

台灣人力資源專業人員訓練設計職能量表發展

Development of the Comprehensive Training Design Competencies for Human Resource Professionals in Taiwan

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摘要：本研究目的為了建構與驗證多構面的訓練設計職能量表，主要使用三個步驟檢驗其建構效度 (N=497)。這些訓練職能中包含了 ADDIE 訓練系統 (分析、設計、發展、執行、評估) 以及與諮詢內容專家的能力，以評估人力資源專業人員從事訓練工作之職能。本文主要採用探索性因素分析與驗證性因素分析進行檢驗。研究結果顯示，訓練設計職能量表主要分成三個構面，分別為：訓練規劃、訓練結果及諮詢內容專家的能力。因此，本文提供了從事人力資源相關的人員一個有效的量表來發展其專業職能，以便規劃出有效

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關鍵字：訓練；訓練設計職能；人力資源；內容專家；顧問諮詢

Abstract: The purpose of this study is to construct and validate a multidimensional measurement of training design competencies (TDC) by using three stages (N=497). These competencies include ADDIE training system (analysis, design, development, implementation, and evaluation) and consultation with subject matter experts (SMEs) when human resource professionals engage in a training job. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted. The results demonstrated that the training design competencies were best represented by three dimensions: training planning, training outcome, and the consultation with SMEs. This study offers human resource-related practitioners a valid instrument to develop their professionals and to organize effective training programs.

Keywords: Training; Training design competencies; Human resource; Subject matter expert; Consultation relationship

1. Introduction

Globalization has made all types of business different from what they were in the past. In order to accept this change, organizations train their employees to adapt this changing environment. It means that training is a way to solve some of organization's problems. Actually, training has been widely used as a method to help increase the organizations' competitive advantage and deal with constantly unprecedented periods of challenges (Noe 2012). For individuals, training is one of the most pervasive methods to develop employees' knowledge, skills, attitudes, and behaviors for accomplishing the job tasks and superior performance which were required by the organizations (Arthur & Bennett 2003; Swanson & Torrance 1995).

The training design process represents using a systematic approach to develop training programs (Lin & Jacobs 2008). In general, the training design process is based on a systematic approach which is composed of the five phases:

analysis, design, development, implementation, and evaluation (ADDIE) (Reigeluth 1983; Dick & Carey 2011; Gagné, Wager, Golas, & Keller 2005). The process of ADDIE is viewed as a problem-solving and decision-making model because this system can offer a number of ways to solve the instructional problems and adopt different opinions to accomplish the superior goal of organizations (Allen 2006; Allen & Swanson 2006). More importantly, this systematic approach used in designing training programs can increase the training quality and enhance the employees' performance efficiently.

In addition to the ADDIE process, training programs in organizations are usually developed by specialists who should be called the training designers and be identified to HR field. HR related professionals were the most appropriate people to integrate all needs of the training among different subunits (Lin & Jacobs 2008). In practice, the success of the training programs was not only counted on the ability of training designers but also on the contribution from subject matter experts (SMEs) who provide their insights and knowledge about the content on the specific area (Herling 2000). Thus, Lin and Jacobs (2008) highly emphasized that a well-organized training program cannot be accomplished either by SMEs or HR professionals separately. HR professionals are not only in charge of the training program design followed by ADDIE process, but also establish the partnership with SMEs to discuss the training content for ensuring it can fit trainees' needs and the content are understandable.

Also, most companies in Taiwan did not have such a position entitled a training designer. The current researches in Taiwan did not mention too much about the sub-role of HR professionals, which was a training designer. In theoretical perspectives, unfortunately, existing human resource development (HRD) competencies models have ignored this critical component- training program designing. Since early 1970's, the literatures in HR have been more concerned with developing highly transferable generic competencies for their overall performance or particular job roles. Many studies have focused on the characteristics and competencies which contribute to the effectiveness of HR professionals because they are responsible for identifying the competencies required for each job classification within the organization and establishing

performance goals and objectives. For example, Chen, Bian, and Hom (2005) concluded the history of the five main competencies model studies in United States since the early 1970's. In the 1970's, Pinto and Walker (1978) were the main authors to focus on training and development (T&D). In the 1980's, McLagan (1983 & 1989) was the main author who moved the focus from T&D to the HRD area. In the 1990's, Rothwell with other authors, in 1999 and later in 2004 and 2007, broadened the research focus from HRD through human performance improvement to Workplace Learning and Performance (WLP) because more organizations had become aware of the importance of intellectual capital and performance results in developing training activities.

As shown above, many researchers have developed about competency model for HR professionals (Pinto & Walker, 1978; McLagan, 1983, 1989; Rothwell *et al.*, 1999, 2012) and only the International Board of Standards for Training, Performance and Instruction (IBSTPI) (1988) proposed a list of instructional design competencies to instructional designers. However, no empirical studies demonstrated a valid instrument of instructional design competencies and there is a paucity of reliable and valid competency model specifying on training design for HR professionals while engaging in training activities in the business setting and also lack of attention to research influencing practice evident on this topic.

Faced with demands for developing training programs followed by the systematic design process, HR professionals are able to develop their training design competencies to perform their in-role job and enhance the training quality in an organization. Given the role of HR professionals to function as a training designer, an assessment method to determine developmental needs would be helpful. Therefore, in this study, we emphasized the importance of developing a reliable and valid instrument measuring the training design competencies for HR professionals in these aspects of following the ADDIE model and consultation with SMEs.

2. Literature Review

Most of literatures supported that training programs should be developed by an organized-system approach, which is typically composed of the five phases: 1) analysis, 2) design, 3) development, 4) implementation, and 5) evaluation. This process generally refers to the ADDIE training system (Reigeluth 1983; Dick & Carey 2011; Gagne, Wager, Gola, & Keller 2005). The ADDIE model provides a systematic approach for determining the training needs, designing and developing the training programs and materials, implementing the programs, and evaluating the effectiveness of the training (Gagne *et al.* 2005). Although a variety of system models (e.g., ID, ISD) were developed since 1960s, the ADDIE process is the most apparent in the traditional approach to design instruction and also the most popular model in many business, industry, government, and military training settings, thus becoming the standards to all other instructional design models (Allen 2006).

Nowadays, the revised ADDIE training system emphasizes on determining the trainees' competence gap, job components analysis, trainees' characteristics, and most importantly linking organization goals and missions consistently with the objectives of the training program. The model suggests the steps of the process and the sequence in which they should be followed when engaging in a training activity (Jacobs 2006). Recognition of the ADDIE process as a system approach suggests that the training program will be more efficient and more effective if the process has been used (Salas & Cannon-Bower 2004). The ADDIE process is expected to accomplish higher quality of training and increase the effectiveness and efficiency of education and training for fitting the employee's jobs (McLagan 1989; Jacobs 2001).

In reality, while the training system identifies the various stages of the activity, the entire process involves much more than just following the linear ADDIE. This linear approach to ADDIE was not accepted in today's conditions (Lin 2008; Allen 2006). This is especially true because the plan of training programs in the organization is a complex process. Outputting a training program requires experienced content experts from different disciplines to work with and it

is quite difficult for single expert in the organization to accomplish the task (Lin & Jacobs 2008; Gagne *et al.* 2005; Reigeluth 1983).

In the past decade, the ADDIE literatures has concluded that the most effective approach to output training programs is a constant collaboration between the training designers and subject matter experts (SMEs) or content experts (Lin & Jacobs 2008). Both sides perceived themselves as experts when collaborating in the ADDIE process (Keppell 1997; Salas & Cannon-Bower 2004; Allen 2006). Training designers are able to provide the perspectives on the process; SMEs are able to provide the perspectives on content from differently specific areas that could not possibly be learned by training designers alone (Herling 2000). Nowadays, a team of professionals or experts from several areas is usually required to complete the plan of a training program (Allen 2006; Lin & Jacobs 2008).

Designing training programs are usually developed by professionals in the human resource field (Allen & Swanson 2006). HR professionals serve as a powerful agent to assist an organization's expansion and to develop its capability (Cosh, Duncan, & Hughes 1998). As Lin and Jacobs (2008) stated, HR professionals should have the ability to contribute knowledge and skills in different aspects of training design. There are some characteristics of HR professionals. First, he or she has the ability to design and put training programs together for employees to use. Second, he or she is knowledgeable in learning theories and concepts, instructional strategies, and techniques. Third, he or she possesses the ability to build and maintain good consulting relationships with subject matter experts (SMEs). Deden-Parker (1981) emphasized that the ability of interpersonal communication was the most important skill while working with experts. Although it is important to establish a relationship between the HR professionals and SMEs to go through the ADDIE process, this approach is not followed in various cases.

Take Lin and Jacobs' (2008) empirical study as an example, HR professionals working in Taiwan high-tech companies recognized the importance of the collaborative relationship between them and SMEs to the success of an

effective training program, but did not have awareness and sensitivity of the process of consideration to plan training programs is an efficient approach in the practice. It means that HR professionals may not sure of what they knew and were not aware of what they did not know about their competencies to design a training program. This finding is kindly consistent with Dick's (1988) study that designers were not sufficiently confident of their skills in instructional design to carry out a project successfully.

Herling (2000) identified that SMEs were the people who provide their insights and understanding about the training content. Based on the study of Keppell (1997), an SME was specializing on a specific domain of knowledge which let designers attempt to induce more particular knowledge in the program. In other words, SMEs engaged in a project with their high level content-specific knowledge or skills (Tessmer 1998). Lin and Jacobs (2008) recognized that training designers usually do not have enough ability to realize the diverse content. Therefore, the job content of a training designer is more like a negotiator to communicate with all people who worked in the same organization or related to their own company. That is to say, the training designer should adequately arrange every detail in the training design process. As recommended by Moller (1995), the relationship between training designers and SMEs was like a partnership in designing training programs. Clearly, a successful training program was probably produced and determined by this relationship. Armstrong and Sherman (1988) concluded that SMEs and designers must collaborate to contribute their knowledge or skills, sharing the responsibilities, and constructing the mutual respect in their cooperation.

To summarize, the critical challenge for HR professionals is whether now they have the competencies which follow the ADDIE training system to design the training program as well as importantly contain the consultation ability with SMEs when engaging in a training activity (Lin 2006).

3. Method

Three stages were conducted to examine the reliability and validity of the

proposed training design competencies (TDC) scale. Data of Stage 1 were collected from high-tech companies located in both Hsinchu and central area of Taiwan separately. Exploratory factor analysis (EFA) was conducted to explore and verify the items and factor structures of ADDIE training system. Data of Stage 2 were collected from Taiwan Training Quail System (TTQS) workshops. Confirmatory factor analysis (CFA) was conducted to confirm the instrument. Stage 3 focused on examining the reliability and validity of consultation with SMEs while HR professionals are working with them.

3.1 Stage 1: Exploratory Factor Analysis (EFA)

In the first stage, item analysis and exploratory factor analysis (EFA) were used to explore the factor structure of ADDIE training system. ADDIE is a systematic process which is divided into five steps: analysis, design, development, implementation, and evaluation, which are theorized by Reigeluth (1983), Dick and Carey (2011), and Gagne, Wager, Gola, and Keller (2005). The initial items of ADDIE training system and consultation with SMEs were collected by reviewing the previous theoretical literatures, partly adopting from Instructional Design Competencies: The Standards (IBSTPI 1988), and interviewing around ten HR practitioners and professors with education, management, or human resource backgrounds. They have strong experience in engaging in a training program or experience in collaborating with inside SMEs or outside experts from consultant companies. Professors also have experience in teaching training and development courses and taking projects for consulting companies which need trainings for employees.

Therefore, we initially organized 68 items (60 for ADDIE training system and 8 for consultation ability to work with SMEs) thorough literature review on previous researches related to the competency of HRD and IBSTPI and other instructional design models. Then pilot test was conducted. We collected around 36 HR or management graduate students and 30 HR junior practitioners and item analysis to examine these initial 68 items. 39 items were eliminated because of showing no significance between the high and low respondent groups by using

independent-sample T test to compare. The results of the ADDIE training system was organized by 21 items with five dimensions (analysis, design, development, implementation, and evaluation) and the consultation with SMEs by 8 items within one dimension.

3.1.1 Sample and Procedures

281 HR professionals who worked either in high-tech related companies located in Hsinchu Science Park or in the central area of Taiwan were used in the first stage. In the whole process of data collection, three steps were adopted: 1) sent the recruitment letters via email or made phone calls to HR departments. The purpose of this step was to explain the goals of this research, to obtain exactly contact information, and to inform the survey would be sent out within two weeks; 2) sent the online or paper-based survey in Chinese to these participants; 3) sent a reminder by emails to all participants for inspiring them to respond after two weeks. Ultimately, these 281 respondents were utilized for Stage 1 to examine the factor structure of ADDIE training system.

3.1.2 Measures

ADDIE Training System. The instrument of ADDIE training system was initially developed by review of relevant literatures, adoption from Instructional Design Competencies: The Standards (IBSTPI 1988), and interview with ten HR practitioners and professors with education, management, or human resource backgrounds. Then, this instrument of ADDIE training system was classified into current ability and desired ability to assess HR professionals. There are totally 21 items included (a) 6-item in the analysis stage; (b) 8-item in the design and development stages; (c) 3-item in the implementation stage; (d) 4-item in the evaluation stage. The response format of this instrument is a 7-point Likert-type scale (1 = *extremely low ability* to 7 = *extremely high ability*). A sample item from the analysis stage is "Access the needs of trainees to determine what they can currently do and what they should be able to do." A sample item from the design and development stage is "Specify the target objective that describes what is expected of trainees after the training." A sample item from the implementation

stage is “Develop an implementation plan to conduct the training program.” A sample item from the evaluation stage is “Determine what trainees have learned from the training program.”

3.1.3 Analyses

We first conducted item analysis to determinate how correlated between each indicator items and the correlation between each item and total scores of ADDIE training system. Pearson correlation analysis was used to make sure that each item of the instrument is not highly correlated with each other and to test each item of this instrument is correlated with the whole construct. Then, we summarized the total scores of the respondents on each item of the dimensions of the current ability and the desired ability respectively. All scores of the respondents on each item were divided into the top 25% high score group and the last 25% low score group (Cooper & Schindler 2010). We adopted independent-sample T test to compare whether the mean difference of the top 25% high group and the last 25% low group was significant. If the item can be discriminated in two extreme groups, t-values will be significant. If no item should be removed from the item analysis, the discrimination of the each item of this instrument should be acceptable for further analysis. Finally, the exploratory factor analysis (EFA) with varimax rotation was performed on the 21 items of the instrument. Our purpose in Stage 1 was to explore the factor structure of ADDIE training system and to examine its reliability and validity.

3.1.4 Results

Item Analysis of ADDIE training system. Table 1 and 2 showed the descriptive statistics and correlations among all the indicators for HR professionals’ perceived current/desired ability in the five dimensions of ADDIE process. The results showed that the correlation coefficients were significantly correlated between each item score to item score and item score to total score ($p < 0.05$). In addition to the item-to-item and item-to-total analysis, Table 3 showed the results of independent-sample T test for each item of ADDIE training system classified into current ability and desired ability. The results in this study revealed

that all respondents can be significantly divided into top 25% high group and last 25% low group based on their scores on each item, the t-value of current ability and desired ability are ranged from 11.45 to 17.68 and 13.97 to 21.22, respectively. As a result, all items should be retained in this scale.

Exploratory Factor Analysis of ADDIE training system. The exploratory factor analysis (EFA) with varimax rotation was performed on the 21 items of the instrument. In this study, KMO is all greater than 0.9 and Barlett's test is significant in every dimension which means that all the variables were suitable for conducting factor analysis. After the EFA, the 21 items of this instrument were extracted into two factors, which satisfied in the current ability as well as desired ability. The items of the analysis and the design and development stages were combined into single factor, which was named as training planning. In addition, the implementation and evaluation stages were merged into another single factor, which was named as training outcome. The two dimensions are combined to form the ADDIE training system. The critical value of 0.4 was the cutoff point to define factors (Gorsuch 1983). In this present data, all the factor loadings were greater than 0.4 and items loaded unambiguously on the correct factors. Only two items were eliminated because of cross-loading on the other dimension. Therefore, the reduced-scale instrument was consisted of 19 items on both current and desired ability.

Table 4 showed the two extracted factors, including items, factor loadings, cronbach's alpha, explained variance, and cumulative explained variance. The cumulative explained variance of current ability and desired ability were 71.33% and 79.23%, respectively. The factor loadings in the current ability range from 0.53 to 0.84 and in the desired ability range from 0.65 to 0.83. As a result, the two factors of ADDIE training system with 19 items demonstrated good scale reliability with good coefficient alphas, whether in the current ability or in the desired ability shown in Appendix.

Table 1
Current Ability of HRD Professionals in the ADDIE Training System: Means, Standard Deviations, and Inter-Correlations
Among Indicator Variables

	M	SD	A1	A2	A3	A4	A5	A6	D7	D8	D9	D10	D11	D12	D13	D14	I15	I16	I17	E18	E19	E20	E21
A1	4.26	1.23	-																				
A2	4.60	1.18	.67**	-																			
A3	4.38	1.27	.72**	.67**	-																		
A4	4.63	1.26	.65**	.66**	.70**	-																	
A5	4.58	1.27	.62**	.61**	.67**	.68**	-																
A6	4.77	1.33	.67**	.58**	.69**	.67**	.71**	-															
D7	4.61	1.30	.67**	.62**	.71**	.67**	.71**	.70**	-														
D8	4.54	1.27	.65**	.64**	.69**	.71**	.74**	.73**	.81**	-													
D9	4.20	1.42	.69**	.64**	.67**	.64**	.61**	.66**	.71**	.73**	-												
D10	4.18	1.32	.65**	.58**	.67**	.65**	.66**	.70**	.70**	.73**	.76**	-											
D11	4.23	1.37	.71**	.65**	.70**	.72**	.70**	.69**	.73**	.80**	.76**	.79**	-										
D12	4.41	1.40	.67**	.61**	.65**	.64**	.65**	.71**	.74**	.76**	.71**	.79**	.77**	-									
D13	4.17	1.47	.65**	.62**	.66**	.64**	.62**	.67**	.68**	.74**	.68**	.77**	.79**	.83**	-								
D14	4.50	1.41	.62**	.56**	.65**	.70**	.69**	.68**	.69**	.74**	.64**	.69**	.74**	.78**	.77**	-							
I15	4.46	1.46	.64**	.60**	.62**	.66**	.59**	.64**	.68**	.73**	.65**	.68**	.74**	.76**	.76**	.76**	-						
I16	4.55	1.44	.60**	.57**	.57**	.59**	.60**	.60**	.60**	.66**	.60**	.61**	.66**	.62**	.63**	.66**	.72**	-					
I17	4.57	1.40	.59**	.53**	.55**	.62**	.59**	.61**	.58**	.67**	.61**	.63**	.66**	.63**	.61**	.69**	.68**	.63**	-				
E18	4.89	1.29	.59**	.54**	.53**	.61**	.58**	.66**	.62**	.66**	.60**	.58**	.63**	.62**	.60**	.62**	.67**	.64**	.70**	-			
E19	4.63	1.32	.57**	.54**	.55**	.59**	.59**	.61**	.65**	.70**	.65**	.63**	.65**	.63**	.62**	.63**	.70**	.69**	.73**	.77**	-		
E20	4.88	1.35	.57**	.57**	.53**	.62**	.63**	.63**	.64**	.72**	.63**	.59**	.64**	.62**	.62**	.67**	.72**	.66**	.68**	.69**	.75**	-	
E21	3.83	1.39	.58**	.49**	.55**	.51**	.53**	.53**	.50**	.62**	.62**	.59**	.54**	.54**	.60**	.54**	.56**	.53**	.58**	.46**	.59**	.60**	-
Total			.85**	.82**	.88**	.86**	.85**	.85**	.86**	.89**	.86**	.88**	.91**	.91**	.89**	.86**	.91**	.89**	.87**	.85**	.91**	.89**	.78**

Note. N=281, $p < .01^{**}$, A: analysis step, D: design and development steps, I: implementation step, E: evaluation step

Table 2
Desired ability of HRD Professionals in the ADDIE Training System: Means, Standard Deviations, and Inter-Correlations
Among Indicator Variables

	M	SD	A1	A2	A3	A4	A5	A6	D7	D8	D9	D10	D11	D12	D13	D14	I15	I16	I17	E18	E19	E20	E21
A1	5.66	1.21	-																				
A2	5.77	1.15	.79 **	-																			
A3	5.70	1.14	.76 **	.76 **	-																		
A4	5.68	1.19	.71 **	.72 **	.79 **	-																	
A5	5.93	1.14	.74 **	.74 **	.76 **	.74 **	-																
A6	5.77	1.19	.69 **	.73 **	.71 **	.73 **	.78 **	-															
D7	5.78	1.19	.77 **	.73 **	.77 **	.74 **	.76 **	.77 **	-														
D8	5.72	1.19	.75 **	.71 **	.79 **	.77 **	.78 **	.79 **	.86 **	-													
D9	5.59	1.24	.74 **	.75 **	.77 **	.69 **	.72 **	.76 **	.82 **	.82 **	-												
D10	5.68	1.21	.72 **	.71 **	.74 **	.68 **	.75 **	.73 **	.77 **	.80 **	.83 **	-											
D11	5.70	1.19	.71 **	.70 **	.73 **	.70 **	.76 **	.74 **	.78 **	.80 **	.79 **	.79 **	-										
D12	5.61	1.22	.69 **	.67 **	.72 **	.68 **	.69 **	.75 **	.77 **	.79 **	.77 **	.79 **	.77 **	-									
D13	5.57	1.26	.71 **	.71 **	.69 **	.68 **	.69 **	.73 **	.77 **	.76 **	.77 **	.78 **	.80 **	.86 **	-								
D14	5.69	1.18	.70 **	.68 **	.71 **	.68 **	.73 **	.72 **	.75 **	.76 **	.73 **	.76 **	.71 **	.78 **	.77 **	-							
I15	5.73	1.18	.65 **	.63 **	.65 **	.66 **	.62 **	.68 **	.74 **	.75 **	.70 **	.77 **	.76 **	.79 **	.79 **	.73 **	-						
I16	5.87	1.22	.65 **	.58 **	.67 **	.67 **	.70 **	.64 **	.73 **	.77 **	.70 **	.72 **	.71 **	.73 **	.67 **	.74 **	.76 **	-					
I17	5.68	1.22	.60 **	.56 **	.61 **	.63 **	.59 **	.66 **	.70 **	.70 **	.69 **	.73 **	.65 **	.75 **	.70 **	.76 **	.78 **	.73 **	-				
E18	5.80	1.18	.65**	.66**	.70**	.69**	.70**	.71**	.71**	.74**	.70**	.74**	.69**	.81**	.71**	.73**	.75**	.73**	.79**	-			
E19	5.76	1.16	.67**	.63**	.68**	.63**	.73**	.68**	.75**	.76**	.73**	.74**	.69**	.77**	.71**	.80**	.75**	.74**	.77**	.86**	-		
E20	5.79	1.16	.65**	.66**	.70**	.72**	.74**	.70**	.74**	.79**	.68**	.72**	.72**	.77**	.70**	.77**	.76**	.81**	.76**	.82**	.85**	-	
E21	5.56	1.23	.62**	.60**	.65**	.61**	.65**	.60**	.67**	.69**	.68**	.74**	.64**	.69**	.72**	.71**	.71**	.73**	.70**	.68**	.75**	.77**	-
Total			.88**	.89**	.90**	.88**	.89**	.88**	.90**	.91**	.91**	.91**	.89**	.91**	.90**	.87**	.93**	.91**	.92**	.92**	.94**	.94**	.87**

Note. N=281, $p < .01$ **, A: analysis step, D: design and development steps, I: implementation step, E: evaluation step

Table 3
Item Analysis

Items	Current ability							Desired ability						
	Group 1			Group 2			T-values	Group 1			Group 2			T-values
	N	Mean	S.D.	N	Mean	S.D.		N	Mean	S.D.	N	Mean	S.D.	
Analysis step														
1. Access the needs of trainees to determine what they can currently do and what they should be able to do.	142	4.99	.91	112	3.34	.96	13.97**	140	6.38	.70	106	4.71	1.07	13.97**
2. Analyze the components of jobs, duties and tasks.	142	5.32	.85	112	3.69	.91	14.74**	140	6.49	.57	106	4.84	1.05	14.64**
3. Identify the characteristics of trainees that influence their ability to achieve the training objectives.	142	5.17	.83	112	3.38	1.00	15.29**	140	6.42	.61	106	4.75	.95	15.88**
4. Analyze the work setting to identify the tools, equipment and other resources used on the job.	142	5.37	.88	112	3.68	1.02	14.12**	140	6.44	.60	106	4.66	1.01	16.09**
5. Analyze the organization to ensure that the goals are consistent with the objectives of the training program.	142	5.36	.84	112	3.60	1.03	15.06**	140	6.65	.56	106	4.65	1.01	15.26**
6. Review additional resources related to the content of the training program.	142	5.53	.87	112	3.79	1.17	13.11**	140	6.52	.65	106	4.52	1.01	15.35**
Design & Development steps														
7. Specify the target objective that describes what is expected of trainees after the training.	141	5.35	.94	107	3.57	.98	14.46**	140	6.55	.58	98	4.74	.96	16.67**
8. Specify the enabling objectives that describe what trainees should know or do to achieve that target objectives.	141	5.28	.85	107	3.50	1.03	14.46**	140	6.52	.58	98	4.66	.91	17.87**
9. Develop performance rating scales and cognitive test items to measure the trainees' learning outcomes.	141	5.01	1.03	107	3.13	1.12	13.74**	140	6.40	.66	98	4.51	.94	17.14**

Table 3
Item Analysis

Items	Current ability							Desired ability						
	Group 1			Group 2			T-values	Group 1			Group 2			T-values
	N	Mean	S.D.	N	Mean	S.D.		N	Mean	S.D.	N	Mean	S.D.	
10. Develop training materials that are consistent with the training objectives.	141	4.92	.95	107	3.15	1.02	14.12**	140	6.49	.62	98	4.59	.94	17.48**
11. Identify training strategies, methods and approaches to present the training content.	141	5.09	.88	107	3.07	1.03	16.67**	140	6.41	.72	98	4.73	.94	14.88**
12. Design lessons based on a logical learning sequence.	141	5.27	.96	107	3.21	.95	16.90**	140	6.39	.66	98	4.50	.88	18.00**
13. Use a structured writing format to prepare trainer and trainee guides.	141	5.06	1.04	107	2.97	1.02	15.77**	140	6.38	.67	98	4.46	1.01	16.47**
14. Select appropriate technology as a means to deliver training.	141	5.38	.92	107	3.33	1.06	16.23**	140	6.46	.66	98	4.64	.91	16.02**

Note. N=281, $p < .01$ **

Table 3

Item Analysis (Continued)

Items	Current ability							Desired ability						
	Group 1			Group 2			T-values	Group 1			Group 2			T-values
	N	Mean	S.D.	N	Mean	S.D.		N	Mean	S.D.	N	Mean	S.D.	
Implementation step														
15. Develop an implementation plan to conduct the training program.	149	5.32	1.01	102	3.19	1.01	16.39**	155	6.43	.68	91	4.55	.90	17.22**
16. Ensure the organization to support the training program.	149	5.36	.99	102	3.37	1.15	14.65**	155	6.58	.55	91	4.62	1.05	16.57**
17. Record the progress of trainees during the training.	149	5.41	.91	102	3.32	1.04	16.88**	155	6.41	.64	91	4.43	.91	18.32**
Evaluation step														
18. Evaluate the trainees' overall satisfaction with the training program.	142	5.63	.87	106	3.89	1.05	14.34**	144	6.53	.59	97	4.71	1.01	16.03**
19. Determine what trainees have learned from the training program.	142	5.49	.83	106	3.48	.95	17.68**	144	6.58	.56	97	4.62	.78	21.22**
20. Report the results of the training program to management.	142	5.76	.83	106	3.74	1.02	17.30**	144	6.55	.54	97	4.72	.97	16.94**
21. Determine the financial benefits of the training program.	142	4.54	1.18	106	2.89	1.05	11.45**	144	6.31	.77	97	4.54	.99	14.84**

Note. N=281, $p < .01$ **

Table 4
Exploratory Factor Analysis Results (Current ability & Desired ability)

Scale items	Training planning	
	Current	Desired
1. Access the needs of trainees to determine what they can currently do and what they should be able to do.	.76	.80
2. Analyze the components of jobs, duties and tasks.	.74	.83
3. Identify the characteristics of trainees that influence their ability to achieve the training objectives.	.84	.79
4. Analyze the work setting to identify the tools, equipment and other resources used on the job.	.71	.73
5. Analyze the organization to ensure that the goals are consistent with the objectives of the training program.	.71	.75
6. Review additional resources related to the content of the training program.	.69	.75
7. Specify the target objective that describes what is expected of trainees after the training.	.72	.73
8. Specify the enabling objectives that describe what trainees should know or do to achieve that target objectives.	.68	.71
9. Develop performance rating scales and cognitive test items to measure the trainees' learning outcomes.	.70	.78
10. Develop training materials that are consistent with the training objectives.	.70	.67
11. Identify training strategies, methods and approaches to present the training content.	.74	.73
12. Use a structured writing format to prepare trainer and trainee guides.	.67	.65
Cronbach's alpha	.96	.97
Cumulative explained variance (%)	66.15	74.32

Note. N=281

Table 4
Exploratory Factor Analysis Results (Current ability & Desired ability) (Continued)

Scale items	Training outcome	
	Current	Desired
13. Develop an implementation plan to conduct the training program.	.69	.77
14. Ensure the organization to support the training program.	.69	.77
15. Record the progress of trainees during the training.	.77	.82
16. Evaluate the trainees' overall satisfaction with the training program.	.78	.77
17. Determine what trainees have learned from the training program.	.84	.79
18. Report the results of the training program to management.	.79	.80
19. Determine the financial benefits of the training program.	.53	.74
Cronbach's alpha	.93	.96
Cumulative explained variance (%)	71.33	79.23

Note. N=281

3.2 Stage 2: Confirmatory Factor Analysis (CFA)

Our main purpose in Stage 1 was to explore the factor structure of ADDIE training system and to examine its reliability and validity. Although the preliminary analysis revealed that the proposed instrument can be extracted into two dimensions- training planning and training outcome. However, we still need further evidence to confirm its factor structure and the reliability and validity. Stage 2 addressed this issue by providing evidence of discriminant and convergent validity with another sample. CFA was a confirmatory approach to develop a standardized instrument (Mackenzie & House 1979; McGrath 1979), thus, we conducted CFA to assess the reliability and the construct validity of the proposed factor structure.

3.2.1 Sample and Procedures

216 respondents from Taiwan Train Quali System (TTQS) were randomly selected from 300 HR professionals in Taiwan Train Quali System (TTQS) workshops. The respondent rate of this sample was 72%. The workshops were held by the training centers which located in north, middle, and south of Taiwan. Most of the participants come from small-medium enterprises in Taiwan and were asked to complete the six-page paper-based survey in their rest time of workshop.

3.2.2 Measures

ADDIE Training System. We used the same scale, ADDIE training system, which was used in Stage 1. Since two items were suggested to be deleted after Stage 1, we used the 19-item version to re-confirm its factor structure and validity. ADDIE training system classified into current ability and desired ability to examine HRD professionals. Coefficient alphas for the current ability of training planning and training outcome, as assessed in Stage1, were 0.96 and 0.93, respectively. Coefficient alphas for the desired ability of training planning and training outcome, as assessed in Stage 1, were 0.97 and 0.96, respectively.

3.2.3 Analysis

Item analysis. In order to decide if the revised 19-item all should be

retained in the reduced-scale from Stage 1, item analysis was necessary to be conducted again for ensuring the instrument of ADDIE training system accomplishedly. Similarly, the independent-samples T test was adopted to assess these 19 items and t-value should be greater than 1.75. The items of ADDIE training system in current ability and desired ability were all significantly and t-values were from 12.52 to 18.94 and 14.59 to 24.49, respectively. Thus, these 19 items should be ready to use for Stage 2.

Confirmatory Factor Analysis. In order to re-confirm the factor structure and re-examine the reliability and validity of the revised ADDIE training system, this study adopted the CFA approach instead of EFA to assess the proposed instrument which was examined in Stage 1. We followed the recommendations of Hair *et al.* (2009), if the ratio of X^2/df is smaller than 3.0, the model can be regarded as well-fitting. For the model fit index, if the values of the goodness-of-fit (GFI), the adjusted goodness-of-fit (AGFI), the normed fit index (NFI), the non-normed fit index (NNFI), the incremental fit index (IFI), and the comparative fit index (CFI) are closer to 1.0, which represents that is a well-fitting model (Bentler & Bonnet 1980). In addition, Hair *et al.* (2009) also suggested that the RMSEA values should not exceed 0.08, which indicates a good fit between the sample and the theoretical model.

3.2.4 Results

The remaining 19 items from Stage 1 were then re-examined through CFA, which was aimed to further assess the construct validity of the scale. Two competing models were examined in this stage. Model 1 which was comprised of all 19 items loaded on a single factor- ADDIE training system. Model 2 contained two factors: training planning and training outcome, with individual items loading on the factor. An increase in fit indexes from Model 1 to Model 2 could provide evidence in support of the discriminant validity. A two-factor model with factors for training planning and training outcome showed superior fit over competing one-factor model, indicating reasonably effective measurement, clearly factor structures and evidence of discriminant validity. As a result, the two-factor model was the best-fitting model. The fit index was shown in Table 5.

Table 5
Fit Indexes for Confirmatory Factor Analysis

Model	level	Chi-square	df	X ² /df	RMSEA	GFI	AGFI	NFI	NNFI	CFI	IFI	Chi-square difference	df
1. One-factor model	Current	354.93	77	4.61	.13	.81	.74	.90	.91	.92	.92		
	Desired	357.93	77	4.65	.13	.81	.74	.92	.93	.94	.94		
2. Two-factor model	Current	180.00	76	2.37	.080	.89	.85	.94	.95	.96	.96	174.93	1
	Desired	171.26	76	2.25	.076	.90	.86	.95	.97	.97	.97	186.67	1

Note. N = 216

Table 6
Convergent validity for Confirmatory Factor Analysis

Dimension	Items	Current ability			Desired ability		
		Factor loadings	CR	AVE	Factor loadings	CR	AVE
Training planning	X1	.81			.80		
	X2	.78			.80		
	X3	.79			.83		
	X4	.92	.94	.71	.89	.95	.72
	X5	.87			.89		
	X6	.85			.87		
	X7	.85			.88		
Training outcome	X8	.83			.90		
	X9	.85			.91		
	X10	.85			.91		
	X11	.92	.95	.72	.92	.97	.89
	X12	.90			.93		
	X13	.89			.90		
	X14	.68			.77		

Note. N=216

We further evaluate the convergent validity as well as the discriminant validity in accordance with the criteria proposed by Fornell and Larcker (1981). There are three criteria in evaluating convergent validity. First, the factor loadings of all items have to be larger than 0.5. Second, composite reliability (CR) should be more than 0.5. Last, average variance extracted (AVE) needs to be larger than

0.5. Table 6 showed the result that the low fit index of this model and the RMSEA was lower than 0.08 for this data, resulting in five items excluded in the dimension of training planning (See Appendix). The factor loadings of the retained 14 items in the dimensions of training planning and training outcome were all greater than 0.68, CR-values were greater than 0.94, and AVEs were greater than 0.71. It forms an appropriate measurement model for current ability and desired ability of HR professionals, which was shown in Figure 1 and Figure 2, respectively. Overall speaking, this 14-item model could be best represented the ADDIE training system for HR professional in organizations.

3.3 Stage 3: Confirmatory Factor Analysis on the Training Design Competency (TDC)

Our main purposes in Stage 1 and Stage 2 were to explore and confirm the factor structure of ADDIE training system. The results showed that the proposed instrument can be extracted into two dimensions-training planning and training outcome, which has been confirmed its factor structure and the reliability and validity in the previous stages. In addition to construct the instrument of ADDIE training system, the consultation with SMEs for HR professionals is an important input for the TDC. Without the collaborative relationship with SMEs, it is hard to succeed training programs alone. Stage 3 addressed this issue and conducted CFA to further assess the reliability and the construct validity of the proposed factor structure: consultation with SMEs.

3.3.1 Sample and procedure

173 HR professionals who worked in the high-tech related companies and had experience in working with SMEs within the recent six months about the training program designing for the trainees were qualified to be surveyed. All respondents were not only asked to assess the ADDIE training system but their consultation ability in working with SMEs as well .

3.3.2 Measures

ADDIE Training System. We used the same scale, ADDIE training system, which were used in Stage 1 and Stage 2. Since seven items were suggested to be

deleted after these two Stages, we used the 14-item version to re-confirm its factor structure and validity. ADDIE training system classified into current ability and desired ability to examine HRD professionals. CR for the current ability of training planning and training outcome, as assessed in Stage 2, were 0.94 and 0.95, respectively. CR for the desired ability of training planning and training outcome, as assessed in Stage 2, were 0.97 and 0.96, respectively.

The Consultation with SMEs. Not only the 14 items of ADDIE training system were developed and validated in Stage 1 and 2, the full scale of TDC should also include the 8-item consultation with SMEs measure. The consultation ability of HR professionals while working with the partner - subject matter experts (SMEs) was partly adopted from Block's (2011) model of flawless consulting and IBSTPI (1988). It described the collaboration between the HR professionals and SMEs. A good relationship of collaboration can affect the outcomes of training programs, resulting in satisfying trainees' needs and organization expectation. The participants who had the experiences of working with SMEs in the training process were qualified to answer this questionnaire. The response format of this instrument is a 7-point Likert-type scale (1 = extremely low ability to 7 = extremely high ability). A sample item from the analysis stage is "Renegotiate with the SME regarding the design of the training program."

3.3.3 Analysis and Results

In order to examine whether the factor structure of the training design competency (TDC) should consist of not only the revised ADDIE training system, but also the consultation ability to work with SMEs, this study adopted the CFA approach instead of EFA to assess the proposed instrument. Based on the result of first two Stages, the two-factor (training planning and training outcome) model was the best-fitting model of the ADDIE training system. Thus, this study put additional necessary factor (consultation with SMEs) to examine the discriminant validity between ADDIE training system and the consultation with SMEs to further examine whether the three factor model of the TDC was the best structure of TDC. According to the principle of parsimony, the smaller values of X^2 and df

would be better. Table 7 demonstrated that the three-factor model was the best model. That is, ADDIE training system and the consultation with SMEs could support the discriminant validity among them.

Table 7
Fit Indexes for Confirmatory Factor Analysis (Sample 3)

Model	level	Chi-square	df	X^2/df	RMSEA	GFI	AGFI	NFI	NNFI	CFI	IFI	Chi-square difference	df
1. One-factor model	Current	2281.26	209	1.92	.13	.81	.74	.90	.91	.92	.92		
	Desired	3058.80	209	14.64	.28	.38	.25	.57	.55	.59	.60		
2. Two-factor model	Current	536.49	208	2.58	.10	.78	.73	.85	.89	.90	.90	1744.77	1
	Desired	666.81	208	3.21	.11	.74	.68	.85	.88	.89	.89	2391.99	1
3. Three-factor model	Current	471.93	206	2.29	.09	.80	.75	.86	.90	.91	.91	64.56	3
	Desired	479.79	206	2.33	.09	.80	.75	.88	.92	.93	.93	187.02	3

Note. N = 173

Table 8
Correlations among the Dimensions of Training planning, Training Outcome, and Consultation with SME at the Level of Current Ability and Desired ability

	Current ability			Desired ability		
	1	2	3	1	2	3
1. Training planning	1.00			1.00		
2. Training outcome	.92(.02)	1.00		.90(.02)	1.00	
3. Consultation with SME	.60(.05)	.64(.05)	1.00	.31(.07)	.24(.07)	1.00

Further, according to Hair *et al.* (2009), the criterion of discriminant validity was to examine the correlation coefficients of dimensions. They demonstrated that the range of correlation coefficient should not contain the value of one when the coefficient plus and minus two standard deviations. The result

was shown in Table 8 and proved well discriminant validity between ADDIE training system and the consultation with SMEs.

4. Conclusion

4.1 Discussion

To summarize, the initial instrument contained twenty one items distributed into five dimensions (analysis, design and development, implementation, and evaluation). After EFA testing (Stage 1), nineteen items left were extracted to two dimensions: training planning and training outcome, which respectively consisted twelve items and seven items. After the process of CFA (Stage 2 & 3), TDC comprised of three dimensions: training planning with seven items, training outcome with seven items, and consultation with SMEs with eight items. Therefore, after the examination of Stage 1, Stage 2, and Stage 3, seven items were deleted and twenty two items were retained in the final scale to measure the TDC as shown on Appendix.

We collected three samples and used three stages for the purpose of demonstrating the reliability and validity of an instrument designed to measure HR professionals' training design competencies. Consequently, the resulting instrument has been subjected to rigorous development and validation procedures. Also, different samples with multiple stage approaches may have reduced possible sample specific bias to a certain extent. By using this rigorous procedure, other researchers should confirm its proposed theoretical constructs. We can conclude that instrument measures three dimensions of TDC using only twenty two items. Three dimensions are training planning, training outcome, and consultation with SMEs.

This valid and reliable instrument developed a 22-items scale of three dimensions: training planning, training outcome, and consultation with SMEs to measure training design competencies for HR professionals. This instrument did provide adequate information of training design competencies. In practice, the detailed understanding of every aspect of training design knowledge and skills,

and the process should be mastered and followed by the role of HR professionals. Also, HR professionals realized that the consultation ability is necessary to establish the collaborating relationship with SMEs for the purpose of communicating about training objectives and program framework and ensuring the accuracy and appropriateness of training content. Once this trustful partnership builds up, constant collaboration between HR professionals and SMEs can be the most efficient approach to simplifying the complex training design process.

However, the main difference in the present empirical study was that the five steps of ADDIE training system supported by theoretical framework and literatures reviews are merged into two dimensions of training planning and training outcome. This result demonstrated the truth that HR professionals in Taiwan did not classify each step clearly and respectively. But, the good aspect is that the order of the five steps is the same. Analysis, design, and development steps are merged into training planning. Implementation and evaluation steps are merged into training outcome. It is still consistent with the theoretical ADDIE model and demonstrates the application in Taiwan practice.

On the other hand, it is worth to discuss that there were totally seven items eliminated in the ADDIE process. Three items were initially created in the analysis step and four items in the design and development steps (see Appendix). Those three items in the analysis step reflected the reality the HR professionals lack for demands in practice today. As Jacobs (2006) observed and Bureau of Employment and Vocational Training (BEVT) of Taiwan discussed (2006-2011) in the TTQS project, Taiwan HR professionals face the current main challenge of how to analysis the gap of employee competences for each job position in an organization and even worse to make the statement of job description for each position, especially in small-medium enterprises of Taiwan. It results difficulty to decide who needs to take training programs for decreasing trainees' competence gap, and then to identify the trainees' characteristics that influence their ability to reach the training objectives. Therefore, recently, BEVT of Taiwan makes an effort on establishing the training quality assurance system for all types of the organization. There are two approaches. First, through the workshops, HR related

practitioners who are interested in or responsible for training in the organizations can attend for future developing training system in his/her companies. Second, the professional consultants certified by BEVT assist organizations in developing the concept that training programs can be designed in a systematical approach, which conceptually follows the ADDIE training process and more addresses the connection of training to the core mission and goals of the host organizations (BEVT 2006-2011).

As shown Appendix, the four items in the design and development steps were eliminated as well. The items including what kind of the materials, methods, approaches, strategies, and the technology tools seemed not be generally used by HR professionals. This result can be explained by Allen's study (2006). He addressed instructional development nowadays are not only in instructional design but also in media such as computer hardware and software, video, interactive learning system. These changes make the materials, methods, strategies in various ways to organize the training programs for the purpose of increasing trainees' motivation and interests. In addition, this result revealed that HR professionals do not play the 'professional' role of training designers in practice. Instructional designers working in E-learning companies in Taiwan are in charge of those tasks such as developing the materials, methods, and strategies. As Den-Parker (1981), Wallington (1981) and Lee (1994) stated, instructional designers have more professional knowledge on cognitive learning systems and concepts, instructional strategies, assessment, testing and measurement, methods of instruction, and the writing skills necessary to design effective instruction and specific learning activities. This result is not surprised to the authors because in Taiwan, most companies do not provide such positions specifically for designing training programs. The reality is that outside or inside SMEs and inside trainers plays multiple roles and one person is often responsible both for providing the training content and designing the training materials, especially in technical skill training programs (Chiu 2003; Chien 2003). This is because technical-oriented training requires professionals who have specific domain expertise rather than novices to accomplish the training projects. For this reason, HR professionals are not sure whether they have the ability to design this kind of technical-oriented

training. In short, HR professionals in Taiwan perceive a barrier based on the boundaries of the content differences. This leads HR professionals to have difficulty in designing training programs across the different content areas in current Taiwan practice (Lin 2006).

4.2 Implications for HR Research and Practice

This study contributes to HR research in several ways. First, it contributes to the knowledge base of the HR field by identifying and verifying a theoretical framework of ADDIE training model. Second, this valid and reliable instrument developed a 22-items scale of three dimensions: training planning, training outcome, and consultation with SMEs to measure training design competencies for HR professionals. This instrument did provide adequate information of training design competencies. One of implications for HR research is that researchers can adapt and further validate this instrument and investigate the real impacts of training in the business setting. The other important implication is that managers can use this instrument as a diagnostic and evaluative tool to develop interview questions to the job position candidates who may be in charge of training activities for the organizations and to develop performance evaluation documents as a means of creating an integrated system which developed from the competencies identified and validated. The last implication in this study is that managers or institutional superintendent should realize that well-educated HR professionals have a comprehensive understanding of how to satisfy the criteria in each step of analysis, design and development, implementation, and evaluation and also monitor each stage of training design process for enhancing training quality in the organization (Saner-Yiu, Jacobs, Wang, & Lee 2005). HR professionals can serve as a powerful agent to assist an organization's expansion and to develop its capability.

4.3 Limitation

Although initial validity evidence has been revealed, this research is not without limitations. First, the sample of this study is likely restricted to a certain group with similar demographic background: HR practitioners in a Taiwan

cultural setting. Cross-cultural generalizability of the results may be a concern. We do not know whether TDC varies across different cultures or countries. The second limitation is that this study did not objectively measure individual performance based on their TDC. Studies are also needed to examine the relationships with other managerial variables such as employee satisfaction, work performance, and HR effectiveness to establish predictive validity for HR professionals' TDC instrument. Further use of the newly developed scale should provide greater understanding of training design competencies in organizations and its relationships with other important organizational variables. The third limitation of this study is that all of measures were collected using the same method (self-reporting) and consequently, relationships among variables may be inflated by common method variance. Furthermore, an inspection of the means and standard deviations of the TDC measures in this study suggest that unrealistically high competencies estimations were no observed. Still, research on competencies rating by supervisors may cause more biased than self-report measures. Thus, it is not clear that supervisor-rating would have produced better data if they do not closely work with HR professionals in training process. The last limitation is that data collected from HR professionals who must have experience of working with SMEs were few. Only 173 HR professionals from three sample sources were qualified to answer the session of the consultation with SMEs. This sample size causes the difficulty to run both EFA and CFA. To solve this limitation, further research on collecting more data from various occupations which need to work with SMEs is recommended.

Appendix A
The Validated and Reliable Items of Training Design Competencies (TDC)

Dimension	Steps	Retained 22 items
Training planning	<i>Analysis</i>	<ol style="list-style-type: none"> 1. Access the needs of trainees to determine what they can currently do and what they should be able to do. (我能夠明確評估受訓者目前所能達成及應能達成工作任務之間的差異) 2. Analyze the work setting to identify the tools, equipment and other resources used on the job. (我能夠分析工作環境、確認工作所需工具、器材及其他可用資源) 3. Analyze the organization to ensure that the goals are consistent with the objectives of the training program. (我能夠確保訓練目標與組織目標一致)
	<i>Design & Development</i>	<ol style="list-style-type: none"> 1. Specify the target objective that describes what is expected of trainees after the training. (我能夠明確說明受訓者，在訓練後應達成之最終目標) 2. Specify the enabling objectives that describe what trainees should know or do to achieve that target objectives. (我能夠明確地讓受訓者先行知道他們在訓練過程中所參與的活動及所使用的相關資源，進而達成行動目標) 3. Develop training materials that are consistent with the training objectives. (我能夠發展出符合訓練目標之教材) 4. Use a structured writing format to prepare trainer and trainee guides. (我能夠運用結構化的格式，撰寫出教導者及受訓者使用之訓練指南)
Training outcome	<i>Implementation</i>	<ol style="list-style-type: none"> 1. Develop an implementation plan to conduct the training program. (我能夠為訓練課程訂定推行計畫書) 2. Ensure the organization to support the training program. (我能夠為訓練課程訂定推行計畫書) 3. Record the progress of trainees during the training. (我能夠在訓練過程中，記錄受訓者之學習進度)

Appendix A
The Validated and Reliable Items of Training Design Competencies (TDC)(Continued)

Dimension	Steps	Retained 22 items
Training outcome	<i>Evaluation</i>	<ol style="list-style-type: none"> 1. Evaluate the trainees' overall satisfaction with the training program. (我能夠評估受訓者對訓練課程之整體滿意度) 2. Determine what trainees have learned from the training program. (我能夠確認受訓者是否已從訓練中習得應有知識) 3. Report the results of the training program to management. (我能夠將訓練成果提報給管理高層了解) 4. Determine the financial benefits of the training program. (我能夠評估訓練課程所獲致之財務利益)
The consultation with SMEs		<ol style="list-style-type: none"> 1. Clarify the role and tasks expected of the SME during the training project. (在訓練專案進行中，我能夠釐清「內容專家」的角色與任務) 2. Obtain a commitment from the SME to be involved in the training project. (我能夠獲得「內容專家」對於訓練專案參與之承諾) 3. Prepare an agenda for each meeting with the SME. (我會充分準備與「內容專家」開會議程) 4. Provide examples to ensure the SME understands how the training will be carried out. (我會提供先前進行過的案例作為參考，促使「內容專家」瞭解訓練如何實行和管控) 5. Ensure that the SME understands the target objective of the training program. (我能夠確定「內容專家」瞭解訓練課程之最終目標) 6. Use open-ended questions to prompt the SME to provide more detailed information. (我能夠運用開放式之提問法，引導「內容專家」提供更詳盡之資訊，有助於課程設計之內容充實) 7. Ask the SME to review the training program to identify weaknesses or missing components. (我能夠請求「內容專家」複閱整體訓練課程，並指出其缺點或待補強之處) 8. Renegotiate with the SME regarding the design of the training program. (關於訓練課程的設計部分，我會與「內容專家」反覆協商討論)

Appendix A

The Validated and Reliable Items of Training Design Competencies (TDC) (Continued)

Dimension	Steps	Eliminated 7 items
Training planning	<i>Analysis</i>	<ol style="list-style-type: none"> 1. Analyze the components of jobs, duties and tasks. (Stage 2-CFA) 2. Identify the characteristics of trainees that influence their ability to achieve the training objectives. (Stage 2-CFA) 3. Review additional resources related to the content of the training program. (Stage 2-CFA)
	<i>Design & Development</i>	<ol style="list-style-type: none"> 1. Develop performance rating scales and cognitive test items to measure the trainees' learning outcomes. (Stage 2-CFA) 2. Identify training strategies, methods and approaches to present the training content. (Stage 2-CFA) 3. Design lessons based on a logical learning sequence. (Stage 1-EFA) 4. Select appropriate technology as a means to deliver training. (Stage 1-EFA)
Training outcome	<i>Implementation</i>	None
	<i>Evaluation</i>	None
The consultation with SMEs		None

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