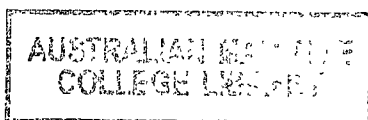


**Training Innovation in Taiwanese
Maritime Education and Training:
Concerns, Expectancy and
Professionalism**

James, Jia-Shen Hu

Ph.D. 2003



**Training Innovation in Taiwanese Maritime Education and Training:
Concerns, Expectancy and Professionalism**

By

James, Jia-Shen Hu

**Submitted in fulfilment of the requirements
for the degree of Doctor of Philosophy**

**Faculty of Maritime Transport and Engineering
AUSTRALIAN MARITIME COLLEGE**

July 2003

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DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed: *James, Jee-Sun Kim*

Date: *25th July / 03*

STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Other sources are acknowledged in the text giving explicit references. A bibliography is appended.

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Training Innovation in Taiwanese Maritime Education and Training: Concerns, Expectancy and Professionalism

By
James, Jia-Shen Hu

Abstract

This thesis investigates the domain of educators' concerns on maritime education and training innovation from various higher-education levels in maritime institutes. The study focuses on Taiwan, the revolution in international standards of competency for seafarers' Standards of Training, Certification and Watchkeeping (STCW) and its relationship to seafaring learning standards, training outcomes and educators' professional standards. The main purpose of this study is a "Stages of Concern" analysis of maritime educators to determine their attitudes and concerns when a new innovation initiative has to be confronted. In addition, the study seeks to determine whether the factors of professionalism and expectancy values can influence maritime educators' stages of concern about the STCW innovation. The established theoretical model takes their seven stages of concern as dependent variables while their professionalism, expectancy and demographics are treated as independent variables. It is tested with the aid of survey data from a Stages of Concern Questionnaire administered to the population of maritime educators from three different levels of Taiwanese academic institutes. The SPSS software package for determination of educators' concerns, including descriptive, correlational and inferential statistics and multivariate analysis of variance procedures, is used to perform the data analysis.

The results verify that an educator's concerns are an important component in the STCW reform implementation process. More specially, the maritime educators in Taiwan express high concerns at the self and impact stages and lower concerns at the awareness and management stages. This indicates that their attentions are shifted to organize and implement the reform efficiently and, in addition, use the relevance of the reform to increase students' performances. However, their concerns appear to reflect the strategies of the reform process rather than the outcomes and achievements of the students. Further, the factors of professionalism and expectancy values are undoubtedly related to educators' stages of concern in the reform. The high expectancy value rating scales are at the impact stage, which reflect that these educators are confident with their competencies to implement the reform and will devote their reform-related attitudes and efforts to help the students achieve the required criteria. The professionalism rating scales are also high at the impact stage, which prove that the positively professional ethics, perceptions and performances of the educators will yield a positive reform outcome. However, expectancy values and professionalism are not statistically significant predictors of Stages of Concern. It reveals that the impetus to the reform mostly derives from the external sources. The satisfaction of the expectations received from the reform consequences is still not mature.

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**Training Innovation in Taiwanese Maritime
Education and Training: Concerns, Expectancy
and Professionalism**

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Glossary of Terms

Annex The annex is the material attached to but separate from the clauses of the STCW 95 Convention.

Assessment The term assessment is the process to evaluate whether an individual's knowledge, understanding, ability and skills has achieved the competence required by the STCW 95 Convention.

CBAM This term is the abbreviation of Concerns Based Adoption Model. The CBAM developed by Hall, George and Rutherford in 1973 is useful to monitor teachers' concerns about educational innovation. It is designed to appraise, portray and interpret the process of implementing reform.

CCMTC This term is the abbreviation of China College of Marine Technology and Commerce.

Competence This term refers to the necessary knowledge, understanding, ability, skills, experiences and confidence for an individual to implement a specified task, duty or responsibility on board ship in a appropriate, safe, efficient and effective manner.

Fuller's concerns theory This term refers to the three phases of concern: a pre-teaching phase (Non-Concern), an early teaching phase (Concern with Self) and a late teaching phase (Concern with Pupils), which was developed by Fuller, F. in 1969.

IMO This term is the abbreviation of International Maritime Organization. IMO is a sub-committee of the United Nation, which is in charge of the global maritime agreements for safe navigation and pollution prevention.

NKIMT This term is the abbreviation of National Kaohsiung Institute of Marine Technology.

NTOU This term is the abbreviation of National Taiwan Ocean University.

MET This term is the abbreviation of Maritime Education and Training. The STCW regulations II/1, II/2, II/3, III/1, III/2, III/3 and IV/2 require seafarers for certification to have completed approved maritime education and training programmes and fulfill the demands of the competence standards set out in the coincident section of the STCW Convention.

Professionalism Professionalism is a term referring to a set of internalized norms that guide and structure the work of the members of an occupation, which may or may not possess the full characteristic of a profession. It can also be defined as “a particular system of social control in which members of an occupational group regulate their own behavior”.

SoC This term is the abbreviation of Hall’s Stages of Concern model. This model, developed by Hall, George and Rutherford in 1973, is used to identify the teachers’ concerns about educational innovation. It depicts how individuals’ consider, approach and implement an innovation.

SoCQ This term is the abbreviation of the Stages of Concern Questionnaire.

STCW 95 This term is the abbreviation of the IMO international convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended 1995.

STCW Code The STCW Code is defined as meaning “the Seafarers’ Standards of Training and Watchkeeping (STCW) Code as adopted by the 1995 Conference resolution 2 as it may be amended”. All the materials in the Annex in turn refer to the STCW Code. Further, any reference to a requirement in a STCW 95 regulation constructs a reference to the coincident section of Part A of the STCW Code. Part A contains the mandatory requirements of the STCW Convention.

TVE This term is the abbreviation of the Technological and Vocational Education.

Vroom’s expectancy theory This term refers to three major components: valence, instrumentality and expectancy proposed by Vroom in 1964. Valence describes how attractive or unattractive a particular outcome or psychological objective is to us. Instrumentality is defined as the perceived degree of relationship

between performance and outcome attainment. Expectancy refers to our perception of the probability of successfully achieving a desired outcome.

Chapter 1

Introduction

Chapter 1 Introduction

1.1 Introduction

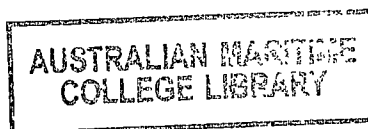
The experiences acquired from the investigations of shipping casualties, disasters and accidents over the centuries have evidenced repeatedly that safe operations of the ships requires that they be carefully designed and constructed, appropriately equipped and competently staffed. The most essential factor in the safe operation of any ship is the experiences and competencies of its master and crew members. A well-trained and experienced master and crew member can prevent maritime casualties by compensating for the defects of their ship or the damages to their ship. Although an absolute safe ship operation can never be achieved, a high degree of safety operation is attainable. Thus, the International Maritime Organization (IMO) has established international standards of competency on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended in 1995 (STCW 95) to ensure that ships should be sufficiently and efficiently manned. In addition, governments should undertake the responsibilities to determine and monitor operations to ensure safe manning ships.

The 1978 STCW Convention was the first attempt to establish global minimum professional standards for seafarers which countries are obliged to meet or exceed

(Winbow, 1999). The clearest area of changes to the STCW Convention is to transfer all thorough technical requirements to related Codes. Part A of the STCW Code is mandatory while Part B is recommended. The greatest change for Maritime Educational Training (MET) schools is the clarification of the knowledge, understanding, skills and competence required by seafarers to make them be responsible for performing shipboard tasks safely and efficiently. These two main changes establish a key feature of a competence-based system, that is the way the tasks and skills are defined in terms of the outcomes to be reached, rather than pure knowledge to be acquired. Therefore, MET schools should have completed the review of their curricula and training programmes and adopted the competence-based approach.

The development of competence-based MET educational innovation has presented an opportunity and a challenge for MET schools to re-examine the way in which seafarers achieve and prove their competencies. The MET schools should ensure that those seafarers commencing their education or training after 1 August 1998 have the ability to perform effectively at the appropriate level functions in accordance with the STCW standards.

MET educational innovation in Taiwan has gone through many turbulent years since the 1995 STCW MET Reform Act, which has brought tremendous changes to the structures and process of maritime schooling. As this MET educational innovation is indeed pervasive at this moment, the learning standards and training outcomes are being defined for the students, professional standards are being formulated for the teachers, new technologies are being widely advocated and implemented, and maritime institute partnerships are being promoted within the shipping industry and communities. Important as all the innovation work is, no one is more aware of the disturbance of these innovations than the educators who have had to put them into



practice. Fullan and Hargreaves (1996) indicated that teachers are certainly an absolutely essential part of educational innovation. Teachers' perceptions of MET innovation are more important than arbitrary objective measures. If a teacher is not willing or not able to cooperate where MET educational innovation is concerned, it simply cannot be done. Those who ignore the central role of teachers in the educational innovation are doomed to fail (Hargreaves & Evans, 1997).

As teachers have often been outshone by innovations, lack of enthusiastic compliance among teachers has been a widely reported pattern of response (for example, Hargreaves & Evans, 1997; Helsby & McCulloch, 1996). Other researchers have indicated the stubbornly creative capacities of many teachers to boycott the dictates of MET educational innovation and redefine the innovations to suit their own intentions. Since teachers have largely been left out of policy discussions, they have often resisted ill-designed and poorly implemented projects for change. Richardson (1990: p.11) suggested that in recent years the educational change literature has moved from "viewing teachers as recalcitrant and resistant to change to examining the structure of the organization and personal attributes of teachers that affect whether or not they implement new programmes". Therefore, this study examines how the educators react to the STCW MET Reform Act in Taiwan. Whether there is enthusiastic compliance or reluctant implementation is measured and reported in the thesis.

Achieving the MET reform is a complicated task that cannot be accomplished by simply presenting new curriculum materials or supplying new facilities (for example, shiphandling simulator) into the MET system. It goes far beyond these points and affects a whole web of significant and meaningful relationships that make up the work of the institutes.

The current worldwide movements in the reform of the MET system seem to focus on a number of issues including the standards, qualities and teachers' preparations. In order to engage in a satisfactory and effective MET reform in Taiwan, it is indispensable that its most valuable human resources (for example, educators) must be adequately and comprehensively developed. Practical considerations must be paid to both pre-service and in-service development of a high quality-oriented teaching force. However, it is also important to take into account the educators' perceptions about the areas in which they feel confident and knowledgeable and their cognition (awareness), attitudes and acceptances of the MET transformations. How to bring about a positive MET educational innovation in our complex, diverse, rapidly changing post-modern times; how effective these innovations have been in transforming the teachers' practices; how to remind the teachers that the legislation only sets a framework for the MET innovation and awaken the teachers such that they must make this innovation happen are rigorous questions which need to be addressed.

1.2 Purpose of the Study

Successful reform implementation mainly relies on the involvement and effectiveness of individuals. It is therefore important to investigate individuals' concerns in ways that will make feedback to them assist in preparing and implementing reform effectively and successfully. Hence, this study examines the attitudes and perceptions of Taiwanese maritime educators about the processes and methods of the STCW maritime education and training innovation.

One of the most respected original teams studying the innovation process in schools, colleges, businesses and government agencies is the Research and Development Center for Teacher Education at the University of Texas at Austin in the United States.

The team has proceeded with its studies in the process and methods of changes in schools, colleges and universities as part of its routine affairs since 1970. It systematically explores individuals' attitudes, feelings and concerns when a new innovation initiative is confronted. Such attitudes, feelings and concerns have been identified as performing at different levels of intensity at different stages by using the Stages of Concern theory (Hall et al., 1973). Along the path, researchers from around the United States, Australia, Belgium, Canada, the Netherlands and many other countries have sought to verify the concepts and constructs, as well as extending this team's studies about the individuals' concerns during innovation.

This stages of concern theory developed by Hall, George and Rutherford (1973), is used to identify the maritime educators' concerns about the MET educational innovation. It depicts how individuals consider, approach and implement a reform. Based on Fuller's concerns-based approach (Fuller, 1969), Hall et al. (1977) developed a seven stages of concern model to monitor educators' feelings and perceptions about educational changes. A standard Stages of Concern Questionnaire (SoCQ) was also developed to offer a quick-scoring pencil-and-paper questionnaire to measure educators' stages of concern. Further, the reliability and validity of SoC Questionnaire were verified using cross-sectional and longitudinal studies of eleven different educational reforms (Hall et al., 1977).

As a result of the above, the stages of concern approach seems to provide a valid and reliable way to measure and make critical judgments about the reform implementation. Thus, it is adopted in this study.

The comprehensive definitions of the Stages of Concern (SoC) about the reform have been developed by Hall, George and Rutherford (1977: p.7), and are described as follows.

-
- Stage 0 (Awareness) – Minimal to no concern about or involvement with the innovation is indicated;
- Stage 1 (Informational) – A general awareness of the innovation and interest in learning more detail about the innovation is indicated;
- Stage 2 (Personal) – Uncertain about the demands of the innovation;
- Stage 3 (Management) – Concerns about the processes and tasks of implementing the innovation and the best use of information and resources;
- Stage 4 (Consequence) – Concerns about the impact of the innovation on students' performance and outcomes;
- Stage 5 (Collaboration) – Attention focuses on coordination and cooperation with others concerning the use of the innovation; and
- Stage 6 (Refocusing) – Attention focuses on exploration of the more universal benefits of the innovation

According to the stages of concern model, a seven-point rating scale, from 0 to 7, depicts the present degree of concerns about the topic described in each Stages of Concern item. Awareness concerns (stage 0) indicates lack of interest, knowledge and information of the innovation for those non-users or beginning users. With regard to the educational innovation users, they will first express informational and personal concerns (self stage), then management concerns (task stage) and finally consequence, collaboration and refocusing concerns (impact stage) (Aneke & Finch, 1997; Hall & Ford, 2001).

The stages of concern model, which is designed to apply to all educational innovations, has been tested and supported by a range of studies including Anderson, 1997; Cheung, Hattie and Ng, 2001; George, Hall and Uchiyama, 2000; Hall and Ford, 2001; Shieh, 1996; Thornton and West, 1999; and, Vandenberghe, 1988. Although many studies have examined the impacts of MET educational innovation

on educators' knowledge and skills to fulfill STCW standard requirements, none of them addresses educators' concerns about the MET innovation. In fact, most of the past studies have focused on the relationship between implementation methods and the knowledge and skills of educators. No systematic research has been attempted to study maritime educators' stages of concern about the implementation of the MET educational reform. Therefore, the first purpose of the research is to determine Taiwanese maritime educators' stages of concern about the implementation of the MET education innovation.

Furthermore, this study seeks to determine the factors influencing maritime faculty members' stages of concern about the MET educational reform. Recent studies indicate that professionalism has become an important factor in educational innovations. For example, Sweetland and Hoy (2000: p.709) posited that "teacher professionalism is labeled as teacher behavior characterized by commitment to students, respect for the competence of colleagues, warm and friendly interactions and engagement in the teaching task (for example, student performance and achievement; educational innovation)". Teachers who believe in themselves, their schools, their colleagues and their students will enforce a probe for innovation excellence. In addition, other studies revealed that expectancy was also linked to the adoption of education innovations (for example, Hoy & Woolfolk, 1993; and, Mitchell & Beaudin, 1996). Educators are more likely to be motivated to act if they perceive the linkage between their own efforts and receipt of a reward (for example, Bartell, 1988; Hatry, Greiner & Ashford, 1994; Ilgen, Nebeker & Pritchard, 1981; Kelly & Protisk, 1997). Accordingly, on empirical grounds, it is logical to assume that professionalism and expectancy can affect faculty members' stages of concern about the MET innovations. No research has attempted to examine the relationships between professionalism, expectancy values and educators' stages of concern about education innovations. Thus, the second purpose of this research is to examine the

relationships between professionalism, expectancy and maritime educators' stages of concern about the MET innovations.

Based on these considerations, this study therefore seeks to determine the intensities of Taiwanese maritime educators' concerns during the MET educational innovation implementation and to what extent expectancy values and professionalism are related to the seven stages of concern. Four research questions are as follows:

Question 1: What are the most intense stages of concern of Taiwanese maritime educators in implementing the STCW reform?

Question 2: Do Taiwanese maritime educators' stages of concern vary when they are grouped according to the institute, teaching discipline, academic rank, highest degree earned, age, years of teaching, years of STCW experience and STCW seminar attendance?

Question 3: To what extent are valence, instrumentality and expectancy related to Taiwanese maritime educators' stages of concern about the STCW reform?

Question 4: How is the professionalism of Taiwanese maritime educators related to stages of concern about the STCW reform?

This research seeks to utilize three models and inter-relate them in such a way that the influence of maritime education and training on the innovation of STCW 95 reform in Taiwan can be clearly identified.

1.3 The Context for the Stages of Concern, Expectancy Values, and Professionalism about the Maritime Education and Training Innovation in Taiwan

Many reformers may believe that an educational reform once agreed for adoption into practice is tantamount to it literally being implemented into practice. However, Hall and Loucks (1977) indicated that this might not take place when the reform was compared with current practices. Worse still, some of the current practices might have actually become a part of the reform implementation. Educational reforms failed more times than they succeeded (Fullan, 1995). One of the main reasons may be that educators' concerns about implementing the change (for example, the STCW reform) have been neglected (Hall & Hord, 2001). In other words, the educators require understanding, guiding and support in the implementation process (Hall & Hord, 2001). They will move from the beginning to the end of the successful phases or stages very quickly when not frustrated by the leaders, practitioners and/or policy-makers (Busick & Inos, 1992; Hall & Hord, 2001). Therefore, the study seeks to highlight some of the key issues identified by using the stages of concern concepts and the understanding of the changes necessary for the successful STCW reform implementation.

In this Chapter 1, some perspectives of the STCW 95 Convention, and the educator's perception, cognition, attitudes, acceptances and concerns, which are important to the MET transformation, are described. In this aspect, a sense of other researchers' outlooks and their approaches to conceptualizing and constructing theories of educational reform are provided. The chapter aims to facilitate understanding of the research questions and what their answers seek to achieve.

Chapter 2 describes the existing activities of the STCW Maritime Education and Training (MET) innovation in Taiwan, such as the STCW Convention basic concepts, requirements and quality assurance, the technological and vocational education system, the professional and technological examination system and the MET certificate system in Taiwan.

Chapter 3 sets a macroscopic context for the STCW reform, which is essential for measuring, assessing, and discussing the dynamics of the reform described later in chapters 4 and 5. The conceptual framework and steps in research developments of how to explore and assess MET educators' awareness, attitudes, perceptions and concerns are described.

As the purpose of this study is to investigate the educators' concern issues involved in the use of reform implementation in Taiwan, the author employs the concepts of a concern-based adoption model, professionalism and expectancy values to assess the extent of STCW reform implementation among the entire MET educators in Taiwan. Hence, in this chapter, attention is also paid to the design of this study and the procedures and methods used in the research enquiry.

There are four measurements constructed by the questionnaire in order to maximize the knowledge from existing studies and theories and understand how the reform constructs have been implemented in the Taiwanese MET institutes and by educators over the past years. The six-page mail questionnaire consists of four components, namely, 35-item stages of concern, 12-item professionalism, nine-item expectancy values and demographics. Since the main component of the questionnaire is based on the 35-item stages of concern, which was developed by Hall et al. in 1977, all 35 items in the original scale are retained. The investigation covers the entire population of 170 MET full time teaching educators in three departments, which are navigation,

engineering and fisheries, in Taiwan. Further, according to the type of the educators' working environments, three different characterized educators, university educators, college educators and institute educators, are chosen.

Chapters 4 and 5 assist in understanding an individual's interactions and cognition about the reform, thus, the Stages of Concern profiles are interpreted and discussed corresponding to the first and the second research questions. Further, the data collected from the expectancies and the professionalism items are also analyzed to link the empirical evidence and new findings corresponding to the third and the fourth research questions.

As a successful reform implementation depends on the understandings of the problems which change the level of educators' concerns (Fullan, 1995), chapter 4 attempts to probe which aspects of the educators' Stages of Concern should be emphasized in the reform implementation and be assessed, including the relationship between the demographics and the educators' concerns. It addresses the feelings and the affective sides of the reform.

Chapter 5 specifically explores Taiwanese MET educators' expectancies and professionalism relating to the individual's concerns during the reform implementation. This chapter facilitates the interpretation of the degrees of intercorrelation among demographics, professionalism, expectancy and stages of concern and examines whether those independent variables function in any significant ways as the potential predictors to the stages of concern.

Since the procedure of statistical analysis is also an important part of these chapters, the statistical analysis is developed in such a way as to help uncover how the educators' stages of concern have impacted on the educational reform in Taiwan. It

also examines what degrees of their expectancies and professionalism have affected the intensities of individuals' concerns during the reform. In addition, the linear relationships between the expectancy values, professionalism, stages of concern and demographics are also explored.

In the final Chapter 6, the research findings are consolidated. This chapter includes major findings, discusses the implications of the study findings and suggests for further research. However, like many other research works, this research has some limitations, such as, sample size, cultural discrepancy, reliability and validity of the SoC awareness subscale, as well as cross-sectional surveys, and these are discussed in detail in chapter 6.

The research is important because it builds upon research already undertaken in the broader education community, applies it to the maritime education community in Taiwan and also extends the previous research by linking three distinct theories.

Chapter 2

The Implementation of the STCW

95 Convention into Maritime

Education and Training in Taiwan

Chapter 2 The Implementation of the STCW 95 Convention into Maritime Education and Training in Taiwan

2.1 Introduction

The International Maritime Organization (IMO) Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended 1995 (STCW 95) is the first global set of minimum professional standards for seafarers which each country is obligated to comply with or exceed. STCW 95 is an essential and important development, which establishes the standards and procedures for global acceptance and implementation, as well as giving guidance on the education and training of masters, officers and crews (Winbow, 1999).

Two major features in the STCW Convention have been changed. The first important change is the transfer of all detailed technical requirements to the associated Code. Part A of the Code is *mandatory*. It contains the procedures and standards which give effect to the regulations and obligations of the STCW Convention and its annex. Part B of the Code is *recommended*. It provides guidance concerning regulations and the obligations of the annex to the STCW Convention. These provisions give in detail the minimum standards required to be maintained by governments in order to give full and complete effect to the Convention. The second important change is the clarification of the knowledge, abilities and competence required by seafarers to undertake their professional tasks on board ships safely, economically and efficiently. It places greater emphasis on proficiency and the actual ability of seafarers to perform their designated tasks satisfactorily. However, the need for the acquisition of necessary academic knowledge is still maintained.

The IMO Convention on STCW 95 dictates competencies and the level of standard which should be achieved. Further, IMO Model Courses and training outcomes provide the suggested boundaries beyond which it is not necessary to go. This centralised and competency-based approach to MET proceeds in a manner which is contrary to the predominant educational thinking where courses, in an increasing number of disciplines, are modularised and the student selects an appropriate set of subjects to satisfy their aspirations and career expectations (Parker, 1997). Further, there is a change in instructional methodologies, requiring teachers to consider every aspect of the use of simulators, audio-visual devices or programmed instructional methods to make the learning process more effective. Hence, many MET administrations and institutes have found that they require a complete change in their approaches to the education and training of seafarers. They have to ensure that the candidate's learning and practical experiences reach the required outcome (skill/competence) to perform his or her duty effectively at the appropriate level and in accordance with the STCW standards. They shall also ensure that the aims and objectives of simulator-based maritime education and training are defined within an overall MET training programme and that specific training objectives and tasks are selected so as to relate as closely as possible to shipboard tasks and practices (STCW95, 2001). Most importantly, the evidence of the desired outcome presented by the candidate shall be objectively assessed through a recognized assessment system (for example, a national professional examination system) to ensure that the required outcome has been achieved.

As Taiwan is a relatively small, densely populated island lacking in natural resources, major economic growth is heavily dependent on skilled manpower and the expansion of export-led industrialization and multinational trade. The shipping industry plays an important part in maintaining a prosperous economy for the country (Chiang, 1995). By year 2002, there were 285 merchant vessels (gross-register-tonnage above

1,000) flying the national flag and more than 100 separate shipping companies with 6,935 employees engaging in the shipping industry. In addition, more than 95% of Taiwanese total international trade by weight was carried by sea (Source: Ministry of Transportation and Communications, ROC, Statistics of Transportation and Communications, 2003). With the growth of the national fleet and the demand for merchant ships' officers, seafaring education, training and replenishment are important maritime activities for Taiwanese administrators. As STCW 95 innovation directly impacts on MET and the validity of certificates for seafarers worldwide, the requirements and/or definitions of STCW 95 lead to a dramatic revolution of the traditional MET system in Taiwan. For political reasons, Taiwan is not a Party to the Convention and will be more strict on the issuing of its own certificate of competence, from accepting seagoing service, education and training and ensuring that the requirements of the STCW 95 Convention relating to seagoing service, education, training and competence are complied with (STCW 95, 2001).

Given the situation of Taiwan as described above, the present conditions and future developments of MET in Taiwan mainly depend on the revised STCW Convention and its power to force the training providers, trainees and seafarers to comply with new standards. In other words, the new Convention must be completely implemented in Taiwan.

Today, the MET institutes and educators in Taiwan are facing an unprecedented challenge to implement the mandated reform. In addition, the challenges of this reform are primarily derived from the STCW Convention which demands the use of competency-based training, new theories, practical learning and minimum standards of performance for the students/seafarers. These imposed changes directly focus the attentions of the educators and in particular their knowledge, skills and competencies base, and professional capacities to meet the MET educational needs and their

concepts of practice. Looking at the situation in total, it demands re-examining, re-training and even re-building MET educators' professionalism so they can perform the reform successfully. Hence, the administrators tried to release educational choice and bureaucratic control to the MET educators in Taiwan to progress from the existing state of MET reform implementation. The educators can choose those approaches they believe provide a desired quality of teaching activities to achieve the students' outcomes and the reform implementation. The administrators only need to observe whether these educators possess real professionalism and ensure they are properly empowered so that a higher quality of practice, linked to the interests of students and the best reform implementation, is generated.

A purpose of this study is to gain an insight into the implementation of the maritime education and training reform programmes. By inspecting certain aspects of changes, a picture is obtained of the structure of the STCW reform implementation programme in Taiwan. Additionally, this chapter provides a background to the study in that it describes both STCW 95 and the situation in Taiwan.

2.2 STCW 95 Convention Perspectives

The International Maritime Organization (IMO) Convention on Standards of Training and Watchkeeping for Seafarers 1978, as amended 1995 (STCW 95) is a far reaching and necessary development for the educational innovation of MET all over the world. It seeks to heighten the level of seafarers' competencies as well as improve a range of factors which affect seafarers' education, training and certification.

Generally, the knowledge, abilities and skills expected of seafarers are related to seven functions:

- 1) Navigation;
- 2) Cargo handling and stowage;
- 3) Controlling the operation of the ship and care for persons on board;
- 4) Marine engineering;
- 5) Electrical, electronic and control engineering;
- 6) Maintenance and repair; and,
- 7) Radio communications (STCW 95, 2001).

The knowledge that underpins most maritime skills is clearly allied to the practical skills necessary to carry out designated tasks safely and efficiently. In addition, the specific criteria for each element of competence are also well defined which include:

- 1) Knowledge, understanding and proficiency;
- 2) Methods for demonstrating that competence has been achieved; and,
- 3) Criteria for evaluating the competencies (STCW 95, 2001).

To further reinforce the implementation of STCW 95 standards, regulation I/8 of STCW 95 requires governments to demonstrate that the training and certification systems under their authority are continuously monitored through a quality standards system, which is subject to independent evaluation. Additionally, the administration shall confirm, through all necessary measures, which may include inspection of facilities and procedures, that the requirements of criteria for ensuring standards of competence, the issue and endorsement of certificates and record keeping are fully complied with according to regulation I/10 of the STCW Convention.

2.2.1 Goals and Effects

An important goal of STCW 95 is to put in place a well-balanced set of verification and control mechanisms, which will ensure that governments take all relevant

measures to give complete and full effect to its provisions. A second goal is to achieve the uniform implementation, application and enforcement of STCW 95 provisions on a global basis. A third goal is to transfer as much technical detail as possible from the content of the STCW 95 Code to MET organizations and institutes in terms of both mandatory standards and guidance on how to implement, apply and enforce the Convention. A fourth goal is to improve the individual career opportunities of seafarers when the applicable standards of competence are maintained. Further, it allows a considerable flexibility in the distribution of shipboard functions so that all human resources available on board ships can be better utilized.

From the point of view of a training provider (MET organizations, colleges, institutes and universities) in relation to the STCW 95 provisions of regulations I/6 and I/8, dealing with training, assessment and quality assurance, Lewarn (1997) pointed out two additional potential maritime education and training goals which needed to be accomplished. First, the competence (skill) is described in terms of the outcome rather than the knowledge. For example, the MET educational innovation for the training of seafarers concentrates on what candidates can actually do upon completing their training rather than just what they know. This has the characteristic of ensuring that individuals really can put into practice what they have learned. Secondly, in order to improve the training quality, national administrations are to apply quality processes to the training providers and their products (courses). For instance, when the administration completes its approval processes for a national curriculum, it will become an official interpretation of STCW 95. In addition, all training providers will align their courses with the national curriculum and standards and government administrators will take a responsibility for the approval, audit and monitoring of MET institutes and their courses.

The requirements of the STCW Convention will significantly improve the quality of seafarers' education and training and thus improve safety at sea (Lewarn, 1995). Therefore, the MET institutes (which educate and train to meet those standards) and the government administration (which assesses candidates abilities and monitors all MET activities to ensure the required standards are meet) need to be closely integrated into a quality standards system to achieve a MET system which meets the demands of the Convention, including those concerning the qualifications and experience of instructors and assessors (STCW 95, 2001). Notwithstanding that, shipping companies must not ignore their explicit responsibilities and obligations to ensure that employees comply with the provisions and are familiar with the equipment and procedures specific to their shipboard tasks. Under the Convention there must be penalties (by governments) to shipping companies and seafarers found to be in breach of the Convention's requirements (regulation I/5 of the Convention). In addition, it will also be reinforced by provisions expanding the authority of Port State Control (PSC) inspectors to verify the qualifications and competence of seafarers on board the ships (ISF, 1995).

2.2.2 STCW 95 Convention Requirements for Seafarers Seeking Certification

STCW 95 provisions of Regulation I/6, training and assessment, states that,

Each Party shall ensure that:

- .1 the training and assessment of seafarers, as required under the Convention, are administered, supervised and monitored in accordance with the provision of section A-I/6 of the STCW Code; and
- .2 those responsible for training and assessment of competence of seafarers, as required under the Convention, are appropriately qualified in accordance with the provision of section A-I/6 of the STCW Code for the type and level of training or assessment involved.

According to this regulation, a government's maritime authority is responsible for ensuring that the mandatory competence standards, as evidenced by the seafarers' issued certificates, comply with those stipulated in the STCW Code which establish,

for the first time, uniform standards for the attainment of competence in particular maritime skills. Based on the Code, seafarers applying for certificates should meet the following requirements.

The requirements of master and deck department

The standards of master and deck officers for certificates of competency are described in Regulation II/1 to II/3 and Chapter IV of the STCW Convention. Every candidate for certification shall meet these mandatory minimum requirements which are summarized in Table 2-1.

Table 2-1 The STCW 95 certification requirements for master and deck officers seeking certificates of competency

certificates of competency certificate requirements	Deck officer	Master and chief mate
Criteria	Specified in Regulation II/1, and Chapter IV of the STCW Convention	Specified in Regulations II/2, II/3, and Chapter IV of the STCW Convention
Age	Not less than 18 years old	Not less than 18 years old
Knowledge and competency	Have completed approved education and training and meet the standards of competency specified in Section A-II/1 of the STCW Code	Have completed approved education and training and meet the standards of competency specified in Sections A-II/2, A-II/3 of the STCW Code
Seagoing service	<u>Candidate for certificate as deck officer:</u> 1. minimum one year service, including on-board-training programme and experience as an officer in charge of a navigation watch; or 2. minimum three years service 3. all the training programmes should be adequately documented in a approved training record book	<u>Candidate for certificate as chief mate:</u> Not less than 12 months service in the capacity of officer in charge of a navigation watch <u>Candidate for certificate as master:</u> 1. not less than 36 months service in the capacity of officer in charge of a navigation watch; or 2. reduced to not less than 24 months service if not less than 12 months has been served as chief mate
Mandatory maritime training courses	Specified in Regulations VI/1 to VI/4, and Regulations V/1 to V/2	Specified in Regulations VI/1 to VI/4, and Regulations V/1 to V/2

The requirements of chief engineer officer and engine department

The standards of chief engineer officer and engineer officers for certificates of competency are described in regulation III/1 to III/3 of the STCW Convention. Every candidate for certification shall meet these mandatory minimum requirements which are summarized in Table 2-2.

Table 2-2 The STCW 95 certification requirements for chief engineer officer and engineer officers seeking certificates of competency

certificates of competency certificate requirements	Engineer officer	Chief engineer officer and second engineer officer
Criteria	Specified in Regulation III/1 of the STCW Convention	Specified in Regulations III/2, III/3 of the STCW Convention
Age	Not less than 18 years old	Not less than 18 years old
Knowledge and competency	Have completed approved education and training and meet the standards of competency specified in Section A-III/1 of the STCW Code	Have completed approved education and training and meet the standards of competency specified in Sections A-III/2, A-III/3 of the STCW Code
Seagoing service	<u>Candidate for certificate as engineer officer:</u> <ol style="list-style-type: none"> 1. minimum six months service, including on-board-training programme and experience as an officer in charge of a engineering watch; or 2. minimum 30 months service 3. The theoretical, practical and mechanical, and electrical workshop skills are appropriate to the duties of an engineer officer 4. all the training programmes should be adequately documented in a approved training record book 	<u>Candidate for certificate as second engineer officer:</u> not less than 12 months service in the capacity of assistant engineer officer or engineer officer <u>Candidate for certificate as chief engineer officer:</u> not less than 36 months seagoing experience of which no less than 12 months has been served as engineer officer in a position of responsibility while qualified to serve as second engineer officer
Mandatory maritime training courses	Specified in Regulations VI/1 to VI/3, and Regulations V/1 to V/2	Specified in Regulations VI/1 to VI/3, and Regulations V/1 to V/2

Throughout Part A of the STCW Code, there are specific criteria which detail the standards of knowledge, understanding and proficiency to be achieved in each

element of competence by candidates for certification, and the criteria for evaluating them. The specific criteria for each element of competence is well defined and presented in Competency Tables in the STCW Code which include:

1. Knowledge, understanding and proficiency;
2. Methods for demonstrating that competence has been achieved; and,
3. Criteria for evaluating the competence.

In general, the Code places emphasis on the seafarer's proficiency and his/her actual ability to perform their designated tasks. The methods specified to demonstrate proficiency will vary and include:

- 1) Approved training ship experience;
- 2) Approved laboratory equipment training; and/or,
- 3) Examination and/or assessment of evidence obtained from approved in-service training and simulator training.

The specific criteria for evaluating competence relating to a seafarer's actual ability are well-defined. They must demonstrate an ability of to carry out his/her duties within specified safety limits at all times.

Following from the above-mentioned requirements, the focus of maritime education and training for seafarers seeking certification must change from traditional knowledge-based education and training as an end in itself to a systematic competency-based approach, based on professional standards, to ensure an individual's knowledge and occupational abilities meet the STCW Convention requirements.

It also points to another important factor, that is the need for a Quality Standards System (QSS) which encompasses the students, the course programmes, the whole

institute and the shipping industries. It demands that continuous attention should be paid to the market and to changes taking place in working practices and international/national regulations, in addition to the graduates' performance outcomes in their first tasks. Hence, a MET institute should have appropriate systems for validating new MET course programmes and for revalidating older MET course programmes. The systems should be under the constructs of quality management to ensure that all the MET activities are consistent in quality levels and subject to continuous improvements during and after STCW Convention implementation.

2.2.3 Quality Standards System

STCW 95 provisions of Regulation I/8 states that:

All Parties have to ensure that all activities which give effect to Convention requirement are continuously monitored through a quality standards system to ensure achievement of defined objectives, including those concerning the qualification and experience of instructors, whether they are carried out by other entities under its authority or carried out within a Government ministry, department or organization.

This regulation indicates that a government's maritime authority is obligated to ensure that all the STCW Convention requirements relating to education, training, competence assessment, certification, endorsement and revalidation activities are implemented and continually monitored through a quality standards system. Further, the quality and experience of teachers, instructors and assessors, including those on board ships, in training institutes and administrations are also required to be covered by the quality standards system or systems.

Regulation I/8 and its provisions came into effect on 1 February 1997. They should be carried out to improve the overall standards of seafarers' competence nationwide and also should be implemented to improve the quality of MET institutes and

national administrations responsible for issuing certificates of competency. The indispensable steps to take to guarantee the good quality of an operation are to:

1. Establish unambiguous policies and standards for administering, supervising and monitoring staff quality and the conduct of activities;
2. Ensure that all staff participate fully in the development and establishment of the system and are kept entirely informed at all times;
3. Select and adopt proper and realistically accumulated implementation and control measures which give practical effect to those policies and standards with the intention of allowing the established objectives to be achieved; and
4. Develop and present standards and procedures that let the performance and results of these activities be continuously monitored and examined to ensure the established objectives are being achieved.

A quality assurance system provides the users of a maritime education and administration system with a guarantee that institutes, instructors, courses and graduates meet certain standards. The quality control system also embraces the methods used to enhance and maintain quality (Melia, 1994). However, the main guardians of standards and quality are the training providers themselves. The positive support, participation and concern of staff at all levels should ensure that the MET innovation is successful, whereas the alienation of any staff member signals a latent failure.

There is clearly an international consensus that quality in educational innovation is important. It emphasizes and embraces three aspects:

- a) Aims;
- b) The process used for achieving aims; and,
- c) How far aims are achieved (Frazer & Lawley, 1992).

The aims, process and achievement can concern institutes, part of institutes (faculties, departments, course teams, and facilities), or individual teachers. The criteria for these aspects may be statements about:

- a) Aims, which means the desired understanding, knowledge, skills and attitudes which should be attained by the students;
- b) Facilities, which means the structure, libraries, staff and equipment available to facilitate students toward obtaining the aims; and
- c) Achievement, which means the understanding, knowledge, skills and attitudes actually reached by successful graduates.

In Taiwan, a graduate's competence is becoming increasingly important and it is regarded as an indication of quality. For example, the way he/she applies the knowledge and skills to perform in the shipping industry successfully.

With respect to STCW 95, it not only deals with improving the competence of seafarers, but is also about improving the quality of MET institutes. Therefore, as a high quality training provider, the MET institute must play a vital role in sharpening the seafarers' attitudes and their approach to being professional and performing in a professional manner.

Lewarn (1999) demonstrates that a quality MET institute should have the following attributes:

- Valid MET courses and programmes which are approved and audited by the national education administration;
- Suitable real or simulated equipment and facilities which are maintained, upgraded, replaced regularly and appropriate for the tasks;
- Qualified and experienced trainers and assessors at all management and operational levels in the activities which affect the Convention requirements;

-
- Quality control procedures, processes and human resources assigned which achieve the identified goals;
 - Internal audit/evaluation of all programmes to monitor the achievement of the defined objectives;
 - Periodic external audit/accreditation of all courses, teachers, teaching aids, facilities; and
 - Quality graduates whose competence, employment, reputation and professionalism meet the criteria of STCW 95 and the needs of customers (for example, the shipping industry).

Simply, an MET provider must try to possess:

- a) Quality staff,
- b) Quality facilities and equipment,
- c) Quality courses and programmes and
- d) Quality graduates,

These help to ensure that the requirements of STCW provisions are met. It will require both a drastic change in thinking and the way teaching and testing occur to implement the STCW 95 Convention.

In parallel with the above-mentioned, the Taiwanese administrators have invested a lot of time and budgets on policy dissemination, reform implementation counselling and coaching, new curriculum formulization, teaching materials replenishment and even Quality Assurance System (QAS) establishment in three MET institutes (National Taiwan Ocean University, National Kaohsiung Institute of Marine Technology, and China College of Marine Technology and Commerce) and two MET organizations (China Seafarers Training Centre and Evergreen Seafarers Training Centre) since 1995. For example:

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- 1) The QAS (ISO 9001:2000) of all these MET institutes and organizations have been documented, audited, approved and certificated by Det Norske Veritas (DNV) (ISO 9001:2000 certificate);
 - 2) Each of the full mission shiphhandling/engine room simulators, Cargo Handling simulators and Radar/ARPA simulators used in training at the MET institutes and organizations have been reconstructed, type-approved and certificated by the DNV (Simulator type approved certification); and,
 - 3) The instructors and assessors have been appropriately re-trained, certificated, qualified and experienced for the particular types and levels of training and corresponding assessment of competence as specified in regulation I/6 and section A-I/6 of the Convention.

Further, all the revised and formulated national MET curricula have been also audited and certificated by DNV (Certificate of STCW training courses compliance) ensuring full compliance with the STCW Convention.

The Taiwanese administrators unilaterally announced the QAS procedures, use of simulators, fully-compliant STCW curricula, and methods/criteria for assessing the seafarer's competence to the IMO and the major trade countries (especially, USA and European countries) were in full compliance with the STCW Convention in 2001. Moreover, since 1999 they have also mutually cooperated with the Maritime Coastguard Agency of the United Kingdom, the Maritime Port Authority of Singapore, and many other countries' maritime authorities (for example, Hong Kong (PRC), Bermuda (UK), and Liberia, etc.) to audit the quality of the MET institutes as well as assess and examine the candidates' competencies for the issue of the STCW 95 Certificates of Competence. All these endeavours and full compliance with the STCW Convention by Taiwanese administrators, institutes and organizations are related to the validating of Certificates of Compliance for Taiwanese seafarers. They

expect to be recognized by the Parties to the STCW Convention, even though Taiwan was expelled from the United Nations and diplomatically isolated by the PRC.

Lewarn (1997: p.2) claims that “the important MET innovation challenges facing MET institutes are the issues of the technical competence of its staff and, equally importantly, the teaching competence of its staff.” Because staff are supposed to possess practical knowledge, technical expertise, and first-hand knowledge of the students, they will be well placed to influence the professionalism of schools and to negotiate the complex work of instruction in the STCW reform. It is very important to take into account the teachers’ own professionalism, perceptions and concerns about satisfactory and effective MET reform. Further, student academic performance and effective school organization for instruction would benefit from the professionalism of teachers (Helen & Karen, 1997).

Instruction is a separate profession and to fully implement STCW 95 depends on technically competent, skilled and committed teachers with a professional sense, and what is more, good quality STCW reform implementation relies on the attitudes and concerns of the individuals at all levels. Clearly it is then necessary for the Taiwanese administrators, reformers and educators themselves to understand what appropriate ways should be employed for students to achieve the required competencies and how they are assessed to ensure that the competencies are met. Further, and importantly, do the educators in Taiwan have the capability of properly carrying out these critical tasks? They are complex tasks for investigation. In this study, a key measure of the quality of STCW reform implementation is the use of Fuller’s concerns theory, particularly the concerns of the educators in Taiwan.

2.3 Technological and Vocational Education (TVE) Administration System in Taiwan

The administrative structure of Technological and Vocational Education (TVE) in Taiwan has three levels: central, provincial/municipal and local authorities. The central authority, the TVE Department under the Ministry of Education, is in charge of national technological and vocational education and has direct supervisory control of national and private senior vocational high schools, junior colleges, institutes and universities of technology. The Department also shares responsibility with the Education Department of the Taiwan Provincial Government and the Education Bureau of the Taipei and Kaohsiung City governments and together they form an organizational network for TVE in Taiwan. Figure 2-1 illustrates the administrative structure of the TVE sector in Taiwan.

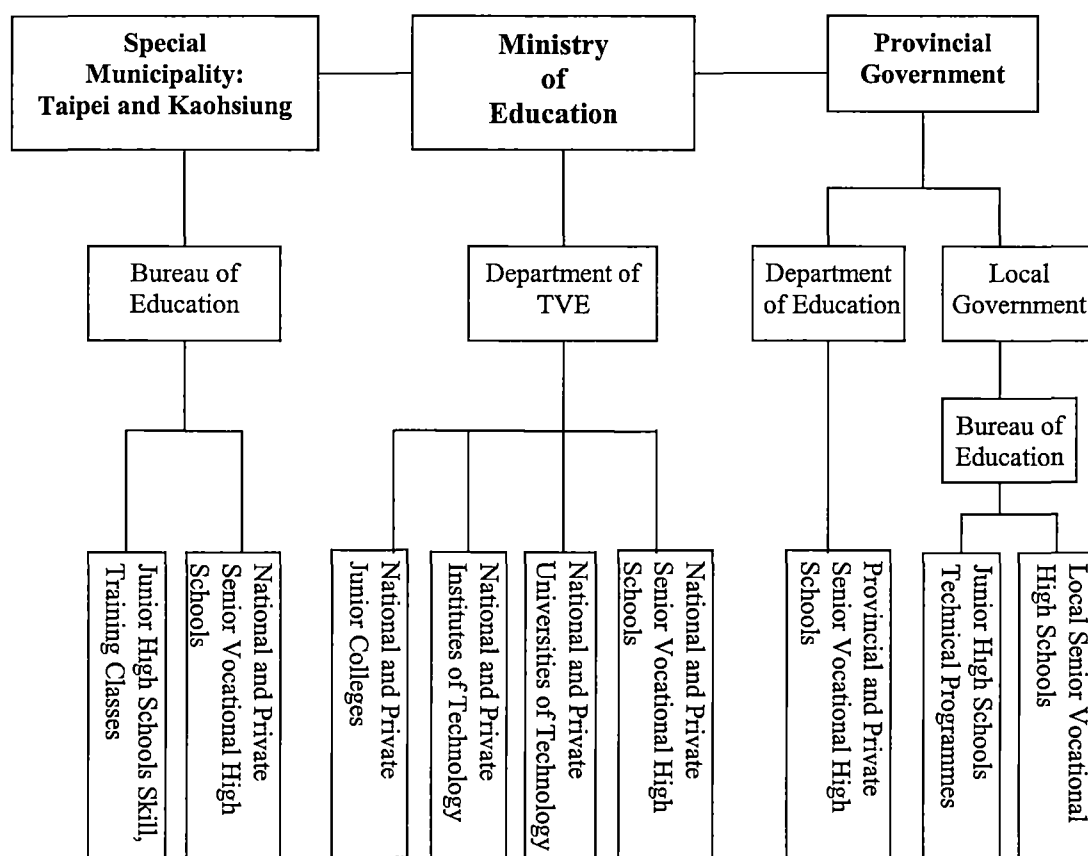


Figure 2-1 The administrative structure of the TVE in Taiwan

Source: website: <http://www.moe.edu.tw>

The programmes in senior vocational high schools are divided into daytime and evening divisions, cooperative education programmes, technical programmes, special technical programmes and supplementary programmes. The junior college system is divided into two types, which are two-year and five-year programmes respectively. The two-year programme also provides the evening programmes, the length of which are at least one year longer than the daytime programmes. The institutes and universities of technology have undergraduate, masters and doctoral programmes. The undergraduate programmes are two-year or four-year programmes and also open to individuals in the work force.

In order to remain in tune with rapid international/national developments, social changes and changing values in shipping industries, and in accordance with technological advancement and the increasingly international nature of MET vocational-technical education, the key issues regarding development of MET in Taiwan are:

1. Emphasizing pragmatic learning while creating a unique schooling system.
2. Focusing on the study of an applied technology while laying the foundation for career development.
3. Applying project work; integrating learning outcomes.
4. Administering skills tests and implementing a certification system.
5. Updating the TVE curriculum to meet the needs of society and international/national laws and regulations.
6. Recruiting teachers from industries, strengthening teachers' professional skills and competencies.

(website: <http://www.moe.edu.tw>)

With the revised STCW Convention coming into force on 1st February 1996, the newly revised MET system was phased in and totally replaced the existing MET

system in Taiwan by 1st February 2001. The fundamental changes in the Taiwanese MET system provide seafarers with the professional knowledge and skills required for the efficient and effective construction, development and delivery of maritime education and training programmes, including teaching techniques, learning technology and the use of teaching aids and simulators. Further, the MET institutes and organizations, together with the administrators in Taiwan, now comprise an effective nationwide MET network to facilitate implementation of IMO's twin objectives of safer ships and cleaner oceans.

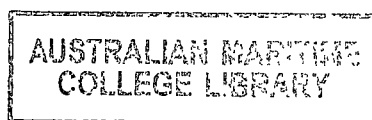
2.4 National Examination System for Professionals and Technologists

Under the Constitution of the Republic of China, the Examination Yuan is the highest examination authority of the state. The responsibilities of the Examination Yuan are to:

- Conduct the examinations for government employees;
- Manage the certification of qualifications, service protection, indemnity, and retirement of government employees; and
- Formulate the policies in regard to appointments and dismissal, performance evaluation, pay scales, promotion, and awards of government employees.

The Examination Yuan oversees all examination-related matters. Under the Examination Yuan supervision, the Taiwan national examination system currently, in effect, comprises four major test categories of examination:

- 1) Examinations for Professionals and Technologists;
- 2) Qualification Examinations;
- 3) Qualification Screening for candidates campaigning for public offices; and,
- 4) Civil Service Examinations.



In today's world of specialization, it is essential for the various technicians, other professionals and technologists to possess the required licences in their daily lives. Their qualifications must be determined by the examinations, which can fully guarantee the qualities of their services. On the basis of Item 2, Article 86 of the Constitution (website: <http://www.gio.gov.tw/info/news/constitution.htm>), it clearly points out: "Qualification for practice in specialized professions or as technicians shall be determined and registered through the examinations by the Examination Yuan in accordance with law." The characteristics of the Current Examinations for Professionals and Technologists are:

- Essential to the lives and properties of citizens, as well as social security;
- Parallel system of examination and qualification screening;
- Training to supplement learning and experiences deficiencies; and
- Permission for qualification professionals and technologists to take up government posts.

(website: <http://www.exam.gov.tw>).

In the reality of rapid changes in the social environment and the intense competition in the international community, the government is vigorously pushing an administrative reform and government restructuring for better national development and for greater national competitiveness. To protect people's lives and properties, a fairly designed examination system for professionals and technologists should be strengthened so that the merit of the licensing system can be maximized. From the point of view of a master, he/she should have no reason to question the qualifications of his/her staff. They have obtained their professional certificates in a system virtually identical to that undertaken by the master.

2.5 The MET Education, Examination and Certificate System

The STCW 95 Convention directly impacts on MET and the validity of certificates for seafarers worldwide. The requirements of STCW 95 have led to a dramatic revolution in the traditional MET system in Taiwan, especially since Taiwan is not a Party to the Convention. They are accordingly more strict on the issuing of their own certificate of competence, in accepting seagoing service, and in the provision of education and training which ensures that the requirements of the STCW 95 Convention relating to seagoing service, education, training and competence are complied with.

Following the IMO STCW reforms in 1995, the administrators in Taiwan began working actively in the area of MET education reform to meet the increase in international competition in the 21st century. Therefore, the development of MET in Taiwan depends mainly on the STCW 95 Convention's power of enforcement to compel MET organizations, institutes and universities to fully adopt these new standards.

Lawton (1988: p.25) claims that, "The implementation of innovation is always easier when teachers have been professionally involved in the development of new curricula and methods of assessment". At the moment, there are two different attitudes to the MET educational innovation in Taiwan. One is the bureaucratic attitude, which is concerned about the effects and efficiencies of the reform implementation. It demands that statistical intelligence data should demonstrate the effects and efficiencies and concentrate on the consequences. It is also accompanied with standards, benchmarks, competency-based performance and standard-related data. The other is the professional attitude, which is concerned with the quality of the reform process and the essentials to underpin a successful reform implementation.

The professional approach focuses on improving teaching qualities, learning processes, reform methods and norms referencing. As the overarching, prescriptive STCW 95 Convention encourages the bureaucrats to put pressure upon the professionals this intrudes into the delicate equilibrium and harmony between the bureaucratic and professional attitudes. It is probable that conflict between these attitudes will occur if the Taiwanese experience is anything to go by.

The Taiwanese administrators have misgiving about the bureaucratic approach becoming too concerned about the effects and efficiencies and sacrificing the real essence of the reform, thus deviating the education services from a professional approach. Appropriate approaches to bridging the discrepancy between the bureaucratic and professional concerns in Taiwan include:

- A review system involving an applicable mix of academic, self, peer, and professional practice assessment related to the process of the reform implementation should be used to avoid confusion and prevent bureaucratic screening and control of the more educational objectives to ensure the desired quality of educational reform is achieved.
- An accreditation system, which ensures nationally and/or internationally recognized quality MET institutes with quality educators and graduates which encourages and mandates continuing professional growth and improvement.

With these, the bureaucrats will not only provide diverse supporting programmes to implement the reform but will also avoid many of the issue which cause professional standards to diminish to cope with the reform implementation.

Further, the philosophy of the Ministry of Education is to establish a modern MET educational system suited to the particular needs of Taiwan whilst incorporating the provisions of the STCW 95 Convention, to produce outstanding modern seafarers,

increase the country's competitiveness, and create a modern maritime nation where a balance is maintained between spiritual culture and material wellbeing of seafarers.

The philosophy of the Ministry of Transportation and Communications is that MET should educate and train officers so that they can operate ships safely according to STCW 95 standards and international/national regulations. The officers should be able to maintain proper watchkeeping at sea, at anchor and in port, and they should have the ability to establish communication links in situations of emergency, urgency and safety traffic.

The philosophy of ship owners is that MET should furnish competent officers who can perform in full awareness of the objectives of the company to conduct the following tasks efficiently:

- Navigation;
- Cargo handling and stowage;
- Controlling the operation of the ship and care for persons on board;
- Marine engineering;
- Electrical, electronic and control engineering;
- Maintenance and repair; and
- Radiocommunications.

The philosophy of the seafarers union is that MET should supply officers with appropriate education, dedicating their efforts to their professional jobs, safety and mobility in the shipping labour market.

The philosophy of MET schools is to educate the students to enable them to develop the specialized skills and competencies necessary for success in the various functional areas, such as maneuvering ships safely, pollution prevention and in such

a way as to be economically viable. In addition, they should provide sufficient knowledge and tools for the officers, which can keep them abreast of developments in the shipping industry and secure a relatively smooth transition to a non-seagoing career, if they prefer to do so.

The above-mentioned sets the scene for a description of the MET education, examination and certificate systems in Taiwan about which the reform implementation is centred.

2.5.1 The MET System

There are three types of MET systems in Taiwan, namely, the technical and vocational education system, common and maritime university education system, and technical and vocational training system. Figures 2-2(a), 2-2(b) and 2-1(c) refer to the existing MET education system.

Basically, all Taiwanese children must attend school for a mandatory minimum schooling period of nine years. Once mandatory schooling is completed, each prospective student has a choice of one of the following four areas for advanced MET studies:

- Approved vocational training through professional license;
- Vocational upper secondary school;
- Technical junior college, technical senior college and technical institute; and,
- Common education and maritime university.

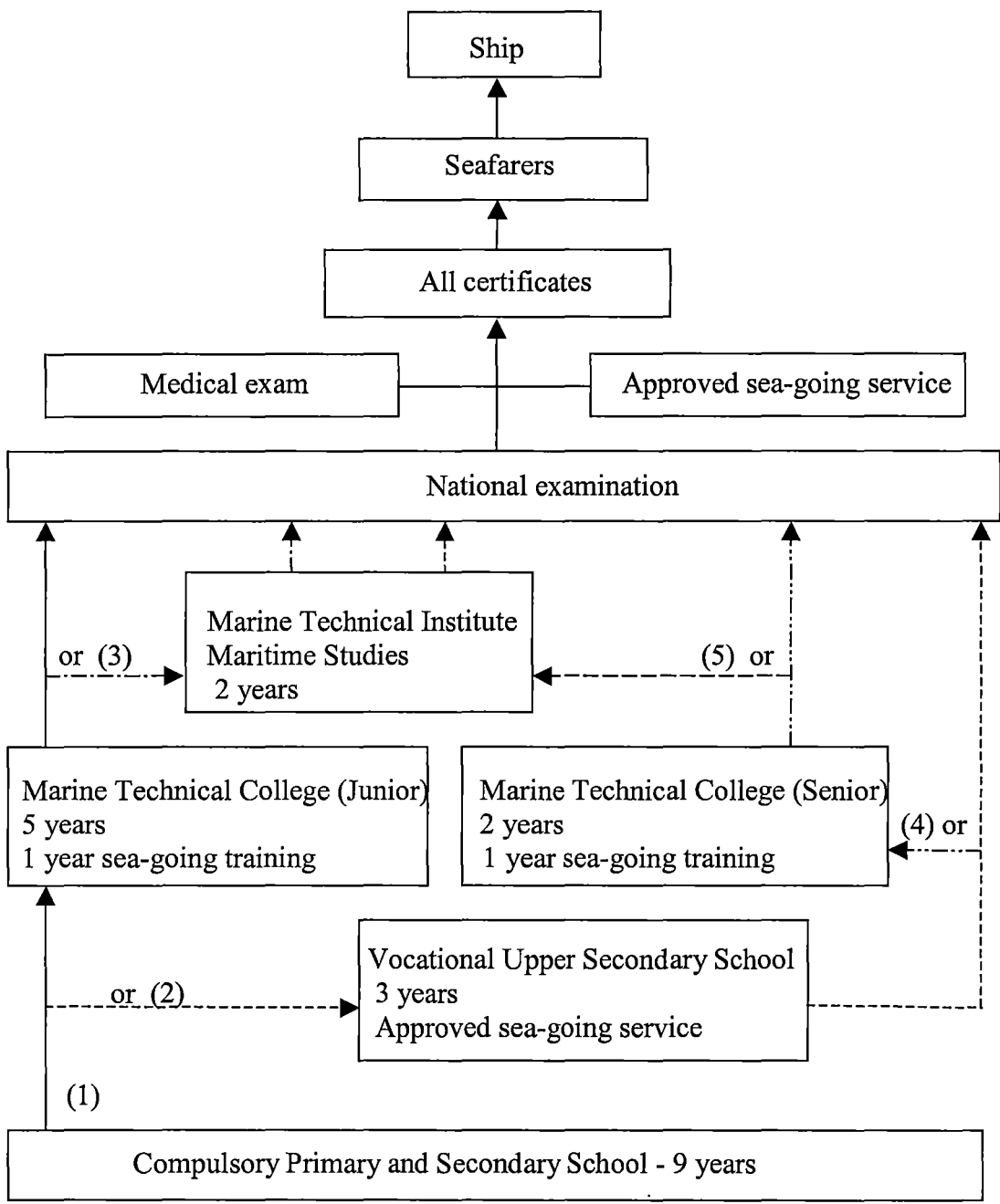


Figure 2-2(a) Technical and vocational education system

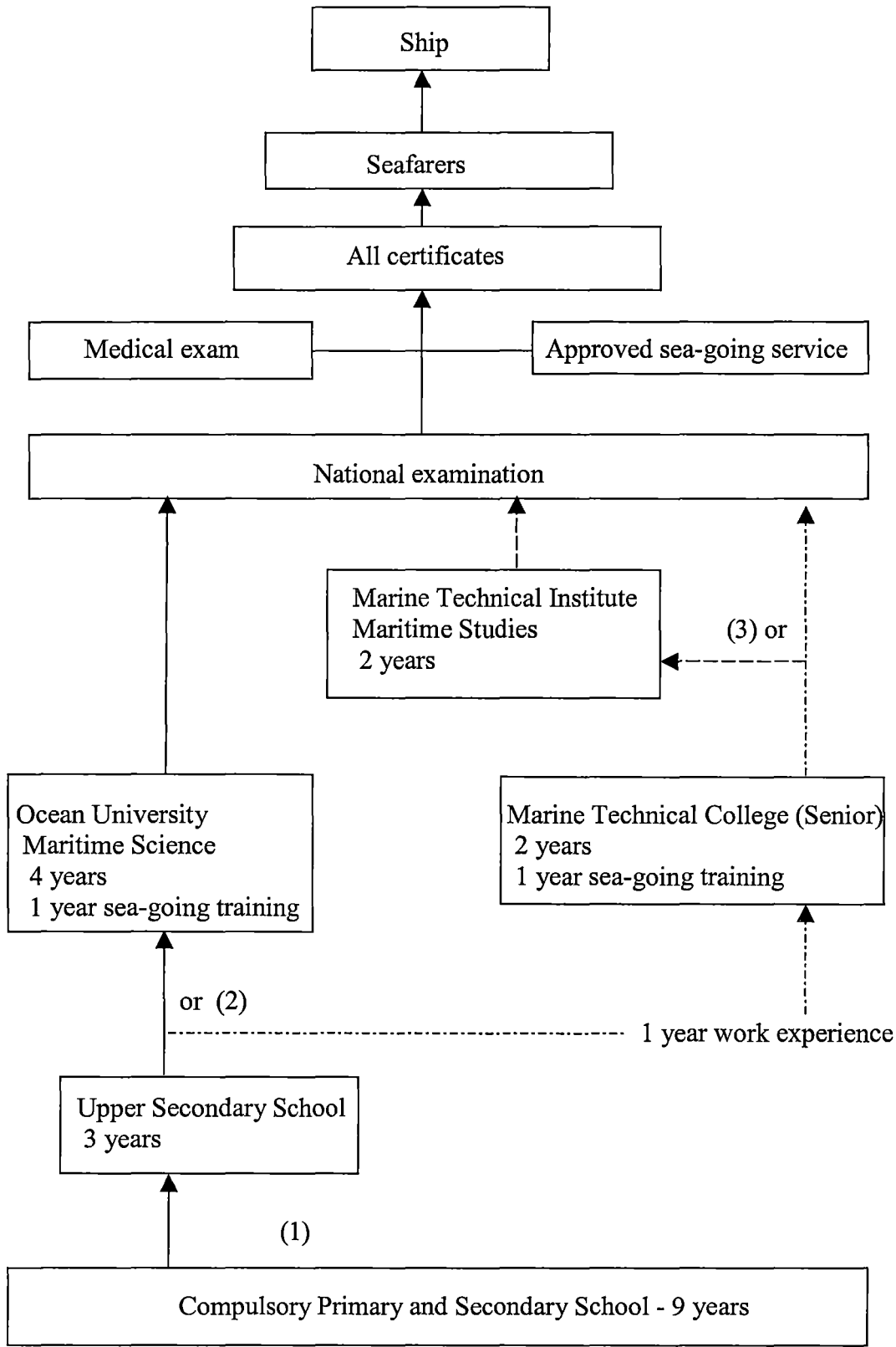


Figure 2-2(b) Common and maritime university education system

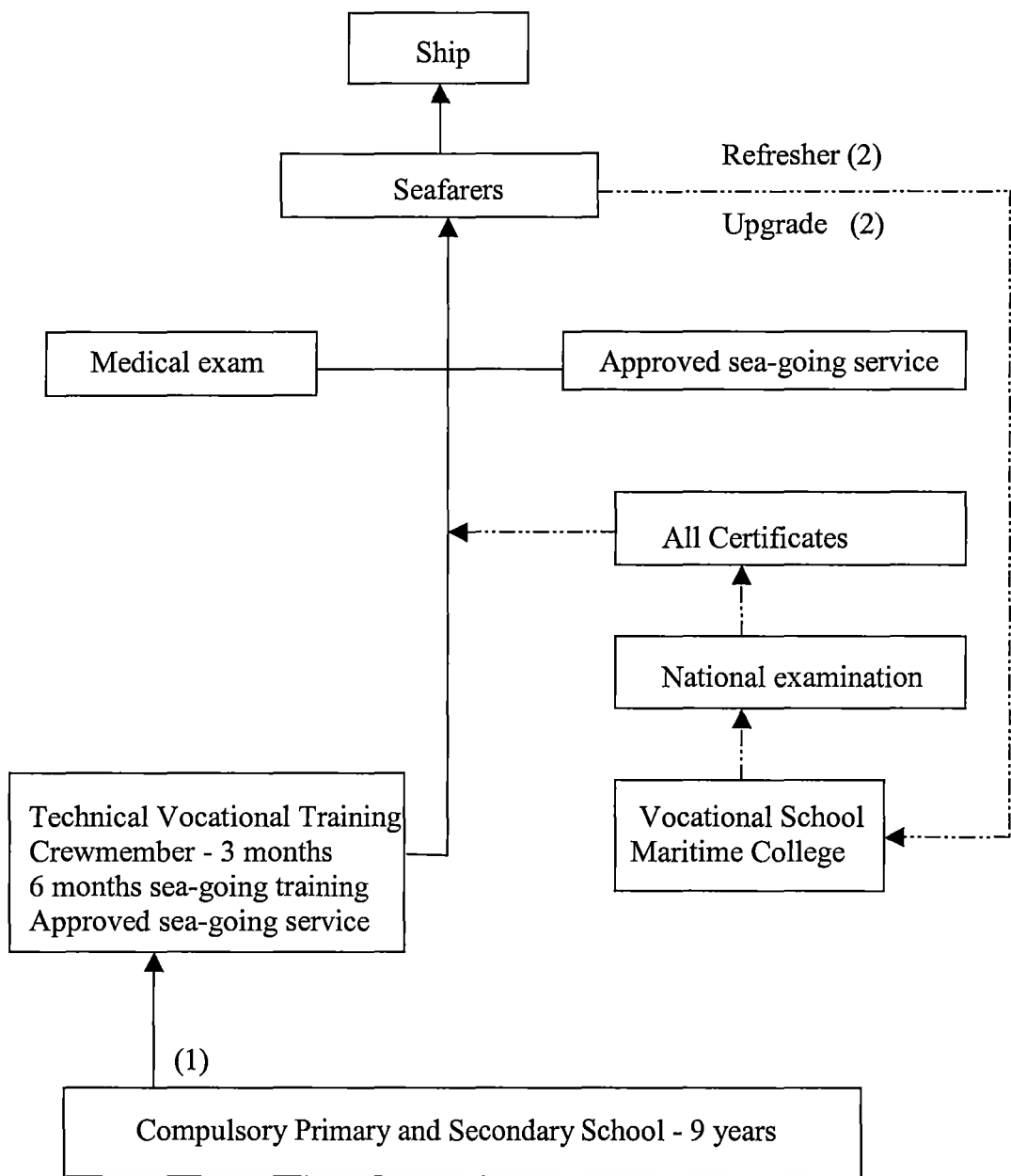


Figure 2-2(c) Technical and vocational training system

In Taiwan, there is a whole range of different MET schemes in place, with widely varying standards. Generally, there are three levels of maritime education and training, and 2 levels of certification for candidates who seek certification as officers in deck/engine departments.

The entrance requirements to the first level MET courses are:

- 1) 12 years general education and a competitive national entrance examination to reach the university/institute level; or,
- 2) 12 years general education and a competitive national entrance examination via vocational education system to reach the university/institute level.

After examination, graduation and serving the prescribed periods of sea service in the deck/engine departments, a candidate will be granted a first-class officer Certificate (unlimited certificate) issued by the MOTC.

The entrance requirements to the second level MET courses are 9 years general education and a competitive national entrance examination to reach the college level. After examination, graduation and serving the prescribed periods of sea service in the deck/engine departments, a candidate will be granted a first-class officer Certificate (unlimited certificate) issued by the MOTC.

The entrance requirements to the third level MET courses are 9 years general education and a competitive national entrance examination to reach the vocational upper secondary school level. After examination, graduation and serving the prescribed periods of sea service in the deck/engine departments, a candidate will be granted a second-class officer Certificate (limited certificate) issued by the MOTC.

A few years after graduation, the shipowners choose the officers who become second officers and then chief mate/engineer or master.

2.5.2 The MET Control System

The MET technological and vocational education system in Taiwan is the responsibility of the Ministry of Education (MOE), the MET vocational training is the responsibility of the Ministry of Transportation and Communications (MOTC), and the Ministry of Examination (MOEX) of Examination Yuan assesses the issue of competence assessment used in qualifying for any STCW certificate. A certificate of competency for seafarers is issued by the Ministry of Transportation and Communications (MOTC) after prescribed periods of sea service. Figure 2-3 illustrates the MET control system in Taiwan.

The MOE and MOTC provide adequate and appropriate resources, both human and physical. For example, if specialist tuition/equipment is required for a particular academic course/training module, they will be approached to provide them. The MOTC controls the module-style training/instructions relating to comprehensive training in safety and emergency matters, as well as the special training on certain types of ship interlocked with the academic system of credit accumulation and transfer that is controlled by the MOE. All the modular/academic courses are required to be subject to detailed examination to ensure that standards are maintained. Further, the course control, detail structure, administration and delivery, etc. are reviewed by independent specialist staff assisted, where appropriate, by external advisors. Through this structure it is able to satisfy most aspirations of maritime education and training as each relates to nautical activity and STCW Convention.

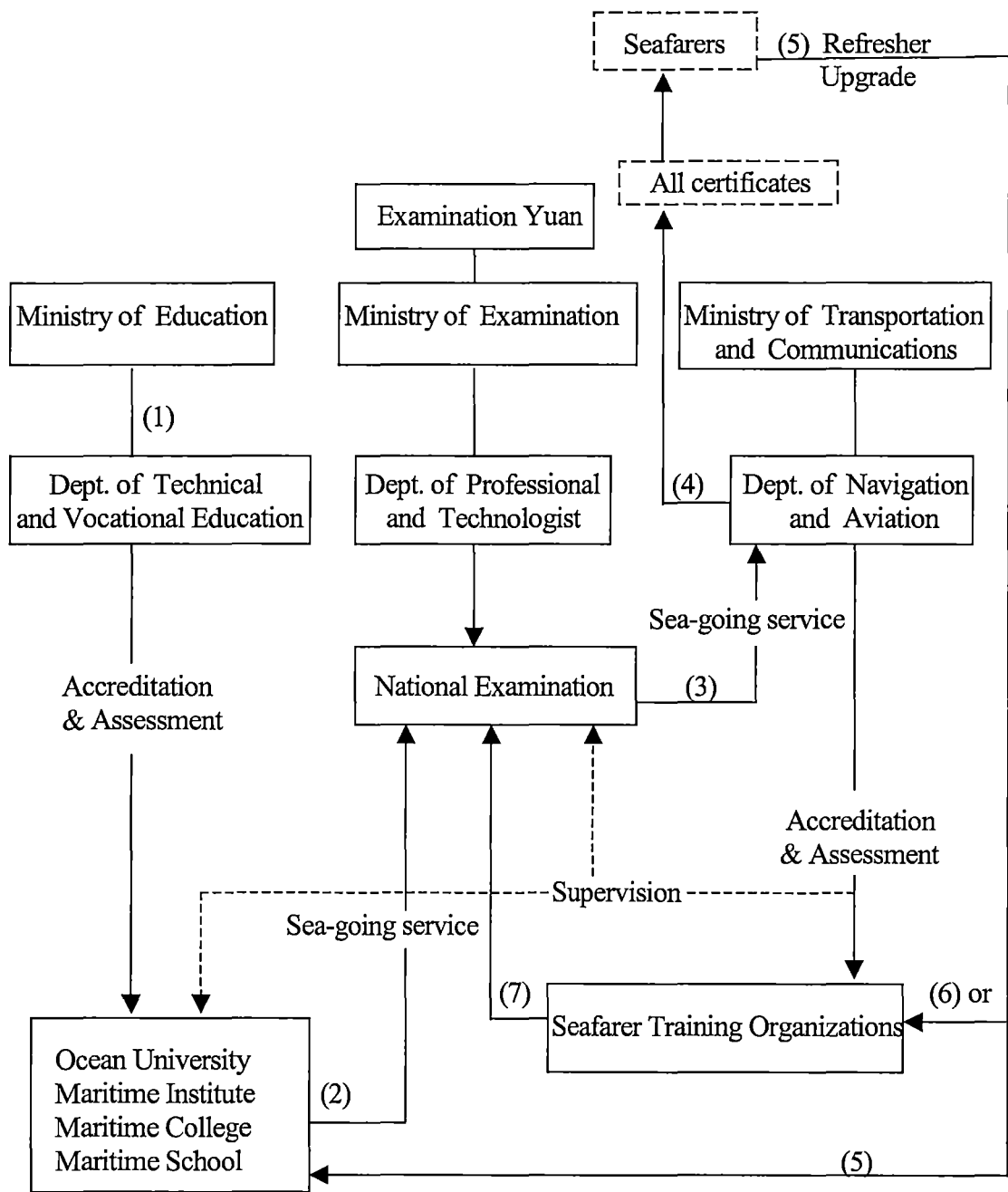


Figure 2-3 Maritime Education and Training control system

With respect to the qualifications of instructors, supervisors and assessors, all of them should be subject to a performance appraisal from the MOE and MOTC. If teaching staff have encountered difficulties in implementing the Convention or need updating in their subject knowledge and skills, the necessary in-service training will

be provided by the MOTC. This policy of positive appraisal for teaching staff assists them in maintaining a modern shipping industrial profile. It also assists the teaching staff to effectively impart the knowledge attitudes required of the trainees under the Convention implementation. The MOE, MOTC and teaching staff themselves share the responsibility to review effectiveness and work for the improvement of the MET reforms.

In order to qualify, seafaring officers have to successfully pass the national professional examination, held by the MOEX, to the satisfaction of the administration (MOTC) issuing the Certificate of Competence. The examination subjects were re-designed in 2000 to seek to test the candidate's competence to apply his/her knowledge, understanding and proficiency to the practical aspects of his/her professional task. Moreover, the methods and procedures by which examinations for competence are conducted are kept under constant review and must be sufficiently flexible and able to be modified or altered as changing conditions dictate by the MOEX.

2.5.3 MET Academic Institutes

This study concentrates on the higher level of the MET schools leading to a certificate of competency for deck/engineering officers and masters on vessels of unlimited gross tonnage.

Fundamentally, there are three different levels of tertiary maritime education and training institutes in Taiwan, namely, National Taiwan Ocean University (NTOU), National Kaohsiung Institute of Marine Technology (NKIMT) and China College of Marine Technology and Commerce (CCMTC). The highest level is the university, then the institute, with the college being the lowest level. Each of them is the one and

only institute at that level, and may be briefly described as follows.

National Taiwan Ocean University

National Taiwan Ocean University is the only university operated by government to educate and train young people for maritime science and technology. This university was originally established in 1953 as a junior college. At present the university has four colleges, namely maritime science, fisheries science, science and engineering, and technology. There are thirteen departments and seventeen graduate schools, eight of which offer programmes leading to doctoral degrees. In the fifty years since its founding the university has grown tremendously and is now recognized as one of the nation's important centres of learning and scholarship, especially in the fields of maritime research and studies (website: <http://www.ntou.edu.tw>).

The university has four departments which commit themselves to maritime education by providing a wide range of training programmes for officers, captains and on-duty engineers, namely the Departments of Nautical Technology, Marine Engineering and Technology, Merchant Marine, as well as Fisheries Science. Their principal objective is to cultivate researchers and professionals and to employ their skills in the engineering systems and the management of the merchant marine industry. As the educational goals of these four departments are for sea-going deck officers and engineering officers to meet the demand for advanced maritime technology, they are used in this research.

National Kaohsiung Institute of Marine Technology

National Kaohsiung Institute of Marine Technology was established in early 1946. It was initially a branch of the Keelung Marine Vocational School. Nineteen years later

it was developed into the Kaohsiung Marine Junior College. Further, it was renamed as the National Kaohsiung Institute of Marine Technology in July of 1997. It is a pure MET institute. There are three academic groups in the institute, namely Merchant Ship, Marine Product, and Engineering. To enable Taiwanese seafarers to meet the requirements set forth in the STCW Convention by the International Maritime Organization in 1978, since 1980 this institute has also been accepted by the Ministry of Transportation and Communications to undertake seafarers' compulsory training. Training includes personnel survival, fire fighting, survival craft and rescue boat, radar/ARPA simulator, tank familiarization, and so forth. This institute has surpassed the position of the National Taiwan Ocean University in the eyes of the shipping industry (website: <http://www.nkimt.edu.tw>).

The institute has three departments committed to providing a wide range of training programmes for officers, captains and on-duty engineers, namely Departments of Marine Navigation Skill and Shipping, Marine Engineering and Fisheries. The aim of these departments is to promote discipline in the field of seafaring operations technology and the ship management business; and marine engineering and management of mechanical and electrical power plants. The graduates may develop their careers in maritime industry as shipmasters, chief engineer officers or as officers in land-based shipping industries or as pilots and inspectors in the harbor bureau. As the educational goals of these three departments are for sea-going deck officers and engineering officers to meet the demand for maritime technology, they are used in this research.

China College of Maritime Technology and Commerce

In 1965, in light of Taiwan being surrounded by the ocean, and the importance of ocean transportation development and marine resource exploration to Taiwan's

economic wellbeing in the future, Mr Wu, Jeng-jong, Mr. Dai, Shyng-tih, and Mr Chen, Jye-kang, proposed to co-establish the China College of Maritime Technology and Commerce. This privately-funded college was established the following year. The primary educational purpose is to foster specialists in ocean business (website: <http://www.ccmtc.edu.tw>).

The college contains both a five-year junior college programme and a two-year senior college programme. It has seven departments relevant to the maritime industries, namely, Departments of International Trade, Shipping Management, Computer and Communication Engineering, Food Science, Fisheries, Turbine Engine and Shipping. In 1998 the Fisheries Department expanded its aims to include ocean leisure and tourism business, expertise in ocean environment management and in fisheries business management (website: <http://www.ccmtc.edu.tw>).

The college only has two departments committed to education which provide a wide range of training programmes for officers, captains and on-duty engineers, namely the Departments of Turbine Engine and Shipping to meet the demand for maritime personnel due to the rapid growth of shipping markets. The educational goals of these two departments are to cultivate sea-going deck officers and engineering officers and to employ their skills in merchant marine technology, hence, they are used in this research.

In general, the institute and the university offer education focusing on advanced studies so as to train students to be the specialists, managers and researchers. The college provides courses in applied sciences and workshop practices, with the aim of turning students into technicians or seafarers after graduation. The workload for the students is based on 40 hours per week for 40 weeks a year and it constitutes contact hours and time spent on studies, attending study-related activities and carrying out

assignments. After the students reach the necessary academic level and pass the written examinations during the last academic year, they will receive a Diploma or Graduation Certificate, which is issued by the MOE. The qualified student then needs to take the national examination for professionals and technologists conducted by the MOEX, which can fully guarantee the quality of his/her professionalism. Table 2-3 shows the pass rates of the state professional examinations for all candidates who attempted to gain certificates of shipmaster, chief mate, chief engineer officer and officers during 1997 to 2000.

Table 2-3 The pass rates of the state professional examinations for all candidates who attempted to apply certificates of shipmaster, chief mate, chief engineer officer and officers during 1997 to 2000.

Sequence/Year	The registration of candidates for the examination (No.)	The participated candidates in the examination (No.)	The passed candidates after the examination (No.)	Pass rate (%)
The 2 nd time/1997	416	305	109	35.74%
The 3 rd time/1997	572	466	197	42.27%
The 1 st time/1998	796	639	157	24.57%
The 2 nd time/1998	691	533	210	39.40%
The 3 rd time/1998	837	669	204	30.49%
The 1 st time/1999	806	621	170	27.38%
The 2 nd time/1999	710	529	159	30.06%
The 3 rd time/1999	853	660	175	26.52%
The 1 st time/2000	862	617	142	23.01%
The 2 nd time/2000	1,060	735	177	24.08%
TOTAL	6,703	5,774	1,700	29.44%

Source: Website: <http://www.moex.gov.tw> (Chinese version)

As the pass rates of the state professional examinations for seafarer's Certificate of Competence only reached 29.44 percent in average, it is hoped that the innovative changes to MET will improve these pass rates.

Once the national examination is passed, the student will receive a Certificate of Pass to serve as a cadet in the deck and engine departments on board a ship. After serving the prescribed periods of sea service (1 year) in the two departments, the candidate will be awarded a Certificate of Competency issued by the MOTC.

Structural changes in the shipping industry are anticipated and will be incorporated into a global and integrated transport system. Further, safety, environmental protection, quality reasons, human error and the reduction of the number of seafarers will emphasize the importance of the human factor. As a consequence of these demands, the revised STCW 95 Convention greatly strengthens and improves the standard of education and training, qualifications of seafarers as well as the implementation of the Convention. Hence, MET will require higher and higher operator performances. This is great opportunity for organizational arrangements to be put in place that enable Taiwanese educators to re-think the MET technical culture of how teaching is best done. It will enable them to re-examine their expectations and concerns for students as well as their own role, not only in the implementation of STCW reform but in preparing students for a future professional performance and development where continuous change is a certainty. In addition, it is an environment in which the educators involved in the MET reforms rely as much on process as on content and is an expression of the individual's value, perceptions and rational concerns as much as knowledge. It follows, therefore, that the development and improvement of good teaching in implementing the reforms will be seen as a priority for the administrators and for the trainers themselves.

2.6 Summary

Overall, STCW 95 attempts to achieve the well-documented technical guidance of uniform standards and requirements for each of the functions applicable to what

seafarers should be able to do to ensure safe and pollution- free ship operations. It is bureaucratic rather than ideal as it seems that there is no short cut to achieve its goals of safety at sea and marine environmental protection without regulating the education, training and instruction of seafarers.

With respect to the regulation of the STCW Convention, the Taiwanese administrators, MET school leaders and teachers at all levels have a clear awareness and understanding of the STCW Convention relating to the MET training, assessment and certification activities which are required to be covered, implemented and continually improved through numerous agenda and discussions. In order to ensure that seafarers meet all the mandatory international/national STCW standards and regulations, the MET schools have to comply with the requirements of MOE and MOTC including MOEX. However, all of them, MOE, MOTC, MOEX and MET schools, share the responsibility to review effectiveness and work for the development and improvement relating to MET reform.

This chapter has focused on the processes of MET reform in Taiwan arising from the STCW Convention. Drawing on both, it is hoped that they will together stimulate dialogue and reflection among teachers, administrators and policy-makers about how to bring about positive educational change in the complex, diverse, rapidly changing post-modern times. It is further hoped that this positive MET reform in Taiwan will help achieve high standards of teaching, learning and caring for all.

The main consideration for treating the subject of STCW reform stems from the fact that so many people seem to think that reform is necessary and so little has been done on what really leads to reforms. This study attempts to clarify some of the possible reasons for the above fact and will attempt to present a frame of reference which can be helpful in future discussions about this problem area.

Since 1995, the MET reform has been well disseminated, understood and implemented in Taiwan. The pressures for MET changes direct attention to educators' perceptions, knowledge base, and abilities to meet seafarers' education and training requirements, their conceptions of practice, and their competencies on board ships. As the MET educators play a crucial role in developing and increasing the competence of seafarers, the new structures, opportunities and organizational arrangements facilitate the educators to understand professionalism and professional growth, the scope and level of education and training they offer may well exceed that of the STCW Convention.

Chapter 3

**Conceptual Framework,
Methodology and Implementation
of the Study**

Chapter 3 Conceptual Framework, Methodology and Implementation of the Study

3.1 Introduction

After the new revised STCW Convention is adopted, it is necessary to solve the most important problems – the process of the implementation of the Convention and the understanding of the achievements of the MET reform.

The MET educator is the most critical factor to the success or failure of the MET reform. Only their knowledge, endeavor, adoptions and transformation of the reform implementation into teaching activities can change this into reformed practices. As there is little knowledge about how MET educators perceive the relationships between stages of concern, expectancy, professionalism and reform, this research scientifically evaluates their principal concerns in the context of the reform implementing process. To achieve this goal, a sequence of steps, which are shown in Figure 3-1, were designed to produce relevant data.

In the study, one extremely important concept to implement the MET education reform is to explore and assess the MET educators' awareness, attitudes, needs and perceptions. An approach is the use of Hall's Concerns Based Adoption Model (CBAM) to monitor their concerns about the MET innovation. It is designed to appraise, portray and interpret the process of reform implementation and has been experienced by teachers involved in attempts to implement new curriculum, teaching materials and professional competencies.

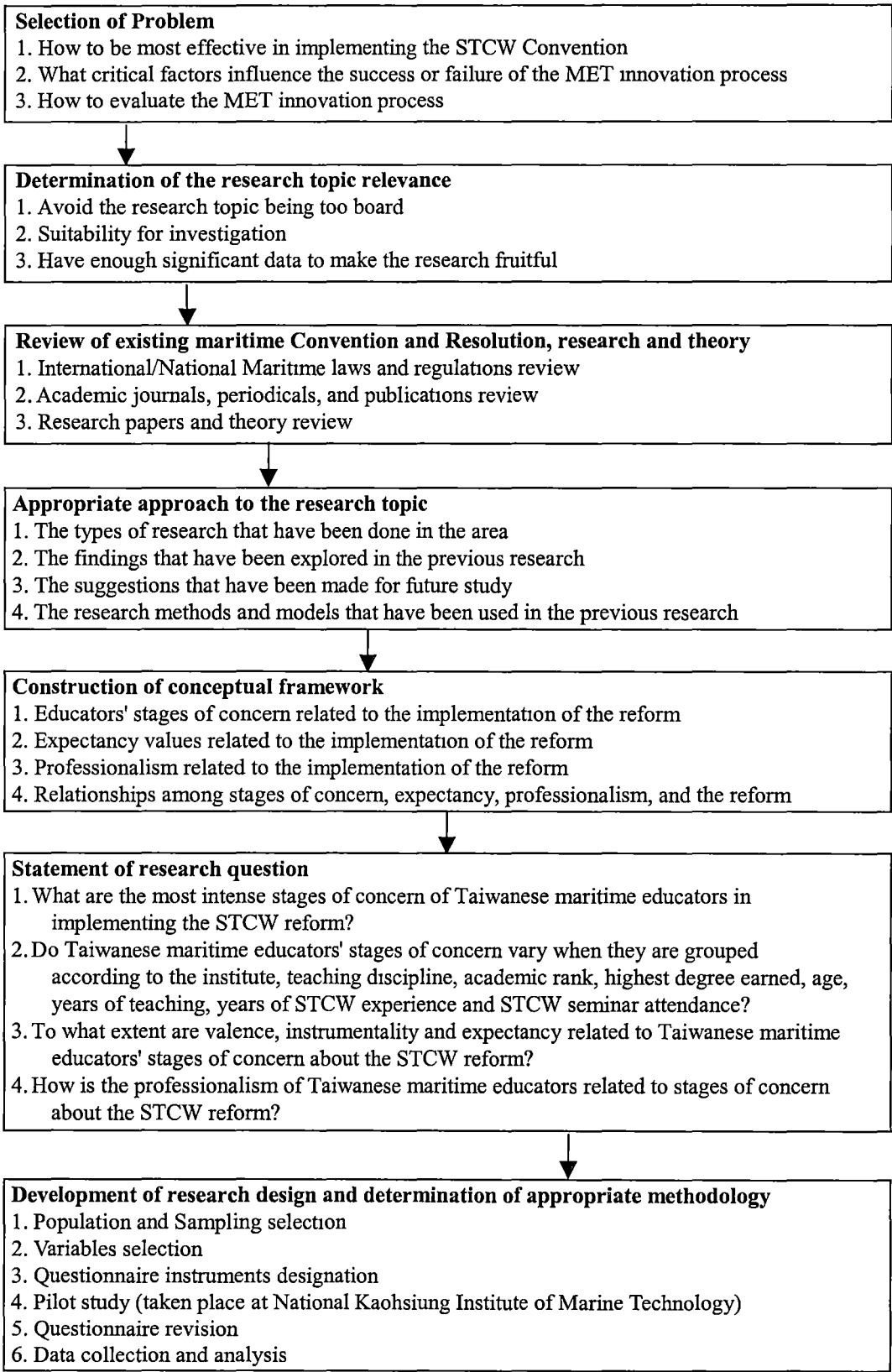


Figure 3-1 Steps in the development of the study

The CBAM can further provide an understanding of how the process is affected by interventions from reform facilitators. It is postulated that the CBAM can offer a mechanism to explore whether the process is desirable or not, and uncover the barriers that the educators in Taiwan confront during the MET reform implementation.

As the implementing of the STCW Convention mainly relies on the norms, values and symbols of individuals, a professional construct embodies this matrix of norms, values and symbols sympathized by the educators. Hence, the second concept to successfully implement the MET education reform is the level of existing professionalism among the educators. A professional educator is assumed to possess a viewpoint emphasizing professional concerns and de-emphasizing non-professional ones (Pollard, 1985). Those concepts form the basis of a five-point, 12-job-characteristic item Likert scale. McLeod and Hawley (1964: p.538) asserted, that it was a positive value to take professional orientation into account, as “those having such an outlook tend to exhibit distinct patterns of cognitive judgment and different specific attitudes”. The replication among most study findings supports the conceptual framework of professionalism, which means that those with a high level of professionalism are more concerned about the norms, more desirous of the implementation of professional values, and better performed on the job than those of lower levels professionalism.

In this thesis, the third set of influences which may affect the implementation of the MET reform is related to what educators expect will occur and what they desire to occur. The expectations and goals of the reform offer a sense of direction and meaning to those educators participating in the reform. A reform with a vigorous sense of tasks that are effectively communicated and accepted by the reformers is more likely to stimulate the educators’ commitments, vitality and concerns. As one

of the key issues attempts to reveal how the educators feel about the reform, how they realize the linkage between their endeavors and desired outcomes, and how the confidence in their competencies to accomplish the tasks of the reform during the process of reform implementation, a five-point, nine-item Likert type scale is formed to investigate the expectation values of the educators in Taiwan. It is postulated that it will help the MET reform to establish the standards of criteria reflecting the desired levels of quality.

The purpose of this study is to describe the nature of the MET educator's population. Therefore, data are analyzed from a 66-item questionnaire which was mailed to the entire population of 170 MET full time teaching educators in the three departments (navigation, engineering and fishery) in all Taiwan regions. The questionnaire consists of four components, namely, the 35-item stages of concern, the 12-item professionalism, the 9-item expectancy values and the demographics. As the main component of the questionnaire is based on the 35-item stages of concern, which was developed by Hall et al. in 1977, all 35 items in the original scale are retained.

This study employs the CBAM, professionalism and expectancy values to assess the extent of STCW reform implementation evidence among the entire population of MET educators in Taiwan today. It is postulated that this may provide an insight to increase the impacts from implementing the reform on MET-related education and the revision of on-the-job training programmes by the reform administrators.

3.2 Conceptual Framework

The conceptual framework of this study concentrates on the relationships between MET educators' stages of concern, expectancy values, and professionalism relating to the implementation of the STCW education innovation. To develop this

framework, several views of concerns and their implications for the MET reform implementation are considered. Some previous research is then reviewed to identify models of educators’ professional perception, expectancy, and concerns about the education reform, and examine possible impacts on educators’ knowledge, abilities and stages of concern based on their view of the reform implementation.

Since this approach is based on the study of the literature reviews, a theoretical model is developed to link the concept of the attitudes, perceptions, and concerns of Taiwanese MET educators about the STCW education reform implementation. The theoretical model of the present study is shown in Figure 3-2.

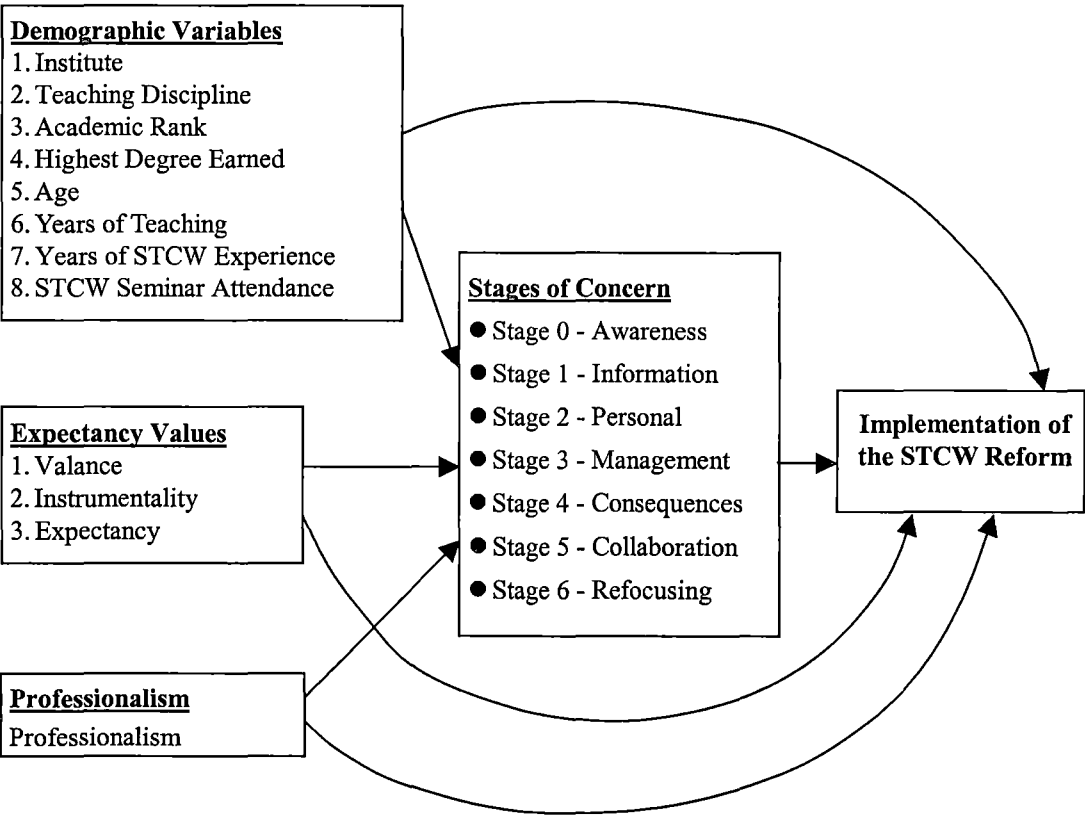


Figure 3-2 A theoretical model reflecting the relationships between demographic variables, professionalism, expectancy values and stages of concern

3.2.1 Concerns Based Adoption Model – Stages of Concern Theory

The instructors of MET organizations, institutes or universities are expected to change the way they teach or provide services to the maritime students and trainees. The dramatic alterations to maritime legislation and procedures, the development of new curricula and material, theoretical developments, philosophical changes, and research all contribute to the changes in the way professionals think and act. These changes generate pressures and provide opportunities to modify the MET organization's, institute's or university's activities. Therefore, "it is the users' involvement, their interaction and emergent understanding and symbolic representations, that serve as the crucible within which innovation takes place (Lewis & Seibold, 1993: p.326)". Innovation related information sources may alter as users commit themselves to the innovational activities. Using new concepts and models or learning new methods of work are likely to be resisted if they perceive that they are threatening to the established concepts and models (Glaser, Abelson & Garrison, 1983).

The successful implementation of STCW 95 requires that educators work together and support the process. If the MET innovation is adopted, the cooperation and participation of maritime educators in Taiwan is crucial. In other words, if the administrators and facilitators want maritime educators to carry out the MET education reform, they have to assess the educators' awareness, attitudes, needs and perceptions. One way to explore maritime educators' awareness, attitudes, needs and perceptions about the MET innovation is to monitor their concerns about it. The Concerns Based Adoption Model, better known as CBAM, was developed by Hall, George, and Rutherford (1977). It is an extensively applied theory and methodology to assess the process of education reform implementation by administrators and

individuals acting in reform facilitating roles (Anderson, 1997). It is also a powerful tool to examine the current stages of maritime educators' concerns about the MET educational innovations in Taiwan.

According to Fuller's concerns-based approach (Fuller, 1969, 1972, 1973 and 1975), Hall et al. (1977) developed a seven Stages of Concern Model to observe the teachers' awareness, feelings and perceptions as they consider, approach, and implement an educational innovation. In order to keep in step with the Stages of Concern Model, Hall et al. designed a 35-item Stages of Concern Questionnaire (SoCQ) consisting of 35 items with five or six items focusing on each of the seven stages of concern constructs in 1977 (Hall & Hord, 2001). A Likert-type scale ranging from 0–7, identifies the extent to which the statement reflected the participant's current feelings. In conformity with the directions provided by Hall, George, & Rutherford (1977), a response of "0" means that the concern is irrelevant, "1" equals not true of me now, "3" and "4" equals somewhat true of me now, and "6" and "7" equals very true of me now. The items on the Stages of Concern Questionnaire is separated into seven stages of concern as follows:

- Stage 0 – Awareness

The educator has little (minimum to no) knowledge about or interest in the MET innovation.

- Stage 1 – Informational

The educator has become interested in learning more about the MET change and the hint of its implementation.

- Stage 2 – Personal

The educator has strong anxieties about his/her ability to complement the MET innovation, the personal costs of taking part in, and the required changes in roles and tasks. They also want to know what peers are doing and feeling.

- Stage 3 – Management

The educator is concerned with logistics, time management, new behaviors and prioritizing responsibilities connected with putting the MET innovation into practice. They have more or less tendencies to the solution of occurring practical problems.

- Stage 4 – Consequences

The educator is concerned about the impact of the MET innovation on students and other teachers, how to effectively implement the innovation for maximum benefit to students, and how to modify or employ this innovation to improve its change.

- Stage 5 – Collaboration

The educator concentrates on working with other colleagues to improve the MET innovation for students and sharing the information of the MET innovation with others.

- Stage 6 – Refocusing

The educator is considering making modifications in the use of the MET innovation or replacing it with something else.

Stages 1 and 2 primarily involve self concerns, stage 3 primarily involve management concerns, further, stages 4, 5 and 6 primarily involve impact concerns. The awareness concerns, stage 0, is independent of these types of concerns.

Several studies providing empirical support to the Stages of Concern Model have been conducted. For example, Sellars (1987) conducted a study of the effect of practice teaching on the concerns of preservice primary teachers. The study involved students in each year level in the three years Diploma of Teaching at James Cook University of North Queensland (Australian) in 1986. The report indicated that the students had higher impact concerns and lower self and task concerns at all year

groups (first, second and third years) after practice teaching. A set of CBAM projects was performed in Belgium and the Netherlands from 1983 to 1993. These projects were implemented in successive cohorts of schools, and were innovated the school organization, curriculum and teaching practices at local level successfully (Van Den Berg and Vandenberghe, 1986). However, due to the limited research in this area, it is necessary to study teachers' SoC in a school-wide educational reform context. The knowledge of teachers' SoC about a school-wide educational reform could improve the knowledge level of effectively implementing the reform.

According to the Stages of Concern Model, the educators first indicate self concerns (informational and personal stages), next task concerns (management stage) when they gain experiences in the use of educational innovation and finally they will be concerned about the impact of the innovation on other educators and students (consequence, collaboration and refocusing stages). It is possible that an educator may have intense concerns at more than one stage at the same time. As Hall and Hord (2001: p.64) put it, "In general teachers will have a conglomeration or array of concerns representing several of the stages, with some more strongly felt than others, and some absent all together".

The Stages of Concern Model offers a rigorous method to measure Taiwanese maritime educators' concerns about the MET education innovation because previous research has indicated that the 35-item questionnaire had strong reliability and internal consistency (Cheung et al., 2001; Hall & Hord, 2001). This model provides a framework and methodology to conceptualize the concerns shown by maritime educators, expected learning and implementing the MET innovations related to their work. Therefore, this study uses the Stages of Concern Model to identify Taiwanese maritime educators' concerns about implementing the MET educational innovation. Based on the above discussion, the Stages of Concern Model is used to answer the

following research questions:

Research question 1: What are the most intense stages of concern of Taiwanese maritime educators in implementing the STCW reform?

Research question 2: Do Taiwanese maritime educators' stages of concern vary when they are grouped according to the institute, teaching discipline, academic rank, highest degree earned, age, years of teaching, years of STCW experience and STCW seminar attendance?

3.2.2 Expectancy Theory

Expectancy theory proposed by Vroom (1964) provided an essentially theoretical explanation on how personal motivations and preferences affect teachers' concerns about educational innovations. Expectancy theory suggested that individuals could be motivated to respond if they perceived a clear linkage between their own efforts and the achievement of a desired goal, and if they perceived the linkage between the achievement of that goal and receipt of a reward (for example, merit pay) that is meaningful to them (Kelly & Protisk, 1997).

According to Vroom (1964), expectancy theory has three major components: valence, instrumentality and expectancy. Valence refers to how attractive or unattractive a particular outcome or psychological objective is to us. Instrumentality is defined as the perceived degree of relationship between performance and outcome attainment. Expectancy refers to our perception of the probability of successfully achieving a desired outcome. Figure 3-3 illustrates how a job situation results in a condition of motivation or absence of motivation for a teacher.

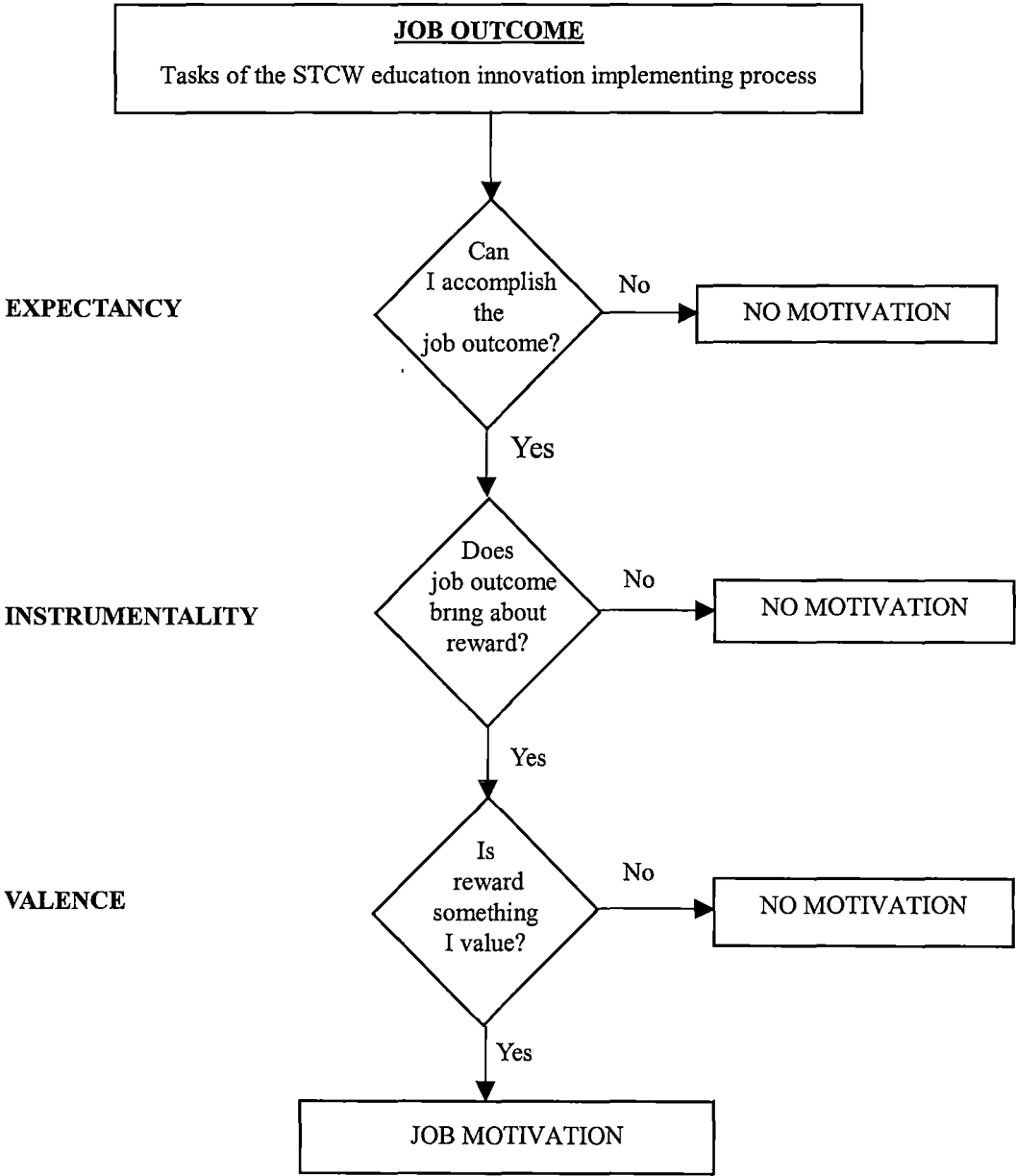


Figure 3-3 Expectancy values versus job motivation

Source: Pinder, 1984

Expectancy theory is consistent with Bandura’s (1977) theory of self-efficacy. Bandura suggested that individuals decide to devote themselves to a specific task based on two circumstances:

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- (1) If an individual is thinking that he has the personal knowledge and skills required to achieve the goal (efficacy expectations); and
 - (2) If an individual believes the implementation of that knowledge and skill will result in a pleasing outcome in a given prospect (outcome expectations).

In other words, people will not devote much more personal efforts if they think they do not have the knowledge, understandings, skills or resources to carry out and attain the goal even though they believe the methods are effective. Similarly, people will not persist with the methods if they do not believe the methods of attaining the outcome can breakthrough the external barriers, even though they have all necessary knowledge and skills. For example, teachers believing they have sufficient knowledge, skills, attitudes and means will achieve the goals and defeat the obstacles, such as poor teaching aids and equipment, they confront, and if they do, they will improve their own teaching instruction. On the contrary, the teaching instruction will not improve, or, will not persist if the teachers do not believe in the actions they performed. Several earlier studies (for example, Bartell, 1988; Hoy & Woolfolk, 1993; Hatry, Greiner & Ashford, 1994; Ilgen, Nebeker & Pritchard, 1981; Kelly & Protisk, 1997; Mitchell & Beaudin, 1996) found that expectancy was related to teachers' adoption of educational innovation, teachers' classroom management knowledge and skills, student motivations, as well as student achievements.

Therefore, in this study, it is proposed that valence, instrumentality and expectancy can be related to the stages of concern about the MET innovations. Expectancy theory suggests that the educators will respond positively to an innovatory project (for example, MET educational innovation), if four conditions are satisfied (Cumming, 1994; Johnson, 1986; Lawler, 1986 and 1990; Welbourne & Mejia, 1995). Firstly, the educators must have positive feelings about the MET educational innovations. For example, the educators believe this reform is realistic and efficient.

Secondly, the educators must realize a connection between their individual efforts and the desired outcomes. For example, they were motivated by the promise of rewards, awards or incentives for implementing the MET educational innovation. Thirdly, the educators must be confident with their competencies, knowledge, and abilities to accomplish the tasks. For example, sufficient knowledge and classroom skills will help students to achieve the higher levels required by the STCW 95 standards. Finally, the educators must value the award they received being sufficient to put forth individual's endeavor to implement the reform. For example, a recognition of all the endeavor that the educators had put into to improve students achievement levels.

In summary, the expectancy theory provides a useful framework to understand the educators' feelings, perceptions and concerns about the MET educational innovation. Thus, in this study expectancy theory is used to answer the following research question:

Research question 3: To what extent are valence, instrumentality and expectancy related to Taiwanese maritime educators' stages of concern about the STCW reform?

3.2.3 Professionalism

Professionalism has long been recognized as an important factor influencing teachers' work, performance and ethical standards (Louis & Kruse, 1995). Professionalism is a term referring to a set of internalized norms that guide and structure the work of the members of an occupation, which may or may not possess the full characteristic of a profession (Nayman, 1973). Professionalism can also be defined as "a particular system of social control in which members of an occupational group regulate their own behavior (Beam, 1990: p.2)". According to

Bernard Barber (1967: p.15-34), a definition of professionalism may include:

- (1) A high degree of generalized and systematic knowledge;
- (2) Primary orientation to the community interests rather than individual self-interests;
- (3) Recognition and support of a code of ethics by the members of the profession; and
- (4) A reward system that is primarily a set of symbols of working achievements and thus ends in themselves, not means to some end of individual self-interests.

A number of previous studies (Beaty, 1996; Goode, 1969; Ismat, 1992; Lortie, 1975; Moore, 1970; Reed, 1999; Schwille et al., 1983; Strike, 1990; Sweetland & Hoy, 2000; and Wilensky, 1964) have attempted to assess the level of professionalism of various occupation members, then to relate that professional level to the other variables. Most of the studies have found that those with a high level of professionalism are more concerned about ethical standards, more educated, more critical of their employers, more independent of the job, less concerned about money and prestige, exhibit stronger desires to implement the professional values, and perform better on the job than those with lower level professionalism. A teacher with good professionalism or professional activity performance should:

- (1) Carry enthusiasm to deliver the best curriculum and instruction;
- (2) Assess their teaching systematically and objectively;
- (3) Improve and update their practice methodically;
- (4) Get and give opinion from and to colleagues;
- (5) Express concern about the quality of their work;
- (6) Take the implication of their teaching into account;
- (7) Make self-evaluation their practice;
- (8) Support colleagues in good work;
- (9) Support the larger school improvement programme; and

-
- (10) Undertake responsibility for educational concerns outside of their classroom.

In other words, professionalism describes the quality of practice (Sockett, 1990), whereas professional activity is the best route to engage in improving the conditions of educators and teaching (Ismat, 1992). A high level of professionalism not only relies on the level of success in the claim to exclusive competence of specialized techniques, but also depends on the level of persistence in the service ideal and its supporting norms of professional behavior (Wilensky, 1964).

Therefore, this study proposes that professionalism can be related to educators' concerns about the MET educational innovations. An educator with the higher level of professionalism should more likely prepare well for teaching and be more up-to-date in his/her practice thus exhibiting a stronger desire to retain quality performance. Besides, a highly professional educator should also more likely support educational reform and adopt educational innovations. Based on these considerations, this study proposes that professionalism can be related to Taiwanese maritime educators' stages of concern about the MET innovation. The fourth research question is as follows:

Research question 4: How is the professionalism of Taiwanese maritime educators related to stages of concern about the STCW reform?

3.3 Methodology

To answer the research questions, four different instruments are applied (see Appendix II). Firstly, a 35 item Stages of Concern Questionnaire (SoCQ) with five items focusing on each of the seven stages of concern constructs (Hall et al., 1977) is used to collect dependent variables relating to the implementation of the reform. Secondly, a nine item expectancy values questionnaire and a 12 item professionalism

questionnaire are used to collect independent variables associated with Taiwanese maritime educators’ stages of concern about the STCW reform. Finally, a demographic questionnaire is also used to collect the characteristics of educators connected to the reform implementation. It also acts as an independent variable to investigate the educators’ receptivity in the reform implementation. These questionnaires were written in “English” at the design stage, and that they were combined and translated into a “Chinese” format questionnaire prior to their administration in Taiwan. Figure 3-4 illustrates the relationship between dependent variable and independent variables.

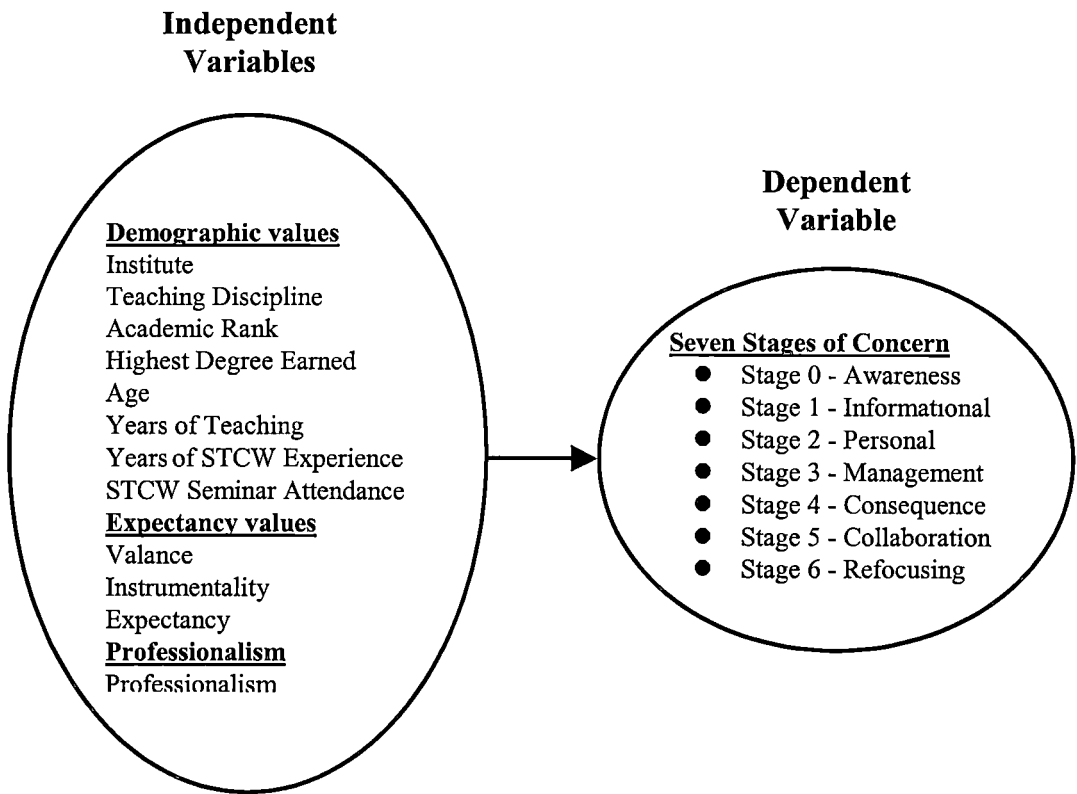


Figure 3-4 Independent variables versus dependent variable

Source: Derived from Figure 3-2 A theoretical model reflecting the relationships between demographic variables, professionalism, expectancy values and stages of concern

3.3.1 Population and Sample

Since a purpose of this thesis is to depict the nature of the population, the investigation is designed to cover the entire population of 170 MET full time teaching Taiwanese educators in three disciplines, namely navigation, engineering and fisheries. The population contains three different types of educators: university educators, college educators and institute educators.

A common impression of university educators is that they prefer working on research that is authentically challenging, are interested in collaborative teamwork and establishing strong communications in their working institutes. The college educators are more likely to perform their teaching activities more perfectly to the extent they even sacrifice their own benefits. In regard to the institute educators' motivation and concerns, they tend to accept the university educators' behavior rather than the college educators (Schuster & Wheeler, 1990). The concerns about the MET reform implementation among the educators are likely to be varied with different individuals' perceptions, skills, professionalism and values. This study however characterizes these chosen educators as three different types according to their working environments, which is the approach recognized in MET worldwide.

The data in this study are based on 95 educators' responses from three MET academic institutes, namely National Taiwan Ocean University (NTOU), National Kaohsiung Institute of Marine Technology (NKIMT) as well as China College of Maritime Technology and Commerce (CCMTC), in three cities. The 56 percent response rate being primarily due to time constraints of potential respondents.

3.3.2 Population and Sample Size of the Study

In order to reveal the nature of the population, this study covers all full-time MET tertiary educators in Taiwan. There are 170 lecturers, assistant professors, associate professors and professors working in the navigation, engineering and fishery departments at three academic institutes involved in the STCW reform. In November of 2001, each of this entire group was requested to respond to the investigating questions. The 170 questionnaires administered to these institutes are shown in Table 3-1.

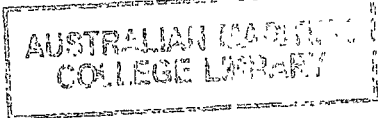
Table 3-1 The distribution/response of questionnaires in various institutes

Academic Institutes	Questionnaires Distributed (No.)	Questionnaires Returned (No.)	Response Rate (%)
National Taiwan Ocean University	80	34	42%
National Kaohsiung Institute of Marine Technology	67	41	61%
China College of Maritime Technology and Commerce	23	20	87%
Total	170	95	56%

Of the questionnaires returned, 95 questionnaires are valid for the statistical analysis. The 95 maritime educators in the sample (i.e. 56% of total population) are used to interpret the population of 170 MET educators at these three institutes.

3.4 Research Variables

There are four measurements are directly linked to 66 research items in the questionnaire (see Appendix II). The first group of 35 research items is directly derived from Hall’s SoC Questionnaire (1977) and it is used to depict and categorize the actual phase of the concerns of reform implementation in Taiwan. The answers to



those 35 items match the intentions of the first research question. Further, a demographic information folio is also employed to obtain the details about the educators' characteristics relating to the reform implementation. Those characteristics including institute, age, teaching discipline, highest degree earned, academic rank, years of teaching, years of STCW experience and STCW seminar attendance functions as independent variables. They provide useful data about the educators' receptivity to the reform implementation. The answers to those demographic items combined with Hall's 35 SoC items can explain the intentions of the second research question. The second group comprises nine research items (designed by the author: based upon Vroom's theory), and it is used to describe what extent and probability of the expectancy values (valance, instrumentality and expectancy) are related to the seven stages of concern about the reform. The answers to these nine items can satisfy the notion of the third research question. The final 12 items group is derived from McLeod and Hawley (1964). It focuses on the factor of individual professionalism (practical quality and professional activity) that could improve current practice and implementation of the reform in MET institutes. The answers to those 12 items indicate the aspirations of the fourth research question.

In summary, the answers to the research questions could maximize the MET educators' understanding about the current implementing stages in Taiwan. It also provides new data and information required for progressing the reform implementation.

Hence, there are four measurements being constructed by the questionnaires in order to maximize the knowledge from existing studies/theories and understand how the reform constructs have been implemented by the MET institutes and educators over the past six years. They are described as follows.

3.4.1 Stages of Concern

The 35-item Stages of Concern scale developed by Hall et al. (1977) is used to assess educators' concerns about the MET educational innovations in Taiwan. The stages of concern questionnaire items are presented below:

1. I am concerned about students' attitudes toward this innovation.
2. I now know of some other approaches that might work better.
3. I don't even know what the innovation is.
4. I am concerned about not having enough time to organize myself each day.
5. I would like to help other faculty in their use of the innovation.
6. I have a very limited knowledge about the innovation.
7. I would like to know the effect of reorganization on my professional status.
8. I am concerned about conflict between my interests and my responsibilities.
9. I am concerned about revising my use of the innovation.
10. I would like to develop working relationships with both our faculty and outside faculty using this innovation.
11. I am concerned about how the innovation affects students.
12. I am not concerned about this innovation.
13. I would like to know who will make the decisions in the new system.
14. I would like to discuss the possibility of using the innovation.
15. I would like to know what resources are available if we decide to adopt this innovation.
16. I am concerned about my inability to manage all the innovation requires.
17. I would like to know my teaching or administration is supposed to change.
18. I would like to familiarize other departments or persons with the progress of this new approach.
19. I am concerned about evaluating my impact on students.
20. I would like to revise the innovation's instructional approach.

-
21. I am completely occupied with other things.
 22. I would like to modify our use of the innovation based on the experiences of our students.
 23. Although I don't know about this innovation, I am concerned about things in the area.
 24. I would like to excite my students about their part in this approach.
 25. I am concerned about time spent working with nonacademic problems related to this innovation.
 26. I would like to know what the use of the innovation will require in the immediate future.
 27. I would like to coordinate my effort with others to maximize the innovation's effects.
 28. I would like to have more information on time and energy commitments required by this innovation.
 29. I would like to know what other faculty are doing in this area.
 30. At this time, I am not interested in learning about the innovation.
 31. I would like to determine how to supplement, enhance, or replace the innovation.
 32. I would like to use feedback from students to change the programme.
 33. I would like to know how my role will change when I am using the innovation.
 34. Coordination of tasks and people is taking too much of my time.
 35. I would like to know how this innovation is better than what have known.

In conformity with the directions provided by Hall, George and Rutherford (1977), the respondents are asked to rate each item using a seven-point scale. The response of "0" represents that the concern is irrelevant, "1" and "2" equal not true of me now, "3" and "4" equal somewhat true of me now, and "5", "6" and "7" equal very true of

me now that indicated their present degree of concern about the topic described in the item.

3.4.2 Professionalism

The “Professionalism” scale is measured by 12 professional orientation items developed by McLeod and Hawley (1964). The respondents are asked to rate each item using a five-point scale, which is used to measure the importance of the 12 job characteristics to them in any jobs, regardless of how well their jobs include in the characteristics. The response categories range from (1) not important at all to (5) extremely important. The items used are presented below:

1. Having a job that is valuable and essential to my community.
2. An opportunity for originality and initiative.
3. Full use of my abilities and training.
4. Opportunities to learn new skills and acquire new knowledge.
5. Getting ahead in my professional career.
6. Working in a well-known and respected college.
7. Respect for the ability and competence of co-workers.
8. Opportunities to have an influence on public thinking.
9. A supervisor who appreciates the time I spend improving my capabilities.
10. Freedom from continual close supervision of my work.
11. A job that makes my college different in some ways because I work for it.
12. Having influence on important decisions.

3.4.3 Expectancy

The expectancy theory has three major variables: valence, instrumentality and expectancy.

The “Valence” is measured by three items. The respondents are asked to indicate whether they agree, using a five-point scale (5 = strongly agree, 1 = strongly disagree), with the following three statements reflecting their attitudes toward the STCW reform:

1. I am very concerned about the innovation.
2. I am serious about the innovation.
3. I am very interested in the innovation.

The “Instrumentality” is measured using three items. The respondents are asked to express their agreement on a five-point scale (5 = strongly agree, 1 = strongly disagree) with the following three statements:

4. I think adoption of the innovation will benefit our students.
5. I think adoption of the innovation will improve the quality of teaching.
6. I think adoption of the innovation will enhance the quality of the faculty members.

The “Expectancy” is also measured by three items. The respondents are asked to indicate their agreement on a five-point scale (5 = strongly agree, 1 = strongly disagree) with the following three statements:

7. I think this innovation will be implemented successfully.
8. I think this innovation will achieve the expected goals.
9. I think most faculty members will adopt this innovation.

3.4.4 Demographic Variables

Finally, the respondents are asked about their gender, age, institute, teaching discipline, highest degree earned, academic rank, years of teaching, years of STCW experience and STCW seminar attendance. The institutes are coded in the three

categories: National Taiwan Ocean University, National Kaohsiung Institute of Marine Technology and China College of Marine Technology and Commerce. The teaching disciplines are also coded in the three categories: navigation, engineering and fisheries. The highest degree earned by an educator is coded into the following categories: bachelor degree, master degree and doctoral degree. The academic rank is code into the four categories: lecturer, assistant professor, associate professor and professor. The years of STCW experience is coded into the following categories: none, less than one year, one-year, two-year, three-year, four-year, five or more year. The STCW seminar attendance is coded into the two categories: yes or no.

3.5 Data Collection and Implementation

In spite of face-to-face personal interviews being regarded as the most flexible approach for obtaining information and being able to easily seek more details and greater depth, it is a time-consuming method. Data collection may take longer, possibly several months, when proceeding with personal interviewing surveys (Wimmer & Dominick, 1983). In recent years, people have become more and more prudent to invite the strangers and even intimate colleagues to their homes or workplaces. Even though the interviewers do meet them in the busy working institutes, their free time is very short so that everything happens in a hurry. There is little time to be used to extend the conversation. Additionally, as the subjects usually possess high-level professional knowledge, they often provide prestigious answers rather than confess that they do not know something about a particular topic. On the other hand, an advantage of a mail survey is that it is conducted anonymously, the subjects are more likely to present genuine answers in dealing with especially sensitive questions (Wimmer & Dominick, 1983; Lo, 1997). The questionnaires can protect the subjects' privacy, as there is no personal contact involved. The mail surveys may also eliminate interviewer bias (Lo, 1997).

The 35-item Stages of Concern Questionnaire is the most formal and precise instrument to measure the existing degree of concerns of individuals or groups (Hall et al., 1977 and 2001). It is constructed for administering to all educational innovations, which have strong internal consistency (coefficient alpha range from .64 to .83) and test-retest reliability estimates (test/retest reliabilities range from .65 to .86) (Hall et al., 1977). Table 3-2 shows these coefficients as the following.

Table 3-2 Alpha coefficients and correlation coefficients of Stages of Concern questionnaire

SoC	Cronbach's Alphas ¹⁾	Correlation ²⁾	Variance explained
Awareness	.64	.65	42.25%
Informational	.78	.86	73.96%
Personal	.83	.82	67.24%
Management	.75	.81	56.61%
Consequence	.76	.76	57.76%
Collaboration	.82	.84	70.56%
Refocusing	.71	.71	50.41%

- 1) Alphas (internal consistency reliability) were computed based on a sample of 830 respondents.
- 2) One-week test-retest correlation coefficients (Pearson- γ) were computed based on a sample of 132 respondents.

Source: Hall et al., 1977, The SoC Questionnaire technical Manual

The questionnaire has been well designed for those who wish to use it, the only change should be made is to insert the name of the specific reform on the cover page. In addition, coding the raw scores from the responded questionnaires is a comparatively simple process by using computer software (Hall et al., 1977). The copies of the original SoC Questionnaire, the SoC Questionnaire Quick Scoring Device and the guideline for the SoC Questionnaire data interpreting are described in Appendix I.

The SoC Questionnaire technical manual provides a guideline for appropriate applications to evaluate concerns and offers additional percentile scoring and interpretation data to develop concerns profiles. The SoC Questionnaire constructs

and measurements not only concentrate on the groups' concerns, but also focus on individuals' movements to implement the change. The overall pictures provided are much easier to understand and help to assess the cognition, attitude and acceptability of MET transformations for the tester(s) (Hall et al., 1977 and 2001). In other words, as the purpose of this study is to identify the concerns of individuals within the groups, not consensus concerns of several persons, the SoC Questionnaire may be more effective than personal interviews of large numbers of people as it delivers more accurate information on the basis of a larger quantity of data.

From the above considerations, a questionnaire survey through the mail may achieve the purpose of this study regardless of the low returning rate of 10 to 40 percent (Leedy & Ormrod, 2001; Lo, 1997; Rogelberg & Luong, 1998). The major problem is to encourage people to respond to the questionnaires. A number of procedures have been used in this study to stimulate better return rates.

1. Address every individual person's name on the cover letter;
2. Use self-addressed envelopes with return postage stamps as substitutes of business reply envelopes;
3. Use follow-up letters to generate the additional returns;
4. Ask for objective information instead of subjective information;
5. Provide a summary of the findings and results of the study if they wish it; and
6. Request important key persons, for example, deans and heads of the faculties, to urge the subjects to respond.

(Frazer & Lawley, 2000; Hall, George & Rutherford, 1977; Leedy & Ormrod, 2001; Lo, 1997; Miller, 1977)

A six-page mail questionnaire was designed to gather information about the maritime faculty in Taiwan (for example, age, education, teaching discipline, highest degree earned, academic rank, teaching experience (years of teaching), participation in

supervisory area workshops (years of STCW experience) and STCW conference, seminar and/or workshops session attendance (STCW seminar attendance)), their stages of concern about the STCW reform, professionalism and the expectancy values. The questionnaire was written in English at the design stage and was translated into Chinese by the author prior to its administration. The Questionnaire is described in Appendix II.

By November 10, 2001, there were 170 full time teaching lecturers, assistant professors, associate professors and professors in the three departments (navigation, engineering and fishery) at three institutes (National Taiwan Ocean University, National Kaoshiung Institute of Marine Technology, and China College of Marine Technology and Commerce). On November 10, 2001, the questionnaires were sent to all maritime faculty members in Taiwan. Two weeks after the first mailing, the follow-up mailing was made along with a letter of thanks to those who had already responded. In the mean time, it also reminded those who had not yet responded. When the completed questionnaires were returned, all of them were opened, examined and allocated an identification number.

By January 20, 2002, ninety-five usable questionnaires representing a 56 percent return rate were returned for analysis. This is regarded as a relatively high response rate for a survey of this nature and there is less chance of a significant response bias than those of a lower response rate.

3.6 Summary

The main objective of this study is to estimate the current intensity of concern stages among Taiwanese maritime educators about the STCW education reform. The other goals include the extent expectancy values as well as professionalism can provide an

evidential link to the tasks of the reform; assessment of the impact of the increased demands about the efficacy and efficiency of STCW-related maritime education; and testing the effectiveness of the Concerns Based Adoption Model (CBAM) as a cross-reform application.

As some potential error sources may produce spurious results when conducting research studies, the process involved in identifying and developing the topic of educators' concerns about the MET reform for research investigation must be carefully considered in advance. Particular attention has been paid to current published material and as such the research tries to tackle smaller, but more practical questions so that the topic can be narrowed to a manageable study.

In addition, in order to present clear and concise results, the ways of collecting data to acquire adequate information for answering questions about the nature of the STCW reform implementation has also been taken into account and developed. Firstly, the format of the questionnaire and the physical layout of questions needs to be carefully designed to assure that the collected information can be used for data analysis, interpretation and presentation. Secondly, the administration of the standardized close-ended questionnaires encompassed the entire population of MET educators in Taiwan. The method of administering survey questionnaires to the respondents was by the mail, accompanied with an explaining letter and a return envelope. Finally, a high response rate (56% response rate) of this self-administered survey has provided sufficient information for data analysis thus eliminating the respondents' bias.

Chapter 4

Strategic Analyses for the Educators' Stages of Concern

Chapter 4 Strategic Analyses for the Educators' Stages of Concern

4.1 Introduction

The successful implementation of the STCW 95 MET education innovation requires educators to work together and support the processes. If the MET innovation is to be smoothly implemented in Taiwan, the co-operation and participation of Taiwanese maritime educators are very important factors. One effective way to explore maritime educators' perceptions, awareness, attitudes, satisfactions, and even frustrations with the MET innovation process is to monitor their expressed concerns about the innovation.

Further, the dramatic alterations to maritime legislation and procedures, the development of new curricula and material, theoretical developments, philosophical changes, and researches all contribute to change the way the professionals think and act. This study:

- 1) Investigates what aspects of the educators' Stages of Concern should be emphasized in the implementation of MET education reform;
- 2) Examines the relationship between the demographic variables and the educators' Stages of Concern; and
- 3) Measures to what extent expectancy and professionalism are related to the educators' Stages of Concern (explored in chapter 5).

Therefore, a series of data statistical analysis procedures are used to help reveal what stage or stages of concern have the greatest impact on the MET educational reform. In the procedures, the data collected from the educators' Stages of Concern,

demographic information, the expectancy values and the professionalism are analyzed using descriptive, correlational and inferential statistics, as well as multivariate analysis of variance procedures.

In this chapter, the raw data are converted to the form of numerical codes (see Appendix III) characterizing attributes of variables to allow for quantitative analysis. A factor analysis, item-total correlation and coefficient alpha (Cronbach, 1951) are used to examine the validity and reliability of the concern scales in the stages. Frequencies and means are calculated to create the educators' SoC profile. A series of one-way analysis of variance (ANOVA) is carried out to examine the relationship between demographic information and respondents' stages of concern. Some implications with the implementation of the STCW educational reform are also discussed. As to the statistical analysis, the SPSS 10.0 for Windows is adopted to perform the data analysis. Figure 4-1 illustrates the simplified procedures of the data analysis adopted in the study.

4.2 Respondents' Demographic Information

Reference to Tables 4-1(a) and 4-1(b) shows that of the 95 respondents, 35 percent of the respondents are teaching at National Taiwan Ocean University, 44 percent of the respondents are from National Kaohsiung Institute of Marine Technology and the others are working in China College of Marine Technology and Commerce. More specifically, 40 percent of the respondents are teaching in the navigation department; 42 percent of the respondents are in the engineering department and the other respondents are from the fishery department. The average age of the respondents is 50.03 years old. The largest age group is from 46 to 55 years old, followed by the age group of 55 to 66 and the age group of 36 to 45 years old. There are a few respondents under the age of 35.

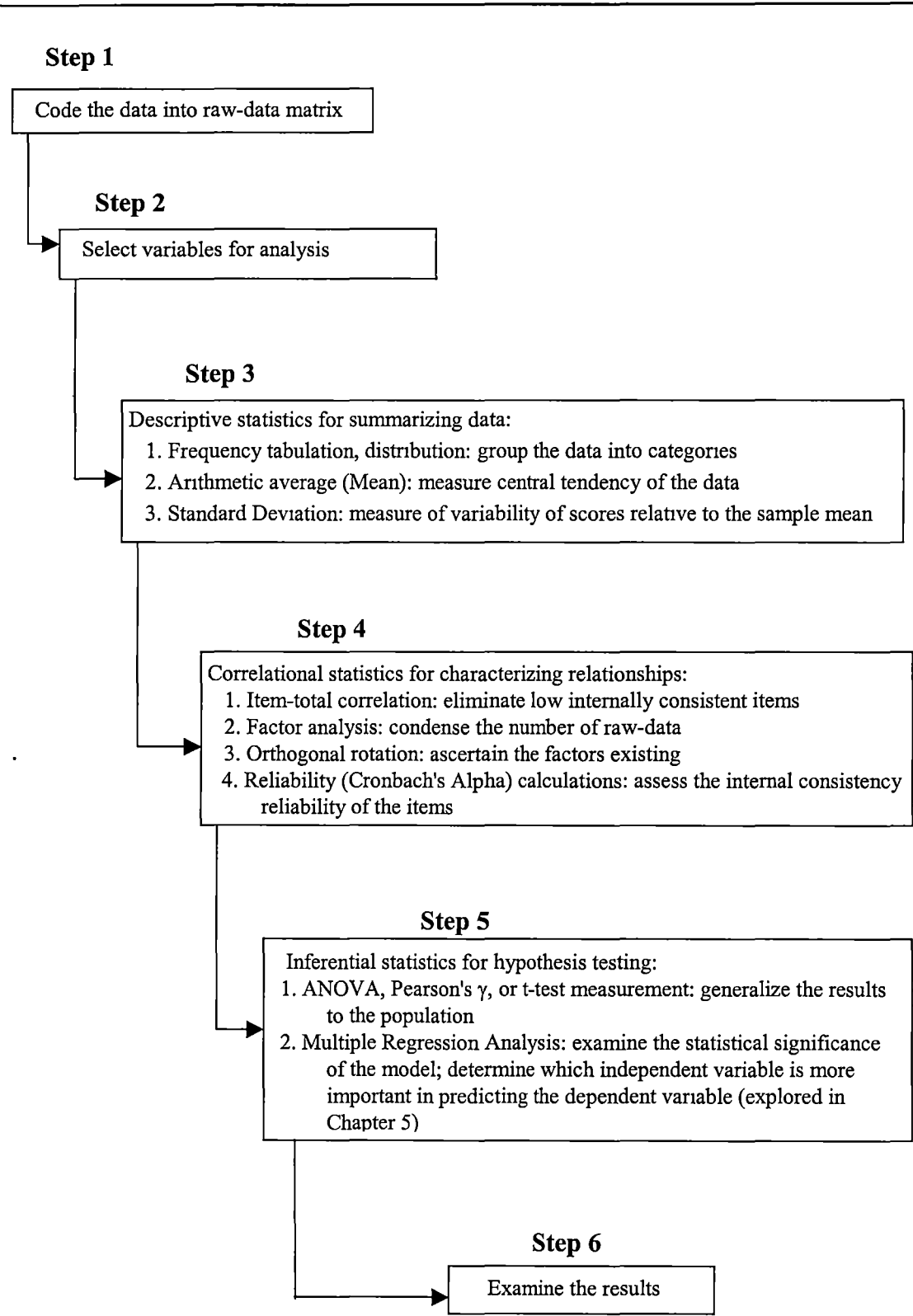


Figure 4-1 Simplified step-by step procedure for data analysis for the study

Table 4-1(a) Respondents' demographic information

Variables	Number of educators	Percentage %	Valid Percentage %
Institute			
1. National Taiwan Ocean University	33	34.7	35.1
2. National Kaohsiung Institute of Marine Technology	41	43.2	43.6
3. China College of Marine Technology & Commerce	20	21.1	21.3
Valid cases	94	98.9	100.0
Missing value	1	1.1	
Total	95	100.0	
Teaching Discipline			
1. Navigation	38	40.0	40.4
2. Engineering	39	41.1	41.5
3. Fishery	17	17.9	18.1
Valid cases	94	98.9	100.0
Missing value	1	1.1	
Total	95	100.0	
Academic Rank			
1. Lecturer	51	53.7	54.2
2. Assistant Professor	4	4.2	4.3
3. Associate Professor	26	27.4	27.7
4. Professor	13	13.7	13.8
Valid cases	94	98.9	100.0
Missing value	1	1.1	
Total	95	100.0	
Age			
1. 25-35	5	5.3	5.4
2. 36-45	21	22.1	22.8
3. 46-55	41	43.3	44.6
4. 56-65	25	26.3	27.2
Valid cases	92	96.8	100.0
Missing value	3	3.2	
Total	95	100.0	
Sex			
1. Male	93	97.9	98.9
2. Female	1	1.1	1.1
Valid cases	94	98.9	100.0
Missing value	1	1.1	
Total	95	100.0	

Table 4-1(b) Respondents' demographic information (continued)

Variables	Number of educators	Percentage %	Valid Percentage %
Highest Degree Earned			
1. Bachelor	28	29.5	29.8
2. Master	34	35.8	36.2
3. Ph.D	25	26.3	26.6
4. Others	7	7.4	7.4
Valid cases	94	98.9	100.0
Missing value	1	1.1	
Total	95	100.0	
Years of Teaching			
1. 1-10	24	25.3	27.0
2. 11-20	39	41.1	43.8
3. More than 21	26	27.3	29.2
Valid cases	89	93.7	100.0
Missing value	6	6.3	
Total	95	100.0	
Years of STCW Experience (participation in supervisory area workshops)			
1. Never	23	24.2	25.3
2. Less than 1	22	23.2	24.2
3. 1-2	22	23.2	24.2
4. 3-4	10	10.5	10.9
5. More than 5	14	14.7	15.4
Valid cases	91	95.8	100.0
Missing value	4	4.2	
Total	95	100.0	
STCW Seminar Attendance (conference/seminar/workshops session attendance)			
1. Yes	56	58.9	60.9
2. No	36	37.9	29.1
Valid cases	92	96.8	100.0
Missing value	3	3.2	
Total	95	100.0	

Tables 4-1(a) and 4-1(b) reveal that the respondents are predominately male and only one respondent is female. Of the 95 respondents, 28 of them are holding bachelor's degrees, 34 of them are holding master's degrees and 25 of them are holding doctoral

degrees. As for the academic ranks of the respondents, 51 of them are lecturers, 30 are assistant/associate professors and the rests are professors.

4.3 The MET Educators' Concerns According to the Seven Stages

The first research question involves Taiwanese maritime educators' stages of concern about the STCW reform.

Tables 4-2(a) to 4-2(h) illustrate the stages of concern expressed by the maritime educators in Taiwan. Following Hall et al. (1977), the 35 items of the "Stages of Concern" scales are divided into seven subscales. Each subscale is comprised of five items. The entire original information collected in this study is coded into a raw-data matrix format. As the matrix may contain a great number of irrelevant data, various statistical methods are applied to reduce this large raw-data matrix so that they can be managed, easily understood and interpreted.

Firstly, a frequency distribution statistical procedure grouping the data into several categories is employed to summarize the number and percentage of people in the response rate. It is important not only to understand the data collected in this study, but also to choose proper statistical methods for the following analyses (Lo, 1997). In the next step, the arithmetic mean is used to average and measure univariate data of a central tendency in order to create the educators' stages of concern profile. The mean, the most well-know summary statistic, takes into account the actual values of all of the univariates in the distribution. It specifies the average scores of all the univariates, and leads to it (the mean) especially sensitive to the "extreme univariates" or "outliers" (Wimmer & Dominick, 1983; Norusis, 1998). In this study, the mean is widely employed in both the descriptive and inferential statistical processes hence, it is discussed in more detail.

Mathematically speaking, the definition of the mean is the sum of the scores of all the univariates divided by the total number of the univariates in a distribution. The mathematical formula for computing the mean is:

$$\mu = \frac{\sum_{i=1}^N X_i}{N}$$

Where:

μ (mu) = the mean

Σ (sigma) = the sum

X_i = any score in a series of univariates (where: $i = 1, 2, 3 \dots N$)

N = the total number of univariate in a limited population or sample

It is unknown how much the univariates data values differ from each other, a special measure known as measures of variation or dispersion measures is used to describe the way the univariate scores are spread out from the central point (mean) in the distribution.

The most well know statistical method, variance, is used to measure the variability. It reports a mathematical index of the degree to which scores of the univariates deviate from the mean. The larger the variance, the more the scores are spread out. The mathematical formula to calculate the variance of a limited sample is:

$$S^2 = \frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n - 1}$$

Where:

S^2 = the variance of a limited sample

$\sum_{i=1}^n (X_i - \bar{X})^2$ = sum of squared distances from the mean for all univariates

X_i = any score in a series of univariates (where: $i = 1, 2, 3 \dots N$)

\bar{X} (X bar) = the mean

n = the total number of univariates in a limited sample

However, the variance has one disadvantage. It cannot mirror the original measurements only the squared deviations. In order to obtain a measure of dispersion reduced to the same unit as the original data for the educators' stages of concern variable, it is required to take the square root of the variance. Therefore, a standard deviation (SD) can be obtained. The standard deviation is usually computed using the formula as shown below:

$$SD = \sqrt{\frac{1}{n - 1} \sum_{i=1}^n (X_i - \bar{X})^2}$$

Where:

SD = the standard deviation

$\frac{1}{n - 1} \sum_{i=1}^n (X_i - \bar{X})^2$ = the variance of a limited sample (S^2)

In short, SD describes a given distance of the scores of unvariates from the mean of a distribution, which especially benefits to illustrate the standardized testing results.

Secondly, an item analysis or item-total correlation is conducted to find those items that form an internally consistent scale and to eliminate those items that do not. Internal consistency, the most frequently used criterion for item selection among those items, explains that it is an indicator of the same underlying concept (Cooksey, 1997). Further, a principal component factor analysis is employed to condense the number of raw-data and observed variables into a smaller number of combined variates, which stress and characterize the underlying group of items. It undertakes a task to explicitly combine variables in a weighted fashion to form a component, which accounts for the maximum amount of variability in the variables' scores by reason of facilitating the detection of underlying structure in a collection of many items. The stronger the structural correlation is, the more the variable helps to define the factors. A correlation-value-level above $\pm .40$ is adopted to identify those variables relatively highly correlating with each factor (Cooksey, 1997; Hair, Anderson, Tatham & Grablovsky, 1984). The related output statistical value, eigenvalue, summarizes how much variance each factor explains out of the total available. If all items are ideally correlated, they could generate a single factor with an eigenvalue equal to the number of items. Conversely, if the items do not correlate with one another, they will simply mirror the variance of the original items, and each eigenvalue will be equal to 1.0.

Thirdly, an orthogonal rotation procedure is also applied to the factors when it is ascertained that those factors do exist. In the orthogonal solution, the factors are extracted and each of them is independent from all others. Consequently, varimax rotation products the result in a loading matrix that expresses how powerfully and significantly each item is related. The loading matrix contains factor loading, which

represents the correlation of each initial variable with each factor. A minimum value of item-factor-loading between .30 to .35 is considered significant in this study. If the value is above .40, it is considered more important. Once the loading value is .50 or greater, they are considered more significantly (Cooksey, 1997; Lo, 1997).

Finally, the assessment of internal consistency reliability, Cronbach's alpha (or KR20 formula), is also applied during the item analysis process. An internal consistency reliability calculates the overall reliability of the scale. Cronbach's alpha measures the degree to which items work together under the underlying concept. The range of Cronbach's alpha reliability varies from 0 to 1.0, with 0 specifying no reliability and 1.0 specifying perfect reliability. In general, the accepted levels of reliability are deliberated to be in the range between .60 and .80 for this research-designed scale (Cooksey, 1997; Lo, 1997).

From the above exploration and discussions, the statistical norm concerning the internal consistency that has been adopted in the study is above $\pm .40$. It can identify the variables relatively high correlating with each factor. However, the accepted value level of the reliability (Cronbach's alpha or KR20 formula) in this study is above .60 for the research-designed scale.

4.3.1 Results of the Seven Stages of Concern

1. Stage 0 "Awareness" subscale

The Stage 0 "Awareness" subscale includes five items (3, 12, 21, 23 and 30). The item 23, "although I don't know about this innovation, I am concerned about things in the area", is deleted, as it has a very low item-total correlation (factor loading is below .50). The principal component factor analysis identifies that the remaining

four items are grouped into a single factor and they measure the same underlying concept.

Since the one factor solution explains 46.41 percent of the total variance (Eigenvalue = 1.87), the four items are added and divided by four to form a subscale “Awareness” (Mean = 1.91, SD = 1.02). As a result, the alpha coefficient is equal to .60, which indicates a high internal consistency reliability of this combined subscale is assured.

Table 4-2 (a) Factor analysis and mean scores on Stage 0 of Concern about the STCW reform for all respondents

Subscale/Items	Mean	SD	Factor Loading
Stage 0 – Awareness			
3. I don’t even know what the innovation is.	1.58	1.65	.67
12. I am not concerned about this innovation.	1.24	1.23	.72
21. I am completely occupied with other things.	2.75	1.71	.66
30. At this time, I am not interested in learning about the innovation.	2.07	1.40	.67
Variance explained			46.41%
Eigenvalue			1.86
Combined subscale (Cronbach’s alpha = .60)	1.91	1.02	

2. Stage 1 “Information” subscale

The Stage 1 “Informational” subscale contains five items (6, 14, 15, 26 and 35). Item 6, “I have a very limited knowledge about the innovation”, has a relatively low item-total correlation (factor loading is below .50) thus being deleted. The remaining four items are subjected to a principal component factor analysis.

The results show that the four items are grouped into a single factor and measure the same underlying concept. The one factor solution explains 70.12 percent of the total variance (Eigenvalue = 2.81), as a result, the four items are added and divided by four to form a subscale “Informational” (Mean = 6.44, SD = 1.09). The alpha coefficient is equal to .86, thus, a high internal consistency reliability of this combined subscale is assured.

Table 4-2 (b) Factor analysis and mean scores on Stage 1 of Concern about the STCW reform for all respondents

Subscale/Items	Mean	SD	Factor Loading
Stage 1 – Informational			
14. I would like to discuss the possibility of using the innovation.	5.67	1.28	.83
15. I would like to know what resources are available if we decide to adopt this innovation.	6.06	1.46	.85
26. I would like to know what the use of the innovation will require in the immediate future.	5.98	1.59	.85
36. I would like to know how this innovation is better than what have known.	5.53	1.40	.82
Variance explained			70.12%
Eigenvalue			2.81
Combined subscale (Cronbach’s alpha = .86)	6.44	1.09	

3. Stage 2 “Personal” subscale

The Stage 2 “Personal” subscale includes five items (7, 13, 17, 27 and 33). Item 7, “I would like to know the effect of reorganization on my professional status”, is also deleted because it has a very low item-total correlation (factor loading was

below .50). The principal component factor analysis also shows that the remaining four items are grouped into a single factor and measure the same underlying concept.

The one factor solution accounts for 63.01 percent of the total variance (Eigenvalue = 2.52). Thus, the four items are added and divided by four to construct a subscale “Personal” (Mean = 5.44, SD = 1.29). As a result, the alpha coefficient is equal to .79, which shows a high internal consistency reliability of this combined subscale is assured.

Table 4-2 (c) Factor analysis and mean scores on Stage 2 of Concern about the STCW reform for all respondents

Subscale/Items	Mean	SD	Factor Loading
Stage 2 – Personal			
13. I would like to know who will make the decisions in the new system.	5.92	1.48	.83
17. I would like to know my teaching or administration is supposed to change.	5.67	1.52	.86
28. I would like to have more information on time and energy commitments required by this innovation.	5.05	1.74	.61
33. I would like to know how my role will change when I am using the innovation.	5.28	1.67	.84
Variance explained			63.01%
Eigenvalue			2.52
Combined subscale (Cronbach’s alpha = .79)	5.44	1.29	

4. Stage 3 “Management” subscale

The Stage 3 “Management” subscale also consists of five items (4, 8, 16, 25 and 34). The item-total correlations show that all five items are highly correlated. Thus, the

five items are subjected to a principal component factor analysis and are grouped into a single factor and measure the same underlying concept.

A total of 53.08 percent of the variance is explained by the factor solution (Eigenvalue = 2.65). Thus, the five items are added and divided by five to constitute a subscale “Management” (Mean = 4.14, SD = 1.56). As a result, the alpha coefficient is equal to .77, which indicates a high internal consistency reliability of this combined subscale is assured.

Table 4-2 (d) Factor analysis and mean scores on Stage 3 of Concern about the STCW reform for all respondents

Subscale/Items	Mean	SD	Factor Loading
Stage 3 – Management			
4. I am concerned about not having enough time to organize myself each day.	3.82	2.34	.81
8. I am concerned about conflict between my interests and my responsibilities.	4.53	2.33	.64
16. I am concerned about my inability to manage all the innovation requires.	3.48	2.08	.66
25. I am concerned about time spent working with non-academic problems related to this innovation.	4.77	1.89	.74
34. Co-ordination of tasks and people is taking too much of my time.	4.07	2.13	.78
Variance explained			53.08%
Eigenvalue			2.65
Combined subscale (Cronbach’s alpha = .77)	4.14	1.56	

5. Stage 4 “Consequence” subscale

The Stage 4 “Consequence” subscale includes five items (1, 11, 19, 24 and 32). The item-total correlations show that all of them should be retained and are subjected to a principal component factor analysis. It further identifies that they are grouped into a single factor and measure the same underlying concept.

The one factor solution accounts for 62.39 percent of the total variance (Eigenvalue = 3.12). Thus, the five items are added and divided by five to form a subscale “Consequence” (Mean = 5.60, SD = 1.17). As a result, the alpha coefficient is equal to .84, which shows a high internal consistency reliability of this combined subscale is assured.

Table 4-2 (e) Factor analysis and mean scores on Stage 4 of Concern about the STCW reform for all respondents

Subscale/Items	Mean	SD	Factor Loading
Stage 4 – Consequence			
1. I am concerned about students’ attitudes toward this innovation.	5.77	1.61	.73
11. I am concerned about how the innovation affects students.	6.28	1.19	.84
19. I am concerned about evaluating my impact on students.	5.88	1.59	.82
24. I would like to excite my students about their part in this approach.	5.79	1.46	.88
32. I would like to use feedback from students to change the programme.	4.38	1.58	.66
Variance explained			62.39%
Eigenvalue			3.12
Combined subscale (Cronbach’s alpha = .84)	5.60	1.17	

6. Stage 5 “Collaboration” subscale

The Stage 5 “Collaboration” subscale contains five items (5, 10, 18, 27 and 29). The item-total correlations also show that all of them should be retained, subjected to a principal component factor analysis and grouped into a single factor and measure the same underlying concept.

Since a total of 58.73 percent of the variance is explained by the factor solution (Eigenvalue = 2.94), the five items are added and divided by five to form a subscale “Collaboration” (Mean = 5.46, SD = 1.17). As the alpha coefficient is equal to .82, it indicates that a high internal consistency reliability of this combined subscale is assured.

Table 4-2 (f) Factor analysis and mean scores on Stage 5 of Concern about the STCW reform for all respondents

Subscale/Items	Mean	SD	Factor Loading
Stage 5 – Collaboration			
5. I would like to help other faculty in their use of the innovation.	5.17	1.64	.63
10. I would like to develop working relationships with both our faculty and outside faculty using this innovation.	5.46	1.44	.79
18. I would like to familiarize other departments or persons with the progress of this new approach.	5.39	1.67	.74
27. I would like to co-ordinate my effort with others to maximize the innovation’s effects.	5.71	1.32	.81
29. I would like to know what other faculty are doing in this area.	5.58	1.59	.85
Variance explained			58.73%
Eigenvalue			2.94
Combined subscale (Cronbach’s alpha = .82)	5.46	1.17	

7. Stage 6 “Refocusing” subscale

The Stage 6 “Refocusing” subscale includes five items (2, 9, 21, 22 and 31). The item-total correlations show that item 31, “I would like to determine how to supplement, enhance, or replace the innovation”, should be deleted because it has a low correlation (factor loading was below .50). The principal component factor analysis concludes that the four items are grouped into a single factor and measure the same underlying concept.

The one factor solution accounts for 58.54 percent of the total variance (Eigenvalue = 2.34). Thus, these four items are added and divided by four to form a subscale “Refocusing” (Mean = 4.32, SD = 1.43). As the alpha coefficient is equal to .75, it proves that a high internal consistency reliability of this combined subscale is assured.

Table 4-2 (g) Factor analysis and mean scores on Stage 6 of Concern about the STCW reform for all respondents

Subscale/Items	Mean	SD	Factor Loading
Stage 6 – Refocusing			
2. I now know of some other approaches that might work better.	2.47	1.73	.50
9. I am concerned about revising my use of the innovation.	5.35	1.76	.84
20. I would like to revise the innovation’s instructional approach.	5.06	2.13	.89
22. I would like to modify our use of the innovation based on the experiences of our students.	4.33	1.90	.78
Variance explained			58.54%
Eigenvalue			2.34
Combined subscale (Cronbach’s alpha = .75)	4.32	1.43	

8. Results of the total of the seven stages subscales

In total, four scale items (6, 7, 23 and 31) have been deleted from Hall's original 35 scale items because their item-total correlations are relatively low. The remaining 31 scale items have appropriate levels of internal consistency reliability to the overall reliability of the Hall's seven subscales. In addition, each of them has also been verified as a suitable item component to the construct of the subscales from the above measures.

As shown in Table 4-2 (h), stage score correlations, Pearson- γ , ranges from .68 to .84 with five of the seven-subscale correlations being above .70, and one of the seven-subscale correlation being above .80. The calculations of internal consistency reliability, Cronbach's alphas, range from .60 to .86 with three of the seven-subscale coefficients being above .70, and three of the seven-subscale coefficients being above .80. The reliability of the scales for awareness stage has been found to be slightly low, yet the Cronbach's alpha is within the acceptable level.

Table 4-2 (h) SoC Questionnaire statistics data on 95 Taiwanese maritime educators involved in STCW reform

SoC	Mean	SD	Cronbach's alpha	Correlation (Pearson- γ)	Variance explained
Awareness	1.91	1.02	.60	.68	46.41%
Informational	6.44	1.09	.86	.84	70.12%
Personal	5.44	1.29	.79	.79	63.01%
Management	4.14	1.56	.77	.73	53.08%
Consequence	5.60	1.17	.84	.79	62.39%
Collaboration	5.46	1.17	.82	.77	58.73%
Refocusing	4.32	1.43	.75	.77	58.54%

The highest mean for all respondents is at the informational stage (Mean = 6.44, SD = 1.09), followed by the consequence stage (Mean = 5.60, SD = 1.17) and the collaboration stage (Mean = 5.46, SD = 1.17), continued by the personal stage (Mean = 5.44, SD = 1.29), the refocusing stage (Mean = 4.32, SD = 1.43) and the management stage (Mean = 4.14, SD = 1.56). The lowest mean for all respondents is at the awareness stage (Mean = 1.91, SD = 1.02).

4.3.2 Intensity of Educators' Stages of Concern in Implementing the STCW Reform

Reference to Figure 4-2 and Table 4-2(h), result shows the informational stage has the highest mean score highlighting that the respondents want information about the MET reform. They are interested in learning more elaborate information about the reform in a selfless attitude, such as general features, influences and requirements of practice and compliance.

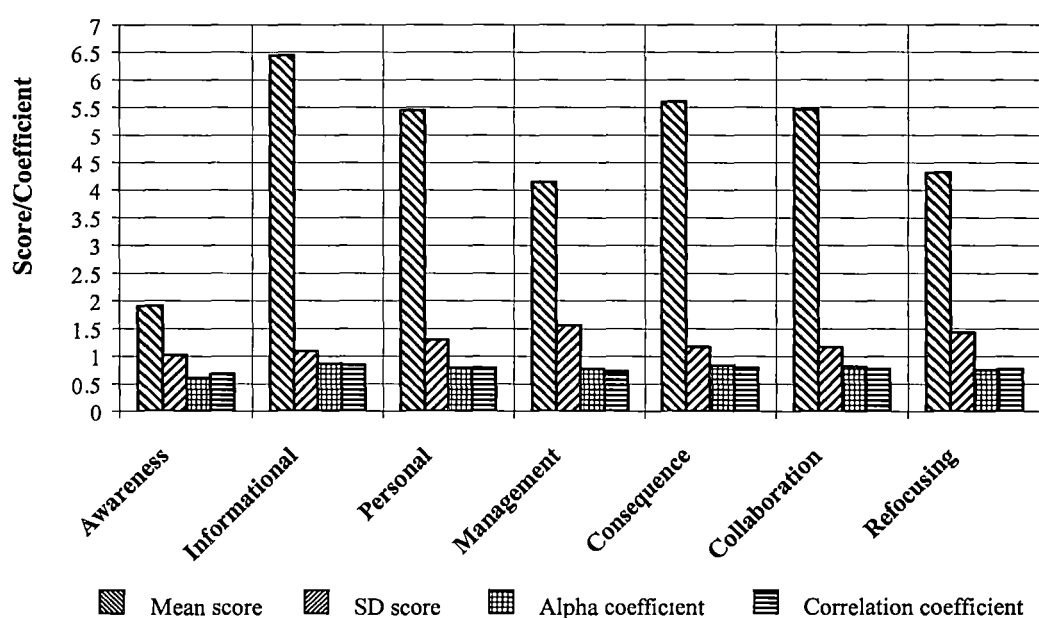


Figure 4-2 The SoC statistics data chart for all respondents

Source: Derived from Table 4-2(h) SoC Questionnaire statistics data on 95 Taiwanese Maritime educators involved in STCW reform

Since the informational stage and the personal stage mostly go together, the personal stage has a relatively high mean score (compared with the informational stage score the score difference is within 1.0 scale points) illustrating that respondents also have considerable personal concerns about the reform and its consequences for them. They have some sort of uncertainty about the requirements of the reform. In addition, they seem ill prepared to meet the demands of the reform and their roles with the reform.

The second high stage score is at the consequence stage which indicates that the respondents have intense concerns about the effects and outcomes of its use for students. Since the collaboration stage has a relatively moderate mean score (the score difference is within 1.0 scale point compared with the consequence stage score), it clarifies that the respondents have some concerns about working with peers as a team in relation to the education reform.

The refocusing and management stages have relatively lower mean scores which illustrate that the respondents have less interest in improving and managing the use of the innovation. Nevertheless, in contrast with the awareness stage, the refocusing and management stages still have some intensive concerns.

The lowest mean for the respondents is at the awareness stage. It indicates Taiwanese MET educators have little concerns about or have somewhat intense involvement with the STCW educational reform. Their concerns have already inclined toward the self and impact stages of concern.

4.4 Comparison of Stages of Concern Data with Demographic Variables

As cross-tabulations and correlations of the intensity of Stages of Concern with demographic data can bring about further interpretations and explanation of the concerns' data, all of the demographic data are employed to compare with the SoC questionnaire data. The second research question asks whether Taiwanese maritime educators' stages of concern vary when they are grouped according to institute, teaching discipline, academic rank, highest degree earned, age, years of teaching, years of STCW experience and STCW seminar attendance.

More specifically, the answers are probed to resolve if the changes in educators concerns vary as a function of institute, teaching discipline, academic rank, highest degree earned, age, years of teaching, years of STCW experience and STCW seminar attendance. The results are summarized in Table 4-3 to Table 4-10.

In order to compare the differences of group means, a series of one-way analyses of variance is performed. The analysis of variance, ANOVA, is a versatile statistic testing significant differences among two or more independent groups' means simultaneously on a single dependent measure. ANOVA uses a set of scores on one or more independent variables to explain the variation.

One-way ANOVA is the most useful tool for comparisons with demography. It investigates one independent variable, or, can also simultaneously evaluate the size of the mean differences among the various groups. The scores from the measurement are then employed to compute a ratio of variance, known as the F-ratio (F). The procedure of this F-ratio test presents whether the variability of the group means is large enough and assures whether there are significant differences among the means.

However, the F-ratio test only expresses that there is at least one significant difference among the various groups. After acquiring a significant F-statistic value, multiple comparison procedures, the Scheffe test, are continuously used to segregate exactly which group means differ from the others.

Additionally, two independent groups of respondents, whether they have attended the STCW related seminars or not on a single dependent variable (Stages of Concern), are measured by the t-test. After the mean score of each group is tested through the use of the t-test, the results are compared to determine if there is a statistically significant difference between these two groups.

The t-test of the two independent groups generates the same sort of outcome as would the one-way ANOVA. That is, the two procedures are related (t-value is simply the square root of the F-value). The main difference is that the ANOVA can be employed to compare mean scores from two or more groups whereas the t-test can only be applied to compare two groups.

4.4.1 Interaction between Institute and Stages of Concern

When the respondents are grouped according to their employed institutes, the mean scores for each SoC are presented in Table 4-3.

The results indicate that the three groups (NTOU, $n = 33$; NKIMT, $n = 41$; and, CCMTC, $n = 20$) are statistically significantly different for three of the seven stages of concern – the management stage ($F = 47.50$, $p < .001$), the consequence stage ($F = 4.45$, $p < .05$) and the refocusing stage ($F = 8.32$, $p < .001$). As shown in Table 4-3, the respondents teaching at the China College of Marine Technology and Commerce

have the highest means within the three stages, whereas those working at National Kaohsiung Institute of Marine Technology have the lowest means.

Table 4-3 Mean scores of Stages of Concern about STCW reform by respondents' institutes

INSTITUTES							
SoC	NTOU		NKIMT		CCMTC		F
	M	SD	M	SD	M	SD	
Awareness	2.07	1.36	1.76	.89	2.01	.49	.96
Informational	6.42	1.46	6.41	1.05	6.49	.17	.04
Personal	5.43	1.63	5.38	1.24	5.53	.12	.08
Management	3.77	1.03	3.43	1.33	6.26	.55	47.50***
Consequence	5.49	1.47	5.38	1.08	6.27	.25	4.45*
Collaboration	5.54	1.52	5.39	1.17	5.46	.23	.15
Refocusing	4.14	1.55	4.02	1.32	5.39	.41	8.32***

NTOU: National Taiwan Ocean University

NKIMT: National Kaohsiung Institute of Marine Technology

CCMTC: China College of Marine Technology & Commerce

Note:

1. Sample size: 94; Numbers of groups: 3;
Degree of freedom between groups = 2; degree of freedom within group = 91
2. Level of probability in this study: * ($p \leq .05$); ** ($p \leq .01$); *** ($p \leq .001$)
3. Value of significance from Distribution of F Table: at the .05 level = 3.11;
at the .01 level = 4.70 (it indicates that the calculated F-ratio value must be equal to or greater than the Table value to show statistical significance)

Furthermore, the results of a Scheffe test reveal that respondents working at CCMTC have a significantly higher mean score at the management stage than the other groups. The Scheffe test also reveals a significant difference in the mean score for the management stage between the respondents from NTOU and those from NKIMT. At the consequence stage, the Scheffe test finds that only two groups, those from NKIMT and CCMTC, are significantly different in their levels of concern. In terms of the refocusing stage, the Scheffe test indicates that the respondents from CCMTC

have a significantly higher mean score than the other two groups. There is also a significant difference between the respondents from NTOU and those from NKIMT.

Intensity of educators' SoC according to institute that the respondents are employed

The SoC Questionnaire technical manual (Hall, George & Rutherford, 1977) indicates that:

- 1) The high refocusing stage indicates the respondents perceive that they already know all about the STCW reform and possess plenty of ideas about what ought to be done and how to improve it;
- 2) The high consequence stage illustrates the respondents' foci are fitting and relevant on the consequences of using the STCW reform for students; and
- 3) The high management stage shows the respondents have time and logistics concerns, as well as how to manage using the reform.

Reference to Table 4-3, results show that the respondents working at the CCMTC have the highest intense concerns at the management stage with the refocusing and consequence stages also being high. This means that these respondents have positive attitudes toward the reform, but at the same time they have many logistics incidents to deal with, and have ideas about what to do about their management concerns. Although there is no statistically significant difference at the informational stage, it has the highest mean score among them, that is, those educators want more information about the STCW reform and have desires to duplicate or learn from what the others know and are doing.

As to those who are teaching at NKIMT and NTOU, the management stage mean scores are relatively low and indicate the attention of those educators to the processes

and tasks of using the reform are already inclined toward the impact concerns. Despite the statistical significance, the informational stage of those two institutes also has the highest informational stage mean scores. Namely, those educators want more information about the reform as well and are anxious to reproduce or learn from what the others know and are doing.

Further, Based on the guidelines of the SoC Questionnaire technical manual (1977) and Fuller's concerns theory (1969), the overall mean scores (see Table 4-3) reveal that these three institutes do not progress from self to task to impact. Instead, progress is obstructed, with self stage concerns continuing to be intense. However, the related high intense impact concerns emerge that these educators are ready to speculate about some of the more advanced and delicate aspects of the reform, even though they still have to understand and learn more about the reform. The relatively high management concerns of the educators of CCMTC reflect the logistics issues they are confronting, for example, resources, materials and ideals for reducing the amount of time and workload, need to be solved.

As shown in Table 4-3, the educators (college educators) working at the CCMTC have highest intensity concerns on five of the seven stages (except stages 1 and 6). They exert greater endeavors into reform implementation and the consequences and effects of the reform including performance, competencies and changes needed to increase their students' outcomes. Additionally, they also anticipate a greater recognition of the tasks when using the reform.

4.4.2 Interaction between Teaching Discipline and Educators' Stages of Concern

The stages of concern of maritime educators categorized by teaching disciplines (navigational, $n = 38$; engineering, $n = 39$; and, fishery, $n = 17$) are presented in Table 4-4. The highest concern intensity of these three groups of educators involved in implementing the STCW reform is at the informational stage, whereas the lowest is at the awareness stage.

Table 4-4 Mean scores of Stages of Concern about STCW reform by respondents' teaching discipline

<u>TEACHING DISCIPLINE</u>							
<u>SoC</u>	<u>Navigation</u>		<u>Engineering</u>		<u>Fishery</u>		<u>F</u>
	M	SD	M	SD	M	SD	
Awareness	1.61	.78	2.06	1.21	2.29	.89	3.51
Informational	6.47	1.05	6.37	1.18	6.47	1.06	.10
Personal	5.47	1.02	5.44	1.54	5.31	1.16	.10
Management	4.11	1.47	4.36	1.71	3.80	1.42	.77
Consequence	5.70	1.05	5.66	1.36	5.29	1.01	.76
Collaboration	5.50	.92	5.51	1.36	5.24	1.27	.36
Refocusing	4.45	1.28	4.53	1.35	3.77	1.59	1.09

Note:

1. Sample size: 94; Numbers of groups: 3;
Degree of freedom between groups = 2; degree of freedom within group = 91
2. Level of probability in this study: * ($p \leq .05$); ** ($p \leq .01$); *** ($p \leq .001$)
3. Value of significance from Distribution of F Table: at the .05 level = 3.11;
at the .01 level = 4.70 (it indicates that the calculated F-ratio value must be equal to or greater than the Table value to show statistical significance)

However, the analysis of variance tests discovered that the stages of the educators' concerns do not vary when the educators are grouped according to teaching disciplines. Although the respondents teaching in the fishery department have the

lowest scores on five of the seven stages of concern, there is no statistically significant difference in the three group means.

4.4.3 Interaction between Academic Rank and Educators' Stages of Concern

Table 4-5 presents the mean scores for each SoC when the respondents are grouped by academic rank.

Table 4-5 Mean scores of Stages of Concern about STCW reform by respondents' academic rank

<u>ACADEMIC RANK</u>							
<u>SoC</u>	<u>Lecturer</u>		<u>Assistant/Associate Professor</u>		<u>Professor</u>		<u>F</u>
	M	SD	M	SD	M	SD	
Awareness	1.87	.96	2.07	1.17	1.79	.94	.48
Informational	6.53	.86	6.32	1.30	6.27	1.43	.51
Personal	5.52	1.10	5.33	1.37	5.25	1.67	.35
Management	4.27	1.62	4.19	1.51	3.65	1.46	.83
Consequence	5.68	.98	5.62	1.41	5.32	1.40	.46
Collaboration	5.55	.95	5.28	1.35	5.48	1.58	.50
Refocusing	4.39	1.25	4.41	1.62	4.17	1.42	.14

Note:

1. Sample size: 94; Numbers of groups: 4;
Degree of freedom between groups = 3; degree of freedom within group = 90
2. Level of probability in this study * ($p \leq .05$); ** ($p \leq .01$); *** ($p \leq .001$)
3. Value of significance from Distribution of F Table: at the .05 level = 2.72;
at the .01 level = 4.04 (it indicates that the calculated F-ratio value must be equal to or greater than the Table value to show statistical significance)

The analysis of variance tests indicates that the stages of concern about the STCW reform do not significantly vary with respect to the three academic ranks (lecturer, n = 51; assistant/associate professor, n = 30; and, professor, n = 13).

The common image of motivations and concerns of educators is that they vary from different academic ranks (lecturer, assistant/associate professor and professor). The educators are able to pursue different professional career objectives and values following by their promotion through the academic ranks.

Surprisingly, result shows that there are no statistically significant differences for the stages of concern among the three academic groups. However, the respondents with “lecturer rank” appear to have the highest mean on all of the seven stages. The educators with “lecturer rank” are more concerned with teaching and would like to know more about the reform. It is highly probable that these lecturers set lower, more realistic and shorter term objectives and tasks than the professors. They are likely to pay more attention to the reform and collaboration with others, and are interested in a greater diversity of their achievements. However, the educators with “professor rank” are likely to tend more towards writing and consulting, as well as being more involved in administration. Hence, they are less concerned about the reform.

4.4.4 Interaction between Highest Degree Earned and Educators’ Stages of Concern

Table 4-6 indicates the mean scores for each SoC when the respondents are grouped by the highest degree earned (bachelor/others, n = 35; master, n = 34; Ph.D., n = 25).

Table 4-6 Mean scores of Stages of Concern about STCW reform by respondents' highest degree earned

HIGHEST DEGREE EARNED							
<u>SoC</u>	<u>Bachelor/Others</u>		<u>Master</u>		<u>Ph.D.</u>		<u>F</u>
	M	SD	M	SD	M	SD	
Awareness	1.82	.91	1.88	.90	2.12	1.31	.67
Informational	6.44	.70	6.82	.80	5.91	1.60	5.34**
Personal	5.57	1.05	5.70	.73	4.89	1.82	3.38*
Management	4.47	1.76	4.30	1.52	3.52	1.14	3.06
Consequence	5.78	.92	5.88	.75	4.99	1.70	4.94**
Collaboration	5.61	.82	5.63	.97	5.01	1.68	2.55
Refocusing	4.57	1.14	4.61	1.24	3.77	1.70	2.14

- Note:
1. Sample size: 94; Numbers of groups: 3;
Degree of freedom between groups =2; degree of freedom within group = 91
 2. Level of probability in this study: * ($p \leq .05$); ** ($p \leq .01$); *** ($p \leq .001$)
 3. Value of significance from Distribution of F Table: at the .05 level = 3.11;
at the .01 level = 4.70 (it shows that the calculated F-ratio value must be equal to or greater than the Table value to show statistical significance)

The respondents holding master's degrees earn higher scores on five of the seven stages. Those holding a doctoral degree exhibit the lowest means on six of the seven stages. In Table 4-6, the analysis of variance tests show that three of the seven stages, informational ($F = 5.34, p < .01$), personal ($F = 3.38, p < .05$), and consequence ($F = 4.94, p < .01$), are statistically significantly different in the three-degree groups.

Further, the results of the Scheffe test reveal that respondents with master's degrees have a significantly higher mean score on the three stages than those with a doctoral degree. The Scheffe test also shows that the respondents with a bachelor degree are statistically significantly different from those with a doctoral degree on the levels of concern for the consequence stage.

Intensity of educators' SoC according to highest degree earned

Based on the guidelines of the SoC Questionnaire technical manual and Fuller's concerns theory, results show that the informational stage of all three-degree groups has the highest mean score, that is, these educators want more information about the reform and are mostly open to and interested in the reform, no matter what degree they are holding. The associated personal stage of these groups has relatively lower mean scores (in comparison with the mean score of the informational stage, the difference is above 1.0 scale points). This illustrates that the respondents feel no personal threats regarding the reform and its consequences for them. They are usually open to and interested in the reform. Further, they seem to adequately perform their roles within the reform.

In regard to the second high mean score – consequence, these educators have concerns about the effects and outcomes of using the reform with their students. They also pay attention to self-appraisal of performance and competence, and the changes required to enhance their students' outcomes.

When the data are analyzed in light of educators' highest degree earned the respondents who are holding a master's degree earn higher scores on five of the seven stages (except stages 0 and 3). Those who are holding a doctoral degree exhibit the lowest means on six of the seven stages (except stage 0). The result illustrates the educators with a masters degree have more intense concerns than the rest of the groups. Their activities will be more inclined to successful reform implementation and improving their understanding of the change issues at the level of practice as well as the evolution of corresponding processes and strategies for bringing about an advantageous reform.

Note:

1. Sample size: 92; Numbers of groups: 3;
Degree of freedom between groups =2; degree of freedom within group = 89
2. Level of probability in this study: * ($p \leq .05$); ** ($p \leq .01$); *** ($p \leq .001$)
3. Value of significance from Distribution of F Table: at the .05 level = 3.11;
at the .01 level = 4.70 (it shows that the calculated F-ratio value must be equal to or greater than the Table value to show statistical significance)

and the .01 level = 4.70 (it shows that the calculated F-ratio value must be equal to or greater than the Table value to show statistical significance)

Those in the age group of 46 to 55 have highest scores at the consequence stage (Mean = 5.70) and collaboration stage (Mean = 5.51), whereas those in the age group of 56 or above possess the highest mean at the refocusing stage (Mean = 4.57). However, the analysis of variance shows that the age factor is not statistically significantly related to any of the stages of concern about the STCW reform.

4.4.6 Interaction between Years of Teaching and Educators’ Stages of Concern

In Table 4-8, the respondents with one to 10 years of teaching experience have the highest score on four of the seven stages and those with 11 to 20 years of teaching experience possess the lowest means on six of the seven.

Table 4-8 Mean scores of Stages of Concern about STCW reform by respondents’ years of teaching

<u>YEARS OF TEACHING</u>							
<u>SoC</u>	<u>1-10</u>		<u>11-20</u>		<u>Over 20</u>		<u>F</u>
	M	SD	M	SD	M	SD	
Awareness	1.81	.73	1.98	1.24	1.83	.82	.26
Informational	6.61	.86	6.24	1.23	6.50	1.17	.94
Personal	5.69	.97	5.23	1.48	5.40	1.26	.92
Management	4.26	1.33	3.82	1.45	4.19	1.80	.77
Consequence	5.88	.71	5.30	1.40	5.74	1.17	2.09
Collaboration	5.61	.98	5.28	1.37	5.56	1.17	.66
Refocusing	4.38	1.28	3.95	1.50	4.77	1.19	2.70

Note:

- 1. Sample size: 89; Numbers of groups: 3;
Degree of freedom between groups =2; degree of freedom within group = 86
- 2. Level of probability in this study: * ($p \leq .05$); ** ($p \leq .01$); *** ($p \leq .001$)
- 3. Value of significance from Distribution of F Table: at the .05 level = 3.11; at the .01 level = 4.70

The result indicates that the less teaching experienced educators are more motivated and activated, more likely to be reform implementers and adjust their professional career styles according to their experienced problems.

However, the analysis of variance indicates that years of teaching periods are not statistically significantly related to any of the stages of concern.

4.4.7 Interaction between Years of STCW Experience and Educators’ Stages of Concern

Table 4-9 displays the stages of concern of the respondents by the years of experiences with the STCW reform.

Table 4-9 Mean scores of Stages of Concern about STCW reform by respondents’ Years of experience with teaming in STCW reform

<u>YEARS OF EXPERIENCE WITH TEAMING IN STCW REFORM</u>							
<u>SoC</u>	<u>None</u>		<u>1 Year</u>		<u>2 or more years</u>		<u>F</u>
	M	SD	M	SD	M	SD	
Awareness	2.34	1.34	1.90	.82	1.69	.93	2.8 1
Informational	6.35	1.46	6.57	.88	6.36	1.05	.37
Personal	5.18	1.66	5.52	1.02	5.50	1.22	.55
Management	3.55	1.60	4.70	1.51	4.04	1.48	4.80**
Consequence	5.33	1.57	5.75	.92	5.64	1.14	.88
Collaboration	4.69	1.52	5.65	.79	5.75	1.10	6.70**
Refocusing	3.24	1.63	4.63	.99	4.87	1.18	12.51***

Note:
1. Sample size: 91; Numbers of groups: 3;
Degree of freedom between groups =2; degree of freedom within group = 88
2. Level of probability in this study: * ($p \leq .05$); ** ($p \leq .01$); *** ($p \leq .001$)
3. Value of significance from Distribution of F Table: at the .05 level = 3.11; at the .01 level = 4.70

The respondents not participating in the STCW reform team have the highest mean on the awareness stage and possess the lowest mean scores on the remaining six stages. The analysis of variance tests indicate that the respondents are statistically significantly different at three of the seven stages – management, collaboration and refocusing. At the management stage, the respondents with the highest mean (Mean = 5.75) are those with one year of STCW experience. At the collaboration stage, the highest mean (Mean = 5.75) occurs when the respondents have two or more years of STCW experience. The respondents with two or more years of STCW experience have the highest mean (Mean = 4.87) at the refocusing stage.

Intensity of educators' SoC according years of STCW experience

Referring to Table 4-9, the results illustrate that the intensity and stages of educators' concerns change when the educators are grouped according to years of STCW experience. The educators participating in the STCW reform team have significantly high intense concerns at stage 5 "collaboration" and relatively high intense concerns at stage 6 "refocusing", further, the moderately intense concerns are significantly posited at stage 3 "management". They also have some concerns at stage 4 "consequence" regardless of its statistical significance. These educators have concerns about how to collaborate with their peers regarding the reform implementation. They have concerns about collaborative endeavors with regard to the other high stages of concern. As these educators' concerns are also high at the refocusing stage and management stage, their concerns tend to be positive in motivations and attitudes toward the reform, and will also have some ideas about how to improve or replace the reform. However, they still have many logistics issues to take care of, including the issues relating to efficacy, managing, systematizing and time demands. At the same time, they also have the highest intense self concerns at stage 1 "informational" despite no statistically significant difference at this stage.

The educators' appearances indicate that they are eager to share and discuss the new approaches of the reform with their colleagues or a knowledgeable principal. Perhaps, owing to poor communications with administrators and/or reform coordinators, they seem uncertain as to the requirements of the STCW reform and as a consequence they still have the highest intensity informational concerns. Conversely, those MET professional educators not participating the STCW reform team have the lowest intensity concerns on all the stages. In summary, the years of STCW experience increase educators' concern levels at the impact stage (stages 4, 5 and 6), and decrease the intensities of concerns at the task stage (stage 3) and the self stage (stages 1 and 2). The findings are consistent with the guideline of SoC Questionnaire technical manual (1977) and Fuller's concerns theory (1969).

4.4.8 Interaction between STCW Seminar Attendance and Educators' Stages of Concern

As shown in Table 4-10, the respondents attending the STCW related seminars have higher means on five of the seven stages than the respondents not attending the STCW related seminars.

The results of the t-test indicate that two groups are statistically significantly different on two stages of concern – awareness ($t = -2.56, p < .05$) and collaboration ($t = 2.46, p < .05$). The respondents not attending the STCW related seminars have a statistically significantly higher mean score at the awareness stage, whereas those attending the STCW seminars tend to express significantly higher concern at the collaboration stage.

Table 4-10 Mean scores of Stages of Concern about STCW reform by respondents' experience with STCW related seminar

<u>STCW SEMINAR ATTENDANCE</u>					
<u>SoC</u>	<u>Yes</u>		<u>No</u>		<u>t</u>
	M	SD	M	SD	
Awareness	1.71	.93	2.26	1.10	-2.56*
Informational	6.45	1.02	6.43	1.23	.06
Personal	5.52	1.16	5.31	1.28	.77
Management	4.14	1.48	4.17	1.72	-1.11
Consequence	5.64	1.06	5.56	1.36	.33
Collaboration	5.70	1.08	5.08	1.27	2.46*
Refocusing	4.56	1.26	4.04	1.54	1.73

Note:

1. Sample size: N1 = 56; N2 = 36.
Degree of freedom: N1 + N2 - 2 = 90
2. Level of probability in this study: * ($p \leq .05$); ** ($p \leq .01$); *** ($p \leq .001$)
3. Value of significance for two-tailed test from t-Distribution Table: at .05 level = 1.99
(it shows that the required values are actually $t \leq -1.99$ and $t \geq 1.99$)

Intensity of educators' SoC according to STCW seminar attendance

Reference to Table 4-10, results illustrates that the intensity and stages of educators' concerns change when the educators are grouped according to the STCW related seminars or workshops attendance. Based on the SoC Questionnaire technical manual (1977), a low awareness stage with a high collaboration stage shows that the educators attending the STCW related seminars or workshops have more intense involvement and concerns with the reform. The collaboration concerns of the educators attending the STCW related seminar (Mean = 5.70, SD = 1.08) are higher than those not attending the STCW related seminars (Mean = 5.08, SD = 1.27). In other words, they have more intense concerns about working and/or co-operating with others in the reform. In addition, they have concerns about collaborative

endeavors related to the other high stage of concerns and also have concerns about how to collaborate with their peers regarding the reform implementation.

The educators attending the STCW related seminars or workshops have statistically significantly lower intensity concerns at awareness stage (stage 0), it means these educators have a somewhat less intensity of involvement with the reform, further, they still have some activities of concerns about the reform. Their concerns tend to be positive in motivations and attitudes toward the reform. The educators not attending the STCW related seminars or workshops also have significantly low intensity concerns at awareness stage (stage 0), it means they have a more or less intense involvement in the reform. However, these two group's low awareness concerns do not reflect unconcern about the reform just because of their concerns having high tendencies toward self and impact stages.

At the same time, these two groups of educators have the highest intense self concerns at informational stage (stage 1) despite no statistically significant differences at this stage. It depicts they still want more information about the reform. The educators appear to indicate that they desire to share and discuss the new approaches of the reform with colleagues or a knowledgeable principal. Perhaps, they are not sure about the requirements of the STCW reform thus having the highest intense informational concerns.

4.5 The Stages of the STCW Reform Implementation in Taiwan

Based upon comprehensive experience of educational reform at schools and colleges, the Stages of Concern Model was developed. The structure of the model has been established to take into account each stage of the concerns which individuals express about the educational reform. With regard to the individuals involved in the reform

and the change process, it is inevitable that some perceptions, awareness, attitudes, satisfactions, and frustrations may emerge.

Hence, the study attempts to facilitate an understanding of the implementation of STCW 95 by analyzing 95 Taiwanese MET educators’ expressed concerns about the innovation. These expressed concerns, of those participating in the implementation of education reform, are analyzed and discussed at this paragraph. Figure 4-3 illustrates the simplified procedures of the SoC Profile interpretations adopted in the study.

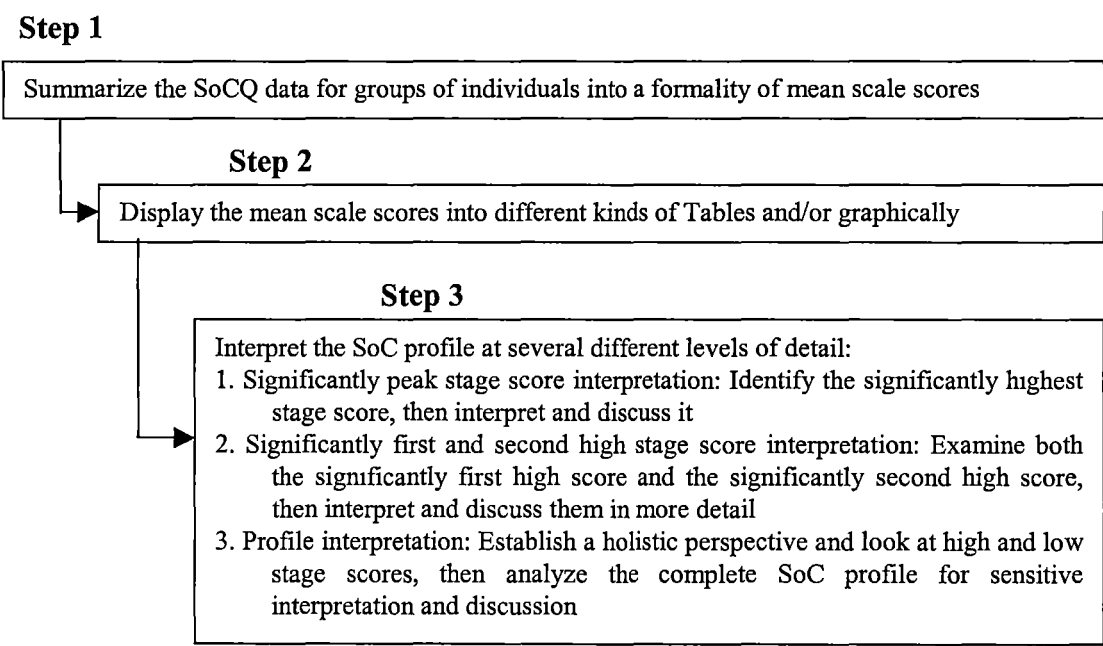


Figure 4-3 Simplified step-by-step procedures for SoC profile interpretation

Source: From *Implementing Change: Patterns, Principles, and Potholes* by Hall and Hord, 2001.

4.5.1 Using Mean Scale-scores for Innovation Profile Interpretation

The technical manual for using the SoC Questionnaire (Hall et al., 1977) suggests that it is essential to convert the collected raw scale scores into percentile scores so as to interpret them correctly. Different types of tables or figures can be used to illustrate SoC Questionnaire data. Preferably, a graphic profile of the percentile scores may be drawn to interpret the SoC Questionnaire data. However, it is notable that the converted percentiles have a major flaw in the statistical analysis, which has a great impact on the scores' distribution. Hall, George and Rutherford (1977) strongly recommended using raw scale scores for the statistical analysis process in the SoC Questionnaire technical manual. Based on this recommendation the raw scale scores were used for this study.

In practice, individual data are typically reported by computing the mean (averages) of responses of all involved in the innovation at the Taiwanese MET institutes. The responses' mean is represented as an overall concerns profile of the institute at different points in the implementation process. Hence, the mean scale scores rather than percentile scores are employed to interpret the SoC profile according to the following considerations.

Firstly, there is no directly comparable concerns model to verify the validity of the SoC Questionnaire percentile scores, which are derived from the 0 to 7 scale-scores on the SoC Questionnaire. Investigations were undertaken to measure and check those scores on the questionnaire, which are related to each other and other variables as Fuller's concerns theory suggested. For example, a case study of 161 North American Independent Schools' teachers involved in individualizing maths and reading were assessed as to Levels of Use and Stages of Concern of these innovations by Hall and his colleagues in 1975. The results showed that the

percentile scores could not satisfy the statistical significance on stages 0, 2 and 5 at the .05 level. Additionally, Hall (1999) made another declaration that in spite of the intercorrelation between stage 1 and stage 2, they were different constructs and should be retained for clinical analysis and diagnosis of his writing. Obviously, there are some other similar SoC Questionnaire validity studies. Cunningham, Hillison and Horne 1985; Bailey and Palsha 1992; Cheung, Hattie and Ng 2001 also negatively reported on the validity of the percentile scores on some stages.

Secondly, as each of the seven Stages of Concern is characterized by five items (statements), the percentile scores for each subscale is the sum of the responses to the five items on that subscale. In other words, they represent the relative intensities. In this study, four items (6, 7, 23 and 31) are deleted from original 35 items due to low item-total correlation. Consequently, the scale scores on stages 1, 2, 3 and 6 cannot satisfy the requirements of the percentile scores converting process, unless a 1.25 value is weighted on each of those item-deleted stages.

Thirdly, the expectancy theory, professionalism theory and a personal data form were added to the questionnaire to obtain the relevant information about the independent variables. The measurements of the converted percentile scores largely influence the relationships between the expectancy theory, professionalism theory, demographics and stages of concern in statistical analysis.

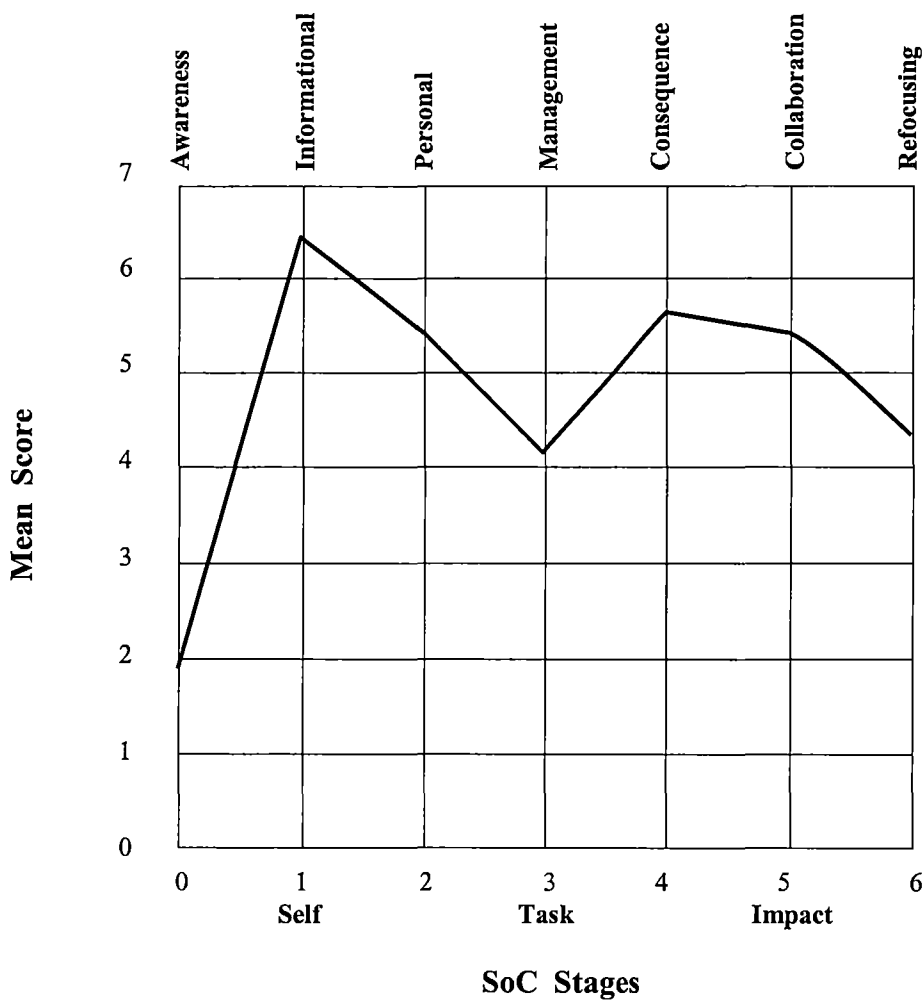
Fourthly, Hall et al. (1977: p.28) also reported that, “the use of the converted percentile scores in statistical analysis would greatly affect the distribution of the scores, making statistical assumptions more tenuous than would otherwise be the case”.

The percentile scores are not explored and explained in detail in this study, even though the percentile scores can be developed to interpret the individuals' or groups' sensitive profile. For interest the seven-grouped raw scale scores were converted to percentile scores and have been listed in the Appendix IV. In addition, an example of a graph specifically designed for SoC Questionnaire profile presentation is also included to facilitate interpreting the individuals' SoC Questionnaire data.

4.5.2 Educators' Stages of Concern Expressed by All Respondents

Figure 4-4 illustrates that the respondents have their most intense concerns at the informational stage (stage 1), which show that they are very interested in learning more details about the MET educational reform. The main aspect they are interested in is a selfless attitude, such as general features, effects and implementing requirements. The relatively high concerns at the personal stage (stage 2) indicate that the respondents are unclear about the reform demands.

Fuller's concerns theory (1969) predicts that a high informational stage with a low personal stage (high 1 with low 2) indicates that individuals need more information about the reform and are mostly willing and interested in the reform. Furthermore, Hall and Hord (2001) also argue that, the less information is provided, the higher the personal concerns will be. When self concerns (stages 1 and 2) are very strong about the reform process, communication becomes important to disseminate what is coming, how the reform is affecting the individuals and why the change must be made.



Remarks:

The outcomes of the profile disclose several findings. Educators perceive working with personal action plans and co-operation with peers or others as positive activities. Most educators also experience sufficient support from the school leaders and principal.

However, these educators' Stages of Concern have not shifted into the expected direction. They are still concentrated upon information gains and self-events and do not focus on task performances or impact on their students and colleagues.

Figure 4-4 The Stages of Concern profile for all respondents

Source: Derived from Table 4-2(h) SoC Questionnaire statistics data on 95 Taiwanese Maritime educators involved in STCW reform

As a result (see Figure 4-4), the high self concerns shows that there are uncertainties among the respondents about what can be anticipated. Worse, they even suspect whether their abilities can comply with the innovation and if the respondents experience a sense of grief, emptiness or disorder, resistance might emerge. While

these two concerns reflect disquietude during the period of the MET reform implementation, they do not necessarily denote a resistance. These educators with high informational concerns (stage 1) only want to acquire small parts of the message repeated over time, as they do not want all of the details at once. Hence, a once-off announcement is not enough to enable everyone to obtain all information. Also, the affiliated personal stage (stage 2) points out that they want to hear enthusiastic promises of persisting commitment and materials supporting the reform.

Based upon the SoC Questionnaire technical manual (1977), the second peak stage of concern and the second intense high score are also employed as a supplementary perception into the dynamics of concerns. The respondents have a second peak stage of concern at the consequence stage (stage 4) and the related collaboration stage (stage 5). It indicates that at these two stages the tendency is to be more concerned about the effects of the educational reform on their students (stage 4), co-ordination and co-operation with their colleagues and other faculty members in using the STCW innovation (stage 5). An institute where both consequence and collaboration stages of concern are significant demonstrates an interest in the students and collegiality about teaching including the effects of using the reform in the classroom. To develop these two stages, it implies that the reform has been truly delivered and sufficient time has been given to implement. As a result, the administration, the superintendents, the principal and the educators have been hard at work and doing some special tasks adequately. The reform is also essential and parallel to the institute's image.

Discussion

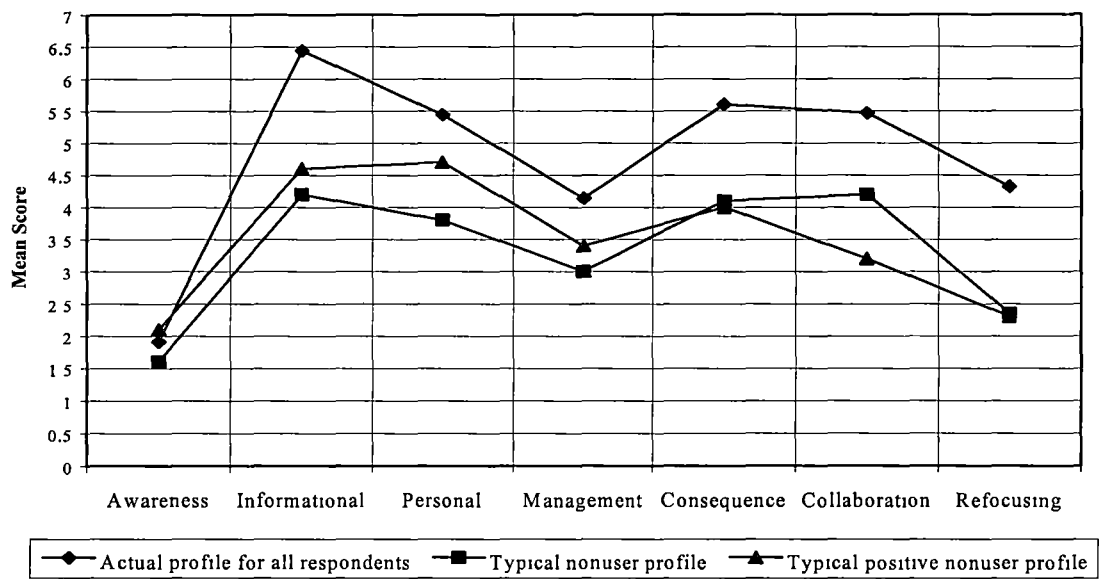
According to Hall et al.'s (1973, 1977 and 2001) propositions, an individual will have intense concerns about more than one stage at the same time. The concerns profile, relatively high at some stages and relatively low at other stages, and/or some

absent altogether, reflects the appearances, perceptions, awareness, attitudes, satisfactions, and frustrations of the educators when the reform process is carried out.

As shown in the SoC profile (Figure 4-4), the high impact stage (stages 4 and 5) with self stage (stages 1 and 2) also being high, portrays that there must be very high and unresolved informational concerns among the individuals. They are attempting to imitate or learn from what others know and are doing, what should be done, and the anticipated outcomes of students rather than concerns for collaboration and consequence. This phenomenon implies that the educators have been given support and pressure to work together on the educational reform. Additionally, the high impact concerns illustrate the ideal objective of a concern-based implementation effort. It reflects that the educators and the principal have concentrated on the reform seriously and perform some of the specific works perfectly. However, if there is only a limited impression of the complicated nature of the reform process this may cause the administrators to neglect engaging in ongoing active support, or the principal fails to facilitate them effectively, or the authority adds more irrelevant reforms that cannot be fully carried out. Undoubtedly, the entire change will eventually be unsuccessful.

It is not surprising that many of the concerns profiles can reveal the characteristics of the individual educators. They are aggregated to form an institute's profile with peak concerns at the impact stage, in combination with overall profiles characteristic of beginning use (Anderson 1997: p.353).

For comparison, Figure 4-4(a) presents the overall shapes of the actual profile for all respondents, the typical nonuser profile and the typical positive nonuser profile.



Remark:

The original percentile scores of the typical nonuser profile and the typical positive nonuser profile, which derived from Hall’s SoC model (1977 & 2001), were converted into mean scores for comparison.

Figure 4-4(a) Comparison of actual profile for all respondents, and typical nonuser and positive nonuser profiles

Source: Derived from Figure 4-4 The Stages of Concern for all respondents; *A manual for use of the SoC Questionnaire* by Hall, et. al., 1977; and, *Implementing change: Patterns, principles, and potholes* by Hall, et. al., 2001.

As a result, the high intense concerns at the impact stage associated with high intense concerns at the self stage shows that, currently, the process of changing Taiwanese MET educators’ concerns seems to be more reflected by the strategies of the change process than the feelings of working with others to make the reform work better for the students by increasing students’ achievements. In these circumstances progress will be suspended and the educators are forced into a sustained self and/or task concerns loop. The reform implementation process will be retarded because of the educators’ concerns remaining at the early stages with little shifting to the progressing stages.

4.5.3 Educators’ Stages of Concern about STCW Reform by Respondents’ Institutes

Figure 4-5 depicts the stages of concern expressed by the educators of the three Taiwanese MET institutes.

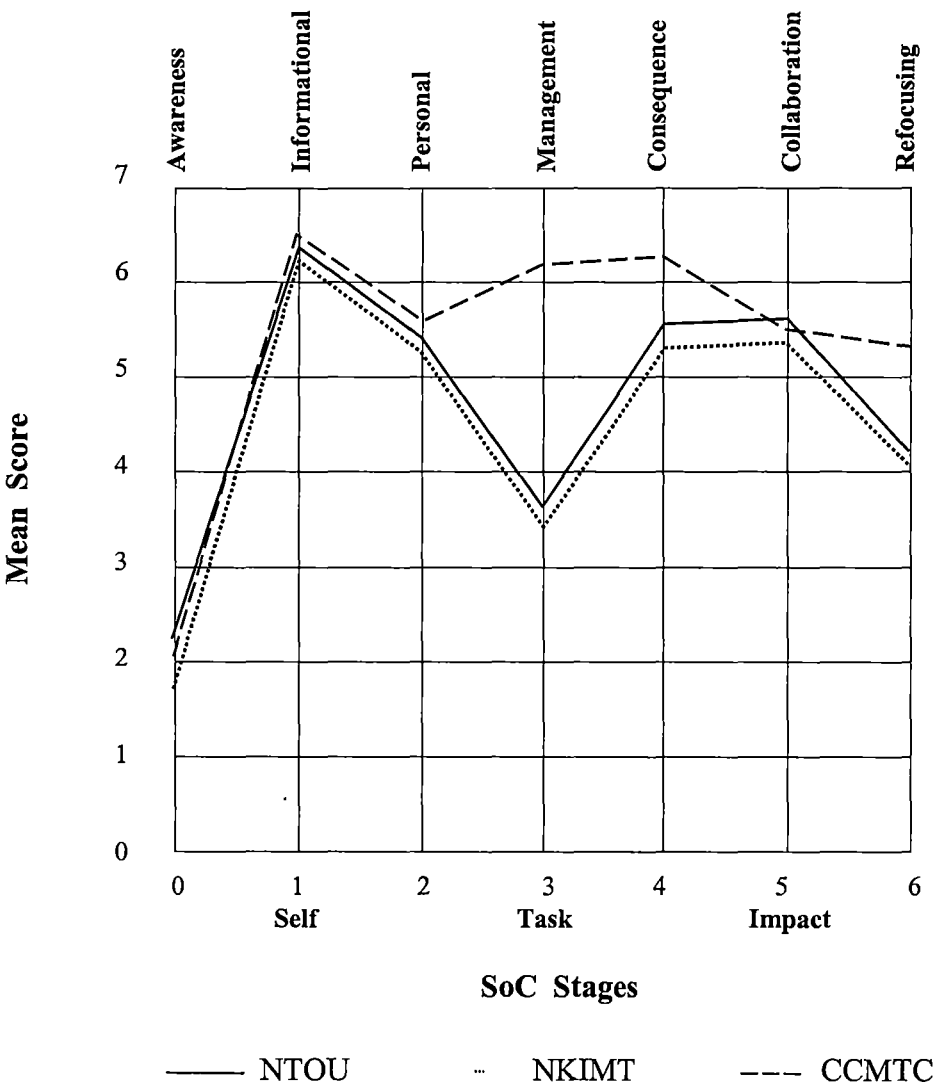


Figure 4-5 The Stages of Concerns profile for three MET institutes

Source: Derived from Table 4-3 Mean scores of Stages of Concern about STCW reform by respondents’ institutes

The informational stage is the highest stage in all three institutes, whereas the lowest is the awareness stage. There are no statistically significant differences at any of these two stages. However, the management stage and refocusing stage for all three institutes does exhibit statistically significant differences. The consequence stage exhibits statistically significant differences between NKIMT and CCMTC only. During the self, task and impact stages, the educators at NTOU and NKIMT have less intense concerns than the educators at CCMTC.

The Stages of Concern Model (Hall et al., 1977) hypothesized that individuals placed in an education reform situation initially moved from unawareness and non-use into beginning use. At the beginning use stage, individuals have higher concerns at awareness, informational and personal stages focusing on the educators' own issues rather than the teaching activities or the students' needs. Following their gradual involvement, the problems of individuals' concerns will be resolved for the time being. Then, their greatest intensity of concerns will shift to the management stage when the educators address their concerns to the nature of the task and the actual work of teaching. The foci will be on the process and the quality of the task performances. The more experiences the individuals acquire, the more intense concerns tend to become at the consequence and collaboration stages. In turn, the intensity at the informational and personal stages will decline.

According to the independent variables of the institutes, when the data are subjected to ANOVA procedures and Scheffe tests, the outcome reveals that the educators teaching at CCMTC have highest intensity concerns at all stages, followed by the educators teaching at NTOU. The educators working at NKIMT have the lowest intensity concerns.

However, it does not matter whether the mean scores of concerns are high or low. It is only a high or low point within an initial framework of the SoC profile. The overall shape of the SoC profile is what should be initially considered (Hall et al., 2001).

Reference to Figure 4-5 showing the higher mean at the consequence stage of the educators at CCMTC indicates that the personal concerns and the demands of the reform are sufficient to satisfy their requirements. The emphasis is shifting to the relevance of the students' competencies and outcomes, as well as the students' performances. Since the relatively lower mean is at the refocusing stage, there is a high degree of communication and little discrepancy among the educators and their principal who slightly dominates the reform's instruction. The attitudes of the educators of CCMTC are positive toward the reform. Furthermore, the difference in means between the consequence stage and the management stage was .01 scale score, which indicates they also have relatively high intense concerns at the management stage. They still have some logistics, time, and task issues to solve about the reform, but have ideas about what needs to be done about their management concerns. It is necessary to emphasize one finding here, that is, the total mean scores of the educators at CCMTC are extremely high. As the individuals' concerns are developed in nature, they have an inclination to score high on one or two stages and low on the others. In this case, extremely high total mean score responses indicate the educators at CCMTC may be short of willingness or ability to discriminate between the sources of concerns about the reform. Alternatively, they may be rather strong-minded or extraordinarily anxious related to the reform.

Fuller's concerns theory predicts that ideally, the more experiences the individuals have, the more intense their concerns are inclined to the consequence stage and collaboration stage, and the less intense at the self stage (informational and personal

stages) and management stage. Conversely, self stage and/or task stage will be higher than the impact stage at the beginning level.

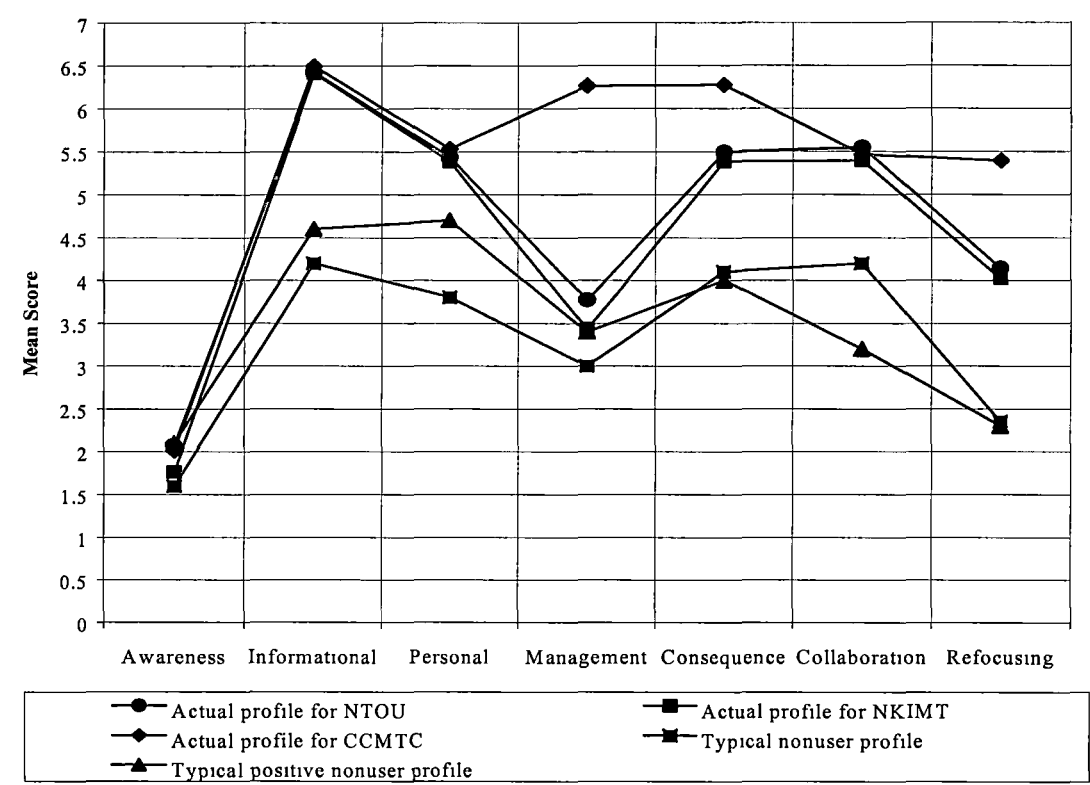
The concerns profile (Figure 4-5) shows the educators working at NTOU and NKIMT are similar at the self stage, task stage and impact stage. The educators at both NTOU and NKIMT have relative high means at the consequence stage. In other words, it means that their attention foci are on the impact and relevance of the reform on students, and the change demand increasing the performances of the students. Their comparative lower means are at the management stage indicating that little attention is paid to the operations, tasks and best use of the reform. The attention of these two groups shifts to the impact concern and appears to be consistent with the predictions of Fuller's concerns theory. However, from the integrity of concerns profile viewpoint, the tendency of reform changes in these two institutes is similar to the tendency of the changes for all Taiwanese MET educators. Those educators did not increase their experiences from the complicated reform process during the past years of implementation according to the Fuller's prediction.

Discussion

For comparison, Figures 4-5(a) presents the overall shapes of the actual profile for three Taiwanese MET institutes, the typical nonuser profile and the typical positive nonuser profile.

When all the MET educators in Taiwan are compared in terms of their professional disciplines, the trends among the three institutes' educators concerns seem not to have many statistically significant differences. Their concerns still reflect the change process strategies, rather than the feelings of working with others so as to make the reform work better for students, and the relevance of the reform to increase their

students’ performance. In this case, the educators’ concerns do not progress from non-user to self to task to impact as anticipated. Instead, the progress is halted while the informational concerns still remain intensive. If the situation stays unchanged many educators may return to awareness concerns, or no concerns about the reform.



Remark:

The original percentile scores of the typical nonuser profile and the typical positive nonuser profile, which derived from Hall’s SoC model (1977 & 2001), were converted into mean scores for comparison.

Figure 4-5(a) Comparison of actual profile for three Taiwanese MET institutes, and typical nonuser and positive nonuser profiles

Source: Derived from Figure 4-5 The Stages of Concerns profile for three MET institutes; *A manual for use of the SoC Questionnaire* by Hall, et. al., 1977; and, *Implementing change: Patterns, principles, and potholes* by Hall, et. al., 2001.

4.5.4 Educators’ Stages of Concern about STCW Reform by Respondents’ Years of STCW Experience

Figure 4-6 summarizes the cross-sectional sampling of the educator at all three institutes in terms of the years of STCW implementing experiences.

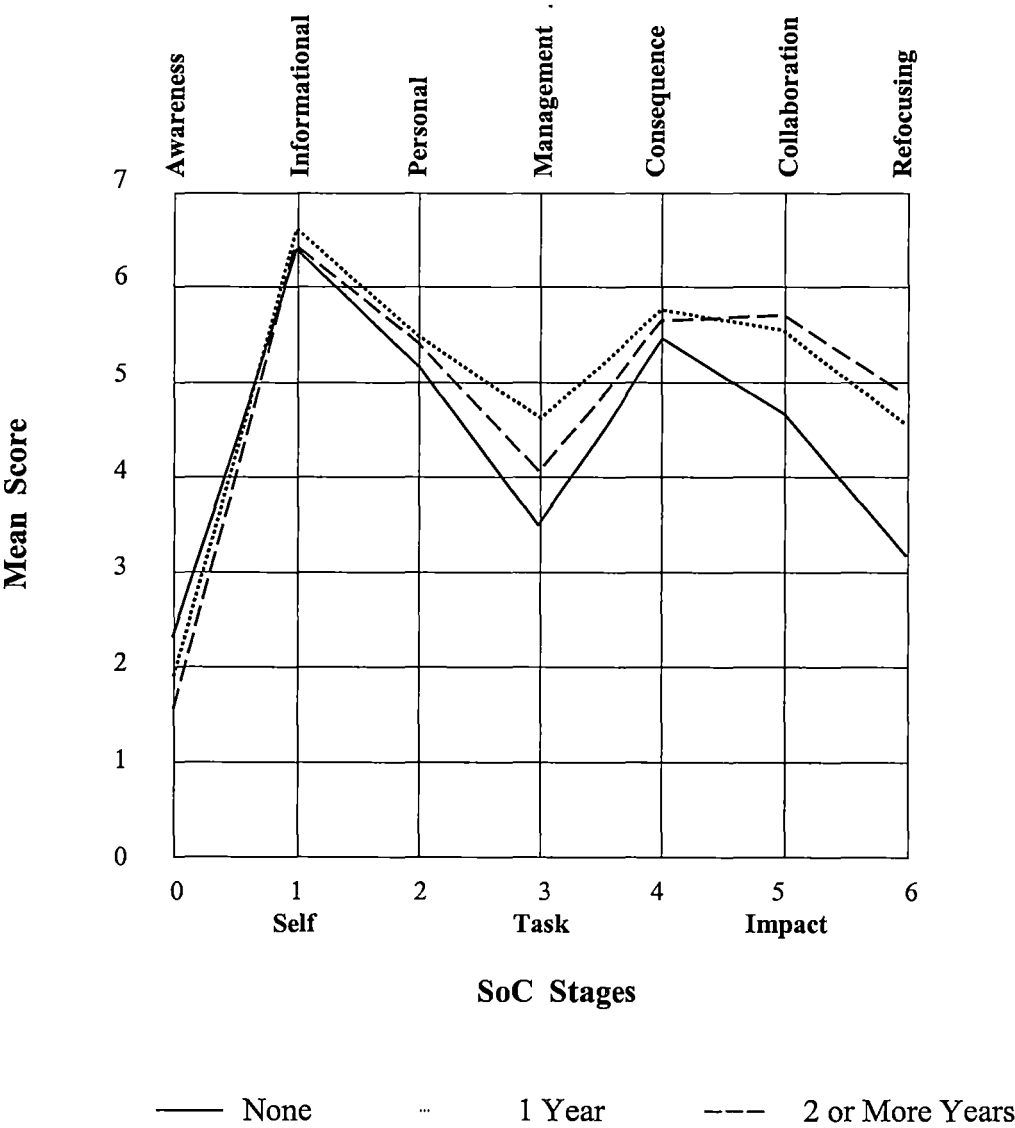


Figure 4-6 The Stages of Concerns profile for respondents’ STCW reform implementing experiences with teaming

Source: Derived from Table 4-9 Mean scores of Stages of Concern about STCW reform by respondents’ years of experience with teaming in STCW reform

The educators with more than 2 years STCW implementing experience have the highest mean at the informational stage and relatively higher mean at the consequence stage and the collaboration stage. For the educators with less than 2 years of STCW implementing experiences the profile is almost identical. The educators without STCW implementing experience have their highest intense concerns at the informational stage and relatively higher intense concerns at the personal stage and the consequence stage. The lowest mean for these three groups is located at the awareness stage. Only the management, collaboration, and refocusing stages are statistically significantly different between these groups.

According to the SoC 's definition (Hall & Hord 2001), the educators with STCW implementing experiences should have relatively high intense collaboration concerns about what should be done and what their co-participants are doing. Meanwhile, they also have some ideas about what alternatives can be used to replace or change the present reform so as to work better in the light of the relatively high intense refocusing concerns. As more experiences are gradually aggregated, the more educators' concerns increase at the impact stage.

The concerns profile (Figure 4-6) shows that the educators with higher collaboration concerns have more implementing experiences as part of a team than the educators with less implementing experiences. Undoubtedly, the intensity level of those educators without implementing experience at the collaboration stage is much lower. The finding is consistent with the predictions of Fuller's concerns theory and Hall's SoC Model.

Although Fuller predicted that a higher level at the impact concerns would cause a lower level at the self concerns, the outcome in this study is inconsistent with this prediction. The study shows that the informational and personal concerns of the

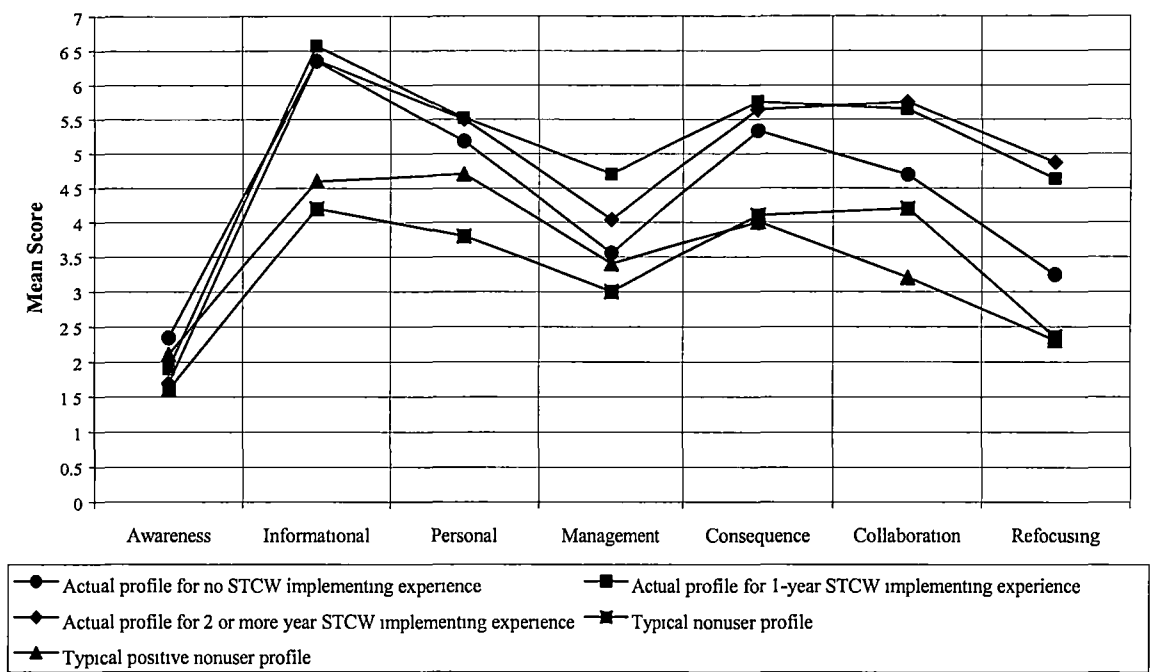
educators with implementing experiences have higher mean scores than the educators without implementing experiences in spite of no statistically significant difference. It reflects that they are still uncertain of the reform demands, thus having intense concerns of seeking ideas from the others. The reason(s) for this phenomenon is difficult to understand in the context of this study.

The lower intensity concerns among the educators with STCW implementing experience are at the management stage, which indicates a large amount of logistic and/or in-service support has been provided. Hence, it appears that they understand how to organize, operate and manage their team more efficiently and how to use the information, resources, and tasks during the reform. Finally, the process skills of running the implementing reform team have been developed perfectly. However, their management concerns are still higher by comparison with the educators without STCW implementing experience. In other words, the management concerns are not easy to solve even in the STCW implementation team.

Discussion

Some may think that the implementation of the STCW reform just takes the time and experience of the STCW team to be trained to implement the reform thoroughly and successfully. However, a six-year experience in the STCW team can be a one-year experience repeated six times in the STCW team. The reform implementing quality cannot be guaranteed by a sole experience in the STCW team.

For comparison, Figure 4-6(a) presents the overall shapes of the actual profile for respondents' STCW reform implementing experiences with teaming, the typical nonuser profile and the typical positive nonuser profile.



Remark:
The original percentile scores of the typical nonuser profile and the typical positive nonuser profile, which derived from Hall's SoC model (1977 & 2001), were converted into mean scores for comparison.

Figure 4-6(a) Comparison of actual profile for respondents' STCW reform implementing experiences with teaming, and typical nonuser and positive nonuser profiles

Source: Derived from Figure 4-6 The Stages of Concern profile for respondents' STCW reform implementing experiences with teaming; *A manual for use of the SoC Questionnaire* by Hall, et. al., 1977; and, *Implementing change: Patterns, principles, and potholes* by Hall, et. al., 2001.

The concerns profile of the educators' experience in the STCW educational and training reform (see Figures 4-6 and 4-6(a)) indicates they have high impact stage and high self stage tendency simultaneously. In this case, it reveals that those uncertainties about understanding, transforming the reform into teaching action and the relationship with the students' competencies still concern the educators participating in implementing reform. Therefore, the administrators, the decision-makers and the facilitators should be aware of this phenomenon. Considerable assistance is needed to avoid spending substantial amounts of wasted time in implementing reform. For instance, sufficient and continuous support about the

information and resources of the reform, and the re-design and delivery of the reform implementing activities addressed at an early stage of concerns allow the educators to develop impact concerns and satisfy the administrators and the decision makers. Further, there are no statistically significant differences at the informational stage and their most intense concerns are also at this stage.

4.5.5 Educators' Stages of Concern about STCW Reform by Respondents' STCW Seminar Attendance

After the respondents are grouped based on seminar and/or workshop attendance, the mean score at each stage of concern is illustrated in Figure 4-7.

The respondents attending the seminars and/or workshops have the highest mean at stage 1 and have relatively high means at stages 2, 4 and 5. By contrast, those not attending the seminars and/or workshops have the highest mean at stage 1 and have relatively high means at stages 2 and 4. The lowest mean for both groups is located at stage 0. However, only stages 0 and 5 have statistically significant differences between these two groups.

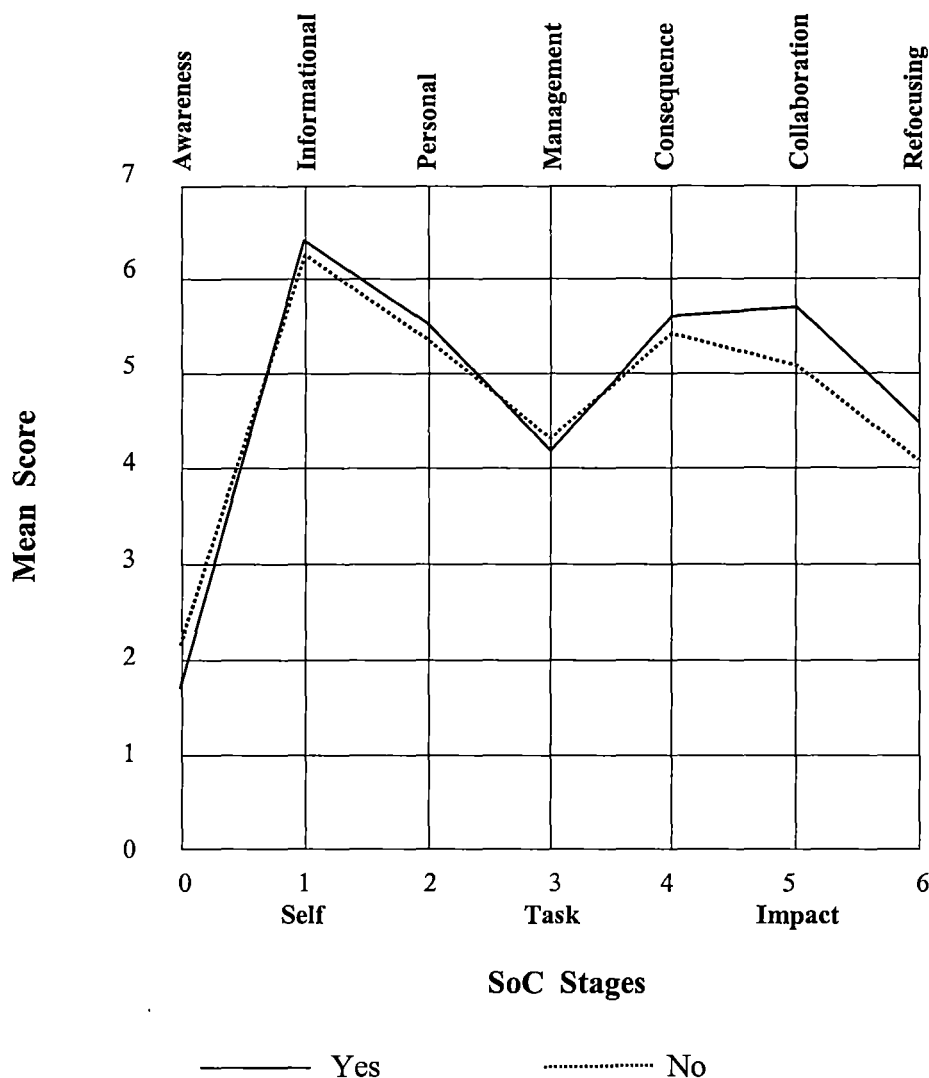


Figure 4-7 The Stages of Concerns profile for respondents' years of experience with STCW related seminar

Source: Derived from Table 4-10 Mean scores of Stages of Concern about STCW reform by respondents' experience with STCW related seminar

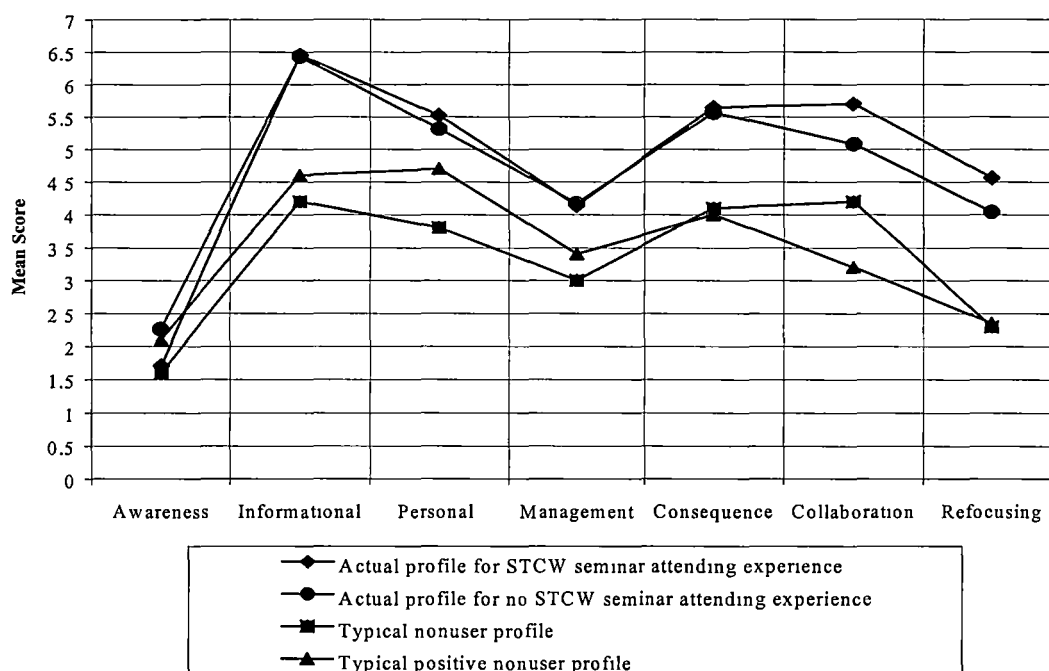
Fuller's concerns theory predicts that after attending reform-related seminars and/or in-service workshops the intensity of the educators' concerns will be enhanced at the impact stage and decreased at the self stage. Research findings (George, 1978; Knowles, 1981; Broyles & Tillman, 1985; Hall & Hord, 2001) suggested that the intensity of self concerns would greatly decrease after attendance at a reform-related seminar. Conversely, the concerns level of the educators not attending reform-related

seminars and/or in-service workshops was higher (increased) at the self stage and lower (decreased) at the impact stage.

The results of this cross-sectional study (see Figure 4-7) reveal that the educators participating in reform-related seminars and/or workshops have higher intense concern level at the impact stage than those without attendance, which is consistent with Fuller's concerns theory. However, these results have some differences from Fuller's prediction. In this case, the educators' concerns are still higher at the self stage than the impact stage or the task stage after participating in seminars and/or workshops. Another inconsistency is that the intensities of concerns at the personal stage among those educators attending the reform-related seminars and/or workshops are higher than the educators without attendance. These inconsistent findings are supported by Aneke, and Finch (1997), whose reform-related training implementing studies indicated that teachers having attended only a fewer hours of reform-related training programmes would show peak concerns at the self stage.

Discussion

The analysis of Stages of Concern profile (see Figures 4-7 and 4-7(a)) reveals that the educators with STCW related seminar-attended experiences have higher levels of concerns at the consequence, collaboration and refocusing stages. Both groups (the educators with/without STCW seminar-attended experience) have similar levels of concerns at the awareness, informational, personal and management stages.



Remark:

The original percentile scores of the typical nonuser profile and the typical positive nonuser profile, which derived from Hall's SoC model (1977 & 2001), were converted into mean scores for comparison.

Figure 4-7(a) Comparison of actual profile for respondents' experiences with STCW related seminar, and typical nonuser and positive nonuser profiles

Source: Derived from Figure 4-7 The Stages of Concerns profile for respondents' experiences with STCW related seminar; *A manual for use of the SoC Questionnaire* by Hall, et. al., 1977; and, *Implementing change: Patterns, principles, and potholes* by Hall, et. al., 2001.

Based upon the technical manual for use of the SoC Questionnaire (Hall et al., 1977), the educators possessing STCW related seminar-attending experiences appear more concerned about the coordination, cooperation and working with the others in the reform. In addition, they are also concerned about the performances and competencies of the students (refer to Figures 4-7 and 4-7(a)). As the highest concerns of those educators exists at the informational stage, it indicates that inadequate time, and/or the schedule is only set at the beginning of the reform, and/or improper contents of the STCW related seminar and/or workshop makes it difficult

to achieve any further progress. It appears that a one-shot seminar and/or short-term workshop was held only at the beginning of the reform. In fact, a couple of days seminar and/or workshop on the reform implementing methods cannot provide the necessary information, knowledge and support for the complex and high level requirements of STCW.

Hall and Hord (2001: p.5) asserted that, "Reform is a process, not an event and cannot expect to be achieved overnight". Hence, long-term and follow-up seminar and workshop activities are necessary.

However, the fact that the intensities of concerns are also high at the impact stage indicates the acceptance of educational reform (see Figure 4-7). Based upon Oscarson and Finch (1980), and Aneke and Finch (1997) propositions, the educators for both groups tend to positively adopt and implement this educational reform.

The phenomenon, of relatively low intensities of management concerns for both groups, shows the educators' attentions are not focussed on logistics, time, or other managerial issues in the reform. This is another issue for further studies. Aneke and Finch (1997) also suggested three hypothetical assumptions about the low management concerns among the teachers participating in reform-related training in their study. The three assumptions are: 1) less involvement among the educators in management aspects of the reform; 2) no delegations to take part in the tasks of management related to the implementing of the reform at their own levels; or, 3) highly involved in the tasks of management so that their concerns had already progressed into the impact concerns. These assumptions remain untested.

Since the teaching discipline, teaching experience, academic rank, highest degree earned, and ages are not statistically significant in distinguishing the educators'

Stages of Concern profiles, there are no further explorations and discussions in this study.

4.6 Understanding the Realities of the STCW Reform Implementation

The Hall's Stages of Concern Model not only concentrates on the pre-implementation period of the STCW reform, but also covers all the stages of the individuals' concerns to achieve the goals of the reform successfully. The use of this model can lead reform-implementers to view the whole as well as the parts of the reform process, especially since there are so many pieces and interactive dynamics. In the case of STCW education and training innovation in Taiwan, elements of the Stages of Concern Model can be used to learn more about its process and to plan for future interventions. One of Fullan's images, the implementation dip (Fullan & Miles, 1992: p.749) had been graphically depicted by Busick and Inos (1992) and as is illustrated in Figure 4-8, has parallels to the Hall's model. It addresses the reform implementation process. As individuals strive to achieve the goals of the reform they pass through many difficulties at the dip (or valley) before they reach the top and emerge at a higher level (or an improved status).

The concepts supporting this image appear to resonate with the Stages of Concern. Reference to Figure 4-8 shows the stage 0 "awareness" expresses that the educators are giving minimum to no attention to the reform because there is no expectancy or no information about it affecting them. If the experienced implementers exhibit high intensities at this stage it means they are more concerned about things not related to the reform, or they are just becoming aware of the reform as beginning implementers. The stage 1 "informational" indicates an interest in inquiry about the reform and the need for more information about it. The stage 2 "personal" reflects having intense

individual concerns about the reform and how its outcomes affect them. The stage 3 “management” emphasizes logistics, time, and management of the reform and illustrates the individuals have difficulties making sense of the reform (Hall et al., 1977 and 2001).

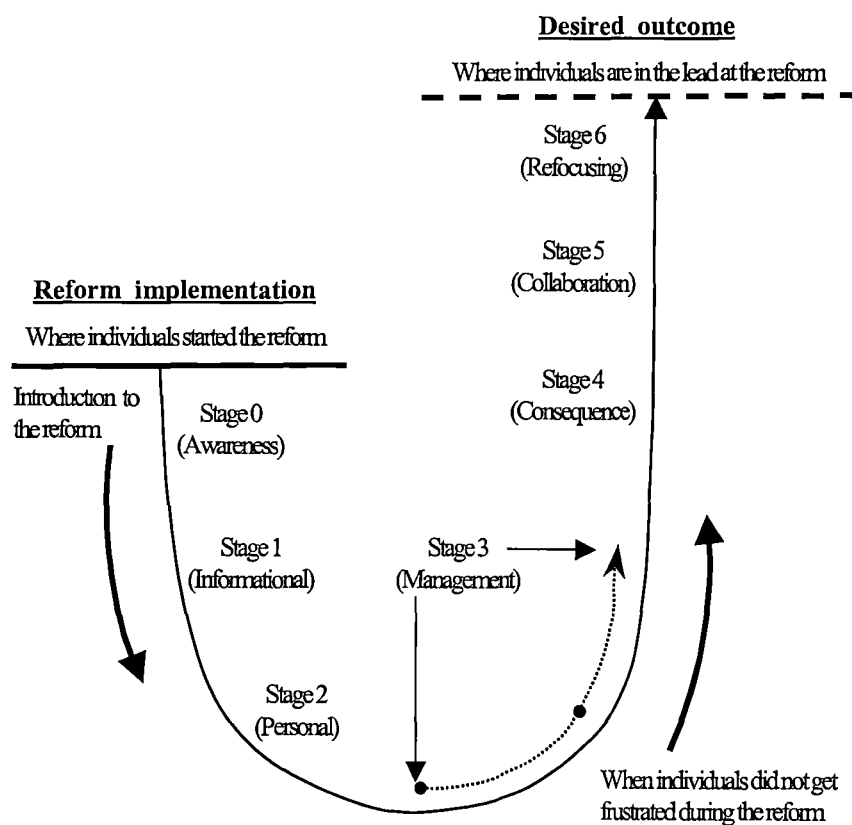


Figure 4-8 The use of Stages of Concern to clarify the reform implementation dip

Source: Hall, G. E. & Hord, S.M. *Implementing change: Patterns, principles, and potholes*. 2001, p.193. – Original was derived from *Synthesis of the research on educational change: Implementation phase* by Busick, K.U. and Inos, R.H., 1992.

Operationalizing the reform is delineated by stages 1, 2 and 3 (Busick & Inos, 1992; Hall & Hord, 2001). When the implementers do not get frustrated during the educational reform by, for example, uncertainty, disorientation and diverse other

sorts of stress, they will promote their concerns to a higher impact stage (stages 4, 5 and 6). If the implementers are confronted by management problems as they are proceeding with the reform, and have no ideas or are confused about what to do under the pressures of a series of continuing changes they will wander at the management stage. There will be little shift to the progress (impact) stage and it is possible the reform implementation will cease at the stage 3 “management”.

If these situations do not change, many implementers will inevitably eventually return to self concerns or no concerns about the reform implementation. Administrators and facilitators should make concern-based interventions to help those engaging in the reform with the details and mechanics of implementing the reform so as to make the reform work more smoothly and effectively. For example, provide professional development learning programmes, make resources available, as well as offering greater autonomy and effective communication, etc. Such interventions will increase the educators’ efficacy and assist them to focus more attention on the reform’s needs, so that they can focus on rethinking the process and methods of the reform and adopt new implementing skills and practices more readily. In this way, the administrators and facilitators can continually adjust interventions, based on the current diagnostic results, to create the most desirable context for the effectual and high-quality implementation of the reform. In turn, these appropriate interventions will lead the educators to move more quickly, resolve lower stages of concern and promote the educators’ effectiveness, growth and development to a higher stage.

Stage 4 “consequence” focuses on the connections between the reform and the students, and evaluates the performances, competencies and changes required in strengthening the students’ outcomes. It illustrates that the educators have concerns about the consequences of using the reform to influence the students. Stage 5

“collaboration” deals with how to properly work, coordinate and cooperate with peers in relation to the reform. Lastly, Stage 6 “refocusing” shows that the educators’ foci shift to the exploration of wider benefits from the reform and may have some ideas about the possibility of replacement or revision with more powerful alternatives that would make the reform work even better (Hall et al., 1977 and 2001).

Many combinations of concerns can be observed from the measurements of the SoC data and the interpretation of the SoC profiles. For example, educators teaching in the CCMTC show higher intense concerns at the management stage, while the other stages are also high (refer to Figure 4-5). If an individual is a less experienced educator, he/she will have some unsolved logistics and task problems. He/she may have more concerns at the personal stage on how to survive in the process of the reform implementation and receive a promotion or tenure. If an individual is truly a master, experienced educator and also has higher intense concerns at the management stage, it means that he/she is a first year or a despairing implementer in the reform. However, he/she may have second higher intense concern at the consequence stage on how to implement the reform to affect his/her students.

In this case, once the SoC profiles have been analyzed and ascertained, the intervention work can start. Some appropriate interventions will be able to eliminate doubts and stimulate educators toward more advanced implementation of the reform. Therefore, the use of the CBAM concepts clarifies the implementation dip and the research findings will systemically facilitate the reformers thinking to learn more about the reform process and plan for future interventions. The use of the CBAM may explain, reveal and even predict many barriers that are confronted during the process of the reform. If this is the case then the reformers are able to fix them and, more importantly, prevent their creation in the first place (Hall et al., 2001).

4.7 Summary

This chapter sought to uncover the degree of the expressed concern of educators at the Taiwanese MET institutes. It indicates the degree of forward progress when the educators implement the educational reform. Initially, after the individuals lower stage concerns (for example, self concerns) have been satisfied, they will move to the higher stages of concern (task concerns and/or impact concerns, for example). On the contrary, if the participants' lower stage concerns can not be satisfied, they will probably refuse to adopt and implement the innovation at the early stages. This approach provides a key diagnostic tool to understand the situation of the educators' involvement activities in Taiwan, and can offer useful feedback to facilitate administrators enforcing the MET educational reform.

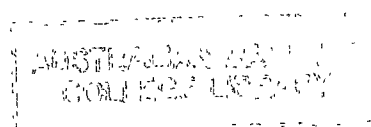
In the chapter, Fuller's concerns theory and Hall's Stages of Concern Model have been shown to be applicable in the implementation of the STCW educational reform. The exploration of the demographic information (for example, institute, STCW reform experiences with teaming, STCW seminar attendance; see Appendix II) attached to the SoC Questionnaire has also provided some useful profiles to interpret the Stages of Concern tendencies in Taiwan. This includes the respondent's institutes, professional development by workshop attendance, experience in participating in the reform, etc. Hence, cross-tabulations, the SoC profiles and correlation of the intense stages of concern with the demographic variables were measured and documented to increase the validity of this study.

As described in the chapter, the observed SoC profiles were carefully examined and interpreted after developing an understanding of the predictions of Fuller's concerns theory and studying the SoCQ technical manual. One of the keys to interpreting the SoC profile is to look at the overall shape of the profile which served as an initial

construct of the reference and are interpreted by combining the full definitions of each stage presented in the SoCQ technical manual (see Appendix I). However, there is always more to be learned by interpreting the SoC profiles appropriately.

An important restriction needs to be considered even though the SoC questionnaire is initially designed for and is intended to rigidly employ a clinical analysis of the individuals involved in the process of the reform implementation. It should not be used for the purposes of examining or evaluating an individual's competence. A personality assessment should not be and cannot be accomplished with the SoC questionnaire and no attempt should be made to do so (Hall et al., 1977). For example, the stage scores and profile look irregular in the case of the extremely high intensity concerns at all stages displayed in Figure 4-5. It implies that some educators lack willingness or capacities to discriminate the difference among the sources of concerns about the reform. But, those concerns are neither good nor bad. They only relate to the reform in question, which means that some kind of intervention and assistance should be addressed to both individuals and organizations so as to help them to gradually understand and become skilled and competent in the use of the reform.

Finally, Hall and Hord (2001) asserted, that successful change starts and ends at the individual level, and the framework of an entire organization's change was constructed on the changes of each member. In this case, if the reform process is appropriately introduced, carefully facilitated and intervened, the educators' stages of concern will move from the self concerns (stages 1 and 2) to the impact concerns (stages 4, 5 and 6) in an orderly manner. It means that the concerns are focusing on how to improve the impact of the reform on the students, and the educators will move towards more advanced reform usage. The analysis of the SoC profiles provides abundant clues to illustrate movement and non-movement during the reform



process, consequently reform administrators and facilitators are advised of the need to be continuously involved and engaged in monitoring and adjusting the stages of concern of all STCW participators.

Chapter 5

Relationships between Demographics, Expectancy, Professionalism, and Educators’ Stages of Concern

Chapter 5 Relationships between Demographics, Expectancy, Professionalism, and Educators' Stages of Concern

5.1 Introduction

This chapter examines the extent to which the expectancy values and professionalism are related to the educators' Stage of Concern with the process and methods of the reform implementation. A series of data statistical analysis procedures are employed to identify the degrees of individuals' expectancies and professionalism that affect the intensity of individuals' concerns during the MET educational reform. A multiple regression procedure is also adopted to summarize the linear relationships between the demographic variables, the expectancy values, professionalism and the stages of concern. The statistical analysis tool SPSS 10.0 for Windows is used to analyze the data.

The data collected from the expectancy values and professionalism surveys are analyzed using descriptive, correlational and inferential statistics as well as a multivariate analysis to link the empirical evidence and findings to the corresponding third and fourth research questions. A factor analysis, item-total correlation and coefficient alpha (Cronbach, 1951), are used to examine the validity and reliability of the professionalism and expectancy scales. The frequencies and means are calculated to reflect the values of diverse levels of professionals' performance in the STCW reform implementation. The statistically significant differences about the educators' Stages of Concern are related to their professionalism, expectancy, and demographics are also taken into consideration. The correlation and regression

analyses are used to examine the relationships between demographic information, professionalism, expectancy variables and stages of concern. This facilitates interpreting the degree of intercorrelation between demographics, professionalism, expectancy and stages of concern, as well as identifying the significance of those independent variables as potential predictors of the stages of concern. By using this approach the assumed influencing factors, such as expectancy, professionalism, and demographics, are integrated into the whole construct to explore how they affect Taiwanese MET educators' stages of concern about the STCW reform implementation.

5.2 Expectancy Values versus Stages of Concern about the STCW Reform Implementation

The third research question is concerned with the relationship between the expectancy values and the stages of concern.

As a main goal of a MET institute is to attain and continuously retain high levels of performance and achievement from its work force, it mainly relies on the ability, motivation and concerns of the work force within the institute (Ilgen, et al., 1981). In 1964, Vroom published a book entitled "Work and Motivation" that played a seminal role in developing interest in the possible application of social psychology on work motivation. There has been considerable amount of both theoretical and empirical attention paid to expectancy-type models of work motivation since Vroom's proposition (for example, Port and Lawler, 1968, Straw, 1976; Zedeck, 1977). Most of these efforts have sought to investigate the characteristics of individuals and organizations that influence valence, instrumentality and expectancy beliefs, or to interrogate the types of conditions within which expectancy-type predictions of work motivation can be expected to apply (Locke, 1975). To

successfully understand what influences the implementation of the reform, probably the most popular approach to work motivation among organizational individuals has been that which is referred to as Expectancy Theory (valence, instrumentality, and expectancy). It seeks to understand individual motivations so that ways to influence their motivations can be developed. In this study, nine items are used to examine the expectancy values of the respondents about the STCW reform (based on Vroom's theory, 1964). For the unidimensional scales, a factor analysis is employed to explore possible subdimensions within the group-selected items and to verify the number of separate components. Thus, a factor analysis and Cronbach's alpha are used to examine the validity and reliability of the expectancy scale. The principal component factor analysis of the nine expectancy items yields three factors by using a varimax rotation so as to produce the most interpretable solution (Cooksey, 1997; Lo, 1997).

Generally speaking, a correlation value level above $\pm .40$ is adopted to identify those variables relatively highly correlating with each factor (Cooksey, 1997; Hair, Anderson, Tatham & Grablovsky, 1984). If the loading value is $\pm .50$ or greater/less, they are considered even more significant (Lo, 1997). Hence, in this nine expectancy items factor analysis the sharing relationship between each item in the factors is summarized, and a correlation-value-level above $\pm .50$ is adopted to identify those variables most highly correlated with each factor. The related output statistical value, eigenvalue, summarizes how much variance each factor explains out of the total available. If all items are ideally correlated, they could generate a single factor with an eigenvalue equal to the number of items. Conversely, if the items do not correlate with one another, they will simply mirror the variance of the original items, and each eigenvalue will be equal to 1.0. Finally, the assessment of internal consistency reliability, Cronbach's alpha, is also applied to calculate the overall reliability of the scale. In general, the accepted levels of reliability are in the range between .60 and .80 for research-designed scales (Cooksey, 1997; Lo, 1997). Accordingly, an

accepted value level of the reliability (Cronbach's alpha) above .60 is adopted in the analysis. Table 5-1 illustrates the matrix of the factor loading from the nine-item expectancy values.

Table 5-1 Principal component analysis of all expectancy values with varimax rotation

Subscales/Items	Mean	SD	Factor Loading		
			F1	F2	F3
<u>Valance</u>					
1. I am serious about the innovation	4.37	.72	.92	.24	.00
2. I am very concerned about the innovation	4.40	.69	.90	.24	.14
3. I am very interested in the innovation	3.98	.93	.84	.32	.18
<u>Instrumentality</u>					
4. I think adoption of the innovation will improve the quality of teaching	4.12	.82	.27	.89	.18
5. I think adoption of the innovation will enhance the quality of the faculty members	4.05	.81	.25	.86	.00
6. I think adoption of the innovation will benefit our students	4.18	.80	.26	.86	.12
<u>Expectancy</u>					
7. I think this innovation will be implemented successfully	3.71	.84	.00	.00	.91
8. I think most faculty members will adopt this innovation.	3.82	.94	.00	.00	.82
9. I think this innovation will achieve the expected goals	3.57	.86	.21	.30	.78
Variance explained			48.90%	20.47%	12.51%
Eigenvalue			4.40	1.84	1.13
Cronbach's alpha			.91	.90	.80
Total variance explained			81.89%		

The first three items (1, 2 and 3), focusing on factor 1, have a high correlation with valence. The second set of three items (4, 5 and 6), focusing on factor 2, correlates with instrumentality. Factor 3 is defined by the third set of three items (7, 8 and 9) and correlates with expectancy. The three-factor solution explains 81.89 percent of the total variance, which shows that all items are strongly correlated with each other.

Furthermore, Table 5-1 indicates that the respondents tend to agree with all nine items. The greatest agreement relates to the two statements: “I am very concerned about the innovation” (Mean = 4.40, SD = .69) and “I am serious about the innovation” (Mean = 4.37, SD = .72). The respondents also strongly agree with the two statements: “I think adoption of the innovation will benefit our students” (Mean = 4.18, SD = .80) and “I think adoption of the innovation will improve the quality of teaching” (Mean = 4.12, SD = .82).

Reference to Tables 5-1 and 5-2 shows the first factor, Valence, accounts for 48.90 percent of the variance (Eigenvalue = 4.40, Cronbach’s alpha = .91). It contains the following three items: 1) I am very concerned about the innovation; 2) I am serious about the innovation; 3) I am very interested in the innovation. The three items are added and divided by three to form a subscale of “Valence” (Mean = 4.25, SD = .73).

Table 5-2 Valence, instrumentality and expectancy statistics data on 95 Taiwanese maritime educators involved in STCW reform

Expectancy values	Mean	SD	Cronbach’s alpha	Correlation (Pearson-γ)	Variance explained
Valence	4.25	.73	.91	.89	48.90%
Instrumentality	4.13	.73	.90	.87	20.47%
Expectancy	3.70	.75	.80	.84	12.51%

Source: Derived from Table 5-1 Principal component analysis of all expectancy values with varimax rotation

The second factor, Instrumentality, contains the following three items (Eigenvalue = 1.84; 20.47% of variance; Cronbach’s alpha = .90): 4) I think adoption of the innovation will benefit our students; 5) I think adoption of the innovation will

improve the quality of teaching; 6) I think adoption of the innovation will enhance the quality of the faculty members. The three items are added and divided by three to constitute a subscale of “Instrumentality” (Mean = 4.13, SD = .73).

Expectancy is the third factor and includes three items (Eigenvalue = 1.23; 12.51% of variance; Cronbach’s alpha = .80): 7) I think this innovation will be implemented successfully; 8) I think this innovation will achieve the expected goals; 9) I think most faculty members will adopt this innovation. The three items are also added and divided by three to construct a subscale of “Expectancy” (Mean = 3.70, SD = .75).

As shown in Table 5-2, the nine items are useful to measure the expectancy value constructs. The highest mean of all respondents is the valence (Mean = 4.25, SD = .73), followed by the instrumentality (Mean = 4.13, SD = .73) and the expectancy (Mean = 3.70, SD = .75). Further, the result demonstrates that both data reliability (alpha values vary from .80 to .91) and validity (factor values vary from .84 to .89) are strong for all “expectancy” scales (valence, instrumentality and expectancy).

Discussion

Table 5-2 indicates that the respondents are greatly concerned about the reform (valance subscale’s mean = 4.25) and also strongly agree with adopting the reform which will lead to the desired outcome (expectancy subscale’s mean = 3.70) as well as enhancing the quality of the faculty members (instrumentality subscale’s mean = 4.13). These positive expectancy values characterize the educators’ positive performance and influence their behavior and attitudes to accomplishing the reform. The educators participating in the STCW educational reform believe in themselves, the process and methods of reform implementation and set high achievable goals. According to Vroom’s theory (1964) a high degree of individual expectancy, where

an individual believes that his/her own high endeavors will lead to a high performance, is associated with a high level of instrumentality which reflects the high level of the valence values held about the reform implementation. The result of this study is consistent with Vroom's theory.

A high positive level of consensus among the educators on the measurement of the expectancy (Mean = 3.70) depicts that most of them put their abilities to use intelligently in a sustained effort to implement the reform. The high mean on the measurement of instrumentality (Mean = 4.13) means the high level of the educators' beliefs produce certain high performances and will generate fruitful and valuable outcomes about the STCW reform. In addition, high agreement on the measurement of valence (Mean = 4.25) illustrates those educators have perceived the value of the outcomes of the reform implementation, are satisfied with them and desire more of those outcomes.

Vroom's theory describes that individuals motivations, behaviors and concerns are related to internal beliefs and attitudes. This implies that individuals will continuously engage in a task (for example, reform implementation) while they expect to derive pleasures or rewards from them (Pinder, 1984; Ebmeier, 1999). The high positive levels of the expectancy values enrich the reform implementation. Further, those expectancies will lead to maximum satisfactions with high performance attainments among the educators (Locke et al., 1990).

As a result (see Tables 5-1 and 5-2), the analysis illustrates that the educators think their individual skills and competencies are adequate to achieve the goals and they also believe the application of those skills and competencies will yield the valued outcomes at a given level. Hence, they will create for themselves self-motivation and persist with their endeavors until their performance reaches their goals, even though

they may frequently fail at the tasks. This finding conforms with Vroom's theory as replicated by Locke and Latham (1990).

However, in spite of obtaining generally positive results from the respondents, there are still certain limitations which should be noted. Namely, repeated successful experiences in the reform are conducive to increasing the educators' attraction and commitment towards a previous task or a higher task, yet continual failures ultimately decrease the educators' affinities for it (Hall, 1976; Hall & Foster, 1977).

Reference to Tables 5-1 and 5-2 also shows that the educators express high positive agreement about the reform's norms, values and rewards structures. This means it is clear what the educators are expected to do to accomplish the reform successfully (expectancy) and it also means these educators will be more motivated and more likely to participate in the reform team (valance) thus enhancing their teaching qualities and benefiting the students (instrumentality). These high expectations are related to achievement of the goals, for example, achieving the STCW reform implementation.

A well-designed goal for such an expectation embraces purposes, dispositions, objectives, deadlines, and tasks/missions that individuals should undertake and be achievable (Locke & Latham, 1990). Such goals underpin the openness and dynamism of the educators' work and career which is also important to maintain the educators' high expectations.

The results of this analysis demonstrate that respondent educators seem satisfied with the context of reform implementation and they would like to take into account their own abilities, skills and cultural values. They are also very pleased to adjust their

career stages or individual contributions to implement, sustain and improve this global maritime standard – the STCW 95 Convention.

Earlier research (Kelley & Protsik, 1997; Klein, 1988; Locke, Fredrick, Buckner & Bobko, 1984; Wood & Locke, 1987) concluded that expectancy theory would not only reflect performance but also significantly affect the attainment of the goals. The relationship between performance (for example, the intensity concern related to the reform implementation) and goal (for example, the STCW educational reform implementation) would be strong for those with high expectancy values of success, and conversely weak for those with low expectancy values of success (Locke et al., 1990). Even though the goal is assigned or chosen from the top-down (authority), the individuals with high expectancy values will still exhibit positive performances and high intense concerns to achieve the tasks. This is usually associated with better consequences and outcomes.

5.3 Professionalism versus Stages of Concern about the STCW Reform Implementation

The fourth research question is concerned with the relationship between professionalism and the stages of concern.

The main features of professionalism are the retention of a knowledge base, a level of autonomy, self-governance and accountability, as well as a strong orientation toward service, and commitment to the employer and customers welfare (Strike, 1990). The level of professionalism at which the educators actually function will influence the process of the reform implementation. A higher level of professionalism will yield better decisions and a higher level of practice in

implementing the reform, and consequently will best serve and sustain the administrators’ and/or the customers’ interests.

In this study, 12 items are used to measure the respondents’ professionalism relating to the process and methods of the reform implementation. Table 5-3 illustrates the matrix of factor loadings from the 12 professionalism items.

Table 5-3 Summary of reliability estimates on professionalism items

Item	Mean	SD	Factor loading
1. Having a job that is valuable and essential to my community	4.35	.77	.70
2. An opportunity for originality and initiative	4.43	.84	.71
3. Full use of my abilities and training	4.54	.81	.69
4. Opportunities to learn new skills and acquire new knowledge	4.54	.83	.70
5. Getting ahead in my professional career	4.12	.96	.81
6. Working in a well-known and respected college	4.26	.88	.67
7. Respect for the ability and competence of co-workers	4.60	.72	.66
8. Opportunities to have an influence on public thinking	4.19	.96	.80
9. A supervisor who appreciates the time I spend improving my capabilities	3.71	1.08	.56
10. Freedom from continual close supervision of my work	4.33	.86	.55
11. A job that makes my college different in some ways because I work for it	3.71	1.01	.61
12. Having influence on important decisions	3.47	1.06	.65
Cronbach’s alpha			.89
Total variance explained			67.91%

Table 5-3 shows that the professionalism items 1, 2, 3, 4, 5, 6, 7, 8 and 10, which reflect nine job characteristics, are seen as very important by the respondents.

The study also used factor analysis and Cronbach’s alpha to examine the validity and reliability of the professionalism scale. The principal component factor analysis of

the 12 professionalism items yields one factor by using a varimax rotation. A correlation value level above $\pm .50$ is adopted to identify those variables which most highly correlate with each factor. The factor solution accounts for 67.91 percent of the total, which also indicates all items are strongly correlated. Following the Windahl and Rosengren (1978) approach the 12 items are added and divided by 12 to form an overall measurement of “professionalism” (Mean = 4.22, SD = .58).

This approach is valid because all of the items have substantially high item-total correlations (from .55 to .81) and the Cronbach’s alpha reaches .89 (above the acceptable level .6 of this analysis). As both data validity and reliability are strong for all “professionalism” scales, the questionnaire items are valuable for appraising the construct of professionalism.

Discussion

Reference to Table 5-3 shows the professional values given the higher ratings by the respondents are concerned with self-improvement and professional development. The respondents tend to view “full use of my abilities and training,” “opportunities to learn new skills and acquire new knowledge,” and “an opportunity for originality and initiative” as very important. It appears that the respondents agree that personnel professionalism is a pre-requisite which will lead to a growth of knowledge and practices associated with the reform. It is the improvement of the individual’s capacity to transform this knowledge and practice effectively into action which aids the implementation of the reform. Additionally, respondents strongly agree that a high individual level of professionalism of educators will influence public thinking and decisions about the reform. It implies a familiarity with the pre-requisites and content of the STCW educational reform as a result of the educators’ high levels of professionalism and an ability to fully use their capabilities to find ways to succeed

in their own professional careers that they may not otherwise have found. The success of the educational reform implementation may be much affected by the individual educators, thus high levels of professionalism have considerable positive influence on the success of reform implementation.

Reference to Table 5-3 shows the respondents also strongly agree that a professional approach to the activities of the reform is essential to get ahead in a professional career. Further, it shows that professional educators support the good practices of their colleagues, respect the ability and competence of their co-workers and contribute their efforts and intelligence towards educational concerns outside the classroom thus benefiting the institute by, for example, gaining a sound MET innovational reputation for the institute.

In other words, educators possessing high levels of professionalism with the reputation of being experts will self-govern to implement the reform successfully. They will also improve their knowledge, skills and capabilities by participating in the reform programme and experiences. In addition, as a result of their substantial and significant professional activities, they appear to be more interested in group work and cooperative procedures in the MET innovation.

The highest respondent rating of the professional values (see Table 5-3) is related to “respect by co-workers/persons for his/her ability and competence”. Does the phenomenon show that respect by co-workers/persons is the central principle of professional practice? This is another issue for further studies.

5.4 Relationships between Expectancy Values, Professionalism, Demographics and Educators' Stages of Concern about the STCW Reform

The most commonly used technique in measuring the degree of relationship between two variables is the Pearson Product Moment Correlation, usually symbolized as “ γ ”. The ranges of Pearson correlation vary between +1.00 and -1.00. A correlation coefficient γ of +1.00 signifies an ideal positive correlation, which means that two variables are entirely covariant. A Pearson coefficient “ γ ” of -1.00 represents an ideal relationship in the negative trajectory. The lowest value of the correlation coefficient “ γ ” is 0.00, which expresses absolutely no relationship between two variables. The strength of the two variables’ relationship relies on the number and must be interpreted in terms of absolute value. In general, a moderate or substantial relationship between two variables occurs when the “ γ ” value is a number from .40 to .70. A very high relationship between two variables occurs when “ γ ” is between .71 to .90 (Babbie, 1986; Cooksey, 1997; Lo, 1997; Wimmer et al., 1983). As to validity coefficients (γ) between .20 and .39, this range is also useful to show that there is a correlation between two variables which can assist in making decisions. (Taylor and Russell, 1939 and 1953; Berliner, 1990). For example, if $\gamma = +.50$, then γ^2 (coefficient of determination) = .25. It illustrates that one variable explains 25% of the variation in the other. The corresponding value of the correlation coefficient $\gamma = +.50$ provides the sign “+” as additional information to show that the relationship between the two variables is in the positive trajectory.

In order to determine the statistical significance of this analysis, a probability level, also known as a significance level, is set up to test against the null hypothesis. The significance level is expressed by letter “p” and set at a level less than or equal to .05, .01 or .001. For example: $p \leq .05$ indicates that the null hypothesis is being

tested at the .05 level of the significance. If the probability is lower than or equal to this level, this null hypothesis is acceptable as well as statistically significant. The limits of the region, where the null hypothesis is rejected, are defined by the significance level. As the type of predication in this study is in either a positive or negative direction, a two-tail-test is applied to predict if the results of the region of rejection fall into both directions. Further, an association at the .05 level is significant in social research studies meaning that an association as large as the observed one cannot be expected to result from sampling error more than 5 times out of 100. Therefore, a series of Pearson Product Moment correlations are used to examine the relationships between the expectancy values, professionalism, demographics and the maritime educators' stages of concern about the STCW reform. The statistical norm concerning the validity of coefficient " γ " that has been adopted in this analysis is above $\pm .20$ to show the correlation between two variables. The probability level " p " (significance level) is lower than or equals to the .05 level of the significance to determine the statistical significance of coefficient " γ ". The results are summarized in Table 5-4.

The primary focus of this study is to address the educators and their needs to understand and support the process and methods of reform implementation. The model used seeks to uncover the changes in individuals' concerns, adoption and development of those new practices and relate them to individuals' expectancy values and professionalism. This section seeks to articulate the relationship between the expectancy values, professionalism and stages of concern in the STCW reform implementation process for those who need to guide and support individuals in their reform implementation endeavors.

Table 5-4 Correlations between Stages of Concern, demographic variables, valence, instrumentality, expectancy and professionalism

DEMOGRAPHICS, EXPECTANCY VALUES AND PROFESSIONALISM vs. STAGES OF CONCERN							
Independent Variables \ Dependent Variable	Awareness	Informational	Personal	Management	Consequence	Collaboration	Refocusing
Institute	-.05	-.03	-.04	-.71**	-.30**	-.00	-.40***
Teaching Discipline	-.17	-.02	.05	.11	.13	.09	.20
Academic Rank	.01	-.10	-.09	-.12	-.09	-.06	-.04
Age	-.11	-.14	-.17	.11	.02	.01	.14
Highest Degree Earned	.11	-.16	-.20	-.23*	-.24*	.07	-.22*
Years of Teaching	-.03	-.04	-.09	-.07	-.05	.04	.11
Years of STCW Experience	-.24*	-.01	-.09	.09	.32**	.43***	.21
STCW Seminar Attendance	.26*	-.01	-.08	.01	-.04	-.25*	-.18
Valence	-.46***	.45***	.57***	-.11	.43***	.64***	.26*
Instrumentality	-.32**	.12	.19	.01	.23*	.42***	.25*
Expectancy	-.10	.22*	.26*	.03	.20	.28**	.21*
Professionalism	-.15	.20	.23*	.29**	.24*	.25*	.42***

(numerical unit: Pearson correlation coefficient)

Remark:

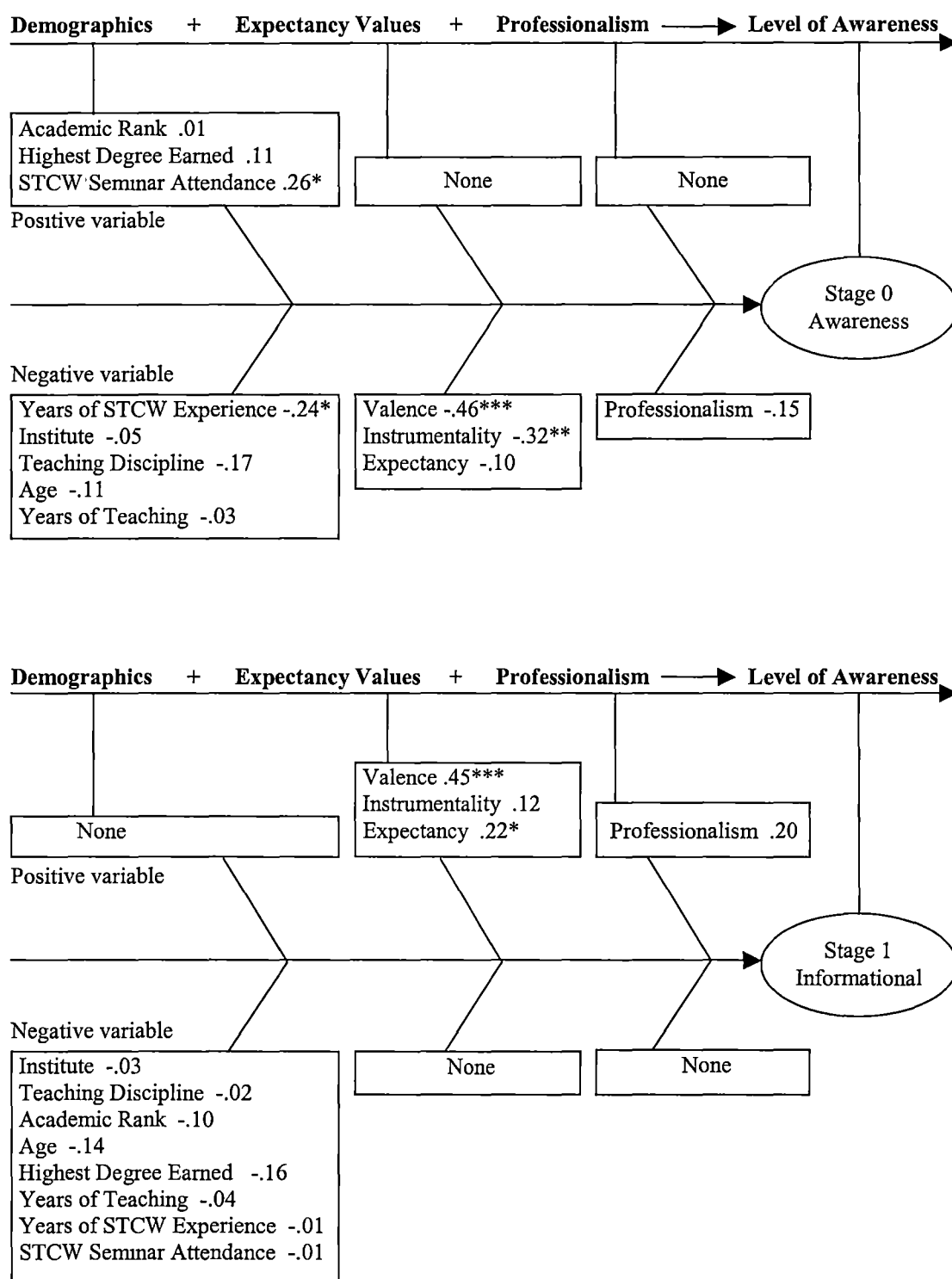
*. statistically significant when p-value (alpha error probability level) < .05

**. p-value < .01, higher level of significant association

***. p-value < .001, highest level of significant association

Note: An association significant at the .05 level indicates that an association as large as the observed one could not be expected to result from sampling error more than 5 times out of 100, and so on.

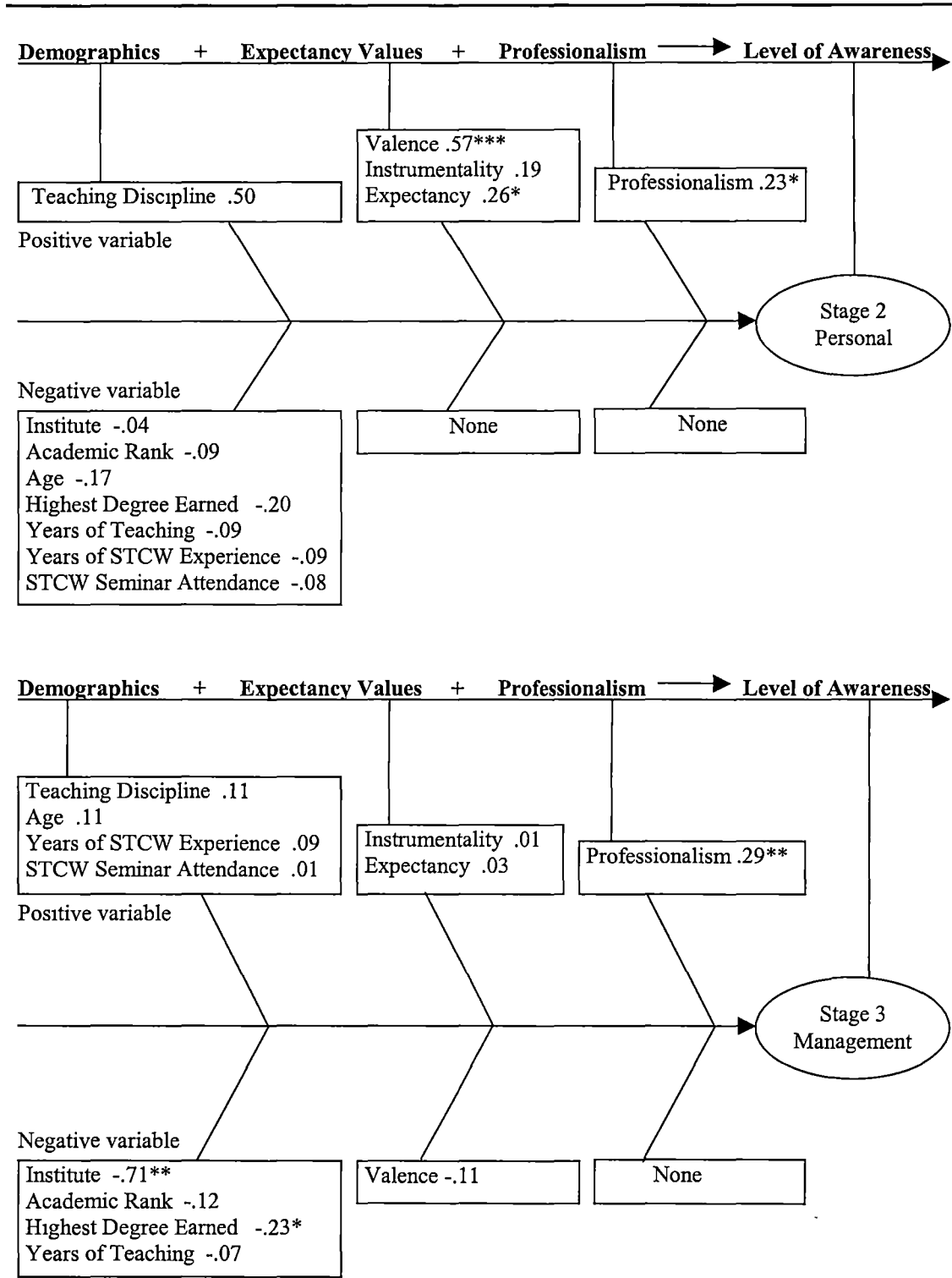
To clarify and better understand the data in Table 5-4, diagrams derived from the table illustrate the relationships between the individuals' expectancy values, professionalism, demographics, and stages of concern. These relationships are shown in Figures 5-1(a) to 5-1(d).



(* . $p \leq .05$, statistically significant; ** . $p \leq .01$, statistically higher significant, *** . $p \leq .001$, statistically highest significant)

Figure 5-1(a) Correlations between demographics, expectancy values and professionalism versus seven Stages of Concern

Source: Derived from Table 5-4 Correlations between Stages of Concern, demographic variables, valence, instrumentality, expectancy and professionalism



(* p ≤ .05, statistically significant; ** p ≤ .01, statistically higher significant; ***. p ≤ .001, statistically highest significant)

Figure 5-1(b) Correlations between demographics, expectancy values and professionalism versus seven Stages of Concern (continued)

Source: Derived from Table 5-4 Correlations between Stages of Concern, demographic variables, valence, instrumentality, expectancy and professionalism

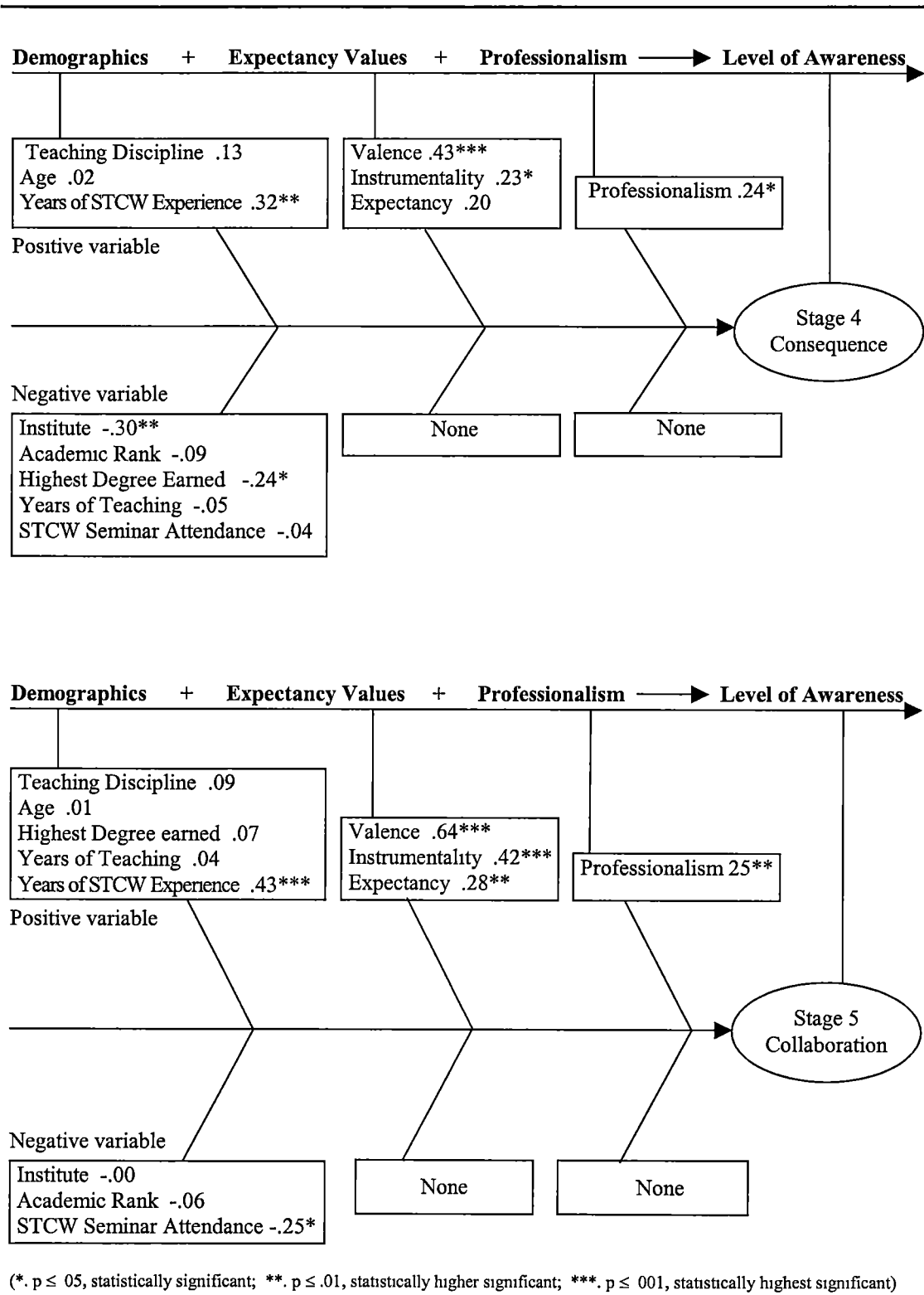


Figure 5-1(c) Correlations between demographics, expectancy values and professionalism versus seven Stages of Concern (continued)

Source: Derived from Table 5-4 Correlations between Stages of Concern, demographic variables, valence, instrumentality, expectancy and professionalism

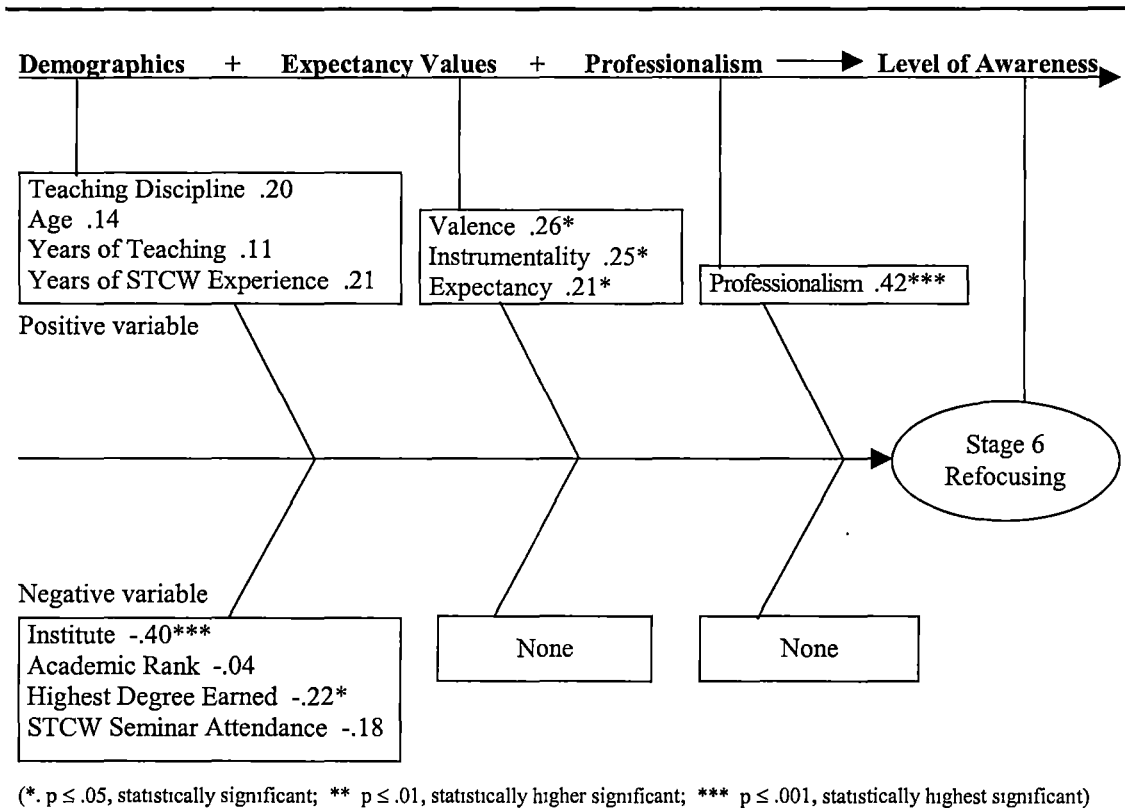


Figure 5-1(d) Correlations between demographics, expectancy values and professionalism versus seven Stages of Concern (continued)

Source: Derived from Table 5-4 Correlations between Stages of Concern, demographic variables, valence, instrumentality, expectancy and professionalism

5.4.1 Interrelationship between Expectancy Values and Educators’ Stages of Concern

As indicated in Table 5-5, valence is significantly but negatively related to awareness ($\gamma = -.46, p < .001$) indicating those who have higher levels of valence tend to have lower levels of awareness concerns. Furthermore, valence is positively related to the informational ($\gamma = .45, p < .001$), personal ($\gamma = .57, p < .001$), consequence ($\gamma = .43, p < .001$), collaboration ($r = .64, p < .001$), and refocusing ($\gamma = .26, p < .05$) indicating that those who have higher levels of valence are more likely to have higher levels of concerns with these five stages.

Table 5-5 Correlation between expectancy values (valence, instrumentality and expectancy) and Stages of Concern

<p style="text-align: center;">EXPECTANCY VALUES (VALENCE, INSTRUMENTALITY AND EXPECTANCY) vs STAGES OF CONCERN</p>							
Dependent Variable Independent Variables	Awareness	Informational	Personal	Management	Consequence	Collaboration	Refocusing
Valence	-.46***	.45***	.57***	-.11	.43***	.64***	.26*
Instrumentality	-.32**	.12	.19	.01	.23*	.42***	.25*
Expectancy	-.10	.22*	.26*	.03	.20	.28**	.21*

(numerical unit: Pearson correlation coefficient)

*. statistically significant when p-value (alpha error probability level) < .05

**. p-value < .01, higher level of significant association

***. p-value < .001, highest level of significant association

Source: Derived from Table 5-4 Correlations between Stages of Concern, demographic variables, valence, instrumentality, expectancy and professionalism

Table 5-5 indicates that instrumentality is negatively related to awareness ($\gamma = -.32$, $p < .01$), but is positively correlated with consequence ($\gamma = .23$, $p < .05$), collaboration ($\gamma = .42$, $p < .001$), and refocusing ($\gamma = .25$, $p < .05$). These results indicate that the respondents who have higher levels of instrumentality are more likely to have lower levels of awareness concerns, but tend to have higher levels of concerns at the consequence, collaboration and refocusing stages.

Table 5-5 also shows that expectancy is positively related to four of the seven stages of concern, indicating the respondents who have greater expectancy are more likely to have greater concerns at the informational stage ($\gamma = .22$, $p < .05$), personal stage ($\gamma = .26$, $p < .05$), collaboration stage ($\gamma = .28$, $p < .01$), and refocusing stage ($\gamma = .21$, $p < .05$).

Intensity of educators' SoC according to expectancy values

Table 5-1 indicates that the respondents strongly agree about the value of achievement (outcomes), known as valence. It also reflects that they have positive feelings which will be attached to their students' performances and the reform consequence.

In conformity with Vroom's theory (1964), the high valence of respondents may reflect the value of different levels of an individual's performance to a department or the institute. The level of performance is one of the most important outcomes that follow from the educator's reform efforts. It can be used to better understand his or her motivation, satisfaction, persistency, and concerns in the reform.

As shown by the valence rating of the responses (refer to tables 5-1 and 5-2), the educators are strongly concerned about the educational reform. As such, they will be motivated to perform highly whilst implementing educational reform. Further they will contribute their actions and create self-stimuli to persist in their endeavors for better reform implementation until their anticipated performances are achieved. Reference to Figures 5-1(a) to 5-1(d) shows the educators with high levels of positive valence are significantly related to informational, personal, consequence, collaboration, and refocusing concerns (stages 1, 2, 4, 5 and 6). However, their valences are negatively related to the awareness concerns (stage 0) and there is no statistically significant difference in the management concerns (stage 3).

Tables 5-1 and 5-2 also show that the respondents agree about the value of the outcome, known as "Instrumentality". As such, they believe that they will achieve desirable consequences if the individual's efforts are put into the sustained effort of educational reform. The results of using the items' means reveal that the educators

have high concerns about contributing their efforts to the reform, as they want to improve their teaching quality, benefit the students and enhance the quality of the faculty or the institute. This is consistent with Vroom's theory. Reference to Figures 5-1(a) to 5-1(d) indicates that educators with high levels of positive instrumentality are significantly related to consequence, collaboration, and refocusing concerns (stages 4, 5 and 6). However, their instrumentalities are negatively related to the awareness concerns (stage 0). It is noticeable that there is no statistically significant difference in informational, personal, and management concerns (stages 1, 2 and 3).

As shown in Tables 5-1 and 5-2, the expectancy rating is still high among the respondents. It shows that they believe a certain level of performance can be achieved by intelligently putting their abilities into sustained efforts in the given reform implementation process.

In conformity with Vroom's theory (1964), the educators who realize the connection between their individual efforts and the desired consequences are motivated to express their higher concerns by the promise of rewards for implementing the MET educational innovation. Such rewards include the students' better outcomes, the improvements of teaching quality, the recognition of their abilities, promotions, opportunities etc.

The result of using the items' means (refer to Tables 5-1 and 5-2) reveals that the educators have high concerns about contributing their efforts to the reform, as they want to successfully implement the reform, achieve the expected goals and collectively share the expected consequences. Moreover, they are confident that their competencies, knowledge, and abilities will accomplish the tasks of the MET reform. They further have the self-reliance to facilitate the students achieving the higher levels required by the STCW 95 standards. Reference to Figures 5-1(a) to 5-1(d)

shows the educators with high levels of positive expectancies are significantly related to informational, personal, collaboration, and refocusing concerns (stages 1, 2, 5 and 6). However, their expectancies do not have statistically significant differences at the awareness, management, and consequence concerns (stages 0, 3 and 4)

In summary, the analysis of the results shows that there is, in general, a statistically significant relationship between expectancy (including valence and instrumentality) and the maritime educators' stages of concern about the STCW reform. The exception to this generalization is at the management stage of concern where there is no statistically significant relationship. The Taiwanese educators generally exhibit high positive valence, instrumentality, and expectancy relating to the stages of concern about this innovatory project.

5.4.2 Interrelationship between Professionalism and Educators' Stages of Concern

A series of Pearson Product Moment correlations were used to examine the relationship between the professionalism and the maritime educators' stages of concern about the STCW reform.

As shown in Table 5-6, the correlations indicate that professionalism is positively related to the personal ($\gamma = .23, p < .05$), management ($\gamma = .29, p < .01$), consequence ($\gamma = .24, p < .05$), collaboration ($\gamma = .25, p < .05$) and refocusing ($\gamma = .42, p < .001$) stages. It appears that the respondents with a higher level of professionalism tend to have greater concerns at these five stages.

Table 5-6 Correlation between professionalism and Stages of Concern

PROFESSIONALISM vs STAGES OF CONCERN							
Dependent Variable Independent Variable	Awareness	Informational	Personal	Management	Consequence	Collaboration	Refocusing
Professionalism	-.15	.20	.23*	.29**	.24*	.25*	.42***

(numerical unit: Pearson correlation coefficient)

- *. statistically significant when p-value (alpha error probability level) < .05
- **. p-value < .01, higher level of significant association
- ***. p-value < .001, highest level of significant association

Source: Derived from Table 5-4 Correlations between Stages of Concern, demographic variables, valence, instrumentality, expectancy and professionalism.

Intensity of educators’ SoC according to professionalism

Table 5-3 (p.153) indicates that the educators in Taiwan respond very strongly to the concepts of professionalism. It indicates that they have utilized their professional capacities to implement and take advantage of the reform-related available opportunities throughout. A higher-educated educator with a higher level of professionalism can be referred to as an educator with both expertise and professionalism (Beaty, 1996). Taiwanese educators’ involvements are not just related to updating their practical skills and their implementing disciplines, but also to their abilities to apply themselves to the reformed subjects, their students’ performances and the reform consequences in order to comply with the diverse requirements within the STCW Convention. Beyond this, they are able to integrate their knowledge and practical skills to implement the reform so as to improve the students’ outcomes.

Reference to Figures 5-1(a) to 5-1(d) shows the educators with high levels of positive professionalism are significantly related to personal, management, consequence, collaboration and refocusing concerns (stages 2, 3, 4, 5 and 6). However, there are no statistically significant differences in the awareness and informational concerns (stages 0 and 1).

In summary, the analysis of the results shows that there is, in general, a significant relationship between professionalism and the maritime educators' stages of concern about the STCW reform implementation. The exception to this generalization is at the awareness and informational stages of concern where there is no statistically significant relationship. The educators in Taiwan generally exhibit high positive professionalism relating to the stages of concern about this innovatory project.

5.5 Relationships between Demographics, Expectancy Values, Professionalism and Educators' Stages of Concern According to the Multiple Regression Analysis

In order to gain further insight into the relationships between demographic variables, expectancy values, professionalism and the stages of concern, a separate multiple regression analysis has been performed for each of the seven stages of concern. A multiple regression procedure summarizes the linear relationship between two or more independent variables (predictors) and a single dependent variable (criterion) by creating a mathematical formula. This describes how information from the predictor variables can be used to calculate the predictions for the criterion. Theoretically, any number of independent variables can be involved as long as the sample size is sufficient.

To carry out the multiple regression analysis, the raw scores of all variables should be converted into standardized scores (z-scores) in order that the other scores within the same sample or the scores from the other sample data are comparable. The “+” symbol attaching to a z-score shows it lies above the mean in value, whereas the “-” symbol attaching to a z-score indicates it is below the mean. The results of those converted scores are the standardized regression weights, also known as beta (β) weights. Each β weight reveals how many changes there are in the dependent variable and controls the other variable in the regression model. For example: Beta = .27 means that if one unit of standard deviation is increased anywhere along the specified independent variable’s score with the other independent variables unchanged, we would anticipate a “(.27) \times (1)” standard deviation units increase in the dependent variable’s score. Furthermore, another important value which must also be computed when undertaking a multiple regression analysis is the explained variability and this is denoted by R^2 . The explained variability (R^2) represents the proportion of the variance in the dependent variable that is accounted for by the independent variables. The coefficient, R^2 , may vary from 0 (or 0% variance explained) to 1.0 (or 100% variance explained). The greater the value of R^2 , the better is the explanation of the influence on the prediction of the criterion variable (Hair et al., 1984; Cooksey, 1997). For example: $R^2 = .48$ indicates that 48 percent of the variability in the dependent variable’s score can be explained by this specified independent variable.

Table 5-7 reports the results of the standard multiple regression analysis. In the regression models, the predictor variables include institute, teaching discipline, academic rank, age, highest degree earned, years of teaching, years of STCW experience, STCW seminar attendance, valence, instrumentality, expectancy and professionalism. The dependent variables are the seven stages of concern.

Table 5-7 Standard multiple regression analysis of stages of concern on institute, teaching discipline, academic rank, age, highest degree earned, years of teaching, years of STCW experience, STCW seminar attendance, valence, instrumentality, expectancy and professionalism

STANDARD MULTIPLE REGRESSION ANALYSIS on DEMOGRAPHICS, EXPECTANCY VALUES AND PROFESSIONALISM vs STAGES OF CONCERN							
Dependent Variable Independent Variables	Awareness	Informational	Personal	Management	Consequence	Collaboration	Refocusing
<u>Demographics</u>							
Institute	.06	-.14	-.28**	-.77***	-.42***	-.24*	-.47***
Teaching Discipline	-.16	-.07	-.03	-.07	.09	-.04	.05
Academic Rank	.10	.05	.04	.01	.10	-.07	-.11
Age	.08	-.09	-.07	.11	-.08	.03	-.08
Highest Degree Earned	-.01	-.28	-.18	-.04	-.22	-.05	.05
Years of Teaching	-.13	.04	.00	-.16	.04	.01	.15
Years of STCW Experience	-.16	-.08	-.03	-.07	-.06	.21	.31*
STCW Seminar Attendance	-.03	.09	.04	-.14	.14	.04	.06
<u>Expectancy</u>							
Valence	-.45**	.68***	.86***	.24*	.71***	.76***	.45***
Instrumentality	-.06	-.31*	-.33**	-.15	-.16	-.12	-.12
Expectancy	.07	.13	.10	-.07	-.02	.07	.08
<u>Professionalism</u>							
Professionalism	-.03	.14	.12	.12	.06	.01	.16
Adjusted R²	.19	.32	.51	.48	.39	.47	.40

(numerical unit: standardized multiple regression coefficient)

*. statistically significant when p-value (alpha error probability level) < .05

**. p-value < .01, higher level of significant association

***. p-value < .001, highest level of significant association

Note:

- Figures are Beta weights with all variables in the model.
- Variables coded or recoded as follows:
 - Institute (1 = National Taiwan Ocean University and National Kaohsiung Institute of Marine Technology, 0 = China College of Marine Technology and Commerce);
 - Teaching Discipline (1= navigation and engineering, 0 = fishery);
 - Academic Rank (1= assistant professor, associate professor or professor, 0 = lecturer);
 - Age (1 = under 46, 2 = 46-55, 3 = over 55)
 - Highest Degree Earned (1 = Ph.D., 0 = bachelor or master);
 - Years of Teaching (1 = 1-10 years, 2 = 11-20 years, 3 = over 20 years);
 - Years of STCW Experience (1 = none, 2 = 1 year, 3 = 2 or more years);
 - STCW Seminar Attendance (1 = yes, 2 = no);
 - Valence, Instrumentality, Expectancy (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree);
 - Professionalism (1 = not important at all, 2 = somewhat not important, 3 = neutral, 4 = quite important, 5 = extremely important).

The standardized multiple regression coefficients (Beta weights) reflect the comparative predictive power of each variable after the overlapping effects of the other predictor variables is controlled.

As shown in Table 5-7 (first column), the valence is the only statistically significant predictor of awareness (Beta = $-.45$, $p < .01$), indicating the respondents with a higher level of valence are more likely to have a lower awareness concern. Table 5-7 (second column) also reveals that the valence (Beta = $.68$, $p < .001$) and instrumentality (Beta = $-.31$, $p < .05$) are significantly associated with the informational concerns indicating that those with a higher level of valence and a lower level of instrumentality tend to have greater informational concerns.

At the personal stage (third column), institute (Beta = $-.28$, $p < .01$), valence (Beta = $.86$, $p < .001$) and instrumentality (Beta = $-.33$, $p < .01$) are statistically significant predictors. It appears that the respondents working at CCMTC exhibit higher levels of personal concerns than their colleagues at the other institutes. In addition, the respondents with a higher level of valence and a lower level of instrumentality are more likely to have higher personal concerns.

With regard to the management, consequence and collaboration stages (columns 4-6), the analysis reveals that the institute and valence are both significant predictors, indicating that the respondents teaching at CCMTC with a higher level of valence exhibit greater concerns at these stages. As to the refocusing stage, the institute (Beta = $-.47$, $p < .001$), the years of STCW experience (Beta = $.31$, $p < .05$) and the valence (Beta = $.45$, $p < .001$) are significant predictors, indicating that respondents working for CCMTC, having more STCW experiences and higher levels of valence are more likely to have greater concerns at this stage.

In Table 5-7, the regression analysis reveals that the institute is an important factor for five of the stages of concern. Valence is the most powerful predictor of the maritime educators' concerns about the STCW reform for six of the seven stages of concern in Taiwan. Instrumentality is also a significant predictor for informational and personal concerns. Contrary to expectation however, expectancy and professionalism are not significant predictors of the stages of concern after the overlapping effects of the other variables in the regression models are controlled.

Discussion

1. Can Vroom's expectancy theory be used to predict the educators' stages of concern?

The valence-instrumentality-expectancy theory (Vroom, 1964) predicts that individuals hold suppositions about different types of outcomes. Their activities are triggered on the basis of their perceptions and beliefs.

Based on the high levels of valences shown in Figures 5-1(a) to 5-1(d), the educators in Taiwan believe that the strength of personal efforts and the level of performance are very important. They also believe that these positive valences are valuable and are instrumental in performing the reform well which also conforms with a high level instrumentality. The results reveal that the satisfaction of expectations received from the reform consequences and the determination of the values concerning the reform consequences are positive. This is consistent with the predictions of Fuller's concerns theory in that the educators will have high intense concerns at the impact stage after their different concerns are satisfied. The high negative levels of valences and instrumentalities at the awareness concern stage indicate that these educators prefer avoiding this situation. This finding is also consistent with Fuller's theory in

that the attentions are shifted to the other concerns. The high positive levels of the expectancies, Figures 5-1(a) to 5-1(d) illustrate that the educators believe in their abilities, skills and competencies to be able to achieve the reform criteria. In other words, they are motivated to perform their endeavors during the reform. The high expectancies (including valences and instrumentality) of the educators in Taiwan reflects a valid representation of the reform-related attitudes and behaviors, which tend to have an impact on the stages of concern.

Turning to the results in Table 5-7, it shows that the expectancy is not a significant predictor of the stages of concern. This finding reveals that the incentive (for example, a confidence in the requisite knowledge and ability to accomplish the MET reform successfully) does not simply motivate the educators to be more concerned about the reform. It appears they attach more importance to their intrinsic satisfactions from their tasks than the extrinsic rewards. Therefore, the flexible uses of incentives in the reform are important. Rewards should differ from each other, as what has been rewarded to one individual may not be suited to the others.

2. Can professionalism function as a predictor to predict the educators' stages of concern?

As shown in Figures 5-1(a) to 5-1(d), the results reveal that there is a generally significant relationship between professionalism and the educators' stages of concern about the MET reform in Taiwan. The educators demonstrate very strong positive professional ethics and attitudes relating to the stages of concern. Their professional perceptions causing their desire to learn something new must be accepted. This will allow them to keep up with the criteria of the reform, enhance their own abilities and use the nature and scope of the available resources to accomplish their tasks. In conformity with Fuller's concerns theory, the educators' high-positive level of

professional performance at the management stage and impact stage reflect that they are prone to believe that the reform is valuable so that they are willing to contribute their efforts to its achievement.

Turning to the results in Table 5-7, it shows that professionalism is not a significant predictor of the stages of concern after the overlapping effects of other variables in the regression analysis are controlled. This finding undoubtedly discloses that there are some other factors and professional capacities which influence the educators during the reform; only one of them is professionalism.

The CBAM states that individuals with professionalism may have intense concerns about a reform (Fuller, 1969; Hall & Loucks, 1978). Hence, the educators with a high level professionalism expect to frequently change their teaching approaches to provide effective services for students (Bailey & Palsha, 1992). The educators can intervene and modify the reform implementation based on their professional consciousness and personal experiences. Indeed, they can also have an insight into the problems of the MET educational reform from sources such as related articles, international/national resolutions, or conferences, etc. However, the impulse for the reform generally comes from external sources, such as on-the-job training, mandatory international/national MET legislation and administrative intervention. The results reported in this study provide considerable support to the argument that professionalism cannot significantly predict SoC. Some appropriate intervention about how to support, initiate and encourage professional learning for the educators may need to be created if the administrators wish MET professional educators to positively devote themselves into the reform.

Further, administrators and reformers stipulating rigid standards for all educators, implementing global policies of recognition, and rewards not being modified for an

institute's culture, professional career stage, or individual capability certainly ignore the crucial personal and professional dimensions of the educators' tasks. This may well influence the educators' professionalism which is reflected by the educators' concerns during the STCW reform.

5.6 Summary

This chapter has revealed the relationships between the demographics, professionalism, expectancy values, and stages of concern of the educators at the MET institutes in Taiwan. Initially, an exploration of expectancy values and professionalism were employed to understand how personal motivations, preferences and professionalism affect the educators' stages of concern about the educational innovations. Secondly, demographic information attached to the SoC Questionnaire was also measured and documented to increase the rigour of this study. Thirdly, seven separate multiple regression analyses were performed to summarize the linear relationship between the independent variables (predictors) and the dependent variable (criterion) by creating a mathematical formula, which describes how the information from the predictor variables can be used to calculate the predication about the criterion. In addition, as described in this chapter, the reliability and validity of the data gathered in this study had been measured and verified by a factor analysis (or item total correlation).

In this chapter, expectancy values and professionalism have been shown to have an effect on the educators' Stages of Concern about the implementation of the STCW educational reform.

The high degree of the educators' expectancies (including valence and instrumentality) reflects a valid representation of the reform-related attitudes and

behaviors that tend to have high impacts on the stages of concern. Taiwanese educators will be able to motivate to perform highly on the basis of their expert knowledge of the performance capabilities of their subjects (for example, the reform implementation). Further, they believe in implementing the reform they will achieve desirable consequences (for example, graduates' better performances). Their endeavors will be put into the sustained endeavor of the implementation of STCW reform. They further have the self-reliance about contributing their expert knowledge and professional skills to achieve the expected goals and collectively share the expected consequences. However, the result reveals that expectancy (not including valence and instrumentality) cannot simply motivate educators to be more concerned about the reform. It seems that they attach more importance to the intrinsic satisfactions from their tasks in the STCW reform than the extrinsic rewards.

The educators with a high level of professionalism also have a significant effect in relation to the stages of concern. Their professionalism may create intense concerns about the reform. The educators in Taiwan exhibit high positive professionalism relating to the stages of concern about the STCW innovation project. It means that they will well position their substantive knowledge, technical expertise, and first-hand knowledge of the students to influence the professionalism of schools and to negotiate the complex work of instruction in the classroom and the reform. They are willing to perform as a collaborative intellectual enterprise focused on students learning and outcomes to influence policies and practices pertaining to the instructional mission. In addition, they will also focus on instructional vision and professional collaboration to be useful as a school reform strategy. However, the findings also uncover that there are some other factors and professional capacities which influence the educators' stages of concern, only one of which is professionalism. Hence, some appropriate interventions which support, initiate, reward and encourage professional learning for the educators may be required if the

administrators and reformers wish MET professional educators to positively devote themselves into the reform.

Using the results contained in chapters 4 and 5, Figure 5-2 summarizes how the Expectancy Values, Professionalism and Demographics factors' influence on educators' Stages of Concern about the STCW reform. Reference to Figure 5-2, the following summaries about these factors influencing the educators' concerns about the reform in Taiwan may be drawn:

1. Institute is statistically significant related to the management, consequence and refocusing stages of educators' concerns.
2. Highest degree earned is statistically significant related to the management, consequence and refocusing stages of educators' concerns.
3. Years of STCW experience is statistically significant related to the awareness, consequence and collaboration stages of educators' concerns.
4. STCW seminar attendance is statistically significant related to the collaboration stage of educators' concerns.
5. Teaching discipline, academic rank, age and years of teaching do not have statistically significant related to the seven stages of educators' concerns.
6. Valence is statistically significant related to the awareness, informational, personal, consequence, collaboration and refocusing stages of educators' concerns.
7. Instrumentality is statistically significant related to the awareness and collaboration stages of educators' concerns.
8. Expectancy is statistically significant related to the informational, personal, consequence and collaboration stages of educators' concerns.
9. Professionalism is statistically significant related to the management, consequence, collaboration and refocusing stages of educators' concerns.

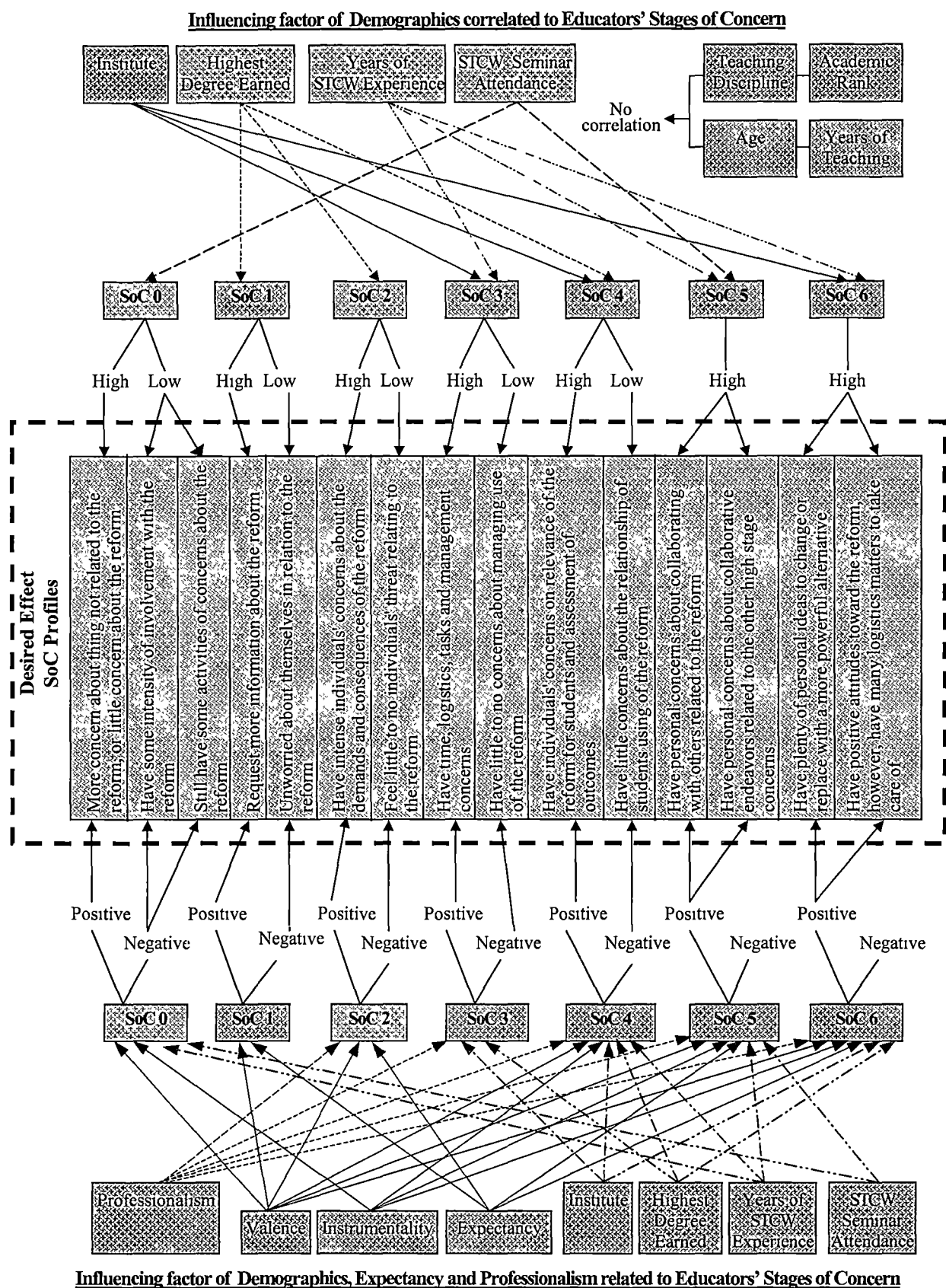


Figure 5-2 Demographics, expectancy and professionalism factors' influence on educators' Stages of Concern about the STCW reform

Source: Hall, G. E., George, A. A. & Rutherford, W. L. *Measuring Stages of Concern about the innovation: A manual for use of the SoC Questionnaire*. 1977; and this thesis.

Chapter 6

Conclusions, Limitations, Implications and Recommendations for Future Studies and Professional Practices

Chapter 6 Conclusions, Limitations, Implications and Recommendations for Future Studies and Professional Practices

6.1 Introduction

Hall et al. (1977 and 2001) claimed that an individual's awareness, satisfactions, frustrations, attitudes and concerns played a significant part in determining the reform's success or failure. Further, the educational reform is also the accumulation of an individual's professional experiences. It assumes that the importance of the individual is often more critical to the success or failure of the reform endeavor than the importance of the logistical and technological support. Hence, this study has sought to scientifically explore and assess the problems of diagnosing groups of MET educators' perceptions and attitudes relating to stages of concern, expectancy and professionalism in the context of the reform implementation.

Since Fuller's concerns theory seeks to enlighten the complicated and insufficiently understood processes and methods of the educational reform implementation, it is one of the seminal works among educational reform theories. Fuller's concerns theory and Hall's SoC Model, therefore, have been used to facilitate planning, delivering, diagnosing and evaluating the influences of individuals' reform activities during the reform implementing process. The methodology and outcomes of this thesis verify that Fuller's concerns theory and Hall's concern-based adoption model can function as a tool to evaluate the levels of the MET educators' concerns when they confront the STCW driven educational innovation. In addition, the findings illustrate that Fuller's concerns theory and Hall's SoC Model are both applicable and

effective in understanding the implementation of the STCW educational reform in Taiwan.

In this study, the use of the expectancy theory (valence, instrumentality and expectancy) approach and the degrees to which the educators actually function as professionals (professionalism) were employed to explore how the existing individuals' motivations, attitudes, abilities and qualities of practicing and implementing relate to the educators' stages of concern in the reform. The findings indicate that these factors undoubtedly influence the educators' stages of concern. Further, they also illustrate that analysis of the demographic information attached to the SoC Questionnaire can provide very useful profiles to interpret the tendencies of the MET educators' stages of concern in Taiwan.

In short, the use of the Fuller's concern theory and Hall's SoC Model contributes to the understanding of MET educators' motivations, attitudes and concerns in STCW reform implementation. The concepts of Fuller's concerns theory are applicable to those who attempt to critically assess any particular educational reform situation as well as plan and intervene in the concerns-based reform activities.

In this thesis, the conceptual framework was developed from a review of Fuller's concerns theory, previous SoC research and the models of educators' professional perception, expectancy and concerns in the reform. Based on those views of reform, an analysis was conducted to determine a theoretical model, select the appropriate approach to the research questions and determine appropriate methodologies. After that, well-designed SoC Questionnaires were administered to the entire population of 170 MET full time educators teaching in the navigation, engineering and fishery departments in Taiwan. The data collected from the survey were subjected to the statistical analysis. Referring to Table 4-2 (h) (page 110), the SoC Questionnaire

survey data have strong internal consistencies (range from .60 to .86), correlation coefficients (range from .68 to .84) and the ratios of variance are explained (range from 46.42% to 70.12%). It is concluded that the data are valid and reliable to effectively measure the levels of educators' stages of concern in Taiwan when those educators encounter significant educational innovation as a result of STCW 95.

Based on the purpose of the research and analysis of the SoC survey data, there are a number of further areas worthy of investigation, these include the intervention behaviors of the individuals' principals, the styles of the reform facilitators in implementing the reform and developing comprehensive pictures of how the institutional changes affect the individuals within the institute, etc. In the light of the findings of this research, it is reasonable to expect that further research could continue by conducting more extensive and detailed explorations of the SoC approach as discussed in section 6.4.

6.2 Major Findings and Conclusions

This research provides an overview, diagnostic data, and a rigorous analysis for the reformers and educators so that the current stage of the educators' efforts to plan and/or revise further implementation activities and interventions at the right time can be better directed. The results reveal that an educator's concerns are an important and real component in the process of STCW reform implementation. The results also show that the educators require to be understood and recognized if the reform implementers expect to receive positive support for a successful reform implementation.

The key to rating the success of the reform implementation is the produced changes in the administrators, the educators, the students, the institutes, and the MET systems.

One of the best ways to evaluate the state of the reform process and associated approach is to use SoC Questionnaire surveys and measurements. In this thesis, the Stages of Concern Model has been demonstrated as a useful tool to critically examine and/or assess the maritime educators' concerns and implementation activities of the STCW educational reform in Taiwan. It further provides an approach which reveals the individuals' roles in the reform process and furnishes different insights into the problems of the reform. In addition, it can be applied to guide the educators and administrators understanding of their personal satisfactions, frustrations, ambiguities, perceptions, motivations and concerns, which could influence the success or failure of the reform. In other words, the framework of the SoC model is treated as a reference point and is used to illustrate the concerns that the individuals express about the reform, how the reform is actually implemented and the process and methods adopted in the reform such that they are compatible to the demands and styles of specific individuals.

Based on the literature survey, the analysis of data collected through the questionnaires and the findings of this study, the following conclusions can be drawn about concerns with the STCW competency-based MET reform.

Firstly, the maritime educators in Taiwan currently express the highest concerns at the self stage (stages 1 and 2) and relatively high concerns at the impact stage (stages 4 and 5). This illustrates that there are still a lot of unsolved informational concerns among them. Additionally, the educators' concerns appear more reflected in the strategies of the reform process than in the outcomes and achievements of the students. The lowest concern of the maritime educators in Taiwan is at the awareness stage (stage 0) followed by the management stage (stage 3) indicating there are little concerns for these two stages. The management concerns seem to be alleviated by continuous logistical support. The educators' attention is focused on organizing and

operating their reform implementations more efficiently and using the relevance of the reform to improve the students' outcomes.

When these MET educators are grouped on the basis of the institutes, the educators working at China College of Maritime Technology and Commerce express most intense concerns at the management, consequence, and refocusing stage (stages 3, 4 and 6), followed by those working at National Taiwan Ocean University whilst the educators working at National Kaohsiung Institute of Marine Technology have the lowest intense concerns at these three stages. The educators teaching at CCMTC express significantly high intense management concerns (refer to Figure 4-5; page 138), which means their management concerns are apparently unresolved. They may require some personal development activities to resolve their management concerns.

However, the overall shape of the SoC profile expressing educators' concerns in these three MET institutes depicts that among those educators there are few crucial differences. As all three institutes present the highest mean score at the informational stage despite of no statistical significance, their concerns still focus on the reform implementing strategies.

When the SoC data are analyzed in the light of the educators' academic degree levels, the educators with master degree express the highest concerns at the informational, personal, and consequence (stages 1, 2 and 4). The educators with doctoral degree have the lowest concerns at these three stages. The overall shape of the SoC profile of concerns for these three educational degree groups shows that among those educators there are few crucial differences. The educators' concerns do not vary following the function of their educational level. However, this still illustrates that those educators are open and concerned to involve themselves in the reform

implementation, additionally, they all have concerns about the consequences for the students of adopting the reform no matter what the highest degree that they earned.

In regard to the educators' age, teaching discipline, teaching experience and academic rank, it seems surprising that there is no statistically significant relationship to the educators' stages of concern about the STCW reforms. This is difficult to understand in the context of this study and is worthy of further research.

Secondly, the educators with more than 2-years of STCW experience working in teams express the highest concerns at the collaboration stage and the refocusing stage (stages 5 and 6), followed by those with 1-year STCW experience. The educators without STCW experience working in teams have the lowest intensity of concerns at these stages. The more STCW implementing experiences are accumulated, the greater are the impact concerns (stages 4, 5 and 6). The impact concerns of the educators without STCW implementing experience working in teams are indisputably much lower than those educators with STCW implementing experience working in teams. It has been six years since the STCW educational reform was mandated for implementing in Taiwan. There are still 49.4 percent of the respondents, MET educators, whose STCW experiences working in teams are less than 1-year or none. This reflects that the reformers and almost the half educators have become too involved in the reform's technology to devote their attentions to the individuals that are involved; some adjustments and re-training activities need to be undertaken. Key adjustments may include new ways of connecting individual's learning and development to meaningful content and change efforts (essentials for individuals knowing where they are going and where they are headed), a continuous and inclusive process of educational policy support is needed to encourage the reform implementers (essential for stimulating and sustaining reform implementation), etc.

The educators attending the STCW related seminars and/or workshops have significantly higher collaboration concerns (stage 5) and lower awareness concerns (stage 0) than the educators who did not attend the seminars and/or workshops. However, the intensity of concerns at the self stage (stages 1 and 2) and the management stage (stage 3) for both groups are similar. As the highest intensity of concerns of these educators occurs at the informational stage, this indicates that a single short-term seminar and/or workshop during the process of the reform implementation may not be enough to understand the complex STCW 95 requirements. Long-term and follow-up seminar and/or workshops are essential and likely to be more effective.

Thirdly, the correlation analysis indicates that expectancy values are significantly related to the Stages of Concern. Valence is positively related to informational, personal, consequence, collaboration, and refocusing concerns (stages 1, 2, 4, 5 and 6), but negatively related to awareness concerns (stage 0). Instrumentality is positively related to consequence, collaboration, and refocusing concerns (stages 4, 5 and 6), but negatively related to awareness concerns (stage 0). Expectancy is positively related to informational, personal, collaboration, and refocusing concerns (stages 1, 2, 5 and 6). Regardless of no statistical significance, the educators with a higher level of valence value are more likely to have more intense concerns at the informational, personal, management, consequence, collaboration and refocusing stages (stages 1, 2, 3, 4, 5 and 6). They are more likely to have less intense concerns at the awareness stage (stage 0).

The correlation analysis also shows that professionalism is positively significant in relation to management, consequence, collaboration, and refocusing concerns (stages 3, 4, 5 and 6). Regardless of the statistical significance, the educators with a high level of professionalism also have positive attitudes toward the informational,

personal, management, consequence, collaboration and refocusing stages (stages 1, 2, 3, 4, 5 and 6). They are also more likely to have negative attitudes toward the awareness stage (stage 0).

As the high expectancy value rating scales are at the impact stage among the educators, this reflects that the educators are confident with their competence to implement the reform. They will devote their reform-related attitudes and efforts to help the students achieve the required criteria as well as to implementing the reform successfully. Further, the professionalism rating scales are also high at the impact concerns stage among the educators. This shows that positive professional ethics, perceptions and performance of the educators would yield a positive reform outcome. The educators with a high level of professionalism will expect to revise their teaching skills and manners so that they can provide effective services to the students and get the best outcomes from the reform.

Fourthly, the regression analysis reveals that valence is the only significant predictor of the awareness concern after the overlapping effects of the other predictor variables are controlled. It indicates that the educators with higher-level valences tend to have lower awareness concerns (stage 0). Valence and instrumentality are significant predictors of the informational concerns (stage 1), indicating that those educators with higher-level valences and lower-level instrumentality tend to have the greater informational concerns (stage 1). As to the personal concerns (stage 2), the institute, valence and instrumentality are significant predictors. The educators working at China College of Marine Technology and Commerce with higher-level valences and lower-level instrumentality exhibit higher-level personal concerns (stage 2) than their colleagues at the other institutes. With regard to the management, consequence, collaboration, and refocusing concerns, the regression analysis also reveals that institute and valence are the only significant predictors. The results indicate that the

educators teaching at China College of Marine Technology and Commerce with higher-level valences exhibit the greatest concerns at these stages (stages 3, 4, 5 and 6). This reflects that CCMTC's educators realize the values of personal endeavors and performance to the department and the institute that they are working for. They are greatly concerned about the reform, and further will make their implementing activities better to achieve a successful reform outcome to improve the institute.

Taken together, the results of the regression analysis indicate that valence is the most powerful predictor of Taiwanese maritime educators' concerns about the STCW reform for six of the seven stages of concern. Instrumentality is also a significant predictor of informational and personal concerns (stages 1 and 2). However, expectancy and professionalism are not significant predictors of the Stages of Concern after the overlapping effects of other variables in the regression models are controlled. This reveals that the impetus for the reform mostly derives from external sources, such as decrees, mandates, regulations, and even administrative interventions. The satisfaction of the expectation as a consequence of the reform is still not mature.

Table 6-1 summarizes all of the key findings mentioned above.

Based on the findings, this research indicates that the traditional centralized and mandated approach to implementing the reform for all educators and the institutes is no longer acceptable. A unique concern-based development approach should be adopted and applied to all MET individuals and institutes. This will eventually bring about higher quality achievements and students' performances from the reform implementation. This is what the administrators, reformers and educators should strive to achieve. An effective new or revised plan for the reform including accurate concern-based activities will yield significant positive consequences in the near

future. Furthermore, the use of Fuller's concerns theory is one of the best tools to achieve the common objective of efficiently and effectively implementing maritime education and training.

Table 6-1 Summary of the research in answering the research questions

DEMOGRAPHICS, EXPECTANCY VALUES AND PROFESSIONALISM RELATED TO TAIWANESE EDUCATORS' STAGES OF CONCERN ABOUT THE STCW REFORM								
Independent Variables	Dependent Variable	Awareness (Stage 0)	Informational (Stage 1)	Personal (Stage 2)	Management (Stage 3)	Consequence (Stage 4)	Collaboration (Stage 5)	Refocusing (Stage 6)
Q1: All Respondents		L	H	H	L	H	H	L
Q2: Institute					X/ L or H	X/ H		X/ L or H
Teaching Discipline								
Academic Rank								
Age								
Highest Degree Earned			X/ H	X/ H		X/ H		
Years of Teaching								
Years of STCW Experience					X/ L		X/ H	X/ L
STCW Seminar Attendance	X/ L						X/ H	
Q3: Valence		X/—	X/+	X/+		X/+	X/+	X/+
Instrumentality		X/—				X/+	X/+	X/+
Expectancy			X/+	X/+			X/+	X/+
Q4: Professionalism				X/+	X/+	X/+	X/+	X/+

"L": low concern; "H": high concern; "x": significantly related; "-": negatively related; "+": positively related

To understand the changing forces that affect the STCW educational reform in Taiwan, this study uses three different theoretical models, which are Hall's Stages of Concern (CBAM), Vroom's Expectancy Theory and Professionalism, to examine the educators' perceptions and concerns about the implementation of this reform. The conclusions about Taiwanese educators' concerns about the reform may be briefly drawn:

1. Teaching discipline, academic rank, age and years of teaching do not have statistically significantly different concerns.

2. The passage of time does not significantly affect educators' concerns; the concerns seem still reflected in the strategies of the reform process, further, a part of the educators play as typical nonusers on the reform.
3. Educators teaching at CCMTC have highest concerns, followed by the educators teaching at NTOU, then the NKIMT educators.
4. Participation in STCW experience working in teams decreases lower stage concerns and increases higher stage concerns.
5. Participation in educators' conference/seminar/workshops session on STCW decreases lower stage concerns and increases higher stage concerns.
6. Expectancy values of educators are positively related to informational, personal, consequence, collaboration and refocusing concerns, but negatively related to awareness; however, there is no statistical significance on management concern.
7. Professionalism of educators is positively related to personal, management, consequence, collaboration and refocusing concerns, however, there are no statistical significance on awareness and informational concern.

Lastly, the research has also provided answers to the research questions:

- Question 1: What are the most intense stages of concern of Taiwanese maritime educators in implementing the STCW reform?
- Question 2: Do Taiwanese maritime educators' stages of concern vary when they are grouped according to the institute, teaching discipline, academic rank, highest degree earned, age, years of teaching, years of STCW experience and STCW seminar attendance?
- Question 3: To what extent are valence, instrumentality and expectancy related to Taiwanese maritime educators' stages of concern about the STCW reform?
- Question 4: How is the professionalism of Taiwanese maritime educators related to stages of concern about the STCW reform?

6.3 Limitations of the Study

Like many other research works, this research has some limitations either by time or research conditions. They are described as follows.

Firstly, the results of this study are based on a sample of maritime educators based in Taiwan alone which excludes maritime educators from other countries. The sample size is small such that multivariate study, such as the multiple regression analysis used in this study, usually requires larger samples than univariate study because it involves the analysis of multiple response data. Future studies should concentrate on increasing the sample size.

Secondly, CBAM theory and procedures can be used to generate comprehensive pictures of the effects of organizational changes on the individuals within an organization. In the present study, the strategies focus on the stages of concern of maritime educators about the STCW reform. Actual behaviors are not assessed in this study. Further researchers should extend this research to measure behaviors i.e. the actions initiated by the educators who seek to adopt and implement the STCW educational innovation.

Thirdly, Anderson (1997: p.363) suggested that “a more realistic view would be to assess and explain patterns of organizational change that include, but are not limited to, situations where numbers are sufficient to result in statistical shifts in the mean”. Therefore, the mean scale scores rather than percentile scores are employed to interpret the SoC profiles of the maritime educators in Taiwan. The authenticity of interpreting the SoC profiles has some ambiguities in the study.

Fourthly, since the 35-item Stages of Concern questionnaire was initially designed in the United States, it might be culture bound and innovation specific (Cheung, et al., 2001). Therefore, in the present study, principal component factor analysis and Cronbach's alpha have been performed to examine the reliability and validity of the SoC scale. In addition, item-total correlations are used to eliminate those low internally consistent scale items to verify that the remaining items are valid indicators of the same underlying concept. Although the results of the analysis have provided considerable support for the broad assumptions underlying the Stages of Concern model, four items have been deleted from Hall's original 35 items because their item-total correlations are relatively low. In addition, the alpha coefficients of internal consistency for the seven Stages of Concern subscales vary from .60 to .86, which indicates that the awareness subscale (stage 0) in this study is relatively less reliable ($\alpha = .60$) than that in Hall's original model. Clearly, future studies are needed to test the reliability and validity of the awareness subscale.

Lastly, the main limitation of this study is that it is cross-sectional. Although cross-sectional surveys produce a valuable body of research on the educational reform, it has noteworthy limitations. First, it yields artificially small correlations attenuated by lack of control over the extraneous and uncontrolled influences. Second, it is insufficient to demonstrate causality. Third, it cannot assess the trends or long-term changes in the educators' stages of concern. Ideally, longitudinal research should be conducted to assess the trends of Taiwanese maritime educators' stages of concern about the STCW reform at different points in time. As Hall and Hord (2001) suggested, reform is a process requiring long-term observations and investigations. Therefore, longitudinal studies are a direction for future research in assessing long-term changes in maritime educators' feelings and perceptions about the STCW reform.

6.4 Implications of the Study Findings and Discussions

Drawing on the analysis and interpretation of the educators' stages of concern about the MET educational innovation described in chapters 4 and 5, and on the national project to implement STCW 95, the implications for the MET reform in Taiwan include:

1. “The requirements of the revised STCW Convention will improve the quality of training available to seafarers provided national administrations take a responsible approach to the approval and audit of maritime training institutes and their courses (Lewarn, 1995: p.5)”.

Several new concepts and valuable measuring tools have been identified and tested as a result of this research. These enable the reformers, facilitators and educators to better understand and evaluate the current circumstance of the STCW education reform process adopted by Taiwan. One important part of the revised STCW Convention concerns the performance of MET organizations including the educators and students. This has many components and interactive dynamics. The way in which the Stages of Concern are applied to understand and appreciate the changes from the MET educators' point of view, and how the CBAM diagnostic dimension is systemically used to view in whole, or in part, the reform's compliance in the MET organizational setting are important aspects to understanding performance. The key element to develop an overview of the reform adoption is the acquisition of diagnostic data to evaluate the national STCW 95 implementing process using the SoC questionnaires and then plan or revise further reform implementation activities. Moreover, using this “concern-based” approach will significantly reduce the time needed to achieve a high level of STCW education reform in Taiwan.

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2. “An organization does not change until the individuals within it change (Hall et al., 2001: p.7)”.

The differences between a quickly improved school and a stuck school lie not only in the resources, environments or the students, but also in the process of developing the teachers' professional cultures, beliefs, and norms (Fullan, 1996). More simply, the way in which the teaching staff do things in an organization represents the philosophy, climate, and culture of the organization. Normally, the improvements in the MET institutes are portrayed as a result of the teaching educators systematically sharing objectives, collegiality, continuous learning and improvements, and mutual collaboration and support for the norms of the reform (Stoll & Fink, 1996; Fink, 1998). Therefore, if faculty members know, in a professional sense, where they are going and focus on the equity of the reform, student outcomes, and reform results within the institute this will have a significant impact on the success in implementing the MET education reform. In other words, in any educational change endeavors, institutes and educators should understand where they are going, and should have a common view of where they are headed (Hargreaves, 1997). The use of the concerns concept is a valuable and accessible tool for the reformers and educators to critically review the reform process, understand what sorts of endeavors are still required to achieve the successful reform implementation, and judge how many significant changes are essential to the individuals, institutes, and systems.

3. One of the main requirements of the STCW Convention is about developing the quality of MET institutes to clarify and ensure the knowledge, skills and competence of seafarers is sufficient to undertake their assigned duties safely and efficiently (Lewarn, 1999; STCW 95, amendment 2, 2001).

Appraising the quality of a MET institute is not an easy task, especially, when assessing the technical and teaching competence of its work force. Generally, many institutes believe that if their educators possess high level maritime-related degrees (for example, every teaching staff member in the engineering department at NTOU possess a doctoral degree), technically competent certificates (for example, hold a master, officer or chief engineer certificate of competency) and professional teaching certificates, they will produce qualified seafarers. However, if their educators are not concerned enough to realistically reflect the skills and competencies needed for seafarers to effectively and efficiently operate their ships this may be sufficient to distort outcomes for students even though those MET institutes genuinely meet the norms and match the competencies required by the STCW 95 Convention (Lewarn, 1995 and 1999).

The SoC Questionnaire and its technical manual are particularly useful for diagnosing, analyzing and assessing MET educators' concerns and formally evaluating the reform implementation efforts. Some type of intervention and some revision of the entire reform implementation should be followed in terms of the process, methods and content which addresses attitudes, motivation, professionalism and critical reform implementation issues. This continuation of a concern-based approach ensures a MET institute and its work force can do what it says it can do, moreover, it ensures it can do it appropriately.

4. “Raising teachers to a new level of professionalism that equips them not only for effective teaching to higher standards in the classroom but for active public leadership of statewide school reform efforts (Reed, 1999: p.79)”.

Even in this world of the new millennium even the most professional educators demand certain sorts of institutional support. Reference to Table 4-1(a), Table 4-1(b)

and Figure 4-6 (pages 96, 97 and 143) shows there are 49.4 percent of the respondents whose STCW experiences with teaming are less than 1-year or none. These beginning-implementers (including non-implementers) express their desires and higher intense concerns about how to obtain general descriptive information about the reform and what the reform means to them, rather than concentrating on the reform's impacts on the students. In regard to the rest of the respondents, there still exists some uncertainties about the process and methods of the reform implementation. Although the educators apparently have a high degree of autonomy and professionalism in the classroom, this finding indicates only a few of them are able to implement the innovation without assistance. Further, the strategies of STCW reform implementation alone may not be enough to secure the educators' spirits, energy concerns, commitments and skills for the time being. The policymakers, administrators and reformers must also establish the necessary support, conditions and initiatives if they wish the educators to pursue a positive educational reform by themselves.

Because the educators are key to the final stage of implementing the STCW educational reform, various forms of personal development support should be made available to the educators in terms of higher qualifications or updating. This can make the educators concern themselves with new reform advances. For example, the Australian Maritime College has a regular programme – the Tertiary Teaching and Learning Course – requiring each faculty member to undertake this short-period (normally about one week) personal development/upgrade programme once within a three-year duration.

In other words, regular personal development support programmes can offer a setting in which many of the distinguishing characteristics associated with the STCW education innovation can be shared between the beginning implementers,

experienced implementers and the renewing implementers. Additionally, the implementers' professionalism and practical skills will also be improved, enhanced and updated.

5. "Employers, marine administrations and MET institutes must work together more closely if real training reform is to be achieved and part of this must include a more flexible approach to the delivery and assessment of MET (Lewarn, 1999: p.4)".

The introduction of the revised STCW Convention represents a revolutionary breakthrough for the MET organizations and shipping industry. The mandatory requirements of the Convention reflect an increasing public awareness that competency-based education and training should take place within MET institutes to improve safety of navigation and environmental protection. The MET organizations including the shipping industry should be used as a way of taking a systematic approach to achieve the STCW requirements to educate and train seafarers to gain the required competencies. The success of this approach depends on a collectively collaborative system. This system will be achieved by balancing the following considerations.

- Marine administrations should create the national regulatory framework and strategic environment for the operations of high quality MET institutes;
- The shipping industry should take more interest in the MET institutes and systematically evaluate the competencies of their employees in the workplace; and,
- MET institutes should take a professional approach to shape the attitudes of the educators, students and seafarers and assure the quality of the educators' and graduates' competencies.

To make further progress, it is necessary to decide upon the most applicable approach to implement that system. The findings have identified that this type of system will provide the support to smoothly implement reform. Even though MET institutes play a vital role in implementing the STCW reform, the shipping industry and maritime administrations must also perform their roles and work more closely with the quality institutes to allow a more flexible approach to educational delivery and assessment of the seafarers.

6.5 Recommendations for Future and Professional Practices

In the study, the SoC profile almost invariably depicts the lowest level of concern at the awareness stage (stage 0) and the highest level of concern at the informational stage (stage 1). This means that the educators in Taiwan acquire little information about the STCW reform but they are still interested and would like to know more about it. In reality, the administrators in Taiwan have invested a lot of time and budgets on policy dissemination, reform implementation counseling and coaching, new curriculum formulization, teaching materials replenishment and even Quality Assurance System (QAS; ISO 9001:2000) establishment. For example, the QAS of all MET institutes and organizations in Taiwan has been audited, approved and certificated by Det Norske Veritas (DNV); full mission shiphandling/engine room simulators and Radar/ARPA simulators have been reconstructed; MET curricula have been revised and formulated. Moreover, they also mutually cooperate with the Maritime Coastguard Agency of the United Kingdom, the Maritime Port Authority of Singapore, and many other Countries' maritime authorities (for example, Hong Kong (PRC), Bermuda (UK), and Liberia, etc.) to audit the quality of the MET institutes as well as assess and examine the candidates' competencies for the issue of the STCW 95 Certificates of Competence. Hence one would expect, based on Fuller's predictions, the educators' stages of concern in Taiwan to have shifted from the self

stage to the impact stage. Contrary to this expectation, the results do not conform to the predictions. This means that a more complex or revised model should be adopted to re-examine those educators' attentions, foci and activities about the reform.

According to the results of the highest degree earned (see Table 4-6; page 121), the educators with a doctoral degree show the lowest intense concerns at all seven stages because they expect to be more involved in the management and impact stages than the educators with lower educational qualifications. But are they too involved in the results of academic theories and knowledge to concern themselves about competency-based knowledge and practices? This is a question for future studies.

Reference to Figure 4-6 (page 143) shows the educators with STCW reform implementing experience with teaming still have high concerns at the self stage (informational and personal stages). This represents some uncertainties about the demands of the reform which still bewilder them. Is there a lack of communication with and/or shortage of information from the outside world which causes this phenomenon? Is it because they have too little or too much knowledge about the reform which creates concern at these stages? These questions form the basis of further empirical research. Further, at the informational stage, there are no statistically significant differences between educators with and without implementing STCW reform experience with teaming even though they both have the most intense concerns. Is it possible for the educators who are short of information to discriminate between the sources of concerns about the reform? Is it possible that the educators want to understand all details of how the reform will affect them personally? Can it be the educators who are too involved in the reform implementing teams are attempting to seek more information? These questions are also suggested as an area for future studies.

In regard to the levels of concerns at the task stage, there are no statistically significant differences between the two groups of educators who have attended and have not attended the STCW related seminars and/or workshops (see Figure 4-7; page 148). Are the educators so knowledgeable that they are able to accomplish the reforming process and tasks without attendance at a workshop or are the workshops ineffective? These questions should be further probed in the future.

The seven stages of concern model provides data about the nature and effectiveness of the reform as it occurs. Through analyzing the educator's concerns the results will indicate whether the reform process is progressing, completed or returning to an earlier stage. It can be very helpful for the administrators, reform facilitators, principals and even individual educators to use CBAM and the educators' stages of concern surveys. Meanwhile, the factors of educators' expectations, attitudes, professional abilities, which may affect the reform, should be taken into account to uncover the realities of the investigation as well. But there are still likely to be other factors which influence the process of reform. Additional investigations about the combinations of the diverse nature of most educators' requirements and opinions should also be undertaken.

Years of accumulative experience can so easily be repeated as one year of experience over and again. The quality behind the process and methods used in the implementation of STCW education innovation cannot simply be achieved by experience alone or by naively relying on the educator's professionalism to properly implement the Convention. The skills, process and methods of the STCW reform implementation necessitate professional practices, which require critical reflection, intra-personally enhanced professional attitudes and abilities. Further, a systematic approach to experiential learning, including reflection, conceptualization and planning, and continuing formalized support, should be employed.

In regard to how to make the reform implementation work, how to most effectively facilitate and influence the process, when is it most appropriate to intervene in the process and how to accomplish the reform's demands, experiences gained during the research suggests that:

- MET educators should continuously sustain professional attitudes and practices to take responsibility for the outcomes of their actions on the reform implementation and also ensure the reform effectively educates our seafarers;
- MET educators should not only resolve how to develop and learn about professional skills, but also about the reform implementation;
- Administrators, reform facilitators, principals, institutes, departments, individual educators, and even many other levels within and outside the academy should make concerted efforts to regulate their own responsibilities and tasks and have a clear professional perception, knowledge and concern to support the process of STCW education reform. Furthermore, they should have sound knowledge to assess the quality of the reform implementation.

“Change implementation is a process, not an event (Hall & Hord, 2001: p.4)”. A structured professional development programme which develops knowledge and understanding of the best ideas for implementing, practicing and accomplishing the reform should be continuously maintained. In addition and just as important, a thorough understanding of the substance of STCW educational reform and its implications are also needed for the professional development of MET educators throughout the whole of the reform. If available, appropriately tutored seminars, workshops, or other dissemination approaches on the concepts, process and methods of reforming, from both inside and outside an institute, are also suggested. This will help the reformers gradually and confidently come to understand so that they become skilled and competent in using new approaches and technology during the reform.

A reform will never be a final reform. It is merely a reflection of the nature and aims of the current education system in that it represents different styles of learning, instruction, and institute's behavior (Flude & Parrott, 1979). Ideally, reform should be sustained, perpetuated and become a permanent part of the institute's culture. The success of a MET educational reform requires it to be based on the institutes' needs and conducted in a systematic manner. The built-in mechanisms to continuously monitor the reform also need to be developed and undertaken simultaneously. Consequently, implementing actions can extend well beyond the short-term reform for real institutional refinements to take place thus motivating staff and effecting a positive result in the reform of MET education.

Education institutes today work in an environment which is not driven by any singular innovation. They operate in the context of multiple changes which means they have to manage, coordinate and integrate numerous changes all without delay (Fullan, 1991). The changes include some which are self-initiated, some internal capacities for continuous developments, and some externally imposed (Hargreaves, 1998; West, 1998). Therefore, the challenge of implementing the STCW education reform confronted today in Taiwan is how to define, manage, coordinate, integrate, and continuously improve the reform process in a multi-dimensional environment rather than simply focusing on a strategic process of faultless planning, design and structural alignment, or a cultural process of building up efficient and effective interrelationships by consultation and collaboration. The research shows that there are more extensive processes requiring equivalent attention and further studies, such as, morale and the involvement of the participants, political interventions, and especially the internal capacities of the participants to ensure the quality of the reform implementation.

Finally, the failure of “top-down” approaches to education reform in the 1960s and 1970s led to “bottom-up” approaches in the 1980s. The “bottom-up” approach is a process oriented towards practitioner involvement, rather than an external focus on educational management, as the priority for change is shifted to focus on the educational processes (Reynolds, 1988). But, this approach alone cannot regularly lead to improvements in the performance and outcomes of students (Reynolds et al., 1993). For all the discussions of democratic decision making, professional qualifications, and competencies it is recognized that the stimulus for reform projects are inevitably implemented from the “top-down” (Holmes, 1998). Thus, in order to ensure that a reform can be successfully implemented, the major focus should shift to a suitable combination of the “top-down and bottom-up” approach in which all the participants are treated as equal partners with no one being high or low. Participants need to realize that they are members of one system, and that they need to work with collective wisdom and concerted efforts to achieve the best results.

In summation a combined “top-down” and “bottom-up” approach should be used to progress the reform. This approach seems to present the best way to resolve conflicts which arise during the process and implementation of the STCW reform. Hence, the government and its administrators should systematically provide information, direction, mandates, recognition and support through a “top-down” approach. The actual process of the reform, such as their design, decision-making, development plans and continuous improvements are left for the MET universities, institutes and organizations to develop through the “bottom-up” approach (Fink, 1998; Hall & Hord, 2001).

As can be seen by the forgoing there remain significant research opportunities to enhance the understanding of the STCW reforms in Taiwan. In conclusion, this research has extended the body of knowledge related to educational change/reform as

well as contributing a more practical approach for use by those involved in maritime education and training reform in Taiwan.

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APPENDIX I The Original SoC Questionnaire, the SoCQ Quick Scoring Device and Guidelines for Interpreting the SoCQ Data

Part A: The Original SoC Questionnaire

INTRODUCTION

The purpose of this questionnaire is to determine what people who are using or thinking about using various programmes are concerned about at various times during the innovation adoption process.

The items were developed from typical responses of school and college teachers who ranged from no knowledge at all about various innovations to many years experience in using them. Therefore, *a good part of the items may appear to be of little relevance or irrelevant to you at this time*. For the completely irrelevant items, please circle "0" on the scale.

Other items will represent those concerns you *do* have, in varying degrees of intensity, and should be marks higher on the scale, according to the explanation at the top of each of the following pages.

0	1	2	3	4	5	6	7
Irrelevant to me	Not true of me now		Somewhat true of me now		Very true of me now		

For examples

0 1 2 3 4 5 6 **7** This statement is very true of me at this time.

0 1 2 3 **4** 5 6 7 This statement is somewhat true of me now.

0 **1** 2 3 4 5 6 7 This statement is not at all true of me at this time.

0 1 2 3 4 5 6 7 This statement seems irrelevant to me.

Please respond to the items in terms of *your present concerns*, or how you feel about your involvement or potential involvement with _____. We do not hold to any one definition of this program, so please think of it in terms of *your own perceptions* of what it involves. Since this questionnaire is used for a variety of innovations, the name _____ never appears. However, phrases such as "the innovation," "this approach," and "the new system" all refer to _____. Remember to respond to each item in terms of *your present concerns* about your involvement or potential involvement with _____.

Thank you for taking time to complete this task.

THE STAGE OF CONCERN QUESTIONNAIRE ITEMS ARE PRESENTED BELOW:

0	1	2	3	4	5	6	7
<u>Irrelevant</u>	<u>Not true of me now</u>		<u>Somewhat true of me now</u>		<u>Very true of me now</u>		
1.	I am concerned about students' attitudes toward this innovation.					0	1 2 3 4 5 6 7
2.	I now know of some other approaches that might work better.					0	1 2 3 4 5 6 7
3.	I don't even know what the innovation is.					0	1 2 3 4 5 6 7
4.	I am concerned about not having enough time to organize myself each day.					0	1 2 3 4 5 6 7
5.	I would like to help other faculty in their use of the innovation.					0	1 2 3 4 5 6 7
6.	I have a very limited knowledge about the innovation.					0	1 2 3 4 5 6 7
7.	I would like to know the effect of reorganization on my professional status.					0	1 2 3 4 5 6 7
8.	I am concerned about conflict between my interests and my responsibilities.					0	1 2 3 4 5 6 7
9.	I am concerned about revising my use of the innovation.					0	1 2 3 4 5 6 7
10.	I would like to develop working relationships with both our faculty and outside faculty using this innovation.					0	1 2 3 4 5 6 7
11.	I am concerned about how the innovation affects students.					0	1 2 3 4 5 6 7
12.	I am not concerned about this innovation.					0	1 2 3 4 5 6 7
13.	I would like to know who will make the decisions in the new system.					0	1 2 3 4 5 6 7
14.	I would like to discuss the possibility of using the innovation.					0	1 2 3 4 5 6 7
15.	I would like to know what resources are available if we decide to adopt this innovation.					0	1 2 3 4 5 6 7
16.	I am concerns about my inability to manage all the innovation requires.					0	1 2 3 4 5 6 7
17.	I would like to know my teaching or administration is supposed to change.					0	1 2 3 4 5 6 7
18.	I would like to familiarize other departments or persons with the progress of this new approach.					0	1 2 3 4 5 6 7
19.	I am concerned about evaluating my impact on students.					0	1 2 3 4 5 6 7
20.	I would like to revise the innovation's instructional approach.					0	1 2 3 4 5 6 7
21.	I am completely occupied with other things.					0	1 2 3 4 5 6 7
22.	I would like to modify our use of the innovation based on the experiences of our students.					0	1 2 3 4 5 6 7
23.	Although I don't know about this innovation, I am concerned about things in the area.					0	1 2 3 4 5 6 7
24.	I would like to excite my students about their part in this approach.					0	1 2 3 4 5 6 7

25. I am concerned about time spent working with nonacademic problems related to this innovation.	0 1 2 3 4 5 6 7
26. I would like to know what the use of the innovation will require in the immediate future.	0 1 2 3 4 5 6 7
27. I would like to coordinate my effort with others to maximize the innovation's effects.	0 1 2 3 4 5 6 7
28. I would like to have more information on time and energy commitments required by this innovation.	0 1 2 3 4 5 6 7
29. I would like to know what other faculty are doing in this area.	0 1 2 3 4 5 6 7
30. At this time, I am not interested in learning about this innovation.	0 1 2 3 4 5 6 7
31. I would like to determine how to supplement, enhance or replace the innovation.	0 1 2 3 4 5 6 7
32. I would like to use feedback from students to change the programme.	0 1 2 3 4 5 6 7
33. I would like to know how my role will change when I am using the innovation.	0 1 2 3 4 5 6 7
34. Coordination of tasks and people is taking too much of my time.	0 1 2 3 4 5 6 7
35. I would like to know how this innovation is better than what we have now.	0 1 2 3 4 5 6 7

**Part B: The Stages of Concern Questionnaire's (SoCQ's)
Quick Scoring Device**

1. Instructions and guidelines for using the SocQ Quick Scoring Device

The Stages of Concern questionnaire contains thirty-five items. The scoring of the SoCQ requires a series of operations that result in an SoCQ profile. The following steps should be carried out on the Quick Scoring Device:

Step 1:

In the box labeled A, fill in the identifying information taken from the cover sheet of the SoCQ.

Step 2:

Copy the numerical values of the circled responses to statement 1 through 35 in the numbered blanks in the Table labeled B. Note that the numbered blanks in Table B are not in consecutive order.

Step 3:

Box C contains the Raw Scale Total for each stage (0-6) in the appropriate column, Take each of the seven column (0-6) in Table B, add the numbers within each column, and enter the sum for each column (0-6) in the appropriate blank in Box C. Each of these seven Raw Score Totals is a number between 0 and 35.

Step 4:

Table D contains the percentile scores for each Stage of Concern. Find the Raw Scale Score Total for Stage 0 from Box C; locate this number in the left-hand column in Table D, then look in the Stage 0 column to the right in Table D and circle that percentile ranking. Do the same for Stage 1 through 6, only match the left-hand column raw score with the corresponding stage.

Step 5:

Transcribe the circled percentile scores for each stage (0-6) form Table D to Box E now contains seven numbers between 0 and 99.

Step 6:

Box F contains the SoC graph. From ox E, take the percentile score for Stage 0 and mark htat point with a dot on the Stage 0 vertical line on the SoC graph. Do the same for Stage 1 through 6. Connect the points to form SoC profile.

2. SoCQ Quick Scoring Device

A

Date. _____

Site: _____ SS# _____

Innovation: _____

B

Stage						
0	1	2	3	4	5	6
3__	6__	7__	4__	1__	5__	2__
12__	14__	13__	8__	11__	10__	9__
21__	15__	17__	16__	19__	18__	20__
23__	26__	28__	25__	24__	27__	22__
30__	35__	33__	34__	32__	29__	31__

C

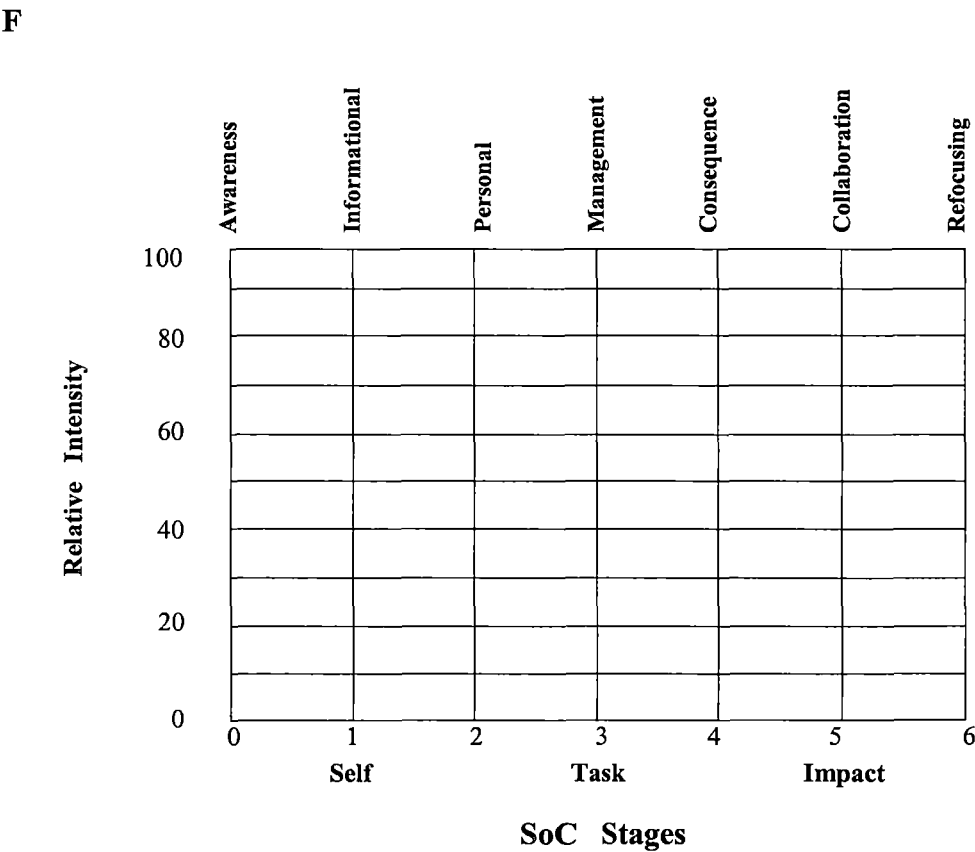
_____ (Raw Score Total)

D

Five Item Raw Scale Score Total	Stage						
	0	1	2	3	4	5	6
0	10	5	5	2	1	1	1
1	23	12	12	5	1	2	2
2	29	16	14	7	1	3	3
3	37	19	17	9	2	3	5
4	46	23	21	11	2	4	6
5	53	27	25	15	3	5	9
6	60	30	28	18	3	7	11
7	66	34	31	23	4	9	14
8	72	37	35	27	5	10	17
9	77	40	39	39	5	12	20
10	81	43	41	34	7	14	22
11	84	43	45	39	8	16	26
12	86	48	48	43	9	19	30
13	89	51	52	47	11	22	34
14	91	54	55	52	13	25	38
15	93	57	57	56	16	28	42
16	94	60	59	60	19	31	47
17	95	63	63	65	21	36	52
18	96	66	67	69	24	40	57
19	97	69	70	73	27	44	60
20	98	72	72	77	30	48	65
21	98	75	76	80	33	52	69
22	99	80	78	83	38	99	73
23	99	84	80	85	43	59	77
24	99	88	83	88	48	64	81
25	99	90	85	90	54	68	84
26	99	91	87	92	59	72	87
27	99	93	89	94	63	76	90
28	99	95	91	95	66	80	92
29	99	96	92	97	71	84	94
30	99	97	94	97	76	88	96
31	99	98	95	98	82	91	97
32	99	99	96	98	86	93	98
33	99	99	96	99	90	95	99
34	99	99	97	99	92	97	99
35	99	99	99	99	96	98	99

E

_____ (Percentile Scores)



Source

Original from Hall, G. E. & Hord, S.M. (2001). Implementing change: Patterns, principles, and potholes, 2001: pp.233-234.

Part C: Measuring Stages of Concern about the Innovation: A Guideline for Interpretation of the SoC Questionnaire Data

1. Look at the high and low stage scores

The focus for the SoC questionnaire data interpreting should be looked at the relative highs and lows to indicate about individuals' concerns, not how high or low it is in relation to some other SoC questionnaire data.

Stage 0:

High 0 – Indicates either an experienced user who is more concerned about things not related to the innovation, or a nonuser who is just becoming aware of the innovation.

Low 0/high other stages – Suggests intense involvement with the innovation.

Low 0, 1, 2, and 3 – Indicates an experienced user who is still actively concerned about the innovation.

Caution – If the stage 0 score is particularly high relative to the other scores, the other stage scores may have little significance. If there is an overall high response tendency, the high stage 0 score may not reflect unconcern about the innovation.

Stage 1:

High 1 – Want more information about the innovation.

Low 1 – Feel that they already know enough about the innovation.

Stage 2:

High 2 – Have intense personal concerns about the innovation and its consequences for them. While these concerns reflect uneasiness regarding the innovation, they do not necessarily indicate resistance.

Low 2 – Feel no personal threat in relation to the innovation.

Stage 1 and 2 generally go together, but when they fall apart, check them closely.

High 1/low 2 – Need more information about the innovation. These respondents are generally open to and interested in the innovation.

Low 1/high 2 – Have self concerns, tend to be more negative toward the innovation and generally not open to information about the innovation per se.

Stage 3:

High 3 – Have logistics, time, and management concerns.

Low 3 – Have minimal to no concerns about managing use of the innovation.

Stage 4:

High 4 – Have concerns about the consequences of use for students.

Low 4 – Have minimal to no concerns about the relationship of students to use of the innovation.

Stage 5:

A high 5 score is complex:

High 5 – Have concerns about working with others in relation to the innovation. A high 5 with all other stages being low is likely to be an administrator, coordinator, or team leader – one who perceives herself/himself to be in a leadership role; coordinating others is the priority.

High 5 with some combination of 3, 4, and 6 also being high – Have concern about a collaborative effort in relation to the other high stage concerns.

High 5 with 1 being high – Have concerns about looking for ideas from others, reflecting more a desire to learn from what others know and are doing, rather than concern for collaboration.

Stage 6:

High 6 with low 1 – Not interested in learning more about the innovation. The person is likely to feel that she/he already knows all about it and has plenty of ideas.

High 6, high 3, low 0, and 2 – Is a user who tends to be positive in attitudes toward the innovation, but has many logistics issues

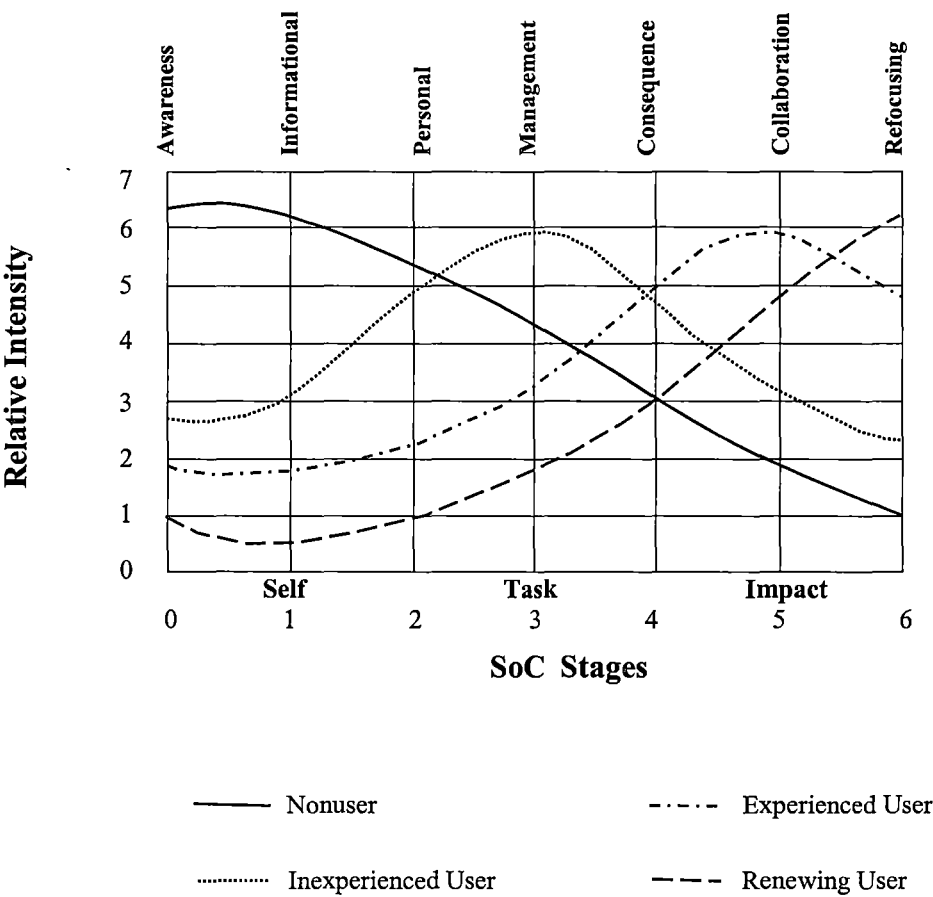
to take care of. The high 6 indicates that the person has ideas about how to improve use of the innovation.

Tailing-up 6 for nonusers – Has ideas about how to do thing differently and is likely to be negative toward the innovation.

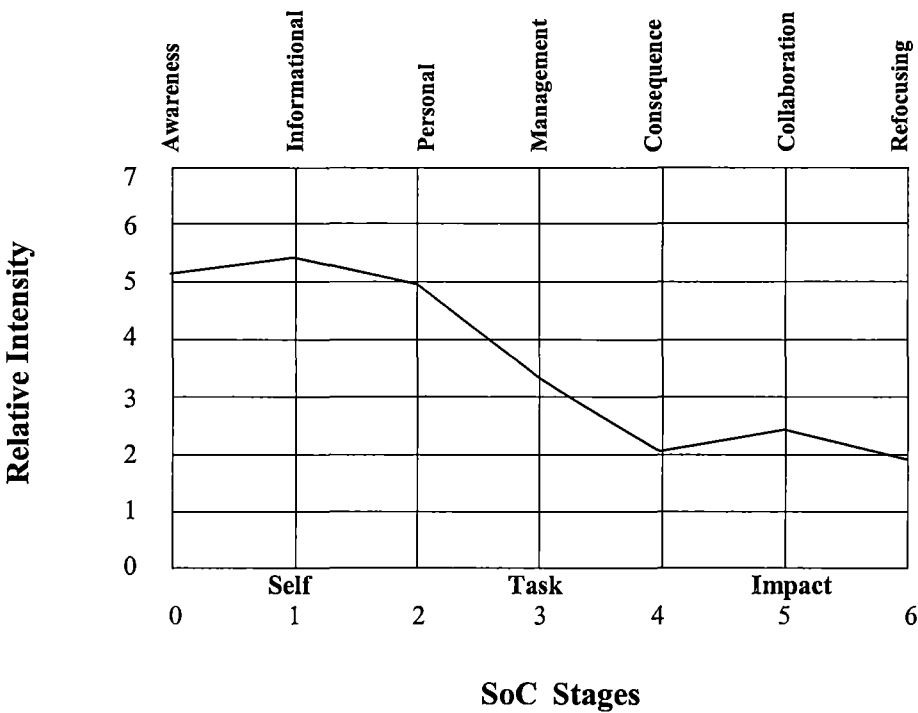
Source Original from Hall, G. E., George, A. A. & Rutherford, W. L. (1977). The Measuring Stages of Concern about the innovation: A manual for use of the SoC questionnaire, 1977: pp.53-55.

2. Some typical characteristic of Stages of Concern Profiles

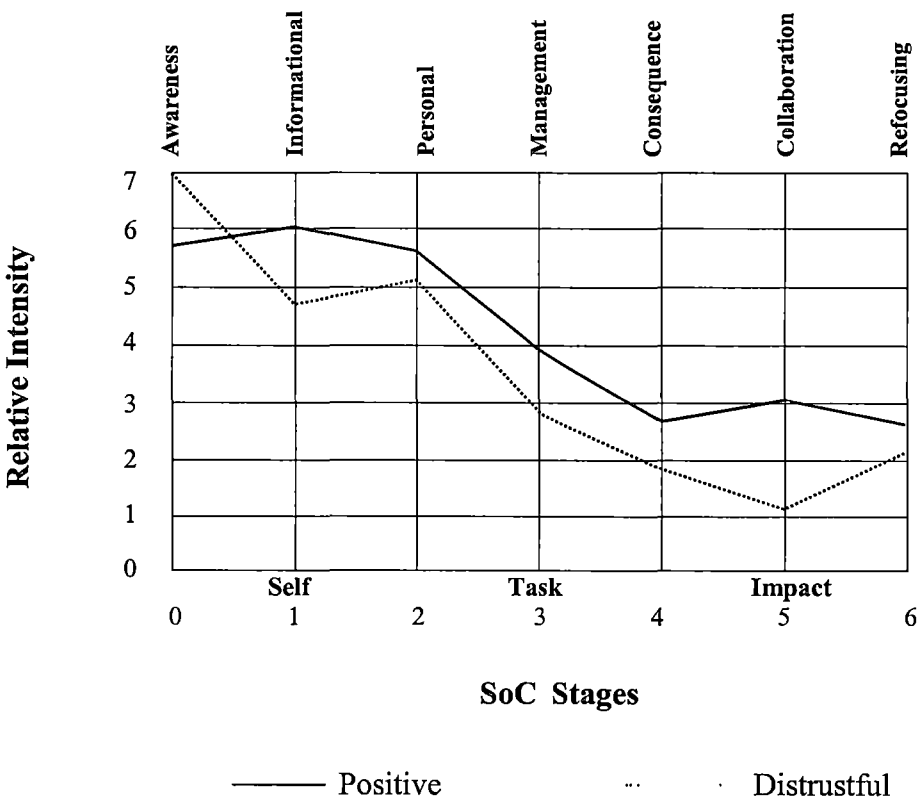
a) Ideal wave motion development of Stages of Concern



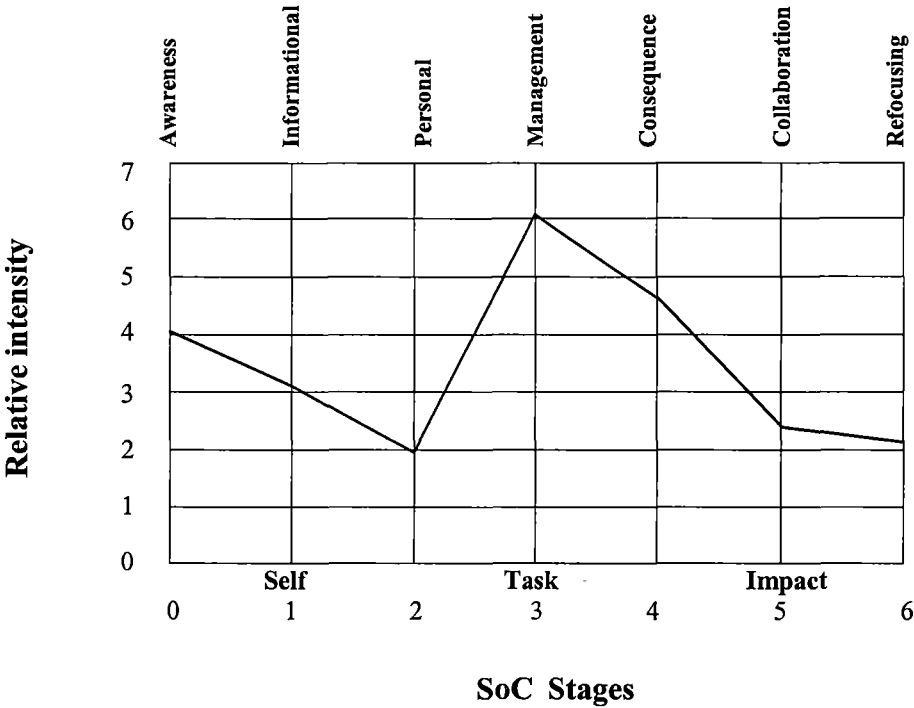
(b) Typical nonuser SoCQ profile



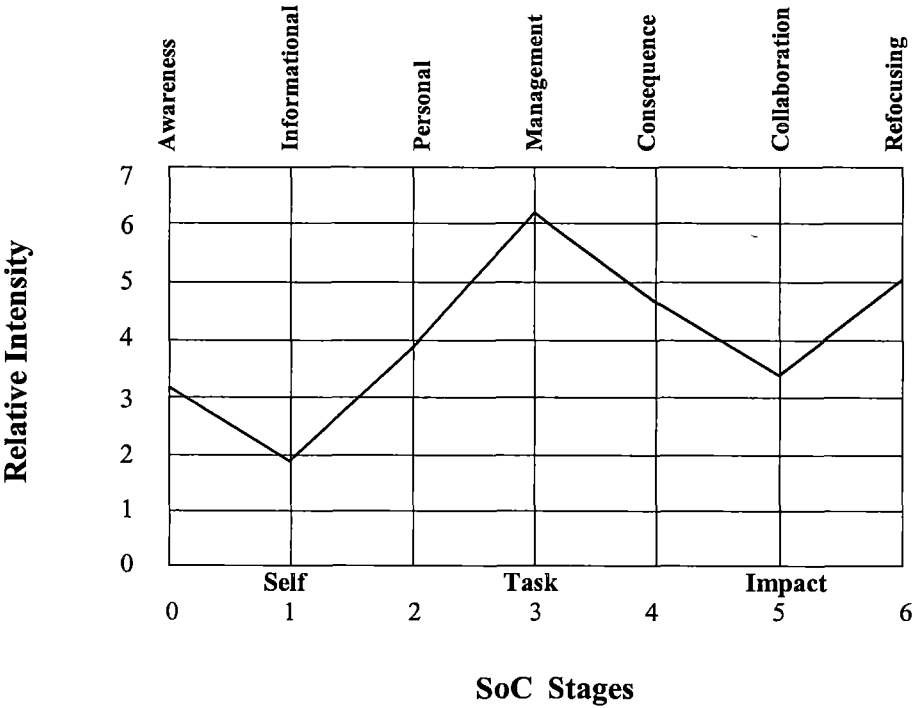
(c) Comparison of positive and distrustful nonuser profiles



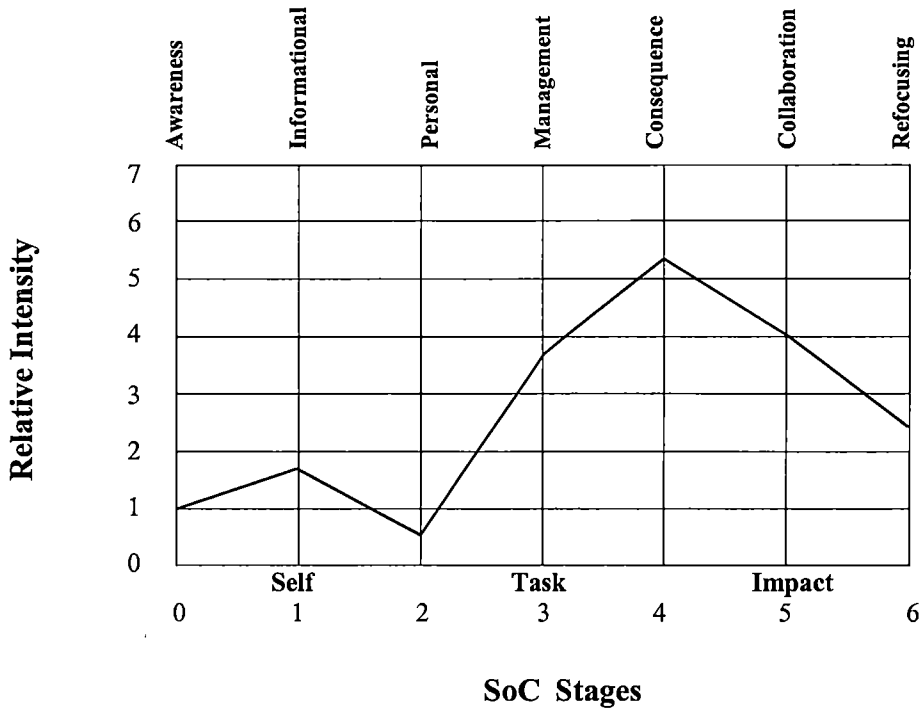
(d) Intense management concerns profile



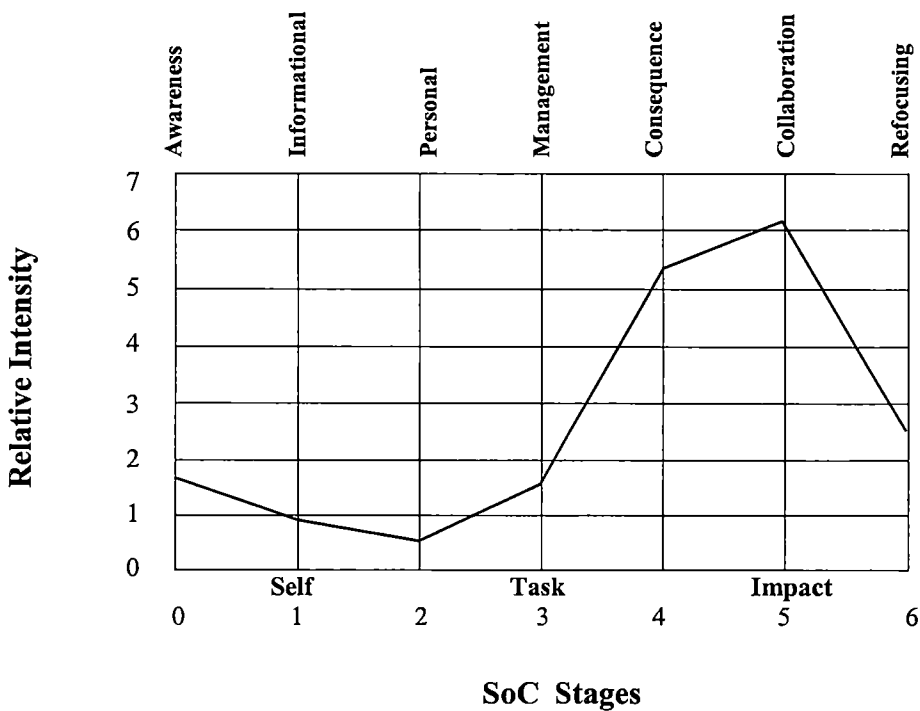
(e) Profile of high management concerns with ideas



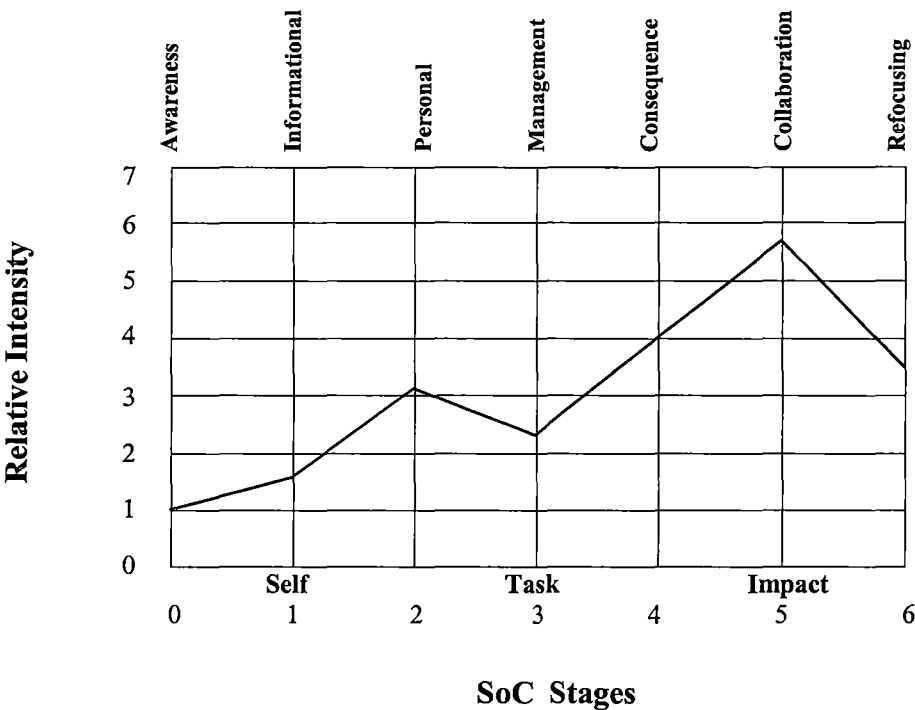
(f) Consequence concerns profile



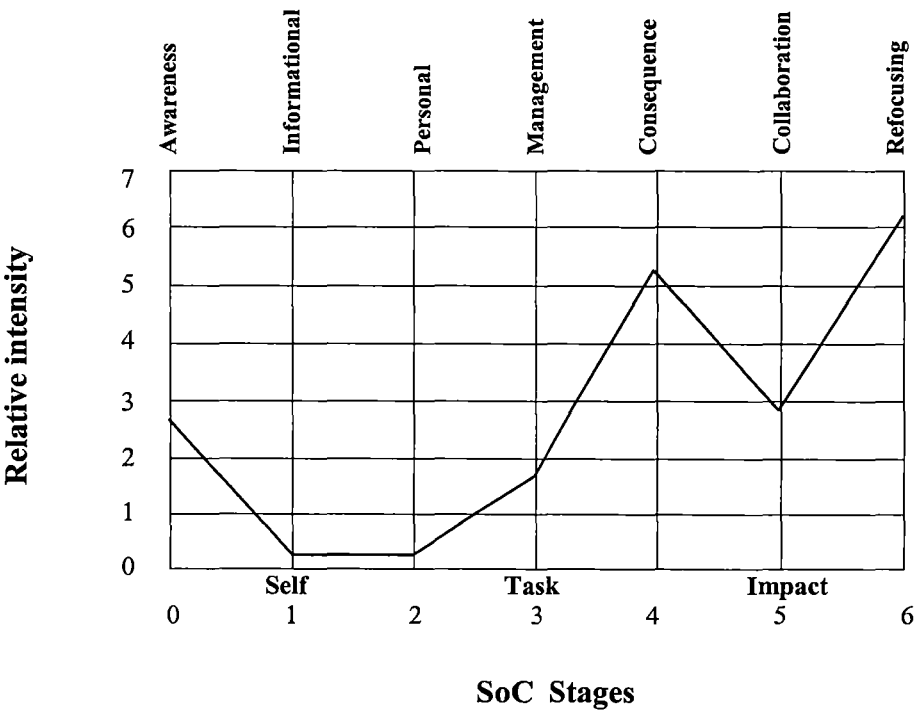
(g) High collaboration and consequence concern profile



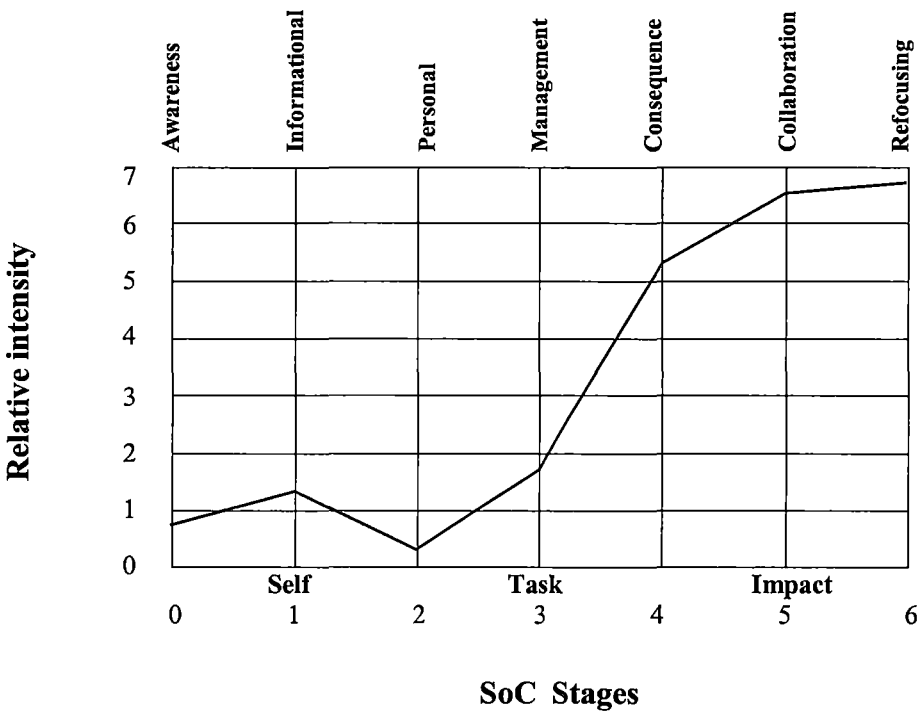
(h) Single high collaboration concern profile



(i) High refocusing concern profile



(j) Profile of impact-concern user and coordinator



Source Derived from the Measuring Stages of Concern about the innovation: A manual for use of the SoC questionnaire. (Hall, G. E., George, A. A. & Rutherford, W. L. (1977)).

APPENDIX II**Questionnaire administered to
Taiwanese Maritime Education
and Training Institutes****INTRODUCTION**

The purpose of this questionnaire is to determine what people who are using or thinking about using various programmes are concerned about at various times during the innovation adoption process. The items were developed from typical responses of university, institute and college educators who ranged from no knowledge at all about various innovations to many years' experiences in using them.

The questionnaire includes four measurements. They are the Stages of Concern related to the STCW maritime education and training innovation; the Expectancy related to the STCW maritime education and training innovation; the Opinions about Your Current Work related to the STCW maritime education and training innovation; and, personal demographic background.

Please respond to the items with reference to your current concerns, or how you feel about of this involvement or potential involvement with "STCW maritime education and training innovation". We do not hold to any definition of this innovation, so please think of it in terms of your own perception of what it involves.

A summary of this task's results can be delivery under your demand. Please leave the name and liaison address at the end of this survey, or alternatively send an email to jshu@mail.nkimt.edu.tw. If there have any uncertainty, please do not hesitate to contact me through the above mentioned email address.

**GREATLY APPRECIATED FOR YOUR VALUABLE TIME AND EFFORT
TO COMPLETE THIS TASK**

Note: The questionnaire was written in "English" at the design stage and that it was translated into "Chinese" prior to its administration in Taiwan.

Please answer these questions by clicking a check mark "√" in the appropriate box "□" of the questionnaire.

[illegible]

[illegible]

[illegible]

The Likert-type scale ranging from 0-5, points out the extent to which the statement reflected your current feelings. The scale "1" represents "strongly disagree", "5" represents "strongly agree". The higher marks you get, the more these statements are suited to your case or viewpoints.

Please answer these questions by clicking a check mark "√" in the appropriate box "□" of the questionnaire.

[illegible]

The Opinions about Your Current Work Related to the STCW Maritime Education and Training Innovation

The Likert-type scale ranging from 0-5, points out the extent to which the statement reflected your current feelings. If it is "extremely important" to your work, please tick "√" in the proper box "□" below the "5" scale, whereas, if "not really important" to your work, please tick "√" in the proper box "□" below the "1" scale. The higher the mark is, the more important the item you are thinking is.

Please answer these questions by clicking a check mark "√" in the appropriate box "□" of the questionnaire.

[illegible]

PART FOUR Demographic

Finally, in order to identify different views of the examined issues in terms of the different personalities, we would like to know a little bit about you. Please tick check mark "✓" in the proper box "□" beside the question.

Declare again, your responses are anonymous and will be treated in confidence.

1. What present employer of you is:
☐1. Taiwan Ocean University ☐2. Kaohsiung Institute of Marine Technology
☐3. China College of Marine Technology and Commerce
2. What current lecturing department of you is:
☐1. Navigation Dept. ☐2. Engineering Dept. ☐3. Fishery Dept.
3. What current professional title of you is:
☐1. Lecturer ☐2. Assistant professor ☐3. Associate professor
☐4. Professor ☐5. Others
4. Age: _____ Years old
5. Sex:
☐1. Female ☐2. Male
6. Highest degree earned:
☐1. Bachelor ☐2. Master ☐3. Doctorate ☐4. Others
7. What the area or country of your highest degree earned was:
☐1. Taiwan ☐2. Europe ☐3. The America ☐4. Asia ☐5. Others
8. Number of teaching years at present school: _____ Year
9. How long have you been involved in the STCW innovation with teaming?
☐1. Never ☐2. Less than 1-year ☐3. 1-year ☐4. 2 years
☐5. 3 years ☐6. 4 years ☐7. 5 years or more
10. Have you ever been attending STCW seminars or in-service workshops?
☐1. Yes ☐2. No
11. After serving as a professional faculty, have you ever been on-the-job study?
☐1. Yes ☐2. No
 If yes, the period of your on-the-job study was: _____ Month/Year
12. Finally, we would like to understand your satisfaction about the current job.
 Are you satisfied your current job?
☐1. Extremely dissatisfied ☐2. Somewhat dissatisfied ☐3. Average
☐4. Somewhat satisfied ☐5. Strongly satisfied ☐6. No comment

Thank you for the assistance and cooperation

**APPENDIX III: The "SPSS" Coding Form of the
Stages of Concern, the Expectancy
Values, the Professionalism and
Demographic Background**

1. The "SPSS" Coding Form of Stages of Concern

Explanation:

- 1. Column 1-2 (V1) : Respondent's ID
- 2. Column 3-37 (V2-V36) : 35-item of Stages of Concern

V1		V2 - V36																																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
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V1		V2 - V36																																			
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V1		V2 - V36																																			
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7	9	4	2	2	0	4	1	5	2	1	4	7	2	6	5	6	2	3	3	4	2	4	5	6	5	6	4	5	3	5	6	2	4	3	5	4	
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8	2	6	1	1	1	6	4	4	4	4	4	6	1	6	7	7	4	6	6	6	1	4	0	6	4	4	6	6	6	6	4	1	4	6	1	6	
8	3	1	4	7	7	4	7	7	7	7	4	7	7	7	4	7	4	7	7	7	4	4	4	4	4	4	4	7	7	7	1	4	4	7	4	7	
8	4	5	1	1	1	7	1	1	1	4	7	7	1	7	7	7	7	7	7	7	4	4	4	7	7	2	7	4	4	7	5	3	7	7	7	7	
8	5	7	1	6	1	7	1	2	7	7	7	7	1	7	7	7	1	7	7	7	1	9	7	9	7	7	7	7	7	7	1	9	9	9	9	9	
8	6	0	0	7	0	0	7	0	0	0	0	0	7	0	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	7	0	0	0	7	0	
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8	9	7	4	1	2	6	2	5	6	6	6	6	1	7	6	6	5	5	6	6	5	3	2	3	6	3	6	7	5	7	2	4	3	5	4	6	
9	0	4	1	0	1	1	2	6	6	5	4	7	1	7	7	7	7	7	7	7	1	1	5	7	7	7	7	5	7	4	6	4	6	4	6	6	
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	

2. The "SPSS" Coding Form of the Expectancy Values, Professionalism and Demographic Background

Explanation:

- 1. Column 1-2 (V1) : Respondent's ID
- 2. Column 38-46 (V37-V45) : 9-item of expectancy values
- 3. Column 47-58 (V46 – V57) : 12-item of professionalism
- 4. Column 59-73 (V58 – V72) : Demographic variables
 - Column 59 : Institute
 - Column 60 : Department
 - Column 61 : Position
 - Column 62-63 : Age
 - Column 64 : Sex
 - Column 65 : Highest degree earned
 - Column 66 : Country of highest degree earned
 - Column 67-68 : Teaching experiences
 - Column 69 : STCW reform experiences with teaming
 - Column 70 : STCW seminars and/or workshops attended
 - Column 71 : On-the-job study
 - Column 72 : Period of the on-the-job study
 - Column 73 : Satisfaction of the current job

V1		V37 – V45									V46 – V57												V58 – V72															
1	2	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	
0	1	5	5	5	4	4	4	1	1	2	5	5	5	5	5	5	3	4	3	2	5	5	1	1	3	3	9	1	3	2	1	0	7	1	1	2	4	
0	2	4	4	3	3	3	3	4	3	4	4	4	4	5	3	3	4	3	3	4	3	2	2	3	1	4	5	1	2	1	1	4	1	2	2	0	5	
0	3	4	4	4	4	5	3	4	4	4	4	4	4	5	4	4	3	4	4	4	5	3	3	2	3	3	4	1	1	2	1	1	3	2	2	1	1	5
0	4	5	5	5	5	5	5	3	4	4	5	5	5	5	4	4	5	4	4	4	4	4	2	3	4	5	6	1	1	1	3	2	4	1	2	0	4	
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0	7	4	4	4	4	4	4	4	4	4	4	4	4	4	2	2	3	1	1	3	1	1	2	3	1	3	5	1	3	1	0	9	2	2	1	1	5	
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0	9	4	4	3	4	4	4	3	3	3	5	5	5	5	4	3	5	4	2	4	4	4	1	1	1	5	0	1	2	1	2	3	6	1	1	1	5	
1	0	5	5	5	5	5	5	3	5	5	5	5	5	5	5	5	5	5	4	4	5	5	2	3	3	4	8	1	2	1	2	3	5	1	1	1	4	
1	1	4	4	4	4	3	3	4	3	4	4	4	4	3	4	3	3	4	3	4	3	3	2	3	3	5	8	1	1	1	2	7	5	1	1	1	3	
1	2	5	5	3	3	2	3	3	2	3	5	5	5	5	5	5	5	5	4	5	5	4	1	1	1	4	2	1	2	1	1	0	5	1	1	1	4	
1	3	5	4	4	4	4	4	4	4	4	5	4	4	5	4	4	5	5	4	4	4	4	2	3	1	4	1	1	2	1	1	2	2	1	1	1	4	
1	4	3	3	3	3	3	3	4	3	4	4	4	4	4	3	4	5	4	3	5	3	2	2	3	3	4	1	1	3	1	1	2	1	2	2	0	5	
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V1		V38 – V46									V47 – V58										V59 – V73																
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3	0	4	4	3	4	4	4	4	3	4	5	5	5	5	5	5	5	5	5	6	6	3	2	5	5	8	1	4	1	2	2	1	2	2	0	5	
3	1	4	4	3	4	4	4	4	3	4	5	5	5	5	5	5	5	5	6	5	6	6	3	2	1	3	3	1	2	1	0	7	2	2	2	0	4
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3	5	5	3	3	6	3	2	5	3	4	5	5	5	5	5	3	5	3	5	5	4	4	2	1	1	4	6	1	2	1	1	6	1	2	1	1	5
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3	9	5	5	5	5	5	5	4	4	4	5	5	5	5	5	5	5	4	3	4	4	3	2	1	1	5	6	1	1	1	1	8	7	1	1	1	4
4	0	5	5	4	5	5	5	3	4	5	5	4	4	4	3	4	5	3	4	4	3	3	2	1	3	4	7	1	1	1	2	0	3	1	1	1	3
4	1	4	4	3	2	3	4	4	3	3	4	4	5	5	4	4	5	4	4	5	4	4	2	1	3	6	1	1	2	3	3	1	1	2	1	2	3
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4	5	5	5	5	5	5	5	4	3	5	5	5	5	4	4	5	4	4	3	3	5	4	2	1	3	4	6	1	2	1	2	0	4	1	1	1	4
4	6	4	4	4	6	6	6	6	6	4	3	1	3	1	1	1	4	1	1	4	9	1	2	1	5	5	1	1	1	1	2	0	1	2	2	0	2
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5	3	2	2	2	4	3	3	3	3	3	4	4	4	4	4	5	5	3	4	4	4	4	2	2	4	5	5	1	3	1	2	8	4	1	1	1	4
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5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	2	3	5	3	1	3	3	2	0	7	1	1	2	4	
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5	8	5	5	4	5	3	3	4	4	3	4	4	5	5	4	4	5	4	3	5	5	3	2	2	5	4	9	1	1	1	2	0	2	1	1	1	3
5	9	5	5	4	5	5	4	4	4	3	5	5	5	5	4	4	5	4	4	4	4	4	2	2	3	4	5	1	3	3	1	0	5	1	1	1	4
6	0	4	4	4	5	4	4	3	3	4	3	3	3	3	3	4	4	3	3	3	3	3	2	2	5	5	0	1	4	1	2	0	1	1	1	1	3
1	2	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73

V1		V38 – V46										V47 – V58										V59 – V73																
1	2	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	
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6	3	5	5	5	5	5	4	5	5	5	5	5	5	5	2	5	5	2	2	5	4	2	2	5	5	0	1	4	4	1	7	3	1	1	1	5		
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7	0	5	5	5	5	5	5	2	2	1	5	5	5	5	5	3	5	5	4	5	2	1	1	1	1	5	1	1	2	2	0	9	1	1	1	1	3	
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7	2	5	5	5	5	5	5	5	5	3	5	5	5	5	5	5	5	5	4	4	4	4	1	1	1	5	1	1	1	1	1	2	4	1	1	2	5	
7	3	4	4	4	5	5	4	2	2	1	4	4	5	5	4	5	3	4	3	4	4	5	1	1	4	6	0	1	3	1	3	0	7	1	1	1	5	
7	4	5	5	5	3	3	3	4	4	5	5	3	4	4	3	4	5	3	2	5	1	1	1	1	2	5	0	1	3	2	1	5	5	1	1	1	5	
7	5	4	4	4	4	4	3	3	3	4	5	4	5	5	4	4	5	4	3	5	4	3	1	1	1	5	7	1	2	1	2	4	3	1	2	0	4	
7	6	5	5	5	5	5	4	4	4	4	5	4	4	5	5	5	5	5	5	3	4	4	2	3	3	5	4	1	3	1	1	8	2	1	1	1	2	
7	7	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1	3	2	9	9	1	3	1	0	4	9	9	9	9	4	
7	8	5	5	5	5	5	5	2	2	4	3	5	2	5	2	5	5	5	5	5	2	2	1	3	4	6	5	1	3	4	3	0	7	1	1	2	4	
7	9	4	4	6	5	4	5	6	6	6	3	4	5	5	3	3	5	4	2	5	2	3	1	3	2	4	3	1	3	1	0	4	1	2	2	0	4	
8	0	4	5	3	6	6	6	2	6	6	5	5	5	5	3	5	6	6	3	6	1	1	1	3	3	4	0	1	3	1	1	1	1	2	1	1	5	
8	1	5	5	5	4	4	4	6	6	6	5	5	5	5	5	4	5	5	5	4	4	4	1	3	4	5	2	2	3	2	2	7	1	2	1	2	3	
8	2	5	5	5	6	4	4	6	6	6	6	6	5	5	4	4	4	4	6	6	6	6	1	3	4	3	9	1	3	1	1	0	1	2	2	0	4	
8	3	4	4	3	4	4	4	3	3	3	5	5	5	4	5	4	4	5	5	4	4	4	1	2	5	2	5	1	1	1	9	9	5	2	2	0	3	
8	4	5	5	5	3	3	4	3	3	2	1	1	1	2	3	3	1	2	5	6	3	2	1	2	5	3	5	1	2	1	0	8	3	2	1	1	1	
8	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	4	3	4	9	4	4	4	1	2	3	9	9	1	2	4	3	5	5	1	1	2	4	
8	6	1	1	1	1	1	1	6	6	6	6	6	6	6	6	6	6	6	5	6	6	1	2	3	4	8	1	3	3	1	4	1	2	2	0	6		
8	7	4	4	4	5	5	5	4	4	4	5	4	5	4	4	4	4	4	4	5	4	3	1	1	1	5	0	1	2	3	1	0	9	9	9	9	4	
8	8	3	3	3	5	5	5	2	4	1	4	4	5	2	2	4	5	5	5	2	5	2	1	2	5	6	2	1	3	3	1	6	2	1	1	2	4	
8	9	5	5	4	4	5	5	3	3	5	5	4	5	5	5	5	5	5	5	5	5	1	2	1	6	0	1	1	1	1	8	4	2	1	2	3		
9	0	5	5	4	3	3	3	4	4	5	5	5	5	5	4	3	4	4	4	5	5	4	2	1	2	4	4	5	1	3	1	1	0	2	1	2	0	4
9	1	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	1	2	1	5	3	1	2	3	1	6	3	2	2	0	3		
9	2	5	5	5	3	4	4	3	4	2	5	5	5	5	5	5	5	5	5	4	4	2	1	2	3	4	4	1	3	3	1	1	1	2	1	2	5	
9	3	4	5	4	4	4	3	4	4	4	5	5	4	4	4	3	4	3	3	2	3	3	1	2	4	4	7	1	3	1	1	8	3	1	1	2	5	
9	4	4	4	4	4	5	5	4	4	3	5	4	5	5	4	4	5	3	3	4	4	4	1	2	4	4	8	1	3	3	1	5	4	2	2	0	5	
9	5	5	5	5	4	4	4	4	4	3	5	5	5	5	5	5	5	5	5	5	5	1	2	4	3	7	1	3	1	0	6	3	2	2	0	5		
1	2	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	

Appendix IV

The Seven-grouped Raw Scores
Total, the Converted Percentile
Scores and the SoC Profile
(Percentile) for all Respondents

1. Raw Scores Total for All Respondents

Respondent ID	Raw Scores Total							Sum
	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	
1	4	29	28	17	35	33	35	181
2	15	24	25	18	20	18	14	134
3	12	30	28	7	25	28	9	139
4	9	28	32	13	33	34	23	172
5	10	22	20	9	24	16	13	114
6	12	25	23	20	22	23	22	147
7	11	21	22	24	23	25	22	148
8	17	29	29	31	31	27	32	196
9	12	28	21	16	27	27	29	160
10	14	29	33	23	33	35	26	193
11	7	19	19	9	22	23	14	113
12	7	30	30	19	31	29	27	173
13	25	34	30	25	25	21	13	173
14	14	19	19	11	16	17	6	102
15	11	26	29	33	32	27	23	181
16	12	26	29	33	32	27	24	183
17	12	28	28	30	30	27	24	179
18	12	26	28	33	32	27	24	182
19	12	26	29	33	32	27	24	183
20	12	26	29	32	33	28	24	184
21	12	26	25	31	31	27	24	176
22	8	26	32	24	28	30	22	170
23	12	26	29	33	32	27	24	183
24	12	26	30	33	32	28	24	185
25	12	26	29	33	32	27	24	183
26	14	26	28	32	32	27	23	182
27	12	25	27	30	30	28	23	175
28	12	26	29	33	32	27	23	182
29	12	26	28	32	32	27	24	181
30	12	26	29	33	32	27	24	183
31	12	26	29	33	32	27	24	183
32	15	24	29	30	31	25	26	180
33	12	26	29	30	31	28	22	178
34	12	27	27	27	31	27	29	180
35	14	23	23	19	23	22	13	137
36	11	26	26	27	29	26	22	167
37	14	27	31	24	31	30	28	185
38	8	27	26	14	30	31	18	154
39	4	21	24	14	17	26	10	116

Respondent ID	Raw scores total							Sum
	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	
40	13	28	27	22	33	28	21	172
41	15	35	28	17	35	23	23	176
42	16	22	16	18	23	27	20	142
43	16	21	19	18	21	23	21	139
44	11	25	27	22	25	26	22	158
45	7	21	22	12	25	23	16	126
46	10	23	26	19	23	23	14	138
47	14	28	31	22	31	33	27	186
48	15	29	24	5	33	32	19	157
49	6	28	29	12	24	28	5	132
50	13	24	29	25	24	30	20	165
51	17	30	33	9	28	33	20	170
52	10	29	35	7	32	32	23	168
53	7	18	11	6	16	15	15	88
54	10	29	35	23	35	35	29	196
55	12	26	28	18	30	33	24	171
56	18	28	31	21	28	26	28	180
57	8	32	28	8	35	32	22	165
58	9	29	32	24	34	35	28	191
59	10	25	25	16	30	28	24	158
60	17	21	18	20	22	19	10	127
61	8	29	35	12	30	20	23	157
62	5	20	27	15	26	26	22	141
63	14	29	29	9	26	35	20	162
64	17	21	18	20	20	19	10	125
65	23	25	25	24	25	21	24	167
66	15	29	25	18	31	31	25	174
67	10	28	35	17	30	35	25	180
68	5	29	32	19	31	33	16	165
69	14	32	29	17	29	20	11	152
70	7	27	32	32	32	35	12	177
71	5	21	25	12	32	32	29	156
72	8	25	28	18	30	28	22	159
73	5	10	8	7	9	11	8	58
74	12	29	31	15	29	31	27	174
75	11	29	26	22	29	29	20	166
76	18	26	30	30	32	35	19	190
77	12	21	22	25	26	25	23	154
78	14	28	18	22	25	35	32	174
79	20	20	20	15	24	21	12	132
80	11	30	28	17	35	32	19	172
81	16	26	29	18	30	25	17	161
82	16	30	28	14	26	28	7	149
83	23	29	35	26	23	29	19	184
84	18	29	26	18	33	32	16	172
85	16	22	23	16	21	35	15	148
86	28	7	0	14	0	0	0	49
87	10	27	31	19	31	29	19	166
88	20	15	9	12	14	18	8	96
89	10	26	27	20	28	32	21	164
90	11	29	31	25	29	26	20	171
91	14	31	30	30	33	32	24	194

Respondent ID	Raw scores total							Sum
	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	
92	13	16	26	16	29	21	22	143
93	10	26	29	19	31	32	17	164
94	10	21	23	19	26	24	23	146
95	10	30	34	22	34	35	27	192

Group profile: N = 95

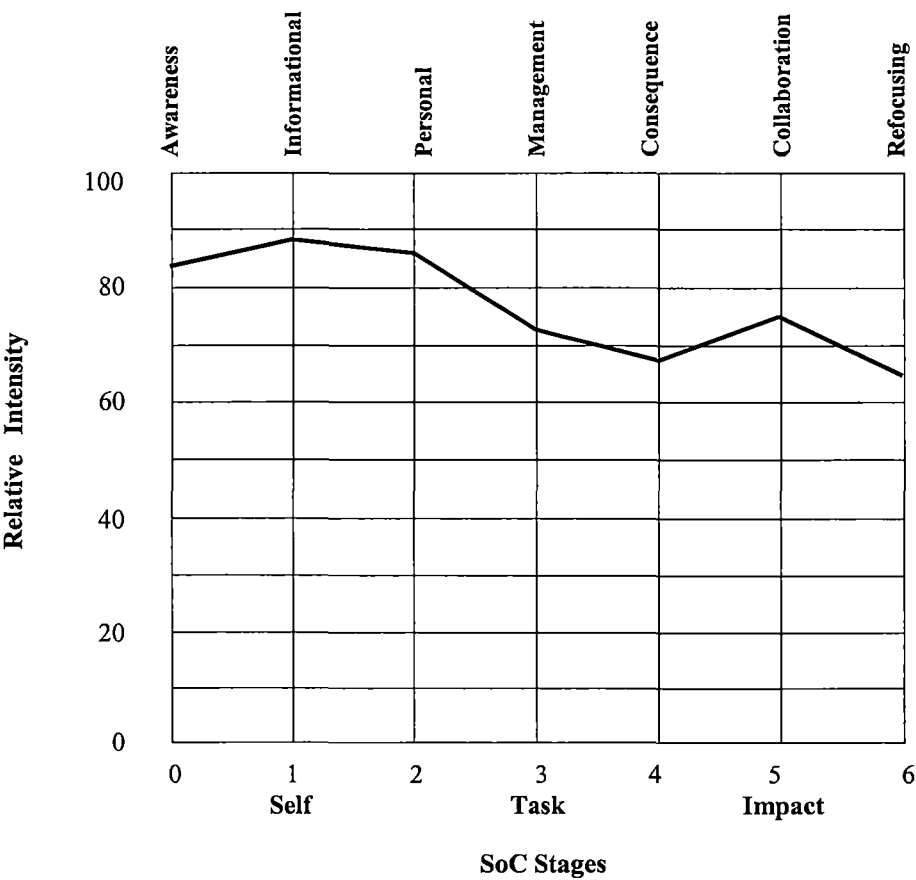
2. The Converted Percentile Scores for All Respondents

Respondent ID	Converted Percentile Scores							Sum
	Stages 0	Stages 1	Stages 2	Stages 3	Stages 4	Stages 5	Stages 6	
1	46	96	91	65	96	95	99	98
2	93	88	85	65	30	40	38	77
3	86	97	91	23	54	80	20	80
4	77	95	96	47	90	97	77	95
5	81	80	72	30	48	31	34	60
6	86	90	80	77	38	59	73	86
7	84	75	78	88	43	68	73	86
8	95	96	92	98	82	76	98	99
9	86	95	76	60	63	76	94	92
10	91	96	96	85	90	98	87	99
11	66	69	70	30	38	59	38	63
12	66	97	94	73	82	84	90	95
13	89	99	94	90	54	52	34	95
14	91	69	70	39	19	36	11	48
15	84	91	92	99	86	76	77	98
16	86	91	92	99	86	76	81	98
17	86	95	91	97	76	76	81	98
18	86	91	91	99	86	76	81	98
19	86	91	92	99	86	76	81	98
20	86	91	92	98	90	80	81	98
21	86	91	85	98	82	76	81	98
22	72	91	96	88	66	88	73	95
23	86	91	92	99	86	76	81	98
24	86	91	94	99	86	80	81	98
25	86	91	92	99	86	76	81	98
26	91	91	91	98	86	76	77	98
27	86	90	89	97	76	80	77	98
28	86	91	92	99	86	76	81	98
29	86	91	91	98	86	76	81	98
30	86	91	92	99	86	76	81	98
31	86	91	92	99	86	76	81	98
32	93	88	92	97	82	68	87	98
33	86	91	92	97	82	80	73	98
34	86	93	89	94	82	76	94	98
35	91	84	80	73	43	55	34	80
36	84	91	87	94	71	72	73	95

Respondent ID	Converted Percentile Scores							Sum
	Stages 0	Stages 1	Stages 2	Stages 3	Stages 4	Stages 5	Stages 6	
37	91	93	95	88	82	88	92	98
38	72	93	87	52	76	91	57	89
39	46	75	83	52	21	72	22	63
40	89	95	89	83	90	80	69	95
41	93	99	91	65	96	59	77	98
42	94	80	59	69	43	76	65	83
43	94	75	70	69	33	59	69	80
44	84	90	89	83	54	72	73	92
45	66	75	78	43	54	59	47	71
46	81	84	87	73	43	59	38	80
47	91	95	95	83	82	95	90	98
48	93	96	83	15	90	93	60	92
49	60	95	92	43	48	80	9	74
50	89	88	92	90	48	88	65	95
51	95	97	96	30	66	95	65	95
52	81	96	99	23	86	93	77	95
53	66	66	45	18	19	28	42	33
54	81	96	99	85	96	97	94	99
55	86	91	91	69	76	95	81	95
56	96	95	95	80	66	72	92	98
57	72	99	91	27	96	93	73	95
58	77	96	96	88	92	98	92	99
59	81	90	85	60	76	80	81	92
60	95	75	67	77	38	44	22	71
61	82	96	99	43	76	48	77	92
62	53	72	89	56	59	72	73	80
63	91	96	92	30	59	98	65	95
64	95	75	67	77	30	44	22	69
65	99	90	85	88	54	52	81	95
66	93	96	85	69	82	91	84	98
67	81	95	99	65	76	98	84	98
68	53	96	96	73	82	95	47	95
69	91	99	92	65	71	48	26	89
70	66	93	96	98	86	98	30	98
71	53	75	85	43	86	93	94	89
72	72	90	91	69	76	80	73	92
73	53	43	35	23	5	16	17	12
74	86	96	95	56	71	91	90	98
75	84	96	87	83	71	84	65	95
76	96	91	94	97	86	98	60	99
77	86	75	78	90	59	68	77	89
78	91	95	67	83	54	98	98	98
79	98	72	72	56	48	52	30	74
80	84	97	91	65	96	93	60	95
81	94	91	92	69	76	68	52	92
82	94	97	91	52	59	80	14	86
83	99	96	99	92	43	84	60	98
84	96	96	87	69	90	93	47	95
85	94	80	80	60	33	98	42	86
86	99	34	5	52	1	1	1	6
87	81	93	95	73	82	84	60	95

Respondent ID	Converted Percentile Scores							Sum
	Stages 0	Stages 1	Stages 2	Stages 3	Stages 4	Stages 5	Stages 6	
88	98	57	39	43	13	40	17	42
89	81	91	89	77	66	93	69	95
90	84	96	95	90	71	72	65	95
91	91	98	94	97	90	93	81	99
92	89	60	87	60	71	52	73	83
93	81	91	92	73	82	93	52	95
94	81	75	80	73	59	64	77	86
95	90	90	90	90	90	90	90	99
Percentile scores	7951	8363	8152	6846	6435	7114	6189	8387
Means (percentile)	84	88	86	72	68	75	65	88
Group profile N= 95								

3. The Stages of Concern Profile (Percentile) for All Respondents



4. Interpretation of Profile:

All the raw-scores are based on the 5-item subscales and converted into percentile scores, which represent the relative intensities. Then, look for the peaks and valleys in interpreting the overall concern profiles. It does not matter whether the peak is at 98% or 45%, or, the valley is at 80% or 20% intensity level. The overall shape must be considered at the beginning. As the high or low points on the specific profile, they serve as the beginning frame of reference.

The interpretations of the "SoC Percentile Profile" for all educators in Taiwan are as follows.

1. Stage 1 has highest mean percentile score that shows the averages of Taiwanese MET educators (experienced users) who want information about the MET Reform.
2. Generally, Stages 1 and 2 go together. Stage 2 has higher mean percentile score that illustrates Taiwanese MET educators have intense personal concerns about the innovation and its consequences for them. While these concerns reflect uneasiness regarding the MET Reform, they do not necessarily indicate resistance.
3. Stage 0 also has a relatively high mean percentile score, which indicates the averages of experienced users who are more concerned about things not related to the innovation. As there is an overall high response tendency, the higher Stage 0 mean score of Taiwanese MET educators may not reflect unconcern about the MET Reform.
4. The two lower mean scores are located at stage 4 and 6 that illustrates the averages of Taiwanese MET educators who have little concerns about the relationship of students using of the MET reform, and how to improve the process and methods of the innovation implementation.
5. As the minor peak of the collaboration stage associated with the awareness stage being high, explains that the averages of Taiwanese MET educators have concerns about looking for ideas from others, reflecting more a desire to learn from what others know and are doing, rather than concern for collaboration.

The overall shape of the "SoC Percentile Profile" for all educators in Taiwan looks like the non-user and positive profile on page 243. Figure 1 presents the overall shapes of the actual SoC percentile for all respondents, the typical nonuser and the typical positive nonuser SoC percentile profiles.

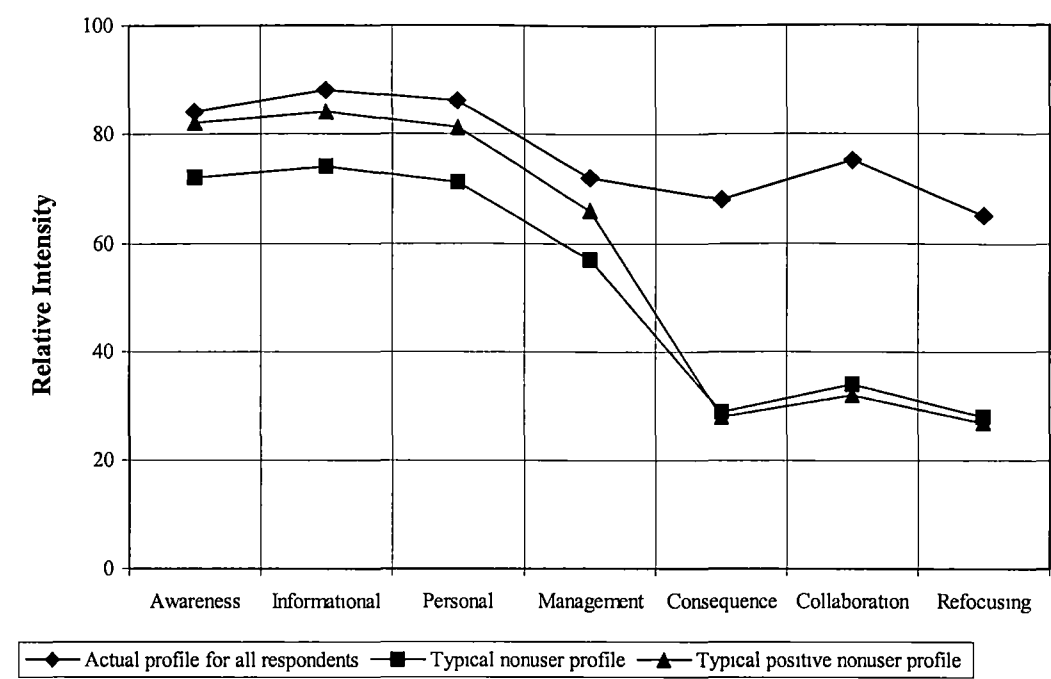
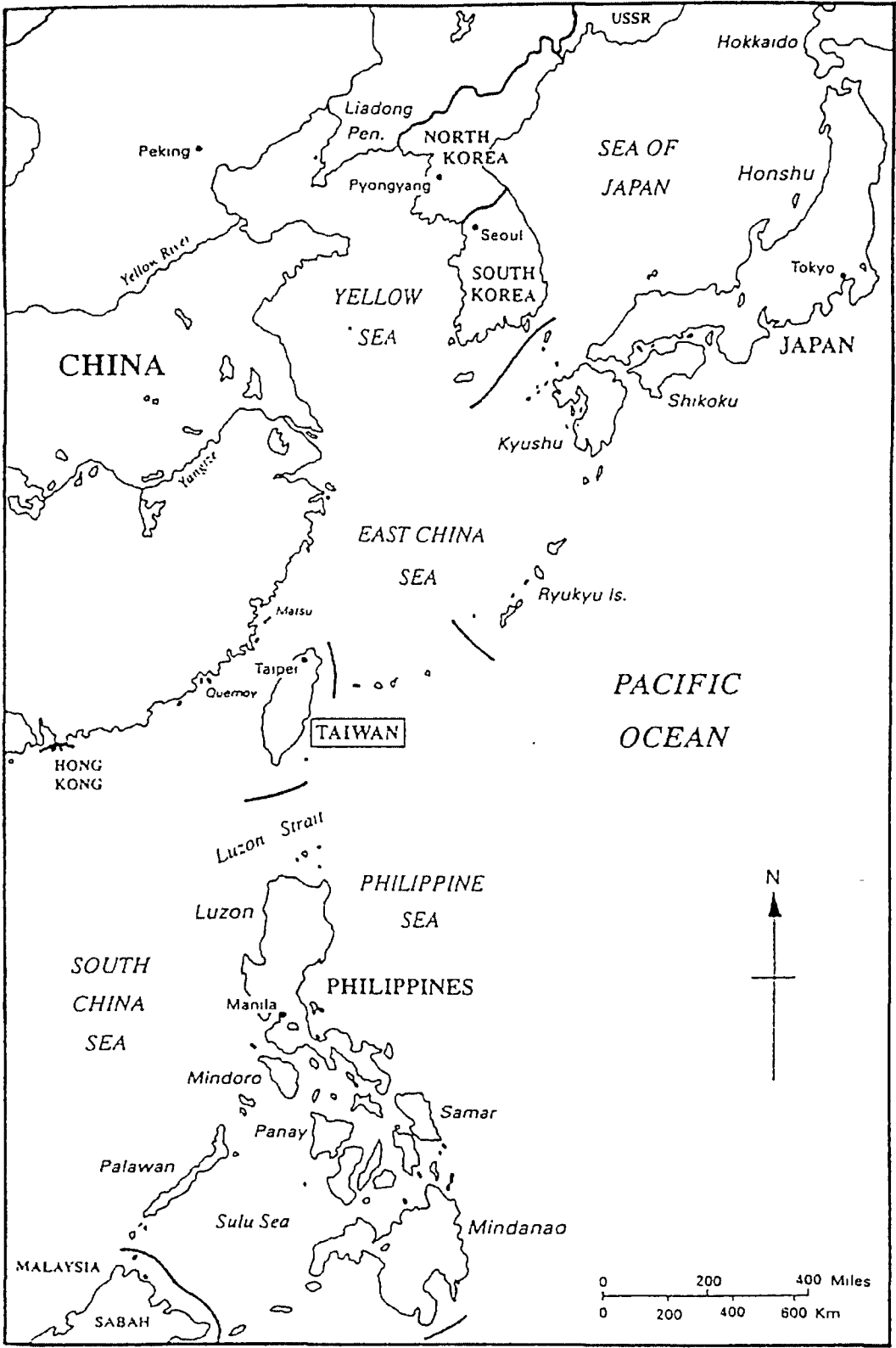


Figure 1 Comparison of the actual SoC percentile profile for all respondents, and typical nonuser and positive nonuser SoC percentile profiles

By comparison the overall shape of the SoC profile for all respondents, and typical nonuser and the typical positive nonuser SoC percentile profiles they are almost coincident. Hence, The percentile-based result mutual proofs one of this research's findings – Taiwanese educators' concerns still focus on the strategies of the reform process, in addition, a part of the educators play as typical nonusers on the reform.

Appendix V Maps of the Far East and Taiwan

1. Map of the Far East



2. Map of Taiwan

