Learning Styles and Perceived Educational Quality in e-Learning

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ABSTRACT :

Assurance of educational quality is a fundamental requirement for distance learning development. Factors that influence educational quality include instructional design, teaching styles, learning styles, learning objectives, content, and instructional media. In this case study, we examined the perceived learning quality of the e-learning courses at the National Tsing-Hua University (NTHU), Taiwan. The study focused on analysis of the types of student learning styles and their correlations with student perceptions of educational quality. The instructional model for the NTHU e-learning courses has been a blended-learning approach which integrates asynchronous e-learning with synchronous two-way audiovisual system (JoinNet) and face-to-face instruction. In order to examine educational quality, we used the Student's Evaluation of Educational Quality (SEEQ) survey instrument to investigate each student's perception of the received learning quality in terms of (a) learning / academic value, (b) instructor enthusiasm, (c) organization / clarity, (d) breadth of coverage, (e) grouping interaction, (f) individual rapport, (g) assignments / readings, and (h) examinations / grading. We then applied the Grasha-Riechmann Student Learning Style Survey (GRSLSS) to investigate any correlations between each student's reported learning style and the perceived educational quality. The findings showed that male students had higher ratings of the received educational quality than female students; there were three significant positive correlations between educational quality and three types of learning styles, including variables of Participative, Independent, and Collaborative; and one significant negative correlation between perceived educational quality and Avoidant learning style; the educational quality could be positively predicted by two SEEQ factors**:** breadth of coverage, and learning / academic value**.** These findings can inform instructors and instructional designers to develop better e-learning environments to improve the educational quality of e-learning.

1. INTRODUCTION :

Distance learning, including correspondence course delivery, has been developed over the past century. The advent of continuing evolution of information technology resources, innovations in teaching methods, and access to complex media applications has vaulted distance education into a new position of importance across the world. Telecourses, teleconferencing, and blended learning (combining e-learning with traditional class-room delivery) have increased exponentially in both traditional schools and universities, as well as in training in business and industry (Yang, Hsiao & Huang, 2008).

Distance learning is no longer limited to one or two media applications; how to appropriately enhance distance educational quality and learning efficiency are critical issues in distance educational research (Clark, 1983 ; Moore & Kearsley, 1996 ; Murgatroyd, 1990 ; Russell, 1999). During the past decade, Western researchers have

conducted research regarding learning quality and media application in distance learning. 'No significant difference' statements are general conclusions of comparisons of traditional and e-learning contexts (Holmberg, 1981 ; Simonson, Smaldino, Albright & Zvacek, 2000).

Russell (1999) summarized 355 research papers and concluded that there was no significant difference in educational outcomes between distance education and traditional education. However, due to educational traditional and environment differences, distance learning development in Asian has been slower than in the West. Asian distance learning systems have begun to be developed, but they have yet to affect the educational main stream. The beginning distance learning systems in Asian are related to the open-university concept, with, most Asian countries establishing open universities in the early 80s. These initial distance education efforts at the university level began with adopting radio and telecourse approaches to provide open access, cost effective learning resources to all learners (Bright & Yang, 2005 ; Yang, 2006).

Lack of literature support, experience, and conservative educational policies in support of maintaining traditional teacher-directed environments have been factors that have influenced Asian educational leaders to have negative attitudes toward the quality and value of distance learning. This paradigm of education has led to student acceptance that education is best when it is respectful of the teacher and that note taking and careful listening prepare students to get good grades on tests. This paradigm has been in place for decades and it will be hard to shift to active learning with the support of technology. As learners have increasing access to e-learning options, and as these students realize that they can pass exams (especially objective tests on memorized facts and concepts) without sitting passively through classes of lectures, it is likely that attitudes will change.

However, the higher educational regulation in Taiwan limits full recognition and accreditation of correspondence and any format of distance learning degrees from foreign institutions. The governmental concern for quality is laudatory, but the lack of consideration of the potential of distance learning to increase learning diversity, accessibility and educational equity is unfortunate. There is a strong need in Asia for more research on how to improve e-learning so that it may achieve different levels of learning objectives as well as provide convenient and effective learning environments. A good e-learning model with applications for Asian learners will require governmental support for continuing research (Yang, 2005).

When Asian society follows Western models to initiate distance learning, it is important to be aware that there are many different cultural and educational factors which will influence educational quality. In order to establish more academic support for future distance learning development in Taiwan, it is necessary to further examine and analyze the impact and quality of distance learning applications in Asian society.

1.1 Educational Quality :

Quality achievement outcomes are fundamental requirements for the use of distance learning as an enhancement or a substitute for traditional classroom instruction if the innovation is to gain further acceptance in Asia. Lack of research evidence on learning effectiveness requires continuing study related to correlations of instructional design and delivery with achievement outcomes. Leidener & Jarvenpaa (1993) indicated that there were three main variables that affected the quality of the e-learning environment ;- the student characteristics, the instructor characteristics, and the technology applications in instruction. Other factors such as curriculum, objectives, instructors, students, colleagues, and administrators have also been found to influence learning effectiveness (Marsh, 1982).

The Student Evaluation of Educational Quality Questionnaire (SEEQ) is widely used to evaluate educational quality and has good reliability and validity (Coffey & Gibb, 2001 ; Bangert, 2006 ; Marsh, 1982). The SEEQ includes eight characteristics of

educational quality;- (a) learning / academic value, (b) instructor enthusiasm, (c) organization / clarity, (d) the breadth of coverage, (e) group interaction, (f) individual rapport, (g) assignments / readings, and (h) examinations / grading.

Many additional cultural factors influence educational quality, and it is challenging to develop a standard set of instructional steps which may apply to various institutions, cultures, and educational systems. Sherry (1996) indicated that effective learning requires both knowledge of learning styles and appropriate preparation by the instructor. Complexities in teaching and learning styles influence the educational quality, but controlling for these variables while maintaining a spontaneous and genuine learning environment is a major responsibility for instructional designers and instructors.

1.2 Learning Style :

Many variables impact educational outcomes and understanding individual learning styles will enhance learning performance (Simpson & Du, 2004). Leidener & Jarvenpaa (1993) indicated that learner characteristics are among the main variables that affect the quality of learning in the e-learning environment. Benigno & Trentin (2000) mentioned that learning style, student-student interaction, learning environment, effective support, information technology, and learning materials are factors for evaluating e-learning courses. Garland & Martin (2005) stated that when designing online courses, student's learning style is one of the most essential factors. Sherry (1996) indicated that in order to develop an effective learning environment, both knowledge of learner styles and advanced teaching preparation of the instructional design are essential.

Keefe (1979) defined learning styles as the composite of characteristic cognitive, affective, and physiological factors that influence how a learner perceives and interacts with the learning environment. Grasha (2002, p. 41) stated that learning styles are "personal qualities that influence a learner's ability to acquire information, to interact with peers and the instructor, and

otherwise to participate in learning experiences". Merriam & Caffarella (1991) explained that learning style is an individual's characteristic way to process, to feel, and to behave in learning situations. Sarasin (1999) pointed out that learning style is the preference of any individual to process or perceive information in a particular way. Learning style influences the learner's ability to interact with peers, acquire information, and to develop a positive attitude toward learning activities and assignments.

Learning style is a complex phenomenon which influences learners' ability to process, store, recall, and perceive learning information (Garcia, Amandi, Schiaffino & Campo, 2007 ; James & Gardner, 1995). Various types of learners have different learning preferences, and in order to improve educational quality, it is necessary for educators to be aware that there are diverse learning styles (Shih & Gamon, 2002). Understanding the nature of the learning styles is an important element to determine the most effective e-learning development, learning process, and learner performance outcome expectations (Cooze & Barbour, 2007 ; Diaz & Cartnal, 1999 ; Shih & Gamon, 2002). Learning styles affect learning success (Dunn, 2000 ; Loomis, 2000).

Many learning styles theories and applications focus on improvement of instruction. The Felder-Silverman Learning Style model includes five learning style dimensions ;- perception (sensing / intuitive), processing (active / reflective), input (visual / verbal), organization (inductive / deductive), and understanding (sequential / global) (Felder & Silverman, 1988). Kolb's Learning Style Inventory (LSI) has been one of the classical learning style theory surveys (James & Gardner, 1995). Kolb considers that different people naturally prefer different learning styles. Kolb developed four combinations of processing and perceiving four learning styles, and each learner was expected to use the most comfortable mode along two dimensions.

The four learning strategies in Kolb's Learning Style Inventory are ;- (a) Concrete

Experience (CE), (b) Reflective Observation (RO), (c) Abstract Conceptualization (AC), and (d) Active Experimentation (AE). And, there are four types of learning styles: Diverging (CE/RO), Assimilating (AC/RO), Converging (AC/AE), and Accommodating (CE/AE) (Kolb, 1976). Type of learning style reflects the learner's preference, abilities, and environment, and the learner can learn better when the objective is presented in a style which matches the learner's preferred learning style (Nulty & Barrett, 1996).

The Grasha-Riechmann Student Learning Style Scales (GRSLSS) is a tool specifically designed for use in a distance learning setting with college / university students (Diaz & Cartnal, 1999 ; Grasha, 2002 ; James & Gardner, 1995). The factors in this survey are described below. The six categories of GRSLESS (learning style), are the following (Grasha, 2002, p. 169) ;

o   Avoidant - Learners have low learning motivation with frequent absenteeism, lower than average academic performance, and low responsibility for learning
o   Participative - Learners have high learning motivation, highly self-directed learning, and willingness to accept challenges and responsibilities
o   Competitive - Learners more aggressively compete for recognitions and rewards
o   Collaborative - Learners enjoy team work, and are willing to learn through sharing ideas
o   Dependent - Learners learn only what is required, and fear new challenges. They depend on specific indications for following directions
o   Independent - Learners prefer to work along, and are highly confident of their own learning abilities. They prefer having individual options about what to do and what to learn

The GRSLSS can benefit instructors to identity learners' different styles and to ensure that the instructional process considers the learners' differences (Grasha,

2002). The GRSLSS identifies five types of teaching style, as follows ;- Expert, Formal Authority, Personal Model, Facilitator, and Delegator. In this study, there were only four e-learning courses investigated, and the the study focused on learning style analysis.

1.3 The NCHU e-Learning Program :

The National Tsing-Hua University (NTHU), Taiwan, has been one of the most prolific e-learning EMBA credit program providers in Taiwan (NTHU, 2007). In order to ensure quality in this e-learning program and to have adequate instructional technology support, the NTHU cooperated with the Sun-Net Technology Corporation (SNTC), one of the biggest e-learning educational service companies in Taiwan. The SNTC has assisted several institutions to provide e-learning credit programs for thousands of students such as at the National Chengchi University, the National Taiwan University, and the National Tsing-Hua Univesity (SNTC, 2007).

The SNTC cooperated with the NTHU to recruit and administer an e-learning EMBA graduate course in technology management. The SNTC developed a blended-learning program which integrates e-learning delivery (asynchronous discussion board and synchronous chat room) with a two-way video and audio approach (synchronous teleconferencing-JoinNet), and face-to-face instruction. Students in the NTHU-EMBA e-learning course had over two years' prior working experience with an undergraduate degree. NTHU-EMBA will issue EMBA credits to those students who complete all course learning requirements (SNTC, 2007).

While there are many e-learning courses in Taiwan that focus on elementary, junior high school, high school, and undergraduate levels, Tasi (2008, p. 8) points out that "It is suggested that future studies focus more on adult learners outside of formal school settings". Accordingly, this present study integrates both the SEEQ and GRSLSS surveys to ask adult learners who enrolled for e-learning course in the NTHU-EMBA (continuing education program) about their perceptions of the educational quality of the e-learning program and their preferences of

learning styles, focusing on the following research questions ;

o   What differences existed in perceptions of the overall ratings of educational quality based on the selected demographic differences including gender, age, working experience, and level of degree ?
o   To what extent did each of the follow determinant factors of educational quality for students predict overall ratings of educational quality in the selected classes in NTHU ? The factors include ; (a) Learning value, (b) The instructor enthusiasm, (c) Organization, (d) Breadth of coverage, (e) Group interaction, (f) The individual rapport, (g) The assignments / readings, and also (h) The examinations / grading
o   What types of learning styles did students have in the selected classes at NTHU ?
o   What correlations existed between the student's learning styles and the student's perception of the overall ratings of educational quality ?

2. METHODOLOGY :

2.1 Sample :

Four EMBA courses at NTHU were offered through a blended e-learning format during the spring semester in year 2007. These included the courses entitled Technology Marketing, Organizational Theory, Financial Management, and Accounting (NTHU, 2007).

Of the 120 registered students, 89 (74%) were male, and 31 (26%) were female. Near the end of the 2007 spring semester, research surveys were distributed in a printed format for anonymous response ; each participant had 15 minutes to respond to the survey questions. A total of 84 (70%) completed and returned the survey. After eliminating invalid surveys, the total valid participant number retained was 78 (65%).

2.2 The Survey Instruments :

In order to examine educational quality, this study used two survey questionnaires.

One was on the student's subjective perceptions of the received educational quality – called the Student's Evaluation of Educational Quality (SEEQ) survey, developed by Marsh (1982) which includes the following dimensions ; learning value, instructor enthusiasm, organization, breadth of coverage, group interaction, individual rapport, assignments / readings, examinations / grading, and an overall quality evaluation. Each dimension consists of three to five questions; there are a total of 31 question items in the SEEQ.

The other was on the student's preferred learning style(s). The Grasha-Riechmann Student Learning Style Scales (GRSLSS) is ideal for assessing student learning preferences in a college-level distance education setting. GRSLSS has been used to identify the preferences of learners and it is also a good learning style inventory for distance learning research. (Diaz & Cartnal, 1999 ; Grasha, 2002). The GRSLSS survey consists of 60 question items, and includes demographic question items on gender, age, work experience, and educational level.

3. RESULTS :

3.1 Reliability :

Reliability was investigated in this study by Cronbach's Alpha test using SPSS 12.0. A value of 0.70 or higher was considered evidence of reliability (Segars, 1997). Reliability analysis was undertaken to measure the internal consistency of the 31-item SEEQ and of the 60-item GRSLSS. Cronbach's Alpha for the SEEQ survey instrument was 0.97, and for the GRSLSS survey instrument was 0.88, indicating that the reliability of each instrument was satisfactory.

3.2 Gender Differences :

One-way ANOVA was used to examine the demographic characteristics, and findings indicated one significant difference in gender, $F(1,72)= 9.325$, $p=0.003$ (see Table 1) indicating a strongly significant gender difference in students' perceptions toward overall ratings of educational quality. Male students showed higher scores

Table 1 : Overall Ratings of Educational Quality by Gender

Gender	Overall Rating of Educational Quality				
	N	M	SD	F	p
Male	53	4.44	0.49		
Female	21	4.00	0.72		
Both	74	4.32	0.59	9.33	0.003**

$** \ p < 0.01$

(mean M=4.44, SD=0.49) than female students (M=4.00, SD=0.72). One-way ANOVA did not indicate any other significant difference, however, among the other student demographic subgroups in the overall ratings of educational quality (OREQ).

3.3 Prediction of OREQ :

A stepwise multiple regression analysis was conducted to evaluate how well the elements of the SEEQ eight subscales could predict the overall ratings of educational quality (OREQ). The predictors were learning / academic value, instructor enthusiasm, organization / clarity, breadth of coverage, grouping interaction, individual rapport, assignments / readings, and examinations / grading, while the criterion variable was the OREQ. As presented in Table 2, the analysis of variance indicated that the regression model was able to predict the significant values of the dependent variable, F (2, 70) =52.025, p=0.000. The coefficient of determination

R^2 was computed as 0.598 and the adjusted R^2 was 0.586, indicating that the regression model accounted for 58.6% of the total variance in the OREQ.

The overall regression model was significant ($p < .01$), and estimates for the contribution of each of the eight elements of educational quality to the model were computed. As shown in Table 3, there were two significant predictors based on standardized regression coefficients: the breadth of coverage (BC) (t=3.836, p=.000) and learning / academic value (LV) (t=2.857, p=.006). Comparison of the unique contribution to the model R^2 (ΔR^2 in Table 3) for each category suggested that

the breadth of coverage (ΔR^2 =0.551) was more important than the category of learning/academic value (ΔR^2 =0.047) in explaining participation. The other six elements of educational quality were each not significant, and are not shown in the stepwise regression results. The regression equation can then be written as follows ; OREQ = 0.486BC + 0.406LV +0.438

Table 2 : Analysis of Variance for the Regression Model

Source	Sum of Squares	df	Mean Square	F	p
Model	15.609	2	7.804	52.025	0.00**
Error	10.501	70	0.150		
Total	26.110	72			

R^2 =0.598 ; adjusted R^2 =0.586 ; $** \ p < 0.01$

Table 3 : Stepwise Regression Analysis for Predicting Perception of Educational Quality

Source	B	*SE* B	β	*t*	*p*	ΔR^2
Constant	0.438	0.391		1.121	0.266	
breadth of coverage (BC)	0.486	0.127	0.469	3.836	0.000**	0.551
learning / academic value (LV)	0.406	0.142	0.349	2.857	0.006**	0.047

** $p < 0.01$

3.4 Type of Learning Style :

Table 4 shows the average or mean learning style scores of students on each of the six categories of the Grasha-Riechmann Student Learning Style Scales (GRSLSS). (Grasha, 2002, p. 203) The order of the six categories from the highest to the lowest was as follows ; 1. Collaborative (*M*=4.17), 2. Participative (*M*=3.96), 3. Independent (*M*=3.60), 4. Dependent (*M*=3.59), 5. Competitive (*M*=3.25), 6. Avoidant (*M*=2.58). Table 5 shows these scores as Low, Moderate, or High based on the norms of each learning style of the GRSLSS scale.

3.5 Correlation between the GRSLSS and the OREQ Findings :

Table 6 lists the correlations between students' learning styles on the GRSLSS and their perceptions toward educational quality on the OREQ. There were three significant positive correlations and one significant negative correlation : the significant positive correlations were on OREQ- Independent, r = 0.24 (*p* = 0.037); OREQ- Collaborative, r = 0.39 (*p* = 0.000); OREQ- Participative, r = 0.40 (*p* = 0.000); and the significant negative correlation: OREQ- Avoidant, r = -0.49 (*p* = 0.000).

Table 4 : Means (*M*) of the Students' GRSLSS Responses

Learning Style	*M*	Classification
Independent	3.60	Moderate
Avoidant	2.58	Moderate
Collaborative	4.17	High
Dependent	3.59	Moderate
Competitive	3.25	High
Participative	3.96	Moderate

Mean *M* based on the GRSLSS Scale range : strongly-disagree 1 to strongly-agree 5

Table 5 : The GRSLSS Classification System

Learning Style	Low	Moderate	High
Independent	1.0 to 2.7	2.8 to 3.8	3.9 to 5.0
Avoidant	1.0 to 1.8	1.9 to 3.1	3.2 to 5.0
Collaborative	1.0 to 2.7	2.8 to 3.4	3.5 to 5.0
Dependent	1.0 to 2.9	3.0 to 4.0	4.1 to 5.0
Competitive	1.0 to 1.7	1.8 to 2.8	2.9 to 5.0
Participative	1.0 to 3.0	3.1 to 4.1	4.2 to 5.0

Table 6 : Correlations between Learning Styles and OREQ

Learning Style	Pearson Correlation Coefficient	two-tailed p
Independent	0.240	0.037*
Avoidant	-0.498	0.000**
Collaborative	0.396	0.000**
Dependent	0.168	0.148
Competitive	-0.064	0.583
Participative	0.404	0.000**

* $p < 0.05$, two-tailed. ** $p < 0.01$, two-tailed

4. DISCUSSION AND IMPLICATIONS :

4.1 Gender Difference in Perceived Educational Quality :

Based on the research results, both male and female learners were in agreement that the students' overall ratings of educational quality (OREQ) in e-learning was positive. However, gender showed a significant difference regarding OREQ. In this study, the OREQ by the male students were higher than those by females. OREQ is likely related to prior experience of study formulating current learning preferences and the observed attitude differences towards e-learning. Research has indicated that female learners have had more negative attitudes toward e-learning than male learners (Busch, 1995 ; Bradley & Russell, 1997). However, some studies have shown that there are no gender differences on e-learning (Singleton, 2001). Variables such as the learner's academic major and level of computer-use experience also influence gender-based performances associated with a technological learning environment (Levine & Schmidt, 1998 ; Allen & Thompson, 1995).

Any e-learning environment requires many technology skills applications, especially with the NCHU-EMBA e-learning courses that adopted a blended learning approach which employed more complex technological skills. Learners need to apply both synchronous and asynchronous e-learning media, such as setting up a webcam, adjusting volume and uploading assignments, which require more skills than asynchronous online learning and ability to overcome unpredictable technological challenges.

Male students have elsewhere been reported to be more comfortable and confident in applying technology within technological learning environments (Prinsen, Volman & Terwel, 2007). Female learners have reported more barriers in their engaging e-learning, which have influenced their learning performance in an e-learning environment. Those results and the results from the present study similarly suggest that future e-learning developments in Taiwan need to consider gender differences that will influence the technology application abilities and OREQ. E-learning instructional designers and instructors could provide more learning support and assistance for female students or students who have special needs.

4.2 Educational Quality of e-Learning :

The SEEQ instrument consisted of eight characteristics of educational quality: These are (a) learning / academic value, (b) instructor enthusiasm, (c) organization / clarity, (d) breadth of coverage, (e) grouping interaction, (f) individual rapport, (g) assignments / readings, and (h) examinations / grading. Based on the students' perceptions in response to the SEEQ, the educational quality could be positively predicted by two SEEQ factors ;- the perceived breadth of coverage, and the perceived learning / academic value.

The factor of learning / academic value reflected whether the learning is perceived to be valuable, whether the learner is interested in the subject, and the student's overall attitude toward learning. A positive learning value will increase learning interest and motivation towards a subject and its content, and this is a key factor to influence learning effectiveness (Selim, 2007).

In NCHU e-learning courses, if students identify higher learning value, learning interest, and learning commitment, then the OREQ will be higher. The instructor could share learning frameworks and conceptual analysis of learning objectives and educational goals in advance in order to assist learners to know the educational purposes of a course. Moreover, the instructors could say what students could benefit from or achieve after completing the course work, thereby increasing the learners' awareness of learning value. In Asian society, negative impressions toward the quality and value of distance e-learning influence the learners' confidence and recognition. Improving students' attitude towards e-learning will benefit their learning participation and the quality of learning achieved.

The factor of breadth of coverage is another important factor that is more important than learning value to influence OREQ, based on the students' feedback. How to appropriately include important teaching content is an important issue for future instructors to improve educational quality. It is difficult to clearly standardize content among various courses or topics, and instructors should follow instructional design processes to identify learning objectives first and then to ensure that instructional content is appropriate to cover all these learning objectives during the learning process.

It is important for e-learning instructors to extend learning material and coverage, to appropriately assign open-response questions, reference databases, reading, and essay assignments, and to provide deeper learning content and direction for those students who are willing to access more resources and references for e-learning. Besides extending the breadth of learning

coverage, instructors need to systemically organize learning contents and materials that more efficiently assist students to follow the learning context instead of providing disorganized learning content without appropriate arrangement.

The NCHU-EMBA e-learning courses are in continuing education that has been especially designed for working professionals. Therefore, the students are adults with practical working experience and achieved social status. Their goals to seek advanced knowledge and their motivation for self-achievement are likely stronger than for younger traditional students. Based on the present statistical analysis results, the preferred learning styles of the NCHU EMBA students were highest for the Collaborative and Competitive learning styles.

In distance learning, isolated learning environment will influence the student's learning motivation and learning interactions, and so influence the eventual learning outcomes for the student. A lack in collaboration with other students can easily reduce learning participation, interaction, and motivation. Especially with graduate level courses, the learning activities and objectives, group discussion, experiential learning, critical thinking, and higher level learning activities all require peer support and successful teamwork.

A competitive learning style is a learning tradition in Asian society that encourages learners to study hard in order to receive recognition from instructors, parents, or peers. Appropriate learning competition can be a positive approach to stimulate students to extend their learning potential. Collaborative and Competitive learning style can be negative opposites or a positive synergic combination. In traditional learning environments, it might be difficult to develop collaborative relationships if learners are strongly competitive toward self-learning achievement. But in e-learning environments, an integrated Collaborative and Competitive learning style can be a positive association to assist learners to maintain strong learning motivation, participation, independent, and interactive learning approach.

4.4 Correlation between the GRSLSS and the OREQ Findings :

This study found significant correlations between the type of learning style on the GRSLSS and the student's overall ratings of educational quality (OREQ). There were three significant positive correlations between OREQ and three types of learning styles, including variables of Participative, Independent, and Collaborative; and one significant negative correlation between OREQ and Avoidant learning style. These indicate that higher learning-style scores on Participative, Independent, and / or Collaborative types were associated with higher OREQ scores. Moreover, when the student's learning style was Avoidant, the OREQ score was decreased.

Learning participation is the most functional learning requirement for any kind of learning format, which is influenced by learning value, interest, learning motivation and a supportive learning environment. Participative and Avoidant are opposite factors : low learning participation will likely increase the level of avoidance. Appropriate enhancement in the student's participation will increase the learning effectiveness (Wigfield & Eccles, 2000). Inactive and passive are characteristic stereotypes of Asian learners (Suzuki, 1983). Instructors in Asia could more strongly emphasis an attendance policy and instructional participation to increase the student's perceptions of quality outcomes in an e-learning environment. Considering adult e-learning students usually have more learning motivation than traditional learners. But when in-class time and on campus time are limited, instructors should integrate formal and informal collaborative learning activities, consistently extend learning and supportive resources to increase learning (academic) value, and increase outcome recognition – so as to increase learner participation.

A self-starting independent learning style is an important type in successful learning achievement in distance learning environment (Moore & Kearsley, 1996). The correlation analysis results in this study are in agreement with previous research which has indicated that independent style

students benefit most from an e-learning environment. Collaborative learning is an essential learning strategy for both an e-learning and a graduate-level context - if adults are to benefit from each other's experiences. Collaborative learning is the key to practice experiential learning and problem-based learning. Through teamwork projects and discussions, adult learners can increase their learning participation and decrease learning avoidance.

Identifying students' learning styles and understanding the correlation between learning style and OREQ will help instructors to determine instructional strategies. Following instructional design theories, it is important for instructors to analyze learner characteristics at the very beginning; approaches to this process include ADDIE (analysis, design, development, implement, evaluation) and ASSURE (analysis, state objectives, select media, utilize media, require learner participation, evaluation). Knowing students' learning styles, instructors can provide appropriate assistance or adjustments to teaching strategies and learning activities. "Students possess different blends of these styles and certain combinations are compatible with particular clusters of teaching style" (Grasha, 2002, p. 193). Based on Grasha's teaching-with-style concept, identifying the students' learner style is a map to guide the instructors in teaching. Expert and Formal Authority types of teaching styles encourage Competitive, Dependent, and Participative learning styles. Instructors could consider wider varieties of instructional methods including lectures, term papers, examinations, and teacher-centered questioning and discussions. Facilitator and a Personal model of teaching style can encourage Collaborative, Participative, and Independent learning styles. Instructional methods include conducting case studies, critical thinking discussion; problem-based learning, laboratory projects, and guided readings.

Instructors could also implement specific instructional activities to accommodate various learning styles, including (a) online lecture notes (to promote the Participative,

and Dependent aspects), (b) online discussions (for the Participative, Collaborative, and Dependent aspects), (c) technological activities (for Collaborative, and Participative), (d) online self-placed modules (for Participative, and Independent), (e) web-based assignments (for Participative, and Independent), (f) online grade book (for Competitive, and Participative), and (g) additional web resources (for promoting the Participative, Competitive, and Independent aspects) (Melton, 2003).

The instructional design of the e-learning programs in Taiwan could adopt advanced learning style assessments to help instructors to accommodate diverse learning styles. They could also provide recommendations for learners to become more aware of their own learning styles, which would in turn assist the students in choosing their own most suitable learning environment.

4.5 Research Recommendations :

This study has analyzed only feedback regarding the perceived educational quality and the learning style data from the NCHU-EMBA e-learning courses students. Because formal and accredited e-learning courses or programs (at the graduate level) are very limited in Taiwan, so the research population and samples are difficult to access, and data are not easy to collect. Future studies could continue to extend the present methodology to large e-learning courses, for more reliable program analysis. Research design could also include an instructors' survey to simultaneously evaluate students' and instructor's perceptions of the prevailing educational quality. Comparative research between an e-learning environment and a traditional learning environment, or study among different nations, cultures, age groups, and e-learning environments are also important to develop information about e-learning design across cultural and diverse learner characteristic boundaries.

Future research could predict what type of teaching style and learning style might influence teaching quality, and cross analysis might then reveal some interesting

differences in the correlations between the students' and the instructors' perceptions of educational quality. Correlations between learning style predictors and teaching style predictors could help inform and benefit future e-learning instructional design.

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