INSPECTING THE THEORETICAL MODEL OF JUNIOR HIGH SCHOOL STUDENTS' LEARNING IN ENGLISH VILLAGE WITH STRUCTURAL EQUATION MODELING

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ABSTRACT

English teaching in elementary and junior high schools in Taiwan has been criticized for years as being restricted in classroom learning and not being expanded out of the classrooms and combined with real situations so that students are not really prepared to successfully use English outside of school Therefore, the computer supported collaborative learning (CSCL) platform for subsequent learning was established in English Village to help the students continue with applicable English learning after studying in English Village. CSCL is therefore worth using for remedial or broader learning. Based on the past literature, this study constructed a theoretical model for junior high school students learning in English Village and discussed the interaction among latent variables in the model. The research tools contained the sub-scales of Learning Motivation, Learning Behavior, and CSCL, as well as four English Village situational tests. A total of 243 grade 7 students in five classes in a junior high school in Pingtung County were selected as the research subjects to test the theoretical model and to observe the fit of the data with Structural Equation Model. The research outcomes show that the theoretical model in English Village presents the goodness of fit on the observed data that students' learning motivation positively and directly affected the expression of learning behaviors, the performance of learning achievements, and the collaborative quality in the CSCL. Students' learning behaviors positively and directly affected the collaborative quality in the CSCL.

INTRODUCTION

To coordinate with Challenge 2008 National Development Project - Talents Cultivation in E-generation - Create International Living Environment and Enhance National English Capability proposed by Executive Yuan, several counties in Taiwan have actively established or operate English Villages, with Taoyuan County as the pioneer. The very first International English Villages were established in Happy and Chung-Li Elementary Schools and Wun Chang Junior High School in 2008. English Village in Private Nan Jung Junior High School, Pingtung County, was also started in the first half of 2008. This study combined English learning situations in English Village to develop the learning platform suitable for students' mobile learning and cooperation communities so that students could precede with follow-up e-learning after the temporary learning experience. Present English instruction in elementary and junior high schools is restricted in classes, without being extended to real situations. It is therefore necessary to provide elaborate English vocabulary teaching and follow-up learning to remedy or deepen the learning.

RESEARCH BACKGROUND AND MOTIVATION

Read (2000) indicated that systematical vocabulary learning could provide the basis for developing single vocabularies. Particularly, in outdoor learning situations with full English, abundant vocabularies were required for different instructional activities rather than focusing on grammar or reading texts. Independent units for vocabulary learning were emphasized, especially the pronunciation and forms, which were considered as the optimal way of vocabulary learning. According to the study of Nuttall (1996), it was likely to appear misconception when focusing language learning on pronunciation, vocabulary, and structures, as reading articles was minor in the basic learning contents, rather than ignoring the importance of learning abundant vocabulary. Through empirical study, training with vocabulary pronunciation could effectively enhance vocabulary learning and writing ability. In addition to learning English from texts and articles in classes, various ways of language learning could be beneficial (Conway & Gathercole, 1990). For instance, flashcards can be applied to training students' pronunciation, enhancing the vocabulary structure, and having them loudly read out the vocabulary to reinforce memorization of the vocabulary. When establishing the contents in the Web-Based Collaborative Learning system, the integration of English learning and media, as mentioned by the previous researchers (Conway & Gathercole, 1990; Nuttall, 1996; Read, 2000), where English vocabulary learning was trained through listening and reading the vocabulary, was referred to reinforce students' vocabulary recitation.

In recent years, the rapid development and popularity of computers and technology has expanded the applications of collaborative learning from traditional classrooms to the world so that students around the world could join in collaborative learning through the web. Such collaborative learning requires computer technology that is generally named Computer Supported Collaborative Learning (CSCL) or Web-Based Collaborative Learning, where the supported application program is called CSCL system. In order to allow students to proceed effectively with collaborative learning on the web, the development and improvement of CSCL have gradually been emphasized.

LITERATURE REVIEW AND DEFINITIONS OF RESEARCH VARIABLES

From the research of Garcia, McCann, Turner, and Roska (1998), it was clearly found that ideas could control motivations related to concept, value, anticipation, and emotion, and ideas play the important mediating role between various motivations and learning behaviors or strategies so that idea-controlled Learning Motivation presented direct effects on students' learning behaviors or strategies. Wigfield and Eccles (2000) pointed out the effects of operation value and ability belief on students' choice and learning behaviors. Pintrich (1989, 2003) also indicated the effects of value, anticipation, and emotion on students' learning behaviors of activity choice, efforts, insistence, and learning strategies.

Collaborative learning refers to group learning in which students in the same group work together to achieve the common objective. All the members jointly receive the benefit of their work. In this case, an active and dependent relationship appears among the classmates (Johnson & Johnson, 1994). Various researchers proposed distinct interpretations for the definition of collaborative learning, including effective mastery of learning topics (Johnson & Johnson, 1994; Krol, Veenman, & Voeten, 2001), stepwised planning of activities (Gutwin & Greenberg, 1999; Morgan, Salas, & Glickman, 1993; Putnam, 1995), and focus on tasks (Marks, Mathieu, & Zaccaro, 2001). The researchers considered the definition of collaborative learning in tasks as group members integrating their abilities, skills, and knowledge and adopting common actions or decision-making to complete the group task or achieve the academic objective. In the research on Web-Based Collaborative Learning Activities, promoting learners' learning effectiveness and enhancing peer interaction and cooperation were mainly expected (Johnson, Druckman, & Dansereau, 1994; Johnson & Johnson, 2000; Johnson & Johnson, 1994, 1996; Johnson & Johnson, 1999; Johnson, Johnson, & Holubec, 1994a, 1994b). Slavin (1995) regarded collaborative learning as a structural and systematical teaching strategy that students with different genders, abilities, and racial backgrounds could cooperatively learn the mastery learning materials with a team or a small group. Three major reasons were discussed for collaborative learning being the mainstream of practical instructions. First, collaborative learning could enhance students' learning effectiveness and improve individual interpersonal relationship and dignity in a group. Second, collaborative learning could effectively promote students' problem-solving and thinking capabilities and the capability of knowledge integration and application. Third, collaborative learning could help students with distinct educational values and racial background learn from interpersonal interaction and cultivate appropriate social skills. Web-Based Collaborative Learning allows students to notice the value of the technology and could enhance their learning contents and technological skills (Winer, Berthiaume, & Arcuri, 2004). Borges and Baranauskas (2003) indicated that instructors were responsible for developing instructional professions, considering different learning behaviors of learners, and designing effective opeartional strategies to promote learners' Web-Based Collaborative Learning with the development of technology.

All behaviors related to learning are regarded as Learning Behaviors, such as learning methods, learning attitudes, learning habits, and learning difficulties (Cookson, 1986). Group Dynamics was proposed by Lewin (1951) in the 1930's when studying a series of group behaviors. The main idea referred to all interactions and behaviors of the group members in a group. Zimmerman (2000) mentioned that learners would observe their own behaviors through various methods and control and adjust the learning behaviors through such self-observation. In this case, Cognition was regarded as a critical factor in learning behaviors. Especially, a person who could accept new experiences could reduce learning difficulties when learning new knowledge and skills. Computer anxiety refers to individuals doubt about using computers, such as loss of important data or errors (Thatcher & Perrewe, 2002). Other reserchers pointed out the effects of preference and environment on Computer anxiety (Marakas, Johnson, & Palmer, 2000). Consequently, Computer anxiety could affect the use of information technology.

Students' Learning Motivation and Learning Emotion are closely related to Academic Learning Behaviors; especially, students' Learning Motivation and Emotion have been greatly emphasized in recent educational research and practice (Pekrun, Goetz, Titz, & Perry, 2002; Schutz & Lanehart, 2002 ; Wenden & Rubin, 1987). From the research, students receiving positive outcomes in the learning process were likely to have positive

emotions like pride and hope. On the contrary, negative emotions like anxiety, anger, and guilt would appear when receiving negative learning outcomes (Pekrun *et al.*, 2002). A lot of researchers (Dweck, 2000; Dweck & Leggett, 1988; El-Alayli & Baumgardner, 2003) believed that students with positive learning behaviors were likely to present positive reactions after achieving success, including the emotions of pride or the emotion of pride and the feeling of relaxation not an emotion relaxation, or being willing to seek for challenges and show insistence and efforts. On the contrary, students with negative learning behaviors could have negative reactions, such as helplessness, negative emotions, and lower motivation and anticipation after failure, or lack of insistence and efforts (Dweck, 2000; El-Alayli & Baumgardner, 2003; Hong, Chiu, Dweck, Lin, & Wan, 1999; Pintrich, 2000). Weiler (2005) pointed out the effect of Learning Motivation on students' Learning Achievement and that Learning Achievement revealed positive relationship with Learning Motivation. Gagne', Yekovich, and Yekovich (1993) regarded motivation as the guidance of behaviors and the strength of power. Most researchers considered emotions in Learning Motivation as an important part of educational activities as well as the factor in students' Learning Behaviors (Meyer & Turner, 2002; Pekrun, Goetz, Titz, & Perry, 2002; Schutz & Lanehart, 2002). As a matter of fact, research on Learning Motivation in educational situations shows that a lot of research tends to discuss the relations among Learning Motivation, Learning Behaviors, or Learning Achievement, and Learning Motivation in academic learning could affect students' Learning Behaviors (Atkinson, 1964; Covington, 1984; Mizelle, Hart, & Carr, 1993). According to social cognition theory, human Motivation-Behavior can be adjusted by individual forethought (Bandura, 1977). Winter (1991) also pointed out the significantly positive relations between students' Learning Motivation and Learning Behaviors.

RESEARCH PURPOSE

This study discusses the effect of Learning Motivation on grade 7 students' Learning Behaviors, Learning Achievement, and Participation in Discussions on Web-Based Collaborative Learning Platform when learning in English Village, as well as the effect of Learning Behaviors on Web-Based Collaborative Learning. The research purposes are listed as follows.

(1) To test the fitness of the theoretical model and observed data when students learn in English Village.
(2) To discuss the path relationship and effects of the structural model when students learn in English Village.

RESEARCH DESIGN

The learning in English Village for grade 7 students is multiple. This study establishes a theoretical model with latent variables of Learning Motivation, Web-Based Collaborative Learning, Learning Behaviors, and Learning Achievement with Structural Equation Modeling (SEM) for students learning in English Village. In addition,to test the fitness of the theoretical model and observed data, the factors in students' learning are further analyzed. The variables in the model are further described as follows.

1. Research hypothesis model

Based on the previous literature review, the factors in students' learning in English Village were inspected, and the structural model of hypotheses is proposed as Fig. 1, including the latent variables of Learning Motivation, Learning Behaviors, Web-Based Collaborative Learning, and Learning Achievement, which are marked with ovals, and the observable variables, which are marked with rectangles. Within the five latent variables, Learning Motivation is the latent independent variable, while Learning Behaviors, Web-Based Collaborative Learning, and Learning Achievement are latent dependent variables. According to the research purposes, the research hypotheses are listed as follows.

(1) To test the fitness of the theoretical model and observed data when students learn in English Village.
Hypothesis 1-1 The reliability, validity, and fitness for the dimensions of the theoretical model correspond to the standard.

(2) To discuss the optimal path relationship and the effects when students learning in English Village.
Hypothesis 2-1 grade7 students' Learning Motivation in English Village positively affects their Learning Behaviors.
Hypothesis 2-2 grade 7 students' Learning Motivation in English Village positively affects their Learning Achievement.
Hypothesis 2-3 grade 7 students' Learning Motivation in English Village positively affects their performance in Web-Based Collaborative Learning.
Hypothesis 2-4 grade 7 students' Learning Behaviors in English Village positively affects their performance in Web-Based Collaborative Learning.

Based on the above research hypotheses 2-1~2-4, the structural model for H2-1~H2-4 is shown in Fig. 1.

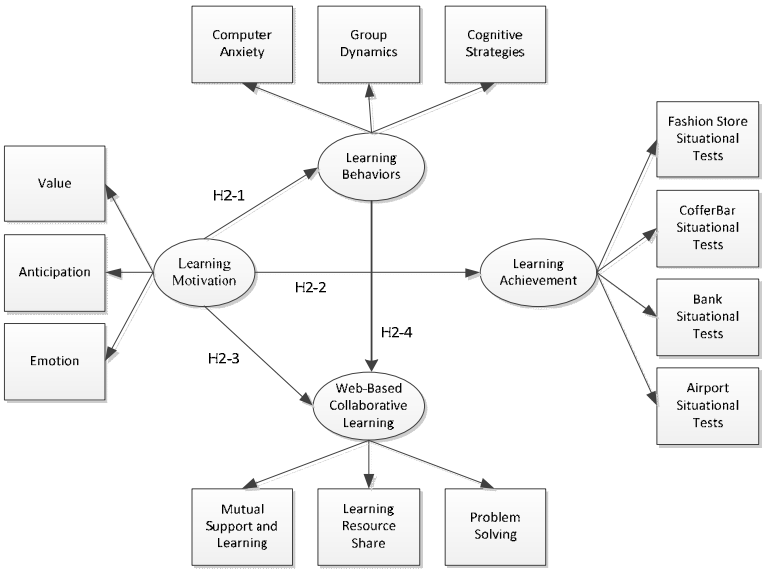

Fig. 1 Structural model for hypotheses

2. Research field

English Village in a junior high school in Pingtung County was selected as the research site, where four learning situations of fashion store, coffee bar, bank, and airport were established. Eight foreign teachers took turns for the instructions of each learning situation. The students were divided into four groups, and each topic lasted for a courses. After the situational learning in English Village, each student could continue English learning and applications through Web-Based Collaborative Learning Platform.

3. Research sample

A total of 245 grade 7 students from five classes who joined the activity were selected for questionnaire survey and tests. The questionnaire was filled in and situational tests were given in classes. A total of 243 copies of questionnaire and test scores were retrieved, with the effective retrieval rate 99.18%. According to the empirical research of Loehlin (2004) on 72 Structural Equation Modeling (SEM) studies in personality and social psychology, with the sample median being 198, almost all Structural Equation Modeling analyses were unstable when the samples were less than 100. Therefore, samples less than 200 are not recommended for stable Structural Equation Modeling analyses. There were 243 samples in this study, which was considered reasonable.

4. Research tool

Questionnaire of Learning Motivation, Learning Behaviors, and Web-Based Collaborative Learning in English Village and four English situational learning tests were self-organized as below.

(1). Questionnaire of Learning Motivation, Learning Behaviors, and Web-Based Collaborative Learning in English Village

Nine education experts were invited to fill in the first draft of the expert questionnaire so as to establish the validity of the questionnaire. Having the experts inspect the text of the questions and revise or delete the unclear ones, the formal questionnaire was completed, with the overall Cronbach's Alpha reliability 0.934. With Likert's five scales, the higher the score received, the higher the intensity the participant showed on the item. Three dimensions were classified, namely Learning Motivation, Learning Behaviors, and Web-Based Collaborative Learning, which were the latent variables in the theoretical model.

Nine questions were included in the sub-scale of Learning Motivation, which were referred to the relevant researchers (Pintrich, 1989, 2003) and semi-structural interviews. Learning Motivation was further divided into three sub-dimensions of Value, Anticipation, and Emotion. Seven questions were contained in the sub-scale of Learning Behaviors, which were referred to the relevant researchers (Lewin, 1951; Pintrich, 1989) and semi-structural interviews. Learning Behaviors was further divided into three sub-dimensions of Cognitive strategies, Group dynamics, and Computer anxiety. By referring to the relevant researchers (Swigger & Brazile, 1997) and semi-structural interviews, seven questions were included in the sub-scale of Web-Based Collaborative Learning, which was further divided into the sub-dimensions of Mutual support and learning, Learning resource share, and Problem-solving

(2). English situational learning tests
The researcher and two English teachers observed and recorded the instructions in English Village for the situational tests based on the four topics of fashion store, coffee bar, bank, and airport. Each quiz, as the evaluation of Learning Achievement, was based on the learning situations in English Village. Two major sections were designed for each test, and each correct question in the section was scored 1. All tests was confirmed the reliability up to 0.976. The four tests were regarded as the sub-dimensions, i.e., the latent variables of Learning Achievement in the theoretical model.

RESEARCH PROGRAM
There are five classed attended this instructional program, and each class contains eight courses. The first four contains consisted of situational instructions in English Village; four groups were divided for one courses of the four situations. The foreign teachers and the researcher proceeded with team teaching, and the groups were moved to the next situational class for the next courses. The students were asked to fill in the situational tests ten minutes before the end of each courses so that four tests were completed in the four courses. The following four courses were preceded follow-up learning in computer labs. Based on Web-Based Collaborative Learning, the computer teacher and the researcher preceded with team teaching of online learning and cooperative discussions. Finally, students were required to fill in Questionnaire of Learning Motivation, Learning Behaviors, and Web-Based Collaborative Learning in English Village twenty minutes before the last courses.

DATA ANALYSIS
According to the research purposes, two statistical methods were adopted.
(1) SPSS12.0 was utilized for descriptive statistics (times distribution, mean, standard deviation, skewness, and kurtosis), and One-Way ANOVA was applied to understanding the characteristics and distributions of the retrieved samples.

(2) AMOS16 was utilized for establishing Structural Equation Modeling and confirmatory analyses. Confirmatory Factor Analysis (CFA), with goodness-of-fit index, was first utilized for testing the composite reliability, convergent validity, and discriminant validity. Various structural models and relevant hypotheses were further tested and compared, including the evaluation of overall fitness, the tests of research hypotheses, and the analysis and comparison of path effect.

RESEARCH OUTCOMES
With Confirmatory Factor Analysis (CFA) to measure the theoretical model for grade 7 students' learning in English Village, the structural model was further examined by Path Analysis of latent variables. Measurement tests were classified into Normality Test, Offending Estimate Test, Fitness Test, Convergent Validity Test, and Discriminant Validity Test; and the structural model test was divided into Offending Estimate Test, Overall Goodness of Fit Index Test, Model Parameter Estimate Test, Hypothesis Test of Path Coefficient, and Effect Analysis.

1. Confirmatory Factor Analysis of measurement tests
(1). Normality Test
The dimensions, sub-dimensions, and question estimates were organized in Table 1 for further tests and explanation. Normality Test was divided into Univariate Normality Test and Multivariate Normality Test. When the absolute skewness and kurtosis of observed variables are less than 2, the observed variables present normality (Bollen & Long, 1993). The absolute SK and KU in Table 1 were less than 2,whics corresponded to the univariate normality. Based on Bollen (1989), when Mardia coefficient is less than p(P+2) (p is the number of observable variables), the sample showesd multivariate normality. In Table 1, the Mardia coefficient of Learning Motivation 24.84,was less than 99, the mardia coefficient of Web-Based Collaborative Learning 14.82 was less than 63, the mardia coefficient of Learning Behaviors 13.34 was less than 63, and the mardia coefficient of Learning Achievement 2.84 was less than 24, so then all corresponded to multivariate normality. Method of Maximum Likelihood therefore could be applied to Structural Equation Modeling analyses.

(2). Offending Estimate Test
Offending estimate refers to the estimated parameter exceeding acceptable range, i.e., inappropriate solution in the measurement model or structural model. When offending estimates appear, the estimate of the entire model is incorrect and it should be organized. In Table 2, the error variance EV was positive, the standardized regression weighted coefficient SFL (t) was between 0.49 and 0.82, not exceeding 0.95, t was significant, and standard error SE was between 0.27 and 0.82, so this measurement model did not reveal offending estimates.

Table 1: Confirmatory Analysis of the measurement model

Dimension	Measured variable	M	SD	SK	KU	SFL	SE	SMC	EV	CR	AVE
Learning Motivation	**Value**	**3.90**								**0.68**	**0.52**
	LM01	3.88	1.02	-0.72	0.09	0.70	0.29*	0.49	0.51		
	LM02	3.91	0.97	-0.73	0.20	0.74	0.28*	0.54	0.46		
	Anticipation	**3.69**								**0.60**	**0.34**
	LM03	3.66	1.07	-0.49	-0.35	0.52	0.32*	0.27	0.73		
	LM04	3.72	1.01	-0.35	-0.49	0.67	0.30*	0.45	0.55		
	LM05	3.69	1.13	-0.52	-0.41	0.55	0.33*	0.30	0.70		
	Emotion	**3.59**								**0.77**	**0.46**
	LM06	3.53	1.12	-0.29	-0.64	0.79	0.30*	0.62	0.38		
	LM07	3.91	1.11	-0.76	-0.20	0.66	0.31*	0.43	0.57		
	LM08	3.37	1.21	-0.38	-0.62	0.63	0.34*	0.40	0.60		
	LM09	3.54	1.14	-0.41	-0.54	0.63	0.32*	0.39	0.61		
	Mardia coefficient	**24.84**					***p*(*p*+2) = 99**				
Dimension	**Measured variable**	**M**	**SD**	**SK**	**KU**	**SFL**	**SE**	**SMC**	**EV**	**CR**	**AVE**
Web-Based Collaborative Learning	**Mutual support and learning**	**3.51**								**0.82**	**0.61**
	WCL01	3.58	1.07	-0.33	-0.38	0.80	0.27*	0.64	0.36		
	WCL02	3.32	1.09	-0.11	-0.46	0.81	0.28*	0.65	0.35		
	WCL03	3.63	1.17	-0.48	-0.57	0.73	0.31*	0.53	0.47		
	Learning resource share	**3.61**								**0.73**	**0.58**
	WCL04	3.54	1.03	-0.37	-0.24	0.75	0.28*	0.56	0.44		
	WCL05	3.69	1.12	-0.65	-0.18	0.78	0.31*	0.60	0.40		
	Problem-solving	**4.13**								**0.66**	**0.50**
	WCL06	3.91	1.18	-0.93	0.00	0.70	0.46*	0.49	0.51		
	WCL07	4.34	0.93	-1.41	1.49	0.71	0.31*	0.50	0.50		
	Mardia coefficient	**14.82**					***p*(*p*+2) =63**				
Learning Behaviors	**Cognitive strategies**	**3.57**								**0.67**	**0.42**
	LB01	3.51	1.11	-0.42	-0.28	0.60	0.33*	0.35	0.65		
	LB02	3.42	1.13	-0.32	-0.47	0.82	0.35*	0.66	0.34		
	LB03	3.78	1.10	-0.58	-0.34	0.49	0.34*	0.24	0.76		
	Group dynamics	**3.87**								**0.58**	**0.42**
	LB04	3.94	1.09	-0.78	-0.19	0.75	0.42*	0.56	0.44		
	LB05	3.80	1.06	-0.78	0.11	0.52	0.55*	0.27	0.73		
	Computer anxiety	**3.22**								**0.55**	**0.38**
	LB06	3.34	1.10	-0.29	-0.29	0.63	0.37*	0.61	0.39		
	LB07	3.09	1.24	-0.15	-0.79	0.60	0.42*	0.64	0.36		

	Mardia coefficient	**13.34**				**$p(p+2)$ =63**					
Learning Achievemet	**Situational tests**	**7.87**									
	Fashion store	11.05	3.74	0.19	-0.86	0.80	0.82*	0.64	0.36	**0.79**	**0.49**
	Coffee bar	10.57	2.23	0.81	0.08	0.75	0.29*	0.56	0.44		
	Bank	3.31	2.07	-1.19	1.22	0.52	0.31*	0.27	0.73		
	Airport	6.54	3.55	-0.72	-0.13	0.71	0.77*	0.50	0.50		
	Mardia coefficient	**2.84**				**$p(p+2)$ =24**					

Data source: organized by the author
Note 1: * stands for the statistics reaching the standard, when α=0.05.
Note 2: M is mean; SD is standard deviation; SK is skewness; KU is kurtosis; SFL is standardized factor loading; SE is the standard error of factor loading; SMC is squared multiple correlation; EV is error variance; CR is composite reliability; and AVE is average variance extracted
Note 3: p is the number of observed variables, and p(p+2) should be larger than Mardia coefficient.

(3). Fitness test
From Table 2, χ^2 in Learning Motivation (35.61, p=0.06>α) did not reach significance, corresponding to the fit index, whileχ^2 in Web-Based Collaborative Learning (26.098, p=0.006<α), Learning Behaviors (21.251, p=0.031<α), and Learning Achievement (6.268, p=0.044<α) achieved significance, not corresponding to the fit index. From such an evaluation index, it might be mistaken that the theoretical model and observed data did not fit because χ^2/df being within 1~5 was required. howeren, χ^2/df of each dimension was 1.484, 2.373, 1.932, and 3.134, so they conformed to the standard fitness.

Regarding the standard fitness of the measurement model, GFI, AGFI, NFI, NNFI, RFI, and IFI of the dimensions in the theoretical model appeared above the optimal value 0.9, except RFI of Learning Behaviors being 0.862, close to 0.9. The above indices indicated that a model could explain the covariance percentage of observed data where the closer the value to 1, the better fitness was shown. Generally speaking, when the value is larger than 0.90, the fitness is regarded as optimal. Standardized root mean square residual (SRMR), as the mean square root of the square elements in the residual covariance matrix, reflects the residual value. When the value is small, the model fitness is better. Moreover, root mean square error of approximation (RMSEA) is regarded as the measure of discrepancy per degree of freedom. When root mean square error of approximation is less than 0.05, it is considered Good fit, Fair fit when between 0.05 and 0.08, Mediocre fit when between 0.08 and 0.10, and Bad fit when larger than 0.10. According to Table 2, SRMR and RMSEA were less than the standard 0.08, except the RMSEA of Learning Achievement being 0.094, reaching the standard fit. Regarding PNFI and PGFI in parsimony goodness-of-fit index, in spite that they did not achieve standard fitness in Web-Based Collaborative Learning, Learning Behaviors, and Learning Achievement, and CN of Web-Based Collaborative Learning did not reach the standard, CN of the rest dimensions corresponded to the standard that the entire measurement model presented favorable fitness.

(4). Convergent Validity Test
Convergent validity tests whether the questions developed from a variable will converge on a factor (dimension). The test standard is referred to (1) the standardized factor loading of observed variables being over 0.5 and t achieving significance (Hair, Anderson, Tatham, & Black, 1998), (2) composite reliability over 0.6 (Bagozzi & Yi, 1988; Fornell & Larcker, 1981), and (3) the average variance extracted of each latent variable larger than 0.5 (Fornell & Larcker, 1981). Composite reliability, also named construct reliability, is the reliability index of latent variables (dimensions) to measure the internal consistency of observed variables (questions in the questionnaire) of latent variables. From Table 1, standardized factor loading of SFL (t) was between 0.49 and 0.82, mostly larger than 0.5, and t achieved significance, The composite reliability CR of the dimensions appeared between 0.55 and 0.82, except Group dynamics and Computer anxiety being 0.58 and 0.55, not reaching 0.6, so the overall reliability presented the reference value. Average variance extracted (AVE) should appear between 0.34 and 0.61. In addition to Web-Based Collaborative Learning, average variance extracted of other dimensions reached 0.5, and some sub-dimensions of Learning Motivation, Learning Behaviors, and Learning Achievement did not achieved 0.5. Overall, the convergent validity of the measurement model in this study was acceptable, while average variance extracted (AVE) required improvement.

Table 2: Test of goodness-of-fit index of the measurement model

Statistic test		Standard	Learning Motivation	Web-Based Collaborative Learning	Learning Behaviors	Learning Achievement
Measures of absolute fit	χ^2	The less the better (P≧α)	35.61* (p=0.06>α)	26.098 (p=0.006<α)	21.251 (p=0.031<α)	6.268 (p=0.044<α)
	χ^2/df	Between 1~5	1.484*	2.373*	1.932*	3.134*
	GFI	>0.9	0.969*	0.972*	0.975*	0.988*
	AGFI	>0.9	0.942*	0.928*	0.938*	0.940*
	RMR	<0.08	0.043*	0.036*	0.054*	0.183
	SRMR	<0.08	0.035*	0.032*	0.045*	0.027*
	RMSEA	<0.08	0.045*	0.075*	0.062*	0.094
Incremental fit measures	**NFI**	>0.9	0.947*	0.958*	0.928*	0.978*
	NNFI	>0.9	0.973*	0.952*	0.928*	0.954*
	CFI	>0.9	0.982*	0.975*	0.962*	0.985*
	RFI	>0.9	0.920*	0.920*	0.862	0.934*
	IFI	>0.9	0.982*	0.975*	0.964*	0.985*
Parsimonious fit measures	**PNFI**	>0.5	0.631*	0.502*	0.486	0.326
	PGFI	>0.5	0.517*	0.382	0.383	0.198
	CN	>200	248*	183	225*	232*

Data source: Self-organized
Note 1: * stands for corresponding to the standard.

(5). Discriminant Validity Test
Discriminant validity refers to the questions in various dimensions where the correlations should be low. By measuring two dimensions and Correlation Analysis, when the correlation between the two dimensions is low, they present discriminant validity (Anderson & Gerbing, 1988; Churchill, 1979). Hair et al (1998) also suggested that the AVE square root of each dimension should be larger than the number of the correlative coefficient in various dimensions and at least represented 75% of overall comparative number. From Table 3, after Correlation Analysis of the ten dimensions, 45 correlations were between 0.01 and 0.66, the AVE square roots were between 0.61 and 0.78, and merely three dimensions have the AVE square roots larger than 0.61. In this case, the AVE square root of each dimension was larger than the number of correlative coefficient in various dimensions and represented 91.67% of the overall comparative number. The discriminant validity of the measurement model was favorable.

Table 3: Test of discriminant validity

Dimension	No. of question	Correlative coefficient / *AVE* square root									
		A	B	C	D	E	F	G	H	I	J
A. Value [1]	2	**0.72**[2]									
B. Anticipation	3	0.58*[3]	**0.69**								
C. Emotion	4	0.57*	0.58*	**0.68**							
D. Supportive learning	3	0.54*	0.51*	0.62*	**0.78**						
E. Learning resource share	2	0.46*	0.51*	0.62*	0.66*	**0.76**					
F. Problem-solving	2	0.35*	0.31*	0.48*	0.46*	0.46*	**0.70**				
G. Cognitive strategies	3	0.42*	0.45*	0.56*	0.61*	0.61*	0.48*	**0.65**			
H. Group dynamics	2	0.28*	0.31*	0.40*	0.41*	0.46*	0.42*	0.40*	**0.65**		
I. Computer anxiety	2	0.23*	0.31*	0.27*	0.45*	0.46*	0.24*	0.49*	0.34*	**0.61**	
J. Learning Achievement	4	0.10	0.15*	0.23*	0.13*	0.16*	0.27*	0.18*	0.16*	0.01	**0.70**

Data source: Self-organized

Note (1): The mean of variables is regarded as the mean of total of various dimensions in the scale.

Note (2): The diagonal value is the AVE square root of the latent variable, whose value should be larger than non-diagonal value.

Note (3): * When the significance α=0.05, the correlative coefficient among variables achieves the significant standard.

2. Path Analysis of latent variables in the structural model

(1). Offending Estimate Test

The offending estimate in the structural model can be observed in Table 4. The error variance in the overall model was positive, the standardized regression weighted coefficient was between 0.264 and 0.838, which was less than 0.95, and the standard error was between 0.034 and 0.441. The three tests corresponded to the standard that no offending estimate appeared in the structural model.

(2). Overall Goodness of Fit Index Test

According to Table 5, $\chi 2$ of the overall model (104.61, $p=0.00<\alpha$) achieved the significant standard, but not the fit; $\chi 2/df=1.715$ reached the fit. Regarding the overall model, GFI=0.939, AGFI=0.909, NFI=0.921, NNFI=0.955, CFI=0.965, RFI=0.899, and IFI=0.965; in addition to RFI=0.899 close to 0.9, the rest achieved the optimal fitness 0.9. Both SRMR and RMSEA were 0.054, less than the fit standard 0.08. In parsimony goodness-of-fit index, PNFI=0.720 and PGFI=0.629 reached the fit standard 0.5; however, CN=186 did not achieve the fit standard 200. As a result, the covariance structure of the model corresponded to that of the real sample data. According to the above goodness-of-fit indices, the structural model in this study presented favorable fitness.

Table 4: Parameter estimate of the overall model

Parameter			Regression weighted coefficient	standard error	t	Error variance	t	Squared multiple correlations
Learning Behaviors	←	Learning Motivation	0.771*	0.038	7.722	—	—	—
Web-Based Collaborative Learning	←	Learning Motivation	0.376*	0.040	3.209	—	—	—
Web-Based Collaborative Learning	←	Learning Behaviors	0.678*	0.141	4.383	—	—	—

Learning Achievement	←	Learning Motivation	0.264*	0.150	3.469	—	—	—
Value	←	Learning Motivation	0.706*	0.037	11.126	0.375*	9.080	0.498
Anticipation	←	Learning Motivation	0.721*	0.034	11.390	0.305*	8.902	0.519
Emotion	←	Learning Motivation	0.838*	0.441	14.993	0.924*	6.687	0.702
Cognitive strategies	←	Learning Behaviors	0.790*	0.139	8.644	0.315*	8.298	0.625
Group dynamics	←	Learning Behaviors	0.557*	0.120	6.807	0.322*	8.415	0.310
Computer anxiety	←	Learning Behaviors	0.576*	0.239	6.645	0.484*	10.352	0.332
mutual support and learning	←	Web-Based Collaborative Learning	0.807*	0.161	9.352	0.272*	6.793	0.651
learning resource share	←	Web-Based Collaborative Learning	0.802*	0.161	9.333	0.462*	10.116	0.643
problem-solving	←	Web-Based Collaborative Learning	0.590*	0.178	3.721	0.628*	9.793	0.348
fashion_store	←	Learning Achievement	0.781*	0.090	9.643	5.433*	6.756	0.610
coffee_bar	←	Learning Achievement	0.760*	0.050	7.369	2.090*	7.319	0.578
bank	←	Learning Achievement	0.518*	0.056	10.402	3.127*	10.003	0.268
airport	←	Learning Achievement	0.714*	0.064	12.402	6.153*	8.134	0.510
Learning Motivation			—	—	—	0.372*	5.889	—
Learning Behaviors			—	—	—	0.004	0.123	0.594
Web-Based Collaborative Learning			—	—	—	0.126*	3.323	0.370
Learning Achievement			—	—	—	7.910*	6.204	0.070

Data source: Self-organized
Note: * stands for significant standard 0.05
— represents no estimate

(3). Model Parameter Estimate Test
From Table 4 and Fig. 2, the factor loading estimate of latent variables and observed variables, the squared multiple correlation (R^2) of observed variables, and the squared multiple correlation (R^2) of latent dependent variables are shown. The factor loading estimate (regression weighted coefficient) between 0.264~0.838 achieved the significant standard ($t>1.96$). The variance explained is demonstrated as below.

Table 5: Test of goodness-of-fit index of the overall model

Statistic test		Standard	Test result	Fitness
Measures of absolute fit	χ^2	The less the better(P≧α)	104.61(P=0.00<α)	No
	χ^2/df	Between 1~5	1.715	Yes
	GFI	>0.9	0.939 0.909	Yes
	AGFI	>0.9	0.909	Yes
	RMR	<0.08	0.151	No
	SRMR	<0.08	0.054	Yes
	RMSEA	<0.08	0.054	Yes
Incremental fit measures	NFI	>0.9	0.921	Yes
	NNFI	>0.9	0.955	Yes
	CFI	>0.9	0.965 0.899	Yes
	RFI	>0.9	0.899	No
	IFI	>0.9	0.965	Yes
Parsimonious fit measures	PNFI	>0.5	0.720 0.629	Yes
	PGFI	>0.5	0.629	Yes
	CN	>200	186	No

Data source: Self-organized
Note: * stands for corresponding to the standard

(i) In terms of Learning Motivation
Learning Motivation contained the dimensions of Value, Anticipation, and Emotion. The factor loading estimates (regression weighted coefficient) of Value and Anticipation showed close values of 0.706 and 0.721, and R^2 were 0.498 and 0.519, close to 0.5, showing the explanation capability. The factor loading estimate of Emotion was 0.838, which was the highest one in all sub-dimensions, and R^2 was 0.702 revealing the favorable explanation. Moreover, when comparing the factor loadings among various sub-dimensions, Emotion (0.838) was the most important factor in students' cognition of Learning Motivation, followed by Anticipation (0.721), and Value (0.706) was relatively low. Such results showed that the critical factor of Emotion should be emphasized in order to enhance students' Learning Motivation. The result was consistent with several researchers' opinions that students' Learning Motivation and Emotion have been highly emphasized in educational research and practice in recent years (Pekrun, *et al*., 2002; Schutz & Lanehart, 2002; Wenden & Rubin, 1987). Most researchers considered Emotion in Learning Motivation as an inevitable part in educational activities (Meyer & Turner, 2002; Pekrun, *et al*., 2002; Schutz & Lanehart, 2002).

(ii) Regarding Learning Behaviors
Learning Behaviors included the sub-dimensions of Cognitive strategies, Group dynamics, and Computer

anxiety. The factor loading estimate of Cognitive strategies was 0.79, and R^2 was 0.625, showing the favorable explanation. The factor loading estimates of Group dynamics and Computer anxiety showed close with values of 0.557 and 0.576, and R^2 was 0.310 and 0.332, revealing that the two factors did not reach the standard 0.4, and so lacked explanation power. Moreover, after comparing the factor loadings among various sub-dimensions, Cognitive strategies (0.79) was the most important factor in students' Learning Behaviors, followed by Computer anxiety (0.576), and Group dynamics (0.557), which was relatively low. Such results showed that the key factors of Cognitive strategies should be stressed when concerning students' Learning Behaviors.

(iii) In regard to Web-Based Collaborative Learning

Web-Based Collaborative Learning contained the sub-dimensions of Mutual support and learning, Learning resource sharing, and Problem-solving. The factor loading estimates of Mutual support and learning and Learning resource sharing showed 0.807 and 0.802, which were rather high in all sub-dimensions, and R^2 was 0.651 and 0.643, showing favorable explanations. The factor loading estimate of Problem-solving was 0.59, and R^2 was 0.348, not achieving the standard 0.4, revealing lower explanation capability. Consequently, both Mutual support and learning (0.807) and Learning resource sharing (0.802) were the key factors in students' Web-Based Collaborative Learning process, followed by Problem-solving (0.59). As a result, Mutual support and learning and Learning resource sharing were the key factors in promoting students' Web-Based Collaborative Learning and Learning effectiveness, in which Mutual support and learning presented the highest correlation with Web-Based Collaborative Learning.

Furthermore, the multiple correlation coefficient R^2 of latent dependent variables showed the variance explained 0.370 for Web-Based Collaborative Learning, 0.594 for Learning Behaviors, and 0.07 for Learning Achievement (Table 4 & Fig. 2).

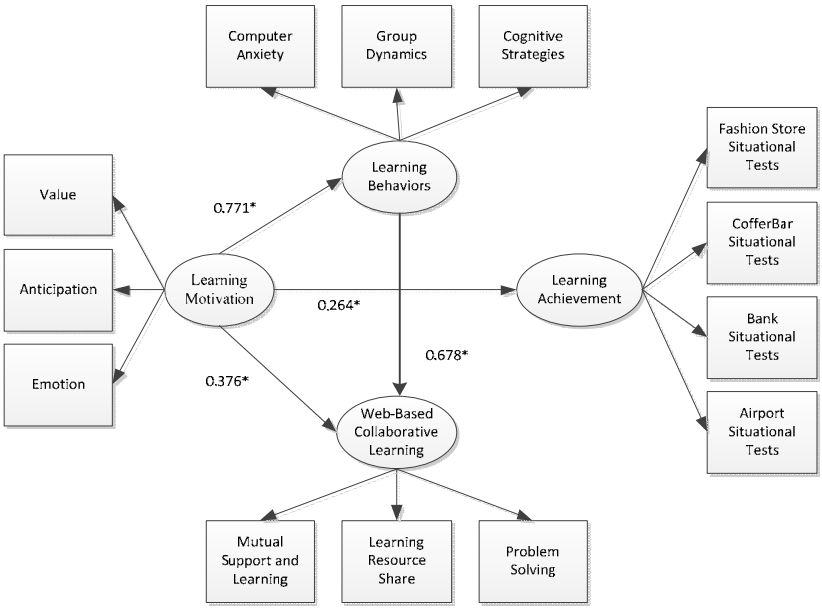

Fig. 2 Path relationship among latent variables in the structural model

(4). Hypothesis Test of Path Coefficient

With the verification of the theoretical model, Table 6, the research hypotheses 2-1~2-4 showed significantly positive effects. The outcomes are concluded as below. (1) In English Village, grade 7 students' Learning Motivation positively affected their Learning Behaviors, with the path=0.771 and t=7.722, achieving significance. (2) grade 7 students' Learning Motivation positively affected their Learning Achievement, with the path=0.264 and t=3.469, reaching significance. (3) grade 7 students' Learning Motivation positively affected their Web-Based Collaborative Learning, with the path=0.376 and t=3.209, achieving significance. (4) grade 7 students' Learning Behaviors positively affected their Web-Based Collaborative Learning, with the path=0.678 and t=4.383, reaching significance.

(5). Effect Analysis

From Table 7, the latent independent variables of Learning Motivation in the theoretical model presented significant correlations with Learning Behaviors, Learning Achievement, and Web-Based Collaborative Learning, in which Web-Based Collaborative Learning revealed the largest effect. The effect values showed Direct effect 0.376, Indirect effect of Learning Behaviors 0.523 (0.771*0.678), and the overall effect 0.899.

Learning Motivation showed positive effects on Learning Behavior with the value 0.771; Learning Behaviors appeared positive effects on Web-Based Collaborative Learning with the value 0.678; and, Learning Motivation revealed positive effects on Learning Achievement with the value 0.264.

In conclusion, the reliability, validity, and fitness between the theoretical model and observed variables corresponded to the standards of Hypothesis 1-1 was confirmed. The path in hypotheses 2-1~2-4 reached significance so that the four hypotheses were confirmed.

Table 6: Test of path relationship

Hypothesis	Path	Hypothesis relation	Path value	t	Hypothesis
2-1	Learning Motivation→Learning Behaviors	positive	0.771*	7.722	Agreed
2-2	Learning Motivation→Learning Achievement	positive	0.264*	3.469	Agreed
2-3	Learning Motivation→Web-Based Collaborative Learning	positive	0.376*	3.209	Agreed
2-4	Learning Behaviors→Web-Based Collaborative Learning	positive	0.678*	4.383	Agreed

Data source: Self-organized
Note: * stands for significance 0.05

Table 7: Effects of overall model

Latent dependent variables	Latent independent variable	Direct effect	Indirect effect	Total effect	Hypothesis
Learning Behaviors	Learning Motivation	0.771*	—	0.771	2-1 agreed
Learning Achievement	Learning Motivation	0.264*	—	0.264	2-2 agreed
Web-Based Collaborative Learning	Learning Motivation	0.376*	0.523(0.771*0.678)	0.899	2-3 agreed
	Learning Behaviors	0.678*	—	0.678	2-4 agreed

Data source: Self-organized
Note: * stands for the significance 0.05
— represents no estimate

The above explanations and Tables 6 & 7 are consistent with what a lot of researchers have presented. In other words, research on Learning Motivation has been greatly emphasized in educational situations, and students' Learning Motivation affects their Learning Behaviors, showing direct and positive effects of Learning Motivation on Learning Behaviors (Atkinson, 1964; Covington, 1984; Gagné, et al., 1993; Garcia, et al., 1998; Meyer & Turner, 2002; Mizelle, et al., 1993; Pekrun, et al., 2002; Pintrich, 1989, 2003; Schutz & Lanehart, 2002; Winter, 1991).

CONCLUSIONS

This study aims to establish a theoretical model which could affect the learning of junior high school students in English Village and to discuss the mutual effects among the latent variables. The research tools contain self-organized Questionnaire of Learning Motivation, Learning Behaviors, and Web-Based Collaborative Learning in English Village and four situational tests. Data from a Total of 243 grade 7 students in five classes in Pingtung County were arranged Structural Equation Modeling to test the fitness of the theoretical model and observed data. The conclusions are demonstrated as follows. The theoretical model and observed data of grade 7 students in English Village are fitted. Students' Learning Motivation positively and directly affects their Learning Behaviors, Learning Achievement, and Web-Based Collaborative Learning, and Learning Behaviors positively and directly affects Web-Based Collaborative Learning. The research outcomes show that Emotion is the key

factor in promoting students' Learning Motivation. When concerning students' Learning Behaviors, Cognitive strategies should be emphasized. Mutual support and learning and Learning resource share are the primary factors in promoting students' Web-Based Collaborative Learning and Learning effectiveness, in which Mutual support and learning presents the highest correlations with Web-Based Collaborative Learning.

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