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The development of indicators for creativity education and a questionnaire to evaluate its delivery and practice

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ABSTRACT

This research aimed to develop a set of indicators for creativity education and a questionnaire to evaluate its delivery in Taiwan. Four research methods were systematically combined to develop the indicators and the questionnaire, including interviews, document analysis, onsite visits, and a survey. The indicator-informed questionnaire was then administered to a total of 1015 school administrators and teachers in Taiwan's primary and secondary schools (pre-test N = 397 and post-test N = 658). The results from confirmatory factor analysis (CFA) and Structure Equation Modeling (SEM) revealed that the questionnaire had very good measurement properties with five interrelated latent variables, including creative teachers, creative students, creative campus, interdisciplinary practice, and creative database. The questionnaire's reliability was calculated at a Cronbach's alpha of 0.97, and the five subscales' Cronbach alpha scores ranged from 0.82 to 0.95. Evidence revealed that the practice of creativity education program in Taiwan was very effective. Overall, among the five subscales, the creative student subscale had highest ratings (most helpful), whereas interdisciplinary practice subscale had the lowest ratings (least helpful). The questionnaire has great potential to be utilized in government, educational institutions, and other sectors as a reference tool to evaluate the delivery and practice of creativity education.

1. Worldwide prioritization of creativity

Innovate or fall behind. The development of human civilization has depended to a significant degree on creativity in social, cultural, economic, and individual arenas. Creativity has thus been advocated in a variety of fields including business and industry (e.g., Florida, 2002, 2005a, 2005b), work place and management (e.g., Amabile, Barsade, Mueller, & Staw, 2005; Amabile, Schatzel, Moneta, & Kramer, 2006), andeducation (e.g., Craft, Cremin, Burnard, & Chappell, 2007; Csikszentmihalyi & Wolfe, 2000; Amabile and Hennessey, 1992; Sternberg, 2001, 2002, 2003). The emergence of the knowledge-based economy has included an emphasis on innovation and creativity as significant aspects of competitiveness (Carayannis & Gonzalez,

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2003; Egan, 2005; McRae, 1996). Organizations that formulate global competitiveness rankings develop specific indicators for evaluating countries' creativity, as they believe there is a strong correlation between creativity and national competitiveness. Many scholars (e.g., Florida, 2002) thus regard creativity as a vital factor contributing to societal improvement.

In recent years, many large creativity programs have been promoted, such as the European Union's (EU) European Year of Creativity and Innovation 2009 (EYCI), which aimed to prioritize the importance of creativity and innovation and their development in individual, social, and economic spheres. It disseminated good evidence-based practice, promoted relevant policy initiatives, and also encouraged creativity education and research (Europa, 2014). Similarly, many countries have initiated national creative learning programs. The Creative Partnerships program (CP) for example, was first implemented across 36 areas in England from 2002 to 2011 (CCE, 2011). Since 2011, in addition to the United Kingdom, the CP program has been disseminated to many other EU countries including Sweden, Hungary, Austria, the Czech Republic, Denmark, Greece, Lithuania, the Netherlands, Portugal, and Romania. As part of their programs, some EU countries have also established partnerships with creative sectors in Australia and the United States (Europa, 2014).

1.1. The practice of creativity education in Taiwan

In Taiwan creativity in education has received increasing attention in recent decades. In 2002, Taiwan's Ministry of Education (MOE) specifically initiated a series of projects aimed at guiding the nation in becoming a "Republic of Creativity" (MOE, 2002a). One of the by-products of these initiatives was the publication of the *White Paper on Creative Education* (*ibid,* 2002). Taiwan has subsequently launched several creative learning programs at all levels of education. Among the many programs, two large-scale programs have specifically been promoted in primary and secondary schools: the Local Creative Education Program (LCEP, 2004–2007) and the Program of Creativity and Imagining the Futures in Education (PCIFE, 2011–present). Overall, Taiwan's government contributes approximately three to five million US dollars annually toward fostering creativity among primary and secondary school students. By implementing creativity education programs in Taiwan, it has become an educational movement in which numerous school educators and staff have adopted innovative teaching pedagogies and strategies to empower students' creative capacities (Cheng, Wang, Liu, & Chen, 2010). Reviewing the *White Paper on Creative Education* (MOE, 2002b) and policy documents of LCEP (MOE, 2006; MOE, 2007) and PCIFE, it is found that the government aims to establish a creative climate and nurturing environment for the development of all citizens' divergent thinking, motivation for innovation, and enjoyment of the creative process (Cheng, Kuo, & Wu, 2008).

In delivering creativity education programs, all leaders and educators of the participating schools are encouraged to create space (both physical and virtual spaces) and provide essential resources for teachers and students to demonstrate their creativity and imagination. Interdisciplinary collaboration is highly recommended, and the schools are encouraged to build partnerships with external sectors and creative practitioners and to form substantive relationships with other schools. The MOE expects school teachers to be immersed in the creative ethos that aligns with the belief that all students have creative potential. The teachers should have opportunities to nurture, enjoy and experience creative processes and to develop their own teaching style, materials, and research capacity. The educational paradigm is expected to shift from teacher-centered to student-centered approaches, with the earnest hope that the schooling, curriculum content, and educational ethos will trigger the students' motivation to learn and create, empower their creative and imaginative capacities, and increase their creative self-efficacy. The government has also set socially inclusive targets for the programs to involve more students who are socio-economically disadvantaged or underachieving and those who have dropped out of school in order to improve their lives (MOE, 2014; Wu and Albanese, 2010; Wu and Albanese, 2013; Kuo, 2014).

However, in the research process, we also noticed that even though many creativity education policy documents, such as the *White Paper on Creative Education* (MOE, 2002b) and the *Program of Creativity and Imagining the Futures in Education Plan*, have had a great impact on Taiwan's creativity education, researchers may feel quite frustrated in the search for core definitions of 'creativity education' in the specific context of Taiwan. In the analysis of the creativity education policy documents, we found that the government has failed to disseminate specific definitions of creativity and creativity education, although a wide range of educational objectives have been clearly stated. It could be interpreted that the policy documents put more emphasis on outlining the desirable outcomes and preferred promotion strategies. However, the documents did not give equal attention to the conceptualization of the meanings of creativity and creativity education in the Taiwan context (Kuo, 2014). The government's deficit and the insufficient scholarly works helping identify Taiwan's creativity education makes this research an important attempt in the field. This study has a potential to make contributions to the knowledge and the future practice, as this study is the first research made endeavors to theorize the notion of creativity education implemented in Taiwan, and help conceptualize its practice through five interconnected dimensions, including creative teachers, creative students, creative campus, creative database, and interdisciplinary practice.

2. Method

2.1. The development of the creativity education questionnaire

The development of the Creativity Education Questionnaire (CEQ) was achieved following a rigorous process conducted over two years that included (1) document analysis, (2) in-depth interviews, (3) onsite visits, and (4) expert review. The first step was to conduct document analysis of the White Paper on Creative Education and some other relevant creativity

policy documents, including the Midterm Creativity Development Plan, the Local Creative Education Program Plan, and the Program of Creativity and Imagining the Futures in Education Plan. After undertaking a content analysis of these documents, a large part of the educational objectives, promotion strategies, and desirable outcomes stated in the plan was already captured. The second step was to interview three policy makers and academic leaders, six administrators who were working in educational bureaus, and five teachers and educational staff. All types of interviewee were crucial for the research. The policy and academic leaders provided useful information on policies at governmental level. Administrators in educational bureaus, school teachers and staff, on the other hand, offered their experience of first-hand practice. More specifically, we asked the policy and academic leaders questions about the objectives, promotion and implementation of the PCIFE. In the interviews with administrators, school teachers and staff, we asked more questions about their in-depth engagement and observation of the impacts and changes brought about by the program. The third step was to visit six schools within three areas involved in the government's creative educational program to observe their practice.

In this research, the main approach used for the enhancement of validity is the utilization of both quantitative and qualitative data collection techniques in order to achieve methodological triangulation (Bryman, 2006; Greene, Caracelli, & Graham, 1989; Robson, 2002). Both qualitative and quantitative data had been carefully collected and analyzed. The qualitative part included document analysis, interviews, and onsite visits, which all helped this study to sort out a wide range of indicators. The first phase was organizing and preparing the qualitative data for analysis. This involved optically scanning existing materials (for document analyses), transcribing the interviews collected, and typing up the field notes taken during onsite visits. Then, the researchers read through all the data collected to obtain a general sense of the information and to reflect on its overall meaning. Data were obtained from the archival documents of governments, the participants' interview texts, and the field notes made in observations. In the third phase, the coding was completed, which facilitated the organization of the materials into chunks or segments of text before bringing meaning to the information (Rossman and Rallis, 1998; p.171). NVivo 8.0 data management and analysis software was used in the process. After coding, this study categorized the data into themes, using the coding to generate a description of the categories or themes for analysis. Description involves a detailed rendering of information about people, places or events. This procedure enabled this research to establish small groups of themes/categories, which were the ones that appeared as major findings in the investigation. Subsequently, the researchers inter-related the themes and categories, then interconnected each theme and category, combining them into narrative stories or developing them into theories or models. The variety of data sources and the collaboration of our research team members had made research triangulation possible, which empowered this study to ensure its quality, validity and reliability.

Due to the constraints of time and resources, a convenient sampling strategy was employed by this study. The researchers attempted to reach as many participants and schools as possible at the data collection period. These efforts above all helped to identify some important indicators and generate statements that would represent successful practice of creativity education, for example, "teachers enjoy creating, imagining, and expressing themselves"; "students have problem solving abilities"; "there are places in school for students to present ideas and products"; and "teachers and students respect and appreciate each other in school." In the fourth step, the indicators were reviewed by ten academic experts in the fields of education, psychology, and business and management and were also examined by educators who were teaching in primary and secondary schools. Ten experts were nominated by the participants we interviewed in the second step to ensure that all the experts have relevant knowledge and abundant experience of implementing creativity programs, so that they could make invaluable contributions for the revision of the indicators. After undertaking this last step, a total of 80 indicators were selected to be included in the CEQ.

A two-step method, advocated by Anderson and Gerbing (1988) and Gerbing and Anderson (1988), was then employed to revise the questionnaire. They suggested that researchers first use pre-test data to examine the quality of the questions, then revise the questionnaire and find latent structures within the questions. Then, post-test data are used to verify the content structure and the factors identified. The samples and analysis used in the two datasets (pre-test and post-test data) are discussed in the following section.

3. Results

3.1. Pre-test analysis

In the pre-test survey, the questionnaire was administered to 500 participants who were involved in creativity education programs in primary and secondary schools. The pre-test data collection had been assisted by the MOE and some local educational bureaus. The questionnaires were administered to the respondents participating in the promoting and training meetings held by the MOE and local educational bureaus in three big cities in Taiwan, including Taipei, Taichung, and Tainan. A total of 397 valid questionnaires were collected and analyzed, a good response rate of ~ 80%. All respondents were school administrators or teachers came from all the cities and counties of Taiwan. Among them 19.4% were taught in a secondary school, 78.2% were taught in a primary school, whereas 2.4% were educational administrators working for local education bureaus. Most of the participants (25.2%) had taught for 11–15 years, 10.2% had taught for less than 5 years, 16% for 6–10 years, 55.4% were male and 44.6% were female, 50% were 31–40 years old, and 30% were 41–50 years old.

As suggested by Devellis (2003) and by Tabachnick and Fidell (1996), data screening was used to examine the fitness of the questions based on statistical indicators, including examination of the accuracy of the data entered, missing data,

Table 1
Correlation matrix of the five factors.

Factors	CT: Creative Teachers	CS: Creative Students	CC: Creative Campus	IP: Interdisciplinary Practice	CD: Creative Database
CT: Creative Teachers	1				
CS: Creative Students	0.71	1			
CC: Creative Campus	0.76	0.73	1		
IP: Interdisciplinary Practice	0.75	0.73	0.78	1	
CD: Creative Database	0.50	0.48	0.51	0.51	1

outliers, distribution normality, and homoscedasticity. Following the data screening process, 13 questions were deleted, including those deemed extreme outliers, and those with problematic skewness or kurtosis, such as "the program can help disadvantaged students increase their learning motivation"; "the program has enabled students to spontaneously participate in creativity-related competition"; and "the program has enabled the school to receive more endowment funding".

It is difficult to examine all the factors made the questions outliers or with problematic skewness or kurtosis, however, we found that those questions had some common features or bias. For example, some respondents reported that the question "the program can help disadvantaged students increase their learning motivation" had limited its targets into a minority group of people – disadvantaged students, which made it impossible for all the respondents to rate the question properly, as some of them really had not had any knowledge of the circumstances of the so-called 'disadvantaged students' in their schools. Similarly, some reported that they had no access to know the school's financial status, so, they chose not to rate the question "the program has enabled the school to receive more endowment funding". It is true that some questions that had been deleted in this phase had their own values for this study to gain a better picture of the practice of creativity education in the school settings; however, some questions can not be perfectly applied on all respondents, thus, after a very careful consideration and discussion among the researchers, some questions were deleted.

After the first phase of item deletion, only 67 items were left for the later factorial analysis. Following data screening, the study employed principal component analysis (PCA) to examine the main factors in the questionnaire and their fit, as scholars including MacCallum (1999), Dunteman (1994), and Huang (2003) have suggested that PCA is well suited for examining and reducing the number of variables, especially when items are highly correlated. The PCA analysis yielded seven factors with eigenvalues >1, which together explained 69.1% of the total variance. After a detailed examination of all questions, some questions were found to not include any of these factors or to have unstable factor loadings. For instance, the question asking whether "the program enables the students to co-construct the school" could not be successfully placed in an appropriate factor, as it could be placed in the factor relating to creative school or the one relating to creative students. Similarly, the question as to whether "the program enables the integration of community resources to reward students who have presented their creative talents" had very low factor loadings for all factors. This question seemed to involve two or more concepts and could be separated into two parts, with the first part, "to integrate more resources from the local community," reasonably categorized as both creative campus and interdisciplinary practice, and the second part, provide the creative students with more rewards could be reasonably placed in either the creative students or creative teachers factor.

By considering the factor loadings, 13 further questions were deleted, leaving only 54 questions (as showed in Table 1). After the second phase of item deletion, PCA was employed again, and five consistent factors were identified which accounted for 68.7% of the total variance. The five factors were "*creative teachers*" (12 items, Cronbach's $\alpha = 0.936$), "*creative students*" (11 items, Cronbach's $\alpha = 0.903$), "*creative campus*" (10 items, Cronbach's $\alpha = 0.914$), "*interdisciplinary practice*" (10 items, Cronbach's $\alpha = 0.928$), and "*creative database*" (11 items, Cronbach's $\alpha = 0.947$). The statistical analysis results indicated that the 54-item CEQ had good measurement properties and could be further examined through post-test analysis.

3.2. Post-test analysis

In the post-test, the questionnaire was administered to a total of 750 participants who were involved in creativity education programs in primary and secondary schools. A total of 658 valid responses were returned, which represented a very good response rate of ~ 88%. Of these respondents, 53% were male, 47% were female, 16.7% were teaching in a secondary school, and 81.8% were teaching in a primary school. The remaining 1.5% were educational administrators who were not teaching in a school. Of the respondents, 50.9% were 31–40 years old, 30.1% were 41–50 years old, and 14.1% were 21–30 years old; only 4.9% were 51–60 years old. 14.6% had taught for <5 years, 18.2% for 6–10 years, 23.9% for 11–15 years, 22% for 16–20 years, and the remaining 21.3% had >20 years of teaching experience.

To test the factor structure of the questionnaire, the correlation values and Cronbach's alpha values were computed. Correlation coefficients indicate the relationships between factors, and the Cronbach's alpha values speak to the degree of internal consistency in the scales. The results indicated that the five factors were strongly related to one another. The correlations among *creative teachers*, *creative students*, *creative campus*, and *interdisciplinary practice* were >.73. *Creative database*, in contrast, showed comparatively lower correlations (.48–.51) with the other four factors, however, the value was still acceptable (i.e., >.30). The high correlation among the five factors indicated that these dimensions all have something in

Table 2
Model fit index of the Creativity Education Questionnaire.

χ^2	*Df*	χ^2/df	TLI	CFI	IFI	RMSEA	SRMR
3196.57	1355	3.09	0.98	0.98	0.98	0.059	0.041

TLI: Tucker-Lewis Index; CFI: Comparative Fit Index; IFI: Incremental Fit Index; RMSEA: Root Mean Square Error of Approximation; SRMR: Standardised root mean square residual.

common – to present the core value of Taiwan's creativity education, and it is appropriate to place all the five subscales in one questionnaire. Furthermore, the Cronbach's alpha values were 0.937–.951. (creative teachers = 0.951; creative students = 0.937; creative campus = 0.940, interdisciplinary practice = 0.957; and creative database = 0.960), indicating that the questionnaire had excellent internal consistency.

Structural equation modelling (SEM) was used to verify the latent structure of the CEQ. In a two-step method, the use of SEM methods is regarded as a necessary process for questionnaire development and verification (Anderson and Gerbing, 1988; Gerbing and Anderson, 1988; Price, 1997; Spector, 1992). LISREL 8.7 software was used in this study to run a confirmatory factor analysis (CFA) of the post-test data. Jöreskog and Sörbom (1989) suggested that CFA is a useful method for examining the structure of latent variables and calculating their covariance, which are factors that cannot be directly measured but can be estimated from the observed variables.

As presented in Fig. 1, in this study, five latent constructs were measured, including creative teachers, creative students, creative campus, interdisciplinary practice, and creative database. With regard to testing the fitness of the model, as suggested by some scholarly works (e.g., Bagozzi, Yi, & Nassen, 1998), three methods were used for verification: offending estimate; overall model fit; and fit of the internal structure of the model. The statistical results for the model fit are presented in Tables 2 and 3.

3.2.1. *Offending estimate*

the offending estimate is employed to verify estimate coefficients that are beyond acceptable parameters based on the CFA. As shown in Table 3, the standardized coefficients of the observed variables were not close and well below 1 (between 0.68 and 0.90). The standard errors and negative errors were not significant. Thus, no offending estimate was found among the estimate coefficients.

3.2.2. *Overall model fit*

this examines the consistency among external quality, the evaluation model, and statistics. The statistics in Table 2 show that the value of the root mean square error of approximation (RMSEA) was 0.059, which indicates that the model has good fit, as the value is <0.06 (Hu and Bentler, 1999) or <0.08 (Browne & Cudeck, 1993; Jarvenpaa, Tractinsky, & Vitale, 2000). One deficit of the model fit may be interpreted from the result of the Chi-square test, which was significant at the 0.01 level. The value of X^2/df was 3.09, which is marginally greater than the suggested good fit value of <3; however, the value still indicates that the model was acceptable, as the value was <5 (Hair, Anderson, Tatham, & Black, 1998; Kettinger & Lee, 1994). The failure of the X^2/df to reach the suggested good fit value may have been caused by the large sample effect, which can lead to an inflation of variances (Chiu, 2006). It should be noted that all other fit indicators revealed that the data fitted the model properly. The fit indicators used in this study included the Tucker–Lewis index (TLI), also called the non-normed fit index (NNFI) (Hu and Bentler, 1999), the incremental fit index (IFI) (Hu and Bentler, 1999), and the comparative fit index (CFI) (Rigdon, 1996), all of which had values of 0.98, which indicates a good fit (> 0.90). These results support the model.

3.2.3. *Fit of the internal structure*

this research used the composite reliability of the potential variables to see if each indicator could measure a latent construct (Table 3). The composite reliability (CR) indicates the internal consistency of the constructs. As shown in Table 3, the CR values for the five latent variables were 0.94–.96; thus, all of them were >.70, indicating that all the internal constructs of the questions were good (Chin, 1998). Moreover, the convergent validity of each construct was checked by examining the average variance extracted (AVE) value. According to the literature, AVE values >.5 indicate convergent validity or unidimensionality (Anderson and Gerbing, 1988; Chin and Newsted, 1999; Chin, 1998). The values of the five constructs here ranged between 0.57 and 0.69, which means that the CEQ had good internal validity.

In summary, this study developed 54 items to capture five underpinning factors that are crucial to the delivery and practice of creativity education programs. Three methods, namely the offending estimate, overall model fit, and fit of the internal structure of the model methods, were used for verification of the CEQ. Based on the results, it appeared that the CEQ demonstrated good psychometric properties. All items loaded properly on the expected factors, and the composite reliability values for all subscales ranged from 0.94 to 0.96, which is acceptable for the purpose of theoretical development. In fact, the development of indicators and the CEQ is an essential step for defining and theorizing Taiwan's creativity education, and filling the gap between theory and practice.

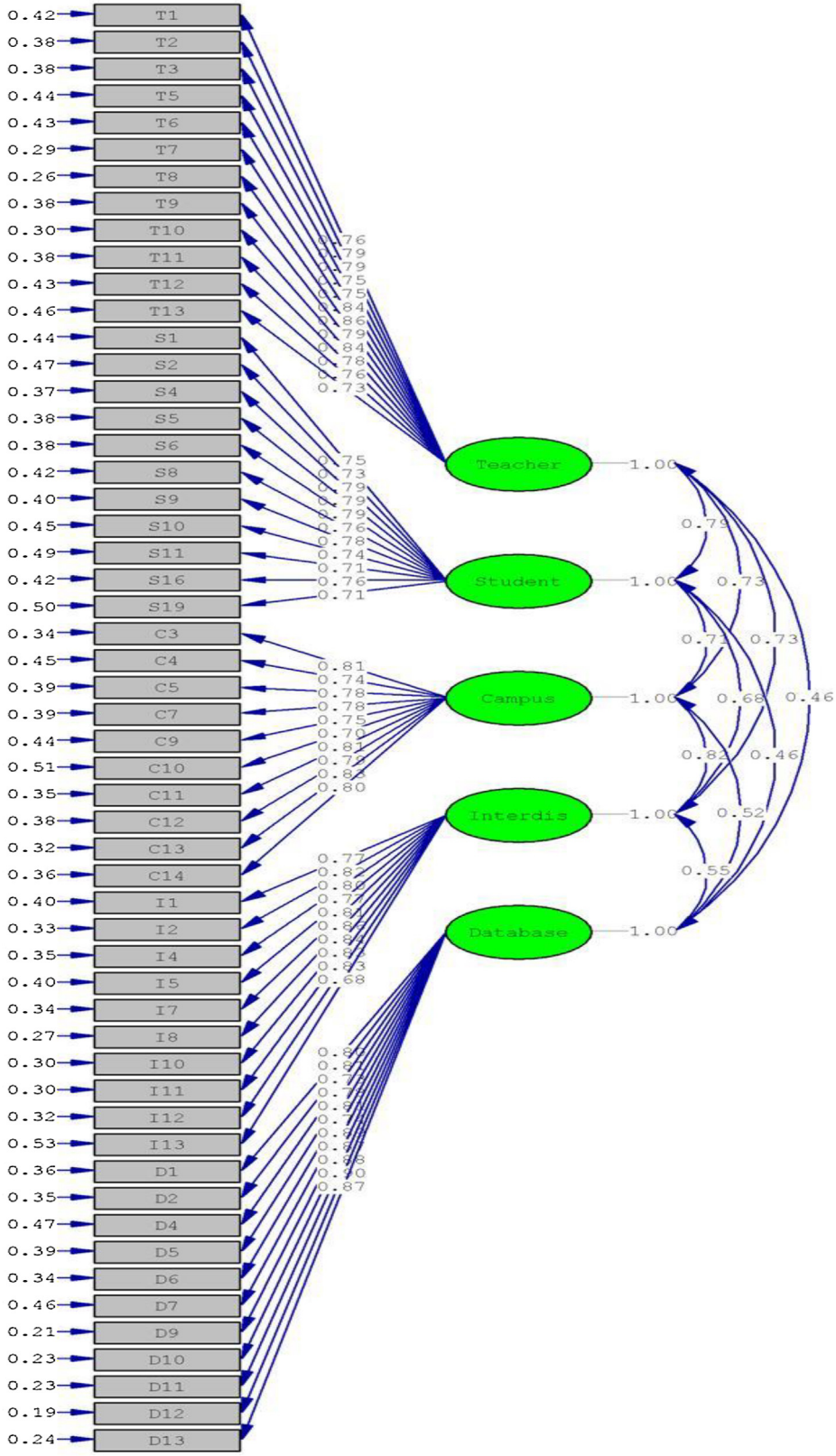

Fig. 1. The analysis model of the five factors structure of the 54 items CEQ.

Table 3
The CFA and descriptive results of the Creativity Education Questionnaire.

Factors/Items									
Creative Teachers (N = 658)		Mean	StD	λ	R^2	S.E.	C.R.	CR	AVE
1	Teachers enjoy creating, imagining, and expressing themselves	3.83	0.805	0.76	0.58	1.00		0.95	0.62
2	**Teachers have experienced the creating process**	4.00	0.769	0.79	0.62	0.05	21.73***		
3	Teachers are creative	3.93	0.782	0.79	0.62	0.05	21.76***		
4	Teachers have the willingness to participate in creativity or imaginative related further study	3.82	0.829	0.75	0.56	0.05	20.32***		
5	*Teachers have action research abilities*	3.59	0.869	0.75	0.56	0.05	20.62***		
6	Teachers have a high quality of teaching	3.82	0.813	0.84	0.71	0.05	23.47***		
7	Teachers have used creative teaching methods	3.92	0.783	0.86	0.74	0.05	24.15***		
8	Teachers have adopted and integrated local features into their teaching	3.93	0.802	0.79	0.62	0.05	21.66***		
9	**Teachers have developed their own teaching styles**	3.97	0.767	0.84	0.71	0.05	23.32***		
10	**Teachers have integrated creativity into their teaching, or have developed creative curriculum and materials**	3.97	0.787	0.78	0.61	0.05	21.61***		
11	Teachers have employed multiple ways to evaluate students' learning	3.88	0.799	0.76	0.58	0.05	20.70***		
12	Teachers have participated in the creativity or imagination related community of practice	3.70	0.858	0.73	0.53	0.05	19.98***		
Creative Students (N = 658)		Mean	StD	λ	R^2	S.E.	C.R.	CR	AVE
1	**Students believe that they have the potential to create or imagine**	4.09	0.702	0.74	0.55	1.00		0.94	0.57
2	**Students have experienced the creating process**	4.21	0.692	0.72	0.52	0.04	24.91***		
3	**Students are creative**	4.12	0.738	0.79	0.62	0.05	20.58***		
4	Students have problem-solving abilities	4.04	0.710	0.78	0.61	0.05	20.44***		
5	Students have motivation to learn things by themselves	3.91	0.758	0.79	0.62	0.05	20.63***		
6	Students have a high quality of learning	3.83	0.795	0.78	0.61	0.05	20.43***		
7	Students have their own learning style	3.83	0.817	0.8	0.64	0.05	20.85***		
8	Students appreciate the performances of others	3.93	0.806	0.74	0.55	0.05	19.35***		
9	Student respect individual differences, and appreciate those who have different viewpoints	3.86	0.791	0.71	0.50	0.05	18.49***		
10	Students like to share their ideas or collaborate with others	4.08	0.799	0.75	0.56	0.05	19.62***		
11	*Students are allowed to express their unique viewpoints or present their products*	3.82	0.836	0.7	0.49	0.05	18.23***		
Creative Campus (N = 658)		Mean	StD	λ	R^2	S.E.	C.R.	CR	AVE
1	**The school has better sustainability**	3.89	0.843	0.8	0.64	1.00		0.94	.61.
2	The school is 'green' and has some 'green buildings'	3.68	0.948	0.73	0.53	0.04	20.86***		
3	The school is secure and beautiful	3.77	0.891	0.77	0.59	0.04	22.26***		
4	**The school has a respectful and appreciative atmosphere**	3.88	0.793	0.77	0.59	0.04	22.3***		
5	**The school has places where teachers and students can share their ideas**	3.84	0.786	0.74	0.55	0.04	21.29***		
6	*The school has adopted innovative or creative management*	3.30	1.04	0.7	0.49	0.04	19.64***		
7	The school has efficiently integrated human and material resources, and promoted resource-sharing	3.70	0.883	0.82	0.67	0.04	24.38***		
8	The school has innovative communication channels and administrative management	3.54	0.865	0.81	0.66	0.04	23.71***		
9	The school has incorporated local cultures and traditions into the campus	3.81	0.916	0.85	0.72	0.04	25.37***		
10	The school has transmitted, extended, or honored local cultures	3.72	0.893	0.82	0.67	0.04	24.29***		

Table 3 (*Continued*)

Factors/Items									
Interdisciplinary Practice (N = 658)		Mean	StD	λ	R^2	S.E.	C.R.	CR	AVE
1	The school has collaborated with other schools in different cities or fields	3.46	0.940	0.79	0.62	1.00		0.96	0.65
2	**The school has used or integrated more local resources**	3.61	0.908	0.83	0.69	0.04	24.4***		
3	The school has prospered the local community	3.49	0.958	0.81	0.66	0.04	23.38***		
4	**The school has recruited creative practitioners from different fields (e.g. artists, musicians, architects, etc) to change campus and create an environment where creativity is encouraged**	3.63	0.967	0.77	0.59	0.04	22.02***		
5	**The school has recruited creative practitioners from different fields (e.g. artists, musicians, architects, etc) to teach students and improve their learning**	3.64	0.906	0.81	0.66	0.04	23.48***		
6	The schools at all levels are encouraged to form collaborative alliances of creativity or imagination	3.48	0.929	0.86	0.74	0.04	25.31***		
7	*The school has formed a creativity or imagination related community of practice (COP) with schools in other cities*	3.23	1.01	0.84	0.71	0.04	24.5***		
8	The school has effectively linked the school, parents, and the local industries together	3.48	0.942	0.83	0.69	0.04	24.31***		
9	The school has enabled dialogue and integration in teaching and research aspects.	3.47	0.905	0.82	0.67	0.04	23.97***		
10	The school has enabled professors and scholars of local universities to enter school and give instruction.	3.54	0.973	0.68	0.46	0.05	18.73***		
Creative Database (N = 658)		Mean	StD	λ	R^2	S.E.	C.R.	CR	AVE
1	The school has a creativity or imagination online database	3.62	1.01	0.81	0.66	1.00		0.96	0.69
2	The school has an online database providing creativity or imagination related knowledge	3.61	1.00	0.81	0.66	0.03	32.15***		
3	The school has an online database enabling students' E-learning	3.59	1.04	0.75	0.56	0.04	21.8***		
4	**The School has an online database exhibiting the contents and results of creativity and imagination competitions or activities**	3.91	0.956	0.78	0.61	0.04	22.91***		
5	**The school has an online database assisting teachers and other schools to develop their creative teaching plans and materials**	3.78	0.969	0.81	0.66	0.04	24.5***		
6	*The school has developed online assessment system to understand the student's creative capacities*	3.16	1.12	0.75	0.56	0.04	22.03***		
7	The school has an online database promoting creativity or imagination teaching methods	3.67	0.970	0.87	0.76	0.04	27.07***		
8	**The school has an online database improving the accessibility to creative resources**	3.74	1.02	0.87	0.76	0.04	27.19***		
9	The school has an online database with a user-friendly interface	3.62	0.999	0.88	0.77	0.04	27.37***		
10	The School has an online database with abundant hyperlinks which links users to the relevant educational resources of creativity or imagination	3.62	1.00	0.90	0.81	0.04	27.69***		
11	The school has an online database which efficiently collects creative or imaginative teaching methods, materials, and plans	3.66	1.03	0.87	0.76	0.04	27.04***		

Three highest rating items were in bold format, whereas the lowest rating item is in italic format.
StD = Standard Deviation; S.E. = Standard Error; C.R. = Critical Ratio (Z value), P < 0.001 = ***; CR = Composite Reliability; AVE = Average Variance Extracted.

3.3. The outcomes of the creativity education programs

As presented in Table 3, 658 participants (post-test survey) were asked whether the creativity education program had been helpful in changing their school's teachers, students, campus, and interdisciplinary practice and in constructing a nurturing creative database. They were asked to answer all 54 questions using a five-point Likert scale, where 1 represented strongly disagree (least helpful), and 5 represented strongly agree (most helpful). For example, the highest rating was found for the question asking whether "students have experienced the creative process," where the mean score was 4.21 out of 5; that is, participants believed that the practice of creativity education program was very helpful in enabling students to experience the creative process. Meanwhile, the lowest rating was scored for the question asking whether "the school has developed an online assessment system to understand the students' creative capacities," where the mean was 3.16 out of 5. Overall, among the five subscales, the creative student subscale had the highest mean value (3.97), whereas interdisciplinary practice had the lowest (3.50).

More specifically, in the *creative teachers* subscale, the creativity program was rated to be most helpful in three respects, namely enabling the teachers "to experience the creative process" (M = 4.0), "to develop their own teaching styles" (M = 3.97), and "to integrate creativity into their teaching or develop a creative curriculum and materials" (M = 3.97). However, participants believed that the program was less helpful in terms of the improvement of the teachers' action research ability (M = 3.59). In the *creative students* subscale, the program was believed to have enabled the students to experience the creative process (M = 4.21) and to have encouraged teachers to believe that "students are creative" (M = 4.12) and "have the potential to create or imagine" (M = 4.09). The lowest rating was given in response to the question asking whether students are allowed to "express their unique viewpoints or present their products," yet interestingly, the mean score for this item was still very high (M = 3.82), higher than for almost all questions related to the interdisciplinary practice and database factors.

In the *creative campus* subscale, participants believed that the program enabled the school to have better sustainability (M = 3.89) and to create a more respectful and appreciative atmosphere (M = 3.88). Respondents believed that the program helped to create places for students and teachers to share their creative ideas (M = 3.84); this result echoes that for the item discussed in the previous subscale regarding freedom for students to express their unique viewpoints, which had a mean score of 3.82. In contrast, the item rated by the participants as least helpful in the creative campus subscale was whether the program enabled the school to adopt a creative or innovative management system (M = 3.30). That is, the school's management/administrative system was viewed as harder to change through the implementation of a creativity program than were other aspects, such as creating an atmosphere or ethos where creativity and imagination were welcomed or making participants believe that the teachers and students were creative and had creative potential.

In the *interdisciplinary practice* subscale, participants believed that because of the creativity program, the school had recruited creative practitioners from a wide range of fields (such as artists, musicians, architects, engineers, etc.) to change the learning environment and ensure that creativity and imagination were encouraged (M = 3.63) and to improve students' learning (M = 3.64). The school also used or integrated more local resources due to the implementation of the creativity program (M = 3.61). However, it was still difficult for the school to form a creative community of practice (COP) with schools located in other cities (M = 3.23). The last subscale was *creative database*, which had to do with whether the creativity programs enabled the school to construct a user-friendly creativity database, especially one that could be connected to through the Internet. In the information age, an online database can improve the accessibility and dissemination of creativity- and imagination-related information, and enable users to access information from both inside and outside school. Among the 11 items, the most helpful items rated by participants were that the program enabled the school to construct an online database of information related to creativity and imagination activities/competitions (M = 3.91), enabled students to share creativity-related information (M = 3.74), and helped teachers and other schools to develop creative teaching plans and materials (M = 3.76).

4. Discussion and conclusion

Education can be seen as a national investment and it is difficult to evaluate its immediate effects in a very short period of time, and creativity education is no exception. Evaluations of policy normally have a fundamental element of considering the rationale for a specific intervention, such as examining the effectiveness and asking why the government needs to take action in a specific area (Georghiou and Keenan, 2008). In the educational field, evaluation examines the quality of the educational system, educational outcomes and provisions (Scheerens, Glas, & Thomas, 2003). One assumption underpinning this is that educational evaluation is an important process for improving educational practice, enabling educational programs to conduct more effective evidence-based practice. Thus, evaluation is regarded as one of the most important and essential aspects of policy analysis or educational intervention analysis. The development of indicators can play an important role in the evaluation of an educational program's practice, as clear definitions of standards or education indicators make it possible to mobilize any available information and promote the use of statistical information. By synthesizing information, the indicators make results accessible and easy to use for policy–makers, as well as for the whole education community. Education indicators, therefore, play an important role in the communication of information (Carrizo et al., 2003; UNESCO, 2008).

A very rigorous process was undertaken to develop the Creativity Education Questionnaire (CEQ), which includes a total of 54 indicators that can be utilized to understand the practice and delivery of creativity education in five interrelated dimen-

sions: *creative teachers, creative students, creative campus, interdisciplinary practice, and creative database*. The questionnaires were examined by various statistical analysis techniques, such as factor analysis, reliability tests, and the structural equation model. The resulting evidence showed that the questionnaires have a good structure, validity, and reliability, and can, therefore, be seen as a very useful tool for understanding the practice and implementation of creativity programs through multiple dimensions. To our knowledge, this is the first study to develop an instrument that considers five factors simultaneously in an attempt to gain a fuller picture of the practice, and which also provides a useful platform that will help a wide range of potential users to examine and thus further improve the implementation of creativity programs.

The current study has made a very original and bold move in the understanding and conceptualizing the core definition and creativity education in Taiwan, as this study outlined a five-dimensioned theoretical framework to evaluate the delivery and practice of creativity education program. The five-dimensioned 54 indicators can be regarded as the definition of creativity education that were theorized by the current study, which can be one of the most important contributions of this research. It's fair to say that it is very difficult to find any governments, institutions, or scholarly works have developed one set of indicators to evaluate the 'whole practice' of large-scaled national creativity education programs, that is, relevant evidence and empirical studies are scant.

Reviewing the extant empirical studies in the field, we well-noticed that some creativity relevant measurements have been developed by scholars to investigate the effects of the practice of creative learning programs. The most salient example may be regarded as Torrance (1974) "Torrance Test of Creative Thinking" (TTCT), which has been widely used in a wide range of educational settings, in which the so-called experts can follow strict standardized guidelines to rate the participant's fluency, flexibility, originality, and elaboration ability. Other major creativity measurements are like self-reported Gough (1979) Creative Personality Test (CPT), Kirschenbaum (1989) Creative Behavior Inventory (CBI), and Amabile (1996) KEYS scale; while the former two instruments are used to investigate individual's creative personality and behaviors, the latter one-KEYS is used to examine whether the environment has the climate to trigger individual's creativity. Other scholars attempted to develop supervisor-rated creativity measurements, such as Oldham and Cummings, 1996 scale, which was designed for supervisors to evaluate the employee's work creativity, and Zhou and George (2001) scale for supervisors to examine the employee's creative problem solving skills.

In recent years, rather than merely considering creativity from a domain-general umbrella, the creativity research field has witnessed more scholars developing instruments to evaluate individual's creativity in so-called "specific domains", though, relevant studies for the creativity scale development remain comparatively scant in the professional peer reviewed creativity journals, such as Thinking Skills and Creativity, Creativity Research Journal, and Journal of Creative Behaviors, and etc. Some examples of the instruments for domain-specific creativity are as follows: Tang and Ding (2014) developed measurements to evaluate individual's professional virtual community creative behaviors, Horng and Lin (2009) developed scale to evaluate the student's creative culinary products, Mayfield and Mayfield (2010) developed scale to measure the participant's garden variety creativity, Chuang and Huang (2015) measured the participant's creativity in digital game story design, and Dyson et al., 2015 develop a test to measure college student's creativity in role-playing games.

However, we strongly believe that this study has secured its originality and significance, as there is no single study developed one set of indicators like the CEQ that can be applied in the examination of one educational institution's (e.g. school's) practice of creativity education program from many dimensions simultaneously. Perhaps, the most relevant instruments having similar functions like CEQ are those developed by governmental initiative projects like the Creative School Development Framework (CSDF) utilized by England's Creativity, Culture, and Education (CCE) in 2012 to evaluate the impact of the Creative Partnerships (CP) program, and the Innovative and Creative Teaching Survey conducted by the European Joint Research Centre (JRC) in 27 EU member states in 2010, which was one of the many subprojects initiated by the European Year of Creativity and Innovation 2009 (EYCI). In overall, the CCS's CSDF paid more attention on the building of partnerships, the liberalization of educational ethos, and the transformation of school leaderships and management, whereas the JRC's Innovative and Creative Teaching Survey put more emphasis on the utilization of ICT technologies in school contexts and the changes of teacher's beliefs in their creative teaching.

Compared with the indicators employed by the CCE and JCR to evaluate their practices of creativity education programs, the five dimensioned CEQ developed by this study are much more inclusive, and has the potential to be seen as a platform to facilitate the dialogues between different sets of indicators, as the CEQ covers most dimensions of indicators used by the CCE and JRC. To some extent, CEQ can be seen as a tool to help deal with that deficit of evidence by critically examining and problematizing the program implementation in Taiwan and other regions/countries. The results of in this study can help the government, schools, educators, students, and other stakeholders to identify the practice of creativity program. Also, the findings obtained from the survey can be seen as a starting point for the government to build evidence- based practice in the future.

In the two years research process, we surprisingly noticed that even though many governmental creativity education policy documents have had a great impact on Taiwan's creativity education, the core definitions of 'creativity education' in the specific context of Taiwan have not been clarified, instead, a wide range of educational objectives have been clearly stated. It could be interpreted that the policy documents put more emphasis on outlining the desirable outcomes and preferred promotion strategies, nonetheless, the government did not give equal attention to the conceptualization of the meanings of creativity education in the Taiwan context. This deficit gives this current research its significance and appropriateness, as this study has helped identify Taiwan's creativity education and its five interrelated dimensions, including 1. creative teachers, 2. creative students, 3. creative campus, 4. creative online database, and 5. Interdisciplinary practice. This study

helps contextualize the terrain of the practice and implementation of creativity education, and identify the features of the so-called creativity education in the specific context of Taiwan, as it explicitly outlines a total of 54 indicators within the five dimensions to present the many objectives that a creativity program can achieve in practice.

Nevertheless, it should be noted that some important objectives pursued in Taiwan may not be perfectly applicable in other countries, such as (1) the development of creative online database, (2) the building of partnerships, and (3) the construction of green buildings, utilization of renewable energy, and adoption of innovative management. Take the construction of creative online database for example, even though scholars such as Csikszentmihalyi (1999), Csikszentmihalyi and Wolfe (2000), Amabile (1996), and Sternberg and Lubart (1995) have all stressed that an individual's access to creativity-relevant resources, information, and techniques can influence their creative performance, they did not specifically put emphasis on an online database. However, Taiwan's government has highlighted the need for construction of online resources not only in creativity education policy but also other education programs, as the government regards the citizen's ability to access information as one of the most essential abilities for surviving in the information age Furthermore, the creative online database can serve as a platform for the promotion of creativity education, it enables educators and practitioners to share their teaching plans, materials, tips, and outcomes with people around the world, especially those in the remote areas, the database can help alleviate the issue of so-called 'digital divide', which is the gap between of accessibility of creativity relevant knowledge and information between urban and rural areas. (MOE, 2002a, 2007, 2014). We well noticed that creativity relevant knowledge, expertise, and skills may not necessarily be acquired via internet connected devices, in many circumstances, this kind of creativity-relevant resources can be obtained through reading, learning from the educator's instructions, or even the participant's immersion in the ethos that is filled with freedom, respectfulness, tolerance to ambiguity, and open mindedness. We thus strongly suggest educational authorities, educators, creative practitioners, and other stakeholders to create a place where the users/participants can easily access to creativity and imagination resources. The construction of online devices, as suggested by Taiwan's government, may be regarded as a useful approach, however, the provision of relevant physical devices or virtual atmosphere for the users/participants may also be considered. Therefore, when examining whether an educational context has offered creativity relevant resources for the users, it is unnecessary for the future studies to only consider the provision of online typed resources, yet, physical and virtual environment and resources can also be included.

With regard to the building of partnerships with creative practitioners (e.g., artists, musicians, architects, engineers, etc.), this approach can be interpreted as an important means to promote participants' creativity in Taiwan's creativity education program. The CEQ thus included several partnerships relevant questions in the subscale of "interdisciplinary practice", such as "the school has recruited creative practitioners from different fields (e.g. artists, musicians, architects, etc) to change campus and create an environment where creativity is encouraged", "the school has recruited creative practitioners from different fields (e.g. artists, musicians, architects, etc) to teach students and improve their learning", "the school has effectively linked the school, parents, and the local industries together", and etc. It is worth of noting that the building of partnerships was also prioritized in the Creative Partnerships program in England between 2002–2011 and in the extended Creative Partnerships program promoted in Europe from 2011 till the present (Europa, 2014) Therefore, it is not surprising to see that the CCE's diagnostic tool – CSDF included a variety of partnerships related indicators, such as the relationships between school and parents, communities, and local organizations. However, the building of partnerships may not be prioritized with equal emphasis in other countries' creative learning programs. We thus suggest the potential users to carefully justify what kind of indicators are most suitable for them to evaluate the impact of their creativity education program accordingly.

Another interesting feature of Taiwan's creativity education that may not be perfectly applied in other countries' creative learning programs is the school's construction of green-buildings, use of renewable energy, and adoption of innovative management. Evidently, from the CEQ's "creative campus" subscale, Taiwanese government has encouraged schools to consider constructing green buildings, using renewable resources, and adopting innovative and efficient management to benefit schools' long-term sustainable development. The underpinning assumption is that these kinds of innovative changes can improve the school's sustainability, and can have a continuing impact on the schools as well as the stakeholders. It should be noted that, even though Taiwan's creativity education programs were very influential and successfully engaged a wide range of stakeholders by inputting a new dynamic in Taiwan's education system, the budget from the central government ended in 2010, resulting in the cessation of these educational programs and many sectors and schools stopped their creativity projects at that period of time. Many scholars and the government understood that the 'creativity movement' could not be stopped as it is closely related to education, citizen's competence, economic growth, social improvement, and international competitiveness. Therefore, even if the government's creativity education program stops in the future due to some unpredictable factors (just like Taiwan's creativity programs once stopped in 2010), the schools can be continuously benefited from the previous practice of creativity program, as the previous program had helped the school to construct green-buildings, adopt innovative management, and use renewable energy, and these kinds of innovative changes may not be immediately malfunctioned just after the end of the program support (MOE, 2014).

With regard to the research limitation, we acknowledge that it is almost impossible to develop one unified set of indicators that can perfectly fit all the creativity education programs worldwide. There is no exception for the development of the CEQ. It is fair to say that not all the indicators included in the CEQ can be perfectly applied in other contexts or countries, as every creativity education program has its own roots, focuses, and limitations that are heavily influenced by its cultures, traditions, and political/governmental emphasis. However, the endeavors made in this study helped identify the notion and special features of the creativity education program implemented by the Taiwanese government. We believe that the CEQ can have a cross-cultural and cross-regional impact on the evaluation of the implementation of creativity education,

as it highlights many key features that most creative learning programs should pursue, such as "teachers have developed their own teaching styles", "students believe that they have the potential to create or imagine", "students have experienced the creating process", "the school has a respectful and appreciative atmosphere", "the school has places where teachers and students can share their ideas", and etc. However, due to the constraints of time and resources, up to date, the CEQ has only been surveyed in Taiwan, its cross-cultural reliability, validity, and generalizability still could not be examined in other cultural contexts. We thus encourage future researchers to undertake further works to validate the questionnaire and its subscales, for instance, to examine its re-test reliability and other forms of validity such as predictive validity, or make endeavors to examine its external validity and generalizability.

Furthermore, throughout the thesis the development of indicators and the questionnaire is aimed to investigate the impact perceived by the research participants. In other words, all the perceived impacts were limited to the opinions reported by the research participants but not the actual statistical performance, thus, the results should be interpreted properly. Due to the time and resource constraint, this research did not measure the participants' actual performances on creativity, imagination, etc. This can be regarded as a treat to the absence of criterion validity, we thus suggest that future researchers can make more endeavors to find out more evidence on the actual statistical performance of the respondents/schools.

To conclude, the rigor of the questionnaire development and various statistical methods such as factor analysis, reliability tests, the structural equation model, and CFA ensured that the CEQ and its five subscales had good measurement properties, and it gave legitimacy and appropriateness to the model based on five latent factors. Even though the CEQ, like other questionnaires, has its limitations, it can still be regarded as a very useful tool for understanding the delivery of multi-dimensional creativity education programs. Each subscale has its own indicators, so if potential users want to examine the practice of a program, they can simply select the suitable subscale(s) for achieving their purposes. Educators can also consider using the indicators developed in this study as a reference, as these have the potential to complement their teaching and delivery of creativity programs.

Some specific issues, topics, and problems identified in this study can provide a platform for future researchers to have meaningful conversations and conduct further studies.

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References

Amabile, T. M., & Hennessey, B. A. (1992). The motivation for creativity in children. In *Achievement and motivation: A social-developmental perspective*. pp. 54–74. New York, NY, US: Cambridge University Press.

Amabile, T. M., Barsade, S. G., Mueller, J. S., & Staw, B. M. (2005). Affect and creativity at work. *Administrative Science Quarterly*, *50*(3), 367–403.

Amabile, T. M., Schatzel, E. A., Moneta, G. B., & Kramer, S. J. (2006). Corrigendum to Leader behaviors and the work environment for creativity: Perceived leader support. *The Leadership Quarterly*, *17*(6), 679–680.

Amabile, T. M. (1996). *Creativity in context: Update to the social psychology of creativity*. Boulder, CO, US: Westview Press.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*(3), 411–423.

Bagozzi, R. P., Yi, Y., & Nassen, K. D. (1998). Representation of measurement error in marketing variables: Review of approaches and extension to three-facet designs. *Journal of Econometrics*, *89*(1–2), 393–421.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen, & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Beverly Hills, CA: Sage.

Bryman, A. (2006). Integrating quantitative and qualitative research: How is it done? *Qualitative Research*, *6*(1), 97–113.

CCE. (2011). *Creative partnerships*. Creativity, Culture and Education.

Carayannis, E. G., & Gonzalez, E. (2003). Creativity and innovation competitiveness? When, how, and why? In L. V. Shavinina (Ed.), *The international handbook on innovation* (pp. 587–606). New York: Elsevier Science.

Carrizo, Cauvageot, & Bella. (2003). *Education policies and strategies: Information tools for the preparation and monitoring of education plans*. UNESCO.

Cheng, Y.-Y., Kuo, H.-C., & Wu, J.-J. (2008). The development of Taiwan creativity education indicators. In *Presented at the ICIE conference*.

Cheng, Y.-Y., Wang, W.-C., Liu, K.-S., & Chen, Y.-L. (2010). Effects of association instruction on fourth graders' poetic creativity in Taiwan. *Creativity Research Journal*, *22*(2), 228–235. http://dx.doi.org/10.1080/10400419.2010.481542

Chin, W., & Newsted, P. (1999). Structural equation modeling analysis with small samples using partial least squares. In R. Hoyle (Ed.), *Statistical strategies for small sample research* (pp. 307–341). Sage Publications.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. In G. A. Marcoulides (Ed.), *Modern methods for business research*. NJ: Lawrence Erlbaum Associates.

Chiu, H. C. (2006). *Structural equation modelling*. Taipei, Taiwan: Shung-Yei.

Chuang, T., & Huang, Y. (2015). An analytic creativity assessment scale for digital game story design: Construct validity, internal consistency and interrater reliability. *Creativity Research Journal*, *27*(4), 322–327. http://dx.doi.org/10.1080/10400419.2015.1087251

Craft, A., Cremin, T., Burnard, P., & Chappell, K. (2007). Teacher stance in creative learning: A study of progression. *Thinking Skills and Creativity*, *2*(2), 136–147. http://dx.doi.org/10.1016/j.tsc.2007.09.003

Csikszentmihalyi, M., & Wolfe, R. (2000). New conceptions and research approaches to creativity: Implications of a systems perspective for creativity in education. In *International handbook of giftedness and talents (Heller.)*. New York: Pergamon.

Csikszentmihalyi, M. (1999). Implications of a systems perspective for the study of creativity. In *Handbook of creativity*. pp. 313–335. New York, NY, US: Cambridge University Press.

Devellis, R. F. (2003). *Scale development: Theory and applications* (2nd ed.). CA: Sage Publications, Inc.

Dunteman, G. H. (1994). Principal component analysis. In M. S. Lewis-Beck (Ed.), *Factor analysis and related techniques*. CA: Sage Publications, Inc.

Dyson, S., et al. (2015). The effect of tabletop role- playing games on the creative potential and emotional creativity of Taiwanese college students. *Thinking Skills and Creativity*, http://dx.doi.org/10.1016/j.tsc.2015.10.004

Egan, T. M. (2005). Creativity in the context of team diversity: Team leader perspectives. *Advances in Developing Human Resources*, *7*, 207–225.

Europa. (2014). *Policy handbook on promotion of creative partnerships*. European Commission.
Florida, R. (2002). *The Rise of the Creative Class: And How it's transforming work, leisure, community and everyday life*. New York: Perseus Book Group.
Florida, R. (2005a). *Cities and the creative class*. Routledge.
Florida, R. (2005b). *The flight of the creative class: The new global competition for talent*. Harper Business.
Georghiou, L., & Keenan, M. (2008). Evaluation and impact of foresight. In *The handbook of technology foresight: Concepts and practice*. pp. 376–399. Cheltenham, U.K. and Northampton: Prime Series on Research and Innovation Policy.
Gerbing, D. W., & Anderson, J. C. (1988). An updated paradigm forscale development incorporating unidimensionality and its assessment. *Journal of MarketingResearch*, *25*(2), 186–192.
Gough, H. G. (1979). A creative personality scale for the Adjective Check List. *Journal of Personality and Social Psychology*, *37*, 1398–1405. http://dx.doi.org/10.1037/0022-3514.37.8.1398
Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed methods evaluation designs. *Educational Evaluation and Policy Analysis*, *11*(3), 255–274.
Hair, J., Anderson, R., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis* (5th ed.). NJ: Upper Saddle River, Prentice-Hall.
Horng, J., & Lin, L. (2009). The development of scale for evaluating creative culinary products. *Creativity Research Journal*, *21*(1), 54–63.
Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. http://dx.doi.org/10.1080/10705519909540118
Huang, T.-W. (2003). Comparisons between common factor analysis and principal component anlysis. *Journal of Education National Changhua University of Education*, *25*, 63–86.
Jöreskog, K. G., & Sörbom, D. (1989). *LISREL7, a guide to the program and applications*. SPSS Publications.
Jarvenpaa, S. L., Tractinsky, N., & Vitale, M. (2000). Consumertrust in an internet store. *Information Technology and Management*, *1*(1/2), 45–71.
Kettinger, W. J., & Lee, C. C. (1994). Perceived service quality and user satisfaction with the information services function. *Decision Science*, *25*(5), 737–766.
Kirschenbaum, R. J. (1989). *Understanding the creative activity of students: Including an instruction manual for the creative behavior inventory*. St. Louis, MO: Creative Learning Press.
Kuo, H. C. (2014). *An investigation of the perceived impact of the programme of creativity and imagining the futures in education. PhD thesis*. England, UK: Faculty of Education, University of Cambridge.
MOE. (2002a). *The white paper on creative education*. MOE.
MOE. (2002b). *White paper on creative education*. MOE.
MOE. (2006). *Creative education initiative development proposal*. MOE.
MOE. (2007). *Creative education mid-term development proposal*. MOE.
MOE. (2014). *Proposal for the program of creativity and imagining the futures in education*. MOE.
MacCallum, R. C. (1999). *Psychology 820 course packet*. OH: The Ohio State University Press.
Mayfield, M., & Mayfield, J. (2010). Developing a scale to measure the creative environment perceptions: A questionnaire for investigating garden variety creativity. *Creativity Research Journal*, *22*(2), 162–169.
McRae, H. (1996). *World in 2020: Power, culture, and prosperity*. Boston: Harvard Business School Press.
Oldham, G. R., & Cummings, A. (1996). Employee creativity: Personal and contextual factors at work. *Academy of Management Journal*, *39*, 607–634. http://dx.doi.org/10.2307/256657
Price, J. L. (1997). Handbook of organizational measurement. *International Journal of Manpower*, *18*, 303–558. http://dx.doi.org/10.1108/01437729710182260
Rigdon, E. E. (1996). CFI versus RMSEA: A comparison of two fit indices for structural equation modelling. *Structural Equation Modeling*, *3*(4), 369–379.
Robson, C. (2002). *Real world research: A resource for social scientists and practitioner* (2nd ed.). Oxford, England: Blackwell.
Rossman, G. B., & Rallis, S. F. (1998). *Learning in the field. An introduction to qualitative research*. Thousand Oaks, CA, US: Corwin press.
Scheerens, J., Glas, C., & Thomas, S. (2003). *Educational evaluation, assessment, and monitoring: a systemic approach*.
Spector, P. E. (1992). *Summated rating scales: An introduction*. Newbury Park, CA: Sage.
Sternberg, R. J., & Lubart, T. I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity*. New York, NY, US: Free Press.
Sternberg, R. J. (2001). *Teaching psychology students that creativity is a decision*, 11–14.
Sternberg, R. J. (2002). Encouraging students to decide for creativity. *Research in the Schools*, *9*(2), 61–70.
Sternberg, R. J. (2003). Creative thinking in the classroom. *Scandinavian Journal of Educational Research*, *47*(3), 325–338.
Tabachnick, B., & Fidell, L. S. (1996). *Using multivariate statistics*. New York: HarperCollins College Publishers.
Tang, C., & Ding, X. (2014). Graduate students' creative professional virtual community behaviors and their creativity. *Computers in Human Behavior*, *41*, 464–470.
Torrance, E. P. (1974). *The Torrance tests of creative Thinking–Norms—Technical manual research Edition—Verbal tests, forms a and B—Figural tests, forms a and B*. Princeton NJ: Personnel Press.
UNESCO. (2008). *Education management information system*. [Retrieved March 3, 2016, from]. http://www.unesco.org/en/policies-and-plans/
Wu, J.-J., & Albanese, D. (2010). Asian creativity, chapter one: Creativity across three Chinese societies. *Thinking Skills and Creativity*, *5*(3), 150–154.
Wu, J.-J., & Albanese, D. L. (2013). Imagination and creativity: wellsprings and streams of education – the Taiwan experience. *Educational Psychology*, *33*(5), 561–581. http://dx.doi.org/10.1080/01443410.2013.813689
Zhou, J., & George, J. M. (2001). When job dissatisfaction leads to creativity: Encouraging the expression of voice. *Academy of Management Journal*, *44*, 682–696. http://dx.doi.org/10.2307/3069410