaires were analyzed using statistical method. The obtained alpha value was .83 (>.70), which means that reliability was very high. The results of the survey on the students' current situation regarding multiple intelligences tendency showed that their interpersonal intelligence tendency was strong while their logical-mathematical intelligence tendency was weak.

**4.2. The distribution of the multiple intelligences tendency.** To make sure that the teachers could teach the course based on their strong intelligences and design expertise, a multiple intelligences tendency evaluation was performed for them. The results showed that their linguistic intelligence tendency was strong while their spatial intelligence tendency was weak. Secondly, during the first week after the beginning of the school term, pre-tests for multiple intelligences tendency evaluation were conducted with the experimental group and the control group, respectively. The interpersonal intelligence tendency of the students in the experimental group was strong while their existential intelligence tendency was weak, and the interpersonal intelligence tendency of the students in the control group was strong while their logical-mathematical intelligence tendency was weak. 18 weeks later, post-tests were conducted, and results showed that both the students in the experimental group and those in the control group had strong interpersonal intelligence tendency and weak logical-mathematical intelligence tendency.

**4.3. Improvements in multiple intelligences tendency and difference analyses.** According to pre-test results, students in the experimental group had stronger linguistic, logical-mathematical, and interpersonal intelligence tendencies than those in the control group, who had stronger spatial, intrapersonal, musical, naturalistic, bodily-kinesthetic, and existential intelligence tendencies. However, these differences were not significant. According to the post-test results, the tendencies toward all 9 intelligences of the students in the experimental group were stronger than those of the students in the control group, and the differences in logical-mathematical intelligence tendency ( $p < .05$ ), intrapersonal intelligence tendency ( $p < .05$ ), and existential intelligence tendency ( $p < .001$ ) were significant.

For students in the experimental group, the tendencies toward all 9 intelligences were stronger in the post-test than in the pre-test. The differences in linguistic intelligence tendency ( $p < .05$ ), spatial intelligence tendency ( $p < .001$ ), intrapersonal intelligence tendency ( $p < .001$ ), naturalistic intelligence tendency ( $p < .001$ ), bodily-kinesthetic intelligence tendency ( $p < .01$ ), and existential intelligence tendency ( $p < .001$ ) were significant. For those in the control group, the tendencies toward all 9 intelligences were also stronger in the post-test than in the pre-test. However, none of these differences were significant.

**4.4. Impact and analyses of the multiple intelligences teaching method on the two groups' professional theories and practical capability learning outcome.** With regard to the knowledge of professional theories, pre-tests were performed with both groups during the first week, and the statistical results showed no significant difference. This means that the students' performances were homogeneous. During the 18th week, post-tests were performed with both groups, and the statistical results showed that the students in the experimental group displayed better performances than the control group. Moreover, the result of the independent sample t-test showed that the difference was significant ( $p < .05$ ).

In the aspect of practical capability, this study aimed to explore the different impact of diverse teaching methods on the practical capability learning outcome of the two groups. Thus, the two teachers were requested to grade the students' works without knowing which work was created by which student using the grading scale. Furthermore, a test for the reliability of the evaluators' grading was performed. The alpha value was between .85 and .97, which means that grading was highly reliable. As for the practical capability of intrapersonal intelligence, this study asked the students to grade their own work in order to practice self-evaluation and self-examination of their work. However, the resulting alpha value from the evaluators' reliability test was .15, which was much lower than .93, the alpha value of the teachers' grading. In the aspect of the practical capability of interpersonal intelligence, this study asked the students to grade their classmates' works to develop their capability of appreciating design. However, the alpha value from the

evaluators' reliability test result was .20, which was much lower than .91, the alpha value of the teachers' grading. Thus, this study decided to use the teachers' evaluation results for grading. Independent sample t-test was performed, and it was found that the students in the experimental group outperformed those in the control group in all 9 intelligences, with the exception of the difference in practical capability of interpersonal intelligence; all the differences were significant ( $p < .001$ ).

**5. Conclusions.** The specific findings of this study are concluded below: With regard to the logical-mathematical, interpersonal, musical, interpersonal, naturalistic, bodily-kinesthetic, and existential intelligence tendencies, the two groups of day school Commercial Design Department (or Visual Communication Design Department) students of the four-year college in technology universities were more representative and rather highly inferential.

The evaluation of multiple intelligences tendency for teachers and students was helpful in gaining insight into the distribution of the multiple intelligences tendency. The teachers and the students could perform various teaching and learning activities according to their strong intelligences. During post-tests, both groups showed some improvements in their multiple intelligences tendency. However, the experimental group exhibited more improvement than the control group. Both groups made some improvements in their knowledge of professional theories in the post-tests. However, the improvement of the experimental group was greater than the control group. The teaching and evaluation of the theories of multiple intelligences could improve the students' practical capability in the "creative thinking and methods" course. However, the experimental group's logical-mathematical, existential, interpersonal, and linguistic intelligence tendencies were rather weak. Therefore, follow-up research is necessary to find out how to more efficiently integrate this theory into teaching and learning activities. Secondly, the two professional teachers from the field of design were highly reliable in the evaluations. They could present the students' performances in practical capability objectively. Yet, the students' evaluation results regarding their own work and each other's works were quite different from the teachers'. Their evaluation capability in the design profession needs to be improved in the future.

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