The Effect of Learning Motivation, Total Quality Teaching and Peer-Assisted Learning on Study Achievement: Empirical Analysis from Vocational Universities or Colleges’ students in Taiwan

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ABSTRACT

The main purpose of this study is to understand the effects of learning motivation, total quality teaching and peer-assisted learning on the study achievement of the vocational universities or colleges’ students in Taiwan. This research applies Convenience Sampling on the sample matrix, and uses Structural Equation Modeling (SEM) to verify its overall model and to assess the modeling fit of Structural Model and Measurement Model. The results show: 1. Student’s learning motivation has significant positive effects on study achievement 2. Total quality teaching has significant positive effects on study achievement 3. Peer-assisted learning has significant positive effects on study achievement.

Keywords: Learning Motivation, Peer-Assisted Learning, Total Quality Teaching, Study Achievement.

INTRODUCTION

Research Motivation

Under the impacts of globalization and low-birth rate, education scholars and human resource management experts are researching and exploring the overall education learning environment and the actual employment environment in Taiwan. Industry and government experts have discovered that, from those studies, the educational mechanism in Taiwan is severely out of balance. There are a number of higher education institutions that demonstrate inadequate enrollment, thus wasting social resources. Meanwhile, there are a great number of college graduates that cannot find employment, turning them into Boomerang Kids. Is there a student learning problem? Or, is there a school education quality problem? The motivation for this research is that by understanding the impact of learning motivation, total quality teaching and peer-assisted learning on the study achievement of the vocational universities or colleges’ students in Taiwan, we may be able to discuss how to solve current problems in the future.

Research Purposes

Based on the above-mentioned motivation, this research explores learning motivation, total quality teaching and peer-assisted learning, to understand their effects on the study achievement of vocational universities or colleges’ students in Taiwan; in other words, the main purpose of this research is listed as follows:

1. Has the students’ learning motivation had a significant positive effect on study achievement?
2. Has total quality teaching in vocational universities or colleges’ students in Taiwan had a significant positive effect on study achievement?
3. Has peer-assisted learning a significant positive effect on study achievement?
LITERATURE REVIEW

Analysis of Learning Motivation Theory

1. Learning Motivation

Varying schools have different definitions of learning motivation. This paper examines behaviorism, humanism and cognitive science as follows:

(1) Behaviorism:

The core concept of the learning motivation in behaviorism is the drive, and the drive arises from biological demand. The model is demand – drive – behavior. If giving the individual his satisfaction to the demand, while the individual is performing the behavior, the behavior will be reinforced and retained. (Zhang Chun-Xing, 1994) The reinforcement principle adopted by directional learning is also their upheld viewpoint on motivation, and its nature is extrinsic. Therefore, behaviorism posits that motivation to maintain the learning process is driven by external incentives, and may be categorized as external motivation, for example: engaging in the learning process may lead to obtaining a diploma, or promotion, etc.

(2) Humanism:

The humanism believes that need is the force of learning motivation. Its core concept lies in the learner’s need (such as esteem, and self-actualization), and it emphasizes individual freedom, self-determination and self-growth. Motivation is a demand for more, and each individual has a drive for growth. It emphasizes the importance of internal motivation, and that the nature of motivation is intrinsic. Learners have the potential to perform good deeds and to pursue excellence. As such, learning motivation occurs when an individual pursues a higher level of development after basic needs are satisfied. Therefore, the humanistic perspective believes that the motivation to maintain the learning process arises from within, creating demand satisfaction, and may be categorized as internal motivation, for example: participating in learning activities may lead to personal development, self-realization, etc.

(3) Cognitive Science:

Cognitive psychology contends that motivation is an intermediate process between the environment (stimulant) and personal behavior (reaction). The affecting factors on a learner’s motivation are; an individual’s perceptions, planning expectations, interpretations on objective facts, estimations and targets. That is, motivation arises from the interaction between an individual’s sensory perceptions and his information receiving process. (Li Yong-Yin, Qius S. Z., and Ke H. W., 1995) Motivation comes from the learner’s interpretation of objective facts, and his thoughts, believes and expectations influence motivation. The three factors that affect an individual’s cognitive ability regarding the environment are past experience, current condition, and future expectation. Therefore, cognitive science believes that motivation is an internal force that drives an individual to move towards the goal after perceiving a plan, for example: the need for accomplishment, the expectation of success, and external incentives, are some of the factors that affect the learning participation.

2. Summary

In summarizing the above, this research defines learning motivation as follows:

It is the internal psychological process that causes the individual learner to understand objective learning activity (incentives), and to spontaneously maintain the activity (needs), so as to guide the activity towards a predefined goal, thus satisfying the learning objectives (accomplishments). In other
words, it is an inner drive that an individual, through objective understanding during learning activities, vests energy in to maintain learning and achieving goals. Scholars from the three above-mentioned fields behaviorism, humanism and cognitive science, believe that motivation is the individual’s psychological drive in pursuing success. It involves interests, needs, and incentives; it exists intrinsically; and it elicits a requirement, and thus, this research proposes the following hypotheses:

Hypothesis 1 (H1): The learning motivation of the vocational universities or colleges’ students in Taiwan has significant positive effects on study achievement.

<table>
<thead>
<tr>
<th>H1,1</th>
<th>The incentives of learning motivation have significant positive effects on the socialization-skill of study achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1,2</td>
<td>The incentives of learning motivation have significant positive effects on the decision-making of study achievement</td>
</tr>
<tr>
<td>H1,3</td>
<td>The accomplishments of learning motivation have significant positive effects on the socialization-skill of study achievement</td>
</tr>
<tr>
<td>H1,4</td>
<td>The accomplishments of learning motivation have significant positive effects on the decision-making of study achievement</td>
</tr>
<tr>
<td>H1,5</td>
<td>The needs of the learning motivation have significant positive effects on the socialization-skill of study achievement</td>
</tr>
<tr>
<td>H1,6</td>
<td>The needs of learning motivation have significant positive effects on the decision-making of study achievement</td>
</tr>
</tbody>
</table>

Total Quality Teaching

Whether the school education is good, or bad, is the specific education quality indicator of a nation. Quality is the core concept of school education reform, and is also the basic objective. We may say: school education reform that ignores quality is ineffective; school education reform that cannot better the quality is a waste (Wu Ming-Qing, 1997).

An American scholar, Astin (1985), also pointed out, “…pursuing excellent quality is the most popular idea in today’s education. Every teacher in every school is striving to find a distinctive method to improve education development, and enrich the quality of educational output.” (Zhou Chun-Hua, and Shen Jian-Hua, 1994) Education quality means that the ability to produce quality results in cognition, affection and skill, is the goal of receiving an education. There are input and output education quality indicators: an input indicator refers to school resources and processes, including teaching hours, content, number of qualified teachers and budget expense; output indicators refer to student achievements, including knowledge and skills (Lin Xin-Fa, 1997).

1. The Meaning and Content of Total Quality Management

   Total Quality Management originates from the business industry. From various literature, we find much jargon describing the concept of quality management, such as: Strategic Quality Management, Systematic Improvement, Quality First, Quality Initiatives, and Service Quality (Sallis, 1993; excerpt from Zeng Rong-Hua, 1999). Of all the jargon, recently, Total Quality Management is used most often and is gaining importance from the promotion of Deming, Juran and Feigenbaum.

2. The Definition Analysis of Education Quality

   (1) The Meaning of Education Quality

   Lin Tian-You (1997) defines education quality as: that which can sustain a targeted level that is publically identified and expected. Specifically, education quality encompasses policy and
regulation, administration and system, education objectives, education content, education process, and education results.

Wu Ming-Qing (1997) believes that whatever improvements a school may have, it must follow the educational objectives of achieving certain educational standards, taking into consideration parental concerns, developing school characteristics, and striving for progress, thus improving the quality of school education. Education Week (1997) in the U. S. developed five educational quality indicators that include: 1. Student academic performance, 2. Student learning standards, 3. Teachers’ teaching quality, 4. School culture, and 5. School resources, (Lin Tian-You, 1997).

Summarizing the above, this study shows that the final goal of education quality is to enhance teaching quality, while teaching quality is mainly focused on the fact that teaching results must satisfy the customer’s demand.

(2) The Definition of Teaching Quality

Domestic scholars mention teaching quality often, but seldom define the term clearly. To further discuss this, based on the previously mentioned concept of quality, teaching quality means to explore the essence of teaching and then perform evaluation. To illustrate this further, here are a few scholarly perspectives. Lawn (1991) contends that teaching quality is a context-based concept. Teaching quality is not self-evident, but a product of competition.

Flairbrother (1996) believes that teaching quality should be explored with three major principles as follows:

1. Teaching requires a broader interpretation. Teaching must be defined as: a teacher’s responsibility to students’ learning enlightenment and management, that involves both school and curriculum dimensions, in addition to in-class teaching.
2. Teaching must meet the needs of the students. That is to satisfy the expectations of students of various backgrounds.
3. Criteria for good teaching and student satisfaction should be the foremost consideration.

Yao Da-Qing and Zheng Zeng-Cai (1998) indicate the relevant concepts of teaching quality as follows:

1. Teaching quality is relative. It varies with different educational purposes and the demands of the different times.
2. In the current education system, the scope of teaching quality contains following levels:
   a. It is the education quality offered by the overall education system.
   b. It is the teaching quality offered by the overall school operation, including course planning, the use of equipment, facilities and teaching resources, and teaching quality of the teachers.
   c. A teacher’s teaching quality includes the overall individual performance in class, and in school.

Liu Wei-Ren (2001) points out that teaching quality can be defined as:

1. Customers’ needs define teaching quality standards.
2. Under the operation of the existing education system and teaching system the assessment of various valued and satisfactory teaching elements in that which teachers and students express in their learning activities and working environments is an important factor in defining teaching quality. The results should be de facto feed-back to various improvement actions.
3. Teaching quality enhancement is the joint responsibility of all parties involved in learning activities: teachers, students, administrators and managers. A few indicators help establish the process of teaching activities and serve as the basis for effectiveness evaluation. Just like using quality control in management studies for control of the quality of products and services, when teaching process is
assessed with a management system to show the quality assurance of teaching effectiveness, it is called teaching quality. Lin Tian-You (1997) points out effective school management may enhance the education quality:

1. Positive Factors to Improving Education Quality
   a. The school is willing: the entire faculty staff and students are willing to invest in education quality improvement.
   b. The school is capable: the school faculty staff has the ability to invest in education quality improvement; the objective conditions of the school can fully cooperate with the requirement to work on education quality improvement.
   c. The school has the opportunity: higher authorities and the entire social condition supports and cooperates.

2. A Few Thoughts on Improving Education Quality
   b. Operation main features: reduce the number of students in each class and the total number of students each teacher teaches daily; work with parental demands and earn their support.
   c. Operation content: clearly set up various learning standards, and gradually increase the standards. Develop, and make full use of, practical and effective teaching assessment tools and methods. Set up specific methods in teacher employment to objectively select new teachers. Set up specific strategies that encourage teachers to continue learning and expanding. Arrange classes that comply with teachers’ expertise to fully utilize teachers’ talent. Administrative staff commits to maintain school campus safety to secure the teaching environment. Teachers fully assess various teaching requirements to strengthen teaching resources.
   d. Operation process: set up specific strategies to encourage teachers and students to get involved in policymaking, and, together, implement the agreed resolutions.
   e. Operation assessment: establish a learning database to fully grasp the changes and the patterns of student learning performance. Assess the main features, content and process of school operation performance regularly, in accordance with the operation objectives.

The Relationship of Total Quality Management and Study Achievement

In Taiwan, some institutions of higher education, such as Yuan Zi University, Tamkiang University, Changhua Normal University, and Taipei University of Technology, are gradually exploring and promoting the application of Total Quality Management.

Zhao Zhi-Yang (1995) points out that when applying the concept of Total Quality Management on the technical and vocational education system, it has the following meanings:

(1) In technical and vocational education, taking care of customer demands, because of its self-evident customer base, customers can be categorized as internal customers and external customers. Internal customers refers to the members in the educational system, including students, teachers, and administrators. External customers refers to the members outside the educational system, including employers, graduate students, parents, and communities. The goal of technical and vocational education is to satisfy the demands of its internal and external customers. To satisfy customer demands the premises must have clearly defined customers, and then, the defined content of their demands. In the curriculum development process, this demand is the primary basis for curriculum development; while in the process of teaching, customer’s demand
should be taken into consideration constantly, adjusting teaching strategy, so that curriculum quality can be established to satisfy the demand of curriculum customers.

(2) Attention and support from the top management officials in vocational education, and its bureaucratic structures, is critical. The primary success factor in promoting Total Quality Teaching Management is that the middle and the top management within the system have comprehensive understanding of Total Quality Management, as well as the firm determination to promote Total Quality Management. Without the accurate perception and strong support from the upper management, the promotion of Total Quality Management will be extremely limited.

(3) Participation in promoting teaching quality is the joint responsibility of teachers, students, administrators, and the management. External customer participation is also an important and influential factor. In the teaching process the teaching quality policy and strategy, established through the effective communication between relevant personnel, cooperating and supporting each other, and eliminating doubts and differences, can then be implemented and the teaching quality can be ensured.

(4) When establishing a timely and effective teaching system quality improvement and assurance must be done during the production process of the products or services, and not during the final inspection. So is the pursuit of teaching quality. To establish a complete quality policy and effective promotion, combining teaching system concept with total quality management, should be a viable model for quality improvement. A complete teaching system includes four stages: analysis, design and development, implementation, and evaluation. If vocational education can be tested in all stages of the system, and then the results are promptly fed back to improve the actions, the teaching quality will be effectively improved.

(5) An important task in improving teaching quality management when using assessment, is extracting relevant information during the process, analyzing and evaluating it scientifically, and then timely reflecting the results in quality improvement. During the teaching process of vocational education, assessment is an important means of improving teaching quality. Teaching assessment should not be performed at the end of the teaching process, but during the ongoing process of the teaching. Teachers can perform statistical analysis on the assessment results, so that they can understand where the problems lie. The diagnostic results used throughout the process can serve as the basis for improving teaching, so that the concept of forming teaching quality through the process can be implemented.

(6) Quality improvement is a never-ending task. Through continuous improvement, the system structure and each of the steps that produces quality can be rationalized, and the activities can proceed sensibly. Vocational education teaching systems, through continuous improvement, enable the modification of teaching objectives, teaching content and teaching strategies, thus satisfying customer demands.

Summary

To summarize the above literature, this study defines total quality teaching as follows:

To comprehensively improve education quality, must pay attention to teaching development and teaching auxiliaries. “Teaching quality means students can perform above targeted level quality in cognition, affect, and skills after receiving education. Education quality indicators can be divided as input and output: input indicator refers to school resources and process, including teaching hours, content, number of qualified teachers and budgeted expenses; while output indicator refers to student
achievement, including knowledge and skills.” In summarizing the above views of scholars and experts, teaching quality standard should be defined by customer demands, assessed through teaching activity development, and established through a few indicators. The basis of an effectiveness evaluation is systematic. Through timely feedback system or channels collection of feedback information will continuously improve in an endeavor to seek the most effective teaching. Therefore, this study proposes following hypotheses:

Hypothesis 2 (H2): The total quality teaching for the vocational universities or colleges’ students in Taiwan has significant positive effects on study achievement.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H2.1</td>
<td>The teaching development of total quality teaching has significant positive effects on the socialization-skill of the study achievement</td>
</tr>
<tr>
<td>H2.2</td>
<td>The teaching development of total quality teaching has significant positive effects on the decision-making of the study achievement</td>
</tr>
<tr>
<td>H2.3</td>
<td>The auxiliaries of total quality teaching have significant positive effects on the socialization-skill of the study achievement</td>
</tr>
<tr>
<td>H2.4</td>
<td>The auxiliaries of the total quality teaching have significant positive effects on the decision-making of the study achievement</td>
</tr>
</tbody>
</table>

**Peer-Assisted Learning**

Peer-assisted learning refers to obtaining knowledge or skills by way of active assistance and support from peers (Topping & Ehly, 1998). The peers have equal or similar status and class, coming from the same or similar social groups. In peer-assisted learning, peers must help each other to learn.

Peer tutoring is the most widely known method in peer-assisted learning (Topping & Ehly, 1998). In peer tutoring, students must help each other, and learn through tutoring (Goodlad & Hirst, 1989), sometimes playing roles of tutor and helper, and sometimes, tutee and helpee. When playing the role of tutee, a student can learn from the peer’s instruction, gaining problem-solving knowledge and skill; while tutoring other fellow students, tutor can also learn from tutoring, re-organizing his knowledge and clarify his concept. Moreover, through peer interaction, mutual discussions, students can develop communication, presentation and explanation ability; by sharing experiences and works, students may reduce learning anxiety. For students playing roles of tutors and tutees, peer-assisted learning is not only a valuable and effective learning method, it can also reduce their dependence to the teacher (Gyanani & Pahuja, 1995). Therefore, this study defines peer-assisted learning as “through peer interaction and mutual discussions, students can develop communication, presentation and explanation abilities”, which includes two secondary dimensions: encouragement relationship and companion relationship.

**Study Achievement**

1. The Definition of Study Achievement

   (1) The Definition of Study Achievement

   *Learning* does not necessarily have a positive correlation to the enhancement of student learning performance. Only through a precise, effective knowledge-attaining process can learning be automatically turned into better learning performance. As a result, the analysis and exploration of the student learning performance must take into account a few factors: the relationship between student-teacher and the learning environment; the differences between the knowledge characteristics and learning capability; and the cooperation of the learning mechanism between the teacher and the student must be good, in order to obtain a high degree of learning performance. To the school, the teacher-student interaction learning process can reduce the
transaction cost; to the students, it can enhance student knowledge capacity, and a better learning performance. Hence, learning performance refers to that student’s attainment of higher study achievement through a better learning environment, a satisfactory student-teacher interaction process, and enhanced knowledge capacity.

(2) Research on Study Achievement

Brown (1987), Lent (1984), Pintrich & DeGroot (1990) point out that learning strategy is the best predictor of study achievement. Many studies also show that students with notable differences in study achievement display significant differences in using learning strategies (Wei Li-Min, 1996; Dweck & Elliott, 1983; Zimmerman & Marinez-Pons, 1986; Zimmerman & Marinez-Pons, 1990).

Some studies also show that learning strategy is not necessarily the only positive variable that affects study achievement. For example, Zhang Yu-Ru (1996) points out in her study that English learning strategy and English study achievement do not have significant correlation; Cheng Bing-Lin (1991) indicated in their studies that learning motivations, interests, and academic aptitudes have higher predictability than the use of learning strategies.

(3) Factors Affecting Study Achievement

Research results show that different family backgrounds indeed reflect the differences between student education and study achievement: a good family background often helps improve the student’s education and study achievement (Zhang Ying-Hua, Xue Cheng-Tai and Huang Yi-Zhi, 1995; Wang Tian-You, 1998, 2000; Gang & Zimmermann, 2000; Huang Yi-Zhi, 2002; Xie Meng-Ying, 2003).

2. Exploration on Study Achievement of the Universities or Colleges’ Students

Green and Miller (1996) compare the relationship in the classroom environment, of different goal-oriented students in perceived ability, cognitive engagement and study achievement. The result shows:

(1) Mastery goal orientation and perceived ability are positively correlated with deep-processing strategies;
(2) Performance goal orientation and shallow-processing strategies are positively correlated.

3. The Relationship between Peer-Assisted Learning and Study Achievement

Schibeci (1989) sums up the four factors that influence attitudes in science as: the characteristics of an individual’s background, families, schools (including teachers) and peers. Studies show that student attitudes in science have positive correlation with study achievement (Peterson & Carlson, 1979; Schibeci, 1984; Simpson & Oliver, 1985), which means that a student’s interests, later transforming into student attitudes in science, is relevant to study achievement. Thus, this study also proposes the following hypotheses:

Hypothesis 3 (H3): Peer-assisted learning has significant positive effects on study achievement.

| H3.1 | The encouragement relationship of peer-assisted learning has significant positive effects on the socialization-skill of the study achievement |
| H3.2 | The encouragement relationship of peer-assisted learning has significant positive effects on the decision-making of the study achievement |
| H3.3 | The companion relationship of peer-assisted learning has significant positive effects on the socialization-skill of the study achievement |
| H3.4 | The companion relationship of peer-assisted learning has significant positive effects on the decision-making of the study achievement |
RESEARCH DESIGN

Research Framework

According to the above literature reviews and associated assumptions, this study proposes an empirical research framework that includes four major dimensions: *learning motivation*, *Total Quality Education*, *peer-assisted learning* and *study achievement*, and validates the relationship of the four dimensions with Structural Equation Modeling, SEM, as shown in Figure 1.

![Figure 1: Research Framework](image)

Research Variables’ Definition and Measurement

The content of the research model roadmap (graphic drawn with AMOS software) includes: Latent variables of the Structural Model, which includes four major dimensions: *learning motivation*, *total quality teaching*, *peer-assisted learning* and *study achievement*; while the manifest variables of the Measurement Model include secondary dimensions: *incentives*, *accomplishments*, *needs*, *decision-making*, *socialization-skill*, *teaching development*, *teaching auxiliaries*, *encouragement relationship*, and *companion relationship*.

(1) *Learning Motivations* for Attending Vocational Universities or Colleges’ Students

This study references Goal Orientation from Dweck (1988, 1991, 1999) and Vande Walle (2001), then studies the content of other literature reviews, and sums up three variables (secondary dimensions), namely: *incentives*, *accomplishments*, and *needs*. Their conceptual definition and questionnaire items are listed in Table 1 below:
<table>
<thead>
<tr>
<th>Dimension</th>
<th>Variables</th>
<th>Conceptual Definitions</th>
<th>Questionnaire Items</th>
</tr>
</thead>
</table>
| Learning Motivations       | Incentives| The reason that a student attends a vocational university or college. | I1. Attending a vocational university or college may enrich interpersonal relationships.  
I2. The greatest gain in attending a vocational university or college is to obtain required knowledge.  
I3. Upon completing a report, I feel a sense of accomplishment.  
I4. I often seek opportunities in attaining new skills and new knowledge. |
| Accomplishments            |           | studying in a vocational university or college allows the student to have a sense of accomplishment and can demonstrate his abilities. | A1. I would like to choose challenging work that allows me to learn.  
A2. I would like to show “I can perform better than my peers.”  
A3. I would like to do special reports in which I can prove my ability. |
| Needs                      |           | Attending a vocational university or college because of individual’s needs. | N1. Attending a vocational university or college to obtain a bachelor degree.  
N2. Obtaining promotion or raise after earning a bachelor degree. |

(2) Total Quality Teaching

This study concludes two variables (secondary dimension) of the total quality teaching, they are: teaching development and teaching auxiliaries. Their conceptual definition and questionnaire items are listed in Table 2:

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Research Variables</th>
<th>Conceptual Definition</th>
<th>Questionnaire Items</th>
</tr>
</thead>
</table>
| Total Quality Teaching | Teaching development | Items of teaching planning and development that are helpful to students | DV1. Our school programs are distinctive.  
DV2. Development plans from our various offices have clear objectives.  
DV3. Class arrangement in our school accords with teachers’ expertise.  
DV4. Our teachers devote their efforts in achieving educational goals.  
DV5. Our teachers’ course contents are suitable to student abilities. |
|                   | Teaching auxiliaries | Items of after-school tutoring and teaching aids that are helpful to students | AU1. Our school implements student-learning assessment on a regular basis.  
AU2. Our teachers encourage and supervise students based on the assessment results.  
AU3. Our teachers implement remedial teaching as needed |
(3) Peer-Assisted Learning

This study references Xu Chun-Jin, Ma Chuan-Zhen (1997) Youth Development Research in Greater Metropolitan Taipei Questionnaire -1, then studies literature reviews, and derives two variables (secondary dimension), they are: encouragement relationship and companion relationship. Their conceptual definition and questionnaire items are listed in Table 3:

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Research Variables</th>
<th>Conceptual Definition</th>
<th>Questionnaire Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer-Assisted</td>
<td>Encouragement Relationship</td>
<td>Fellow peers inspire, encourage others to study</td>
<td>E1. Other well-performing students affect me to work harder.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E2. Students learn from mutual discussion.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E3. Students encourage each other to learn.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E4. Students can accept or understand the views I proposed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E5. When encountering problems, I look for other students to work together for solutions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E6. I participate in the same after-school discussion with other students.</td>
</tr>
<tr>
<td></td>
<td>Companion Relationship</td>
<td>Fellow peers complement, and help each other, learning teamwork, and helping those in need.</td>
<td>C1. Upon a team project, I look for students with complementary skills to work on a report.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C2. In a group report, I joined other students and learn the team spirit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C3. I do my best to help other students in need.</td>
</tr>
</tbody>
</table>

(4) The relevant study achievement beneficial to myself after attending school

This study references Tough (1982) and Long (1983) and sums up with two variables (secondary dimension), they are: decision-making and socialization-skill. Their conceptual definition and questionnaire items are listed in Table 4:

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Research Variables</th>
<th>Conceptual Definition</th>
<th>Questionnaire Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Achievement</td>
<td>Decision-Making</td>
<td>Enhance professional decision-making ability, develop employment ability</td>
<td>D1. Enhanced professional knowledge and concept.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D2. Enhanced decision-making ability.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D3. Enhanced thinking ability.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D4. Enhanced analytical ability.</td>
</tr>
</tbody>
</table>
Socialization skill | Attending a university of technology helps the student feel a sense of accomplishment and demonstrates his abilities | G1. Interpersonal relationship is significantly improved.  
G2. Communication skill is significantly improved.  
G3. Team spirit and rapport are cultivated.  
G4. Lectures given by relevant enterprises are helpful.  
G5. Coordination and negotiation ability are improved.  
G6. Course learning can effectively enhance employability.

RESEARCH METHOD

Research Subject and Sampling Method

This study uses questionnaires to collect data, and measures each dimensions of all variables with five-point Likert scale. The sampling subjects are technical and vocational college students in Taiwan. This study uses convenience sampling of the non-random sampling method and perform questionnaire test. Pre-testing was implemented to weed out inappropriate or ambiguous items, which were then modified or deleted. There were 400 questionnaires released for post-test, and after removing invalid questionnaires, there were 310 valid questionnaires. The valid response rate was 77.5%. This study is therefore based on the 310 copies of questionnaire as research samples.

Structural Equation Modeling, SEM

This study applies Structural Equation Modeling and uses AMOS as analytical software tool, and uses Maximum Likelihood Estimation for data parameter estimation. This study also attempts AMOS’s Confirmatory Factor Analysis (CFA) method to examine the research model, and the reliability and the validity of the scale. The internal structural fit of the model is used to assess the significant level of the estimation parameters, and the reliability of each indicator and of latent variables within the model. This fit maybe called the inner quality of the model, and is used to measure the internal consistency of the research model.

And then, this study applies correlation matrix on major dimensions to explore their relationship. If the indices are GFI> 0.9; NFI> 0.9; CFI> 0.9; RMR <0.05 and RMSEA < 0.05 (Bagozzi & Yi, 1988), then the overall model is fit to measure. It also shows if the overall model of this study passes recommended index value; if it is a good fit; and if it is an acceptable research model.

ANALYSES AND RESULTS

Analysis of Structural Equation Model

The Overall Structural Model Analysis of Motivation, Peer-Assisted Learning and Total Quality Teaching to Study Achievement

The purpose of using linear structural equation analysis for research is to explore the relationship between different dimensions, for that reason, the fit indices in this study with GFI, AGFI ranging from 0.90 to 0.96, and RMR is less than 0.05 (Table 5), while the parameter estimation of the latent variables with $t$ value reaches significant level (Table 6). These data show the research model past recommended
index value: it is a good fit; and it is an acceptable research model. The structure roadmap is shown in figure 1.

Table 5: Model Fit Evaluation

<table>
<thead>
<tr>
<th>Indices</th>
<th>( \chi^2 )</th>
<th>df</th>
<th>GFI</th>
<th>NFI</th>
<th>AGFI</th>
<th>CFI</th>
<th>RMR</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fit Value</td>
<td>48.87</td>
<td>28</td>
<td>0.9105</td>
<td>0.9357</td>
<td>0.9014</td>
<td>0.9526</td>
<td>0.0258</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Note: \( t \) value is significant (\( \alpha=0.05 \))

Table 6: Parameter Estimation of Latent Variables

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Parameters</th>
<th>( t )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Motivation → Study Achievement</td>
<td>0.375*</td>
<td>14.983</td>
</tr>
<tr>
<td>Total Quality Teaching → Study Achievement</td>
<td>0.278*</td>
<td>17.274</td>
</tr>
<tr>
<td>Peer Assisted Learning → Study Achievement</td>
<td>0.489*</td>
<td>16.196</td>
</tr>
<tr>
<td>Learning Motivation ←→ Total Quality Teaching</td>
<td>0.358</td>
<td>2.391</td>
</tr>
<tr>
<td>Learning Motivation ←→ Peer Assisted Learning</td>
<td>0.369</td>
<td>10.986</td>
</tr>
<tr>
<td>Total Quality Teaching ←→ Peer Assisted Learning</td>
<td>0.348</td>
<td>3.186</td>
</tr>
</tbody>
</table>

Note: \( t \) value is significant (\( \alpha=0.05 \))

This study applies Maximum Likelihood Method, MLE, to obtain r, w and c value, which are used to test if this study has reached the significant level. Figure 2 below explains:

Figure 2: SEM Model Analysis Results (Standardized)

Figure 2 shows the causal relationship between the variables tested with SEM within the model of this study. Table 7 below shows the tested results.
Table 7: Hypothesis & Tested Results

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Result</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Support</td>
<td>The learning motivation of the vocational universities or colleges’ students in Taiwan to attend colleges has significant positive effects on study achievement.</td>
</tr>
<tr>
<td>H1.1</td>
<td>Support</td>
<td>The incentives of the learning motivation have significant positive effects on the socialization-skill of the study achievement</td>
</tr>
<tr>
<td>H1.2</td>
<td>Support</td>
<td>The incentives of the learning motivation have significant positive effects on the decision-making of the study achievement</td>
</tr>
<tr>
<td>H1.3</td>
<td>Support</td>
<td>The accomplishments of the learning motivation have significant positive effects on the socialization-skill of the study achievement</td>
</tr>
<tr>
<td>H1.4</td>
<td>Support</td>
<td>The accomplishments of the learning motivation have significant positive effects on the decision-making of the study achievement</td>
</tr>
<tr>
<td>H1.5</td>
<td>Support</td>
<td>The needs of the learning motivation have significant positive effects on the socialization-skill of the study achievement</td>
</tr>
<tr>
<td>H1.6</td>
<td>Support</td>
<td>The needs of the learning motivation have significant positive effects on the decision-making of the study achievement</td>
</tr>
<tr>
<td>H2</td>
<td>Support</td>
<td>The total quality teaching for the vocational universities or colleges’ students in Taiwan has significant positive effects on study achievement.</td>
</tr>
<tr>
<td>H2.1</td>
<td>Support</td>
<td>The teaching development of total quality teaching has significant positive effects on the socialization-skill of the study achievement</td>
</tr>
<tr>
<td>H2.2</td>
<td>Support</td>
<td>The teaching development of total quality teaching has significant positive effects on the decision-making of the study achievement</td>
</tr>
<tr>
<td>H2.3</td>
<td>Support</td>
<td>The auxiliaries of total quality teaching have significant positive effects on the socialization-skill of the study achievement</td>
</tr>
<tr>
<td>H2.4</td>
<td>Support</td>
<td>The auxiliaries of the total quality teaching have significant positive effects on the decision-making of the study achievement</td>
</tr>
<tr>
<td>H3</td>
<td>Support</td>
<td>Peer assisted-learning in vocational universities /colleges’ students in Taiwan has significant positive effects on study achievement.</td>
</tr>
<tr>
<td>H3.1</td>
<td>Support</td>
<td>The encouragement relationship of peer-assisted learning has significant positive effects on the socialization skill of the study achievement</td>
</tr>
<tr>
<td>H3.2</td>
<td>Support</td>
<td>The encouragement relationship of peer-assisted learning has significant positive effects on the decision-making of the study achievement</td>
</tr>
<tr>
<td>H3.3</td>
<td>Support</td>
<td>The companion relationship of peer-assisted learning has significant positive effects on the socialization-skill of the study achievement</td>
</tr>
<tr>
<td>H3.4</td>
<td>Support</td>
<td>The companion relationship of peer-assisted learning has significant positive effects on the decision-making of the study achievement</td>
</tr>
</tbody>
</table>

CONCLUSIONS AND SUGGESTIONS

Conclusions
From the above research analyses and results, the findings are: 1. Student’s learning motivation has significant positive effect on study achievement 2. Total quality teaching has significant positive effect on study achievement 3. Peer-assisted learning has significant positive effect on study achievement.

Student’s Learning Motivation Has Significant Positive Effects on Study Achievement
This research finds that the most influential factor to study achievement is learning motivation. It means that a student’s personal learning motivation, whether intrinsic or extrinsic, is the most important deciding factor on study achievement, in terms of motivation, and it has the highest correlation to achievement (see Table 5). This means the self-actualization of a student’s inner drive is greater than the
attraction of and the demand for the external incentives. Hence, student’s learning motivation has significant positive effect on study achievement. The result is similar to the viewpoint, “the participation of learning activities is affected by a combination of several factors such as the needs for accomplishments, the expectation of success, external incentives”, proposed by Li Yong-Yin (1995)

1. Total Quality Teaching Has Significant Positive Effects on Study Achievement

In terms of total quality teaching, the greater influence factor is the teaching auxiliaries. It is possible that, to the students, the actual auxiliary teaching measurement may be more helpful than the teaching development measurement such as the general curriculum arrangement. In addition, total quality teaching has no significant correlation with learning motivation and peer-assisted learning, which means teaching and administrative measures have no impact on the behavior of individual students getting along with each other. Among other things, total quality teaching has the least impact on study achievement ($r_{42} = 0.278$). Consequently, total quality teaching has significant positive effect on study achievement. The result is consistent with the findings proposed by the American scholar, Astin (1995) and Lin Xin-Fa (1997).

2. Peer-Assisted Learning Has Significant Positive Effects on Study Achievement

In terms of peer-assisted learning, the more influential factor is the companion relationship, which shows that learning together is very important in the learning process. Through encouragement relationship and companion relationship, peer-assisted learning poses positive and significant influence over the decision-making and socialization-skill dimensions of study achievement. In addition, the study also shows that peer-assisted learning can explain that learning is a group behavior; only through group interaction, can a better learning effect be produced. Specifically, peer-assisted learning has significant positive effects on study achievement. The result is consistent with the arguments put forward by Gyanani & Pahuja (1995).

Management Implications

There are a few occurrences in Taiwan where vocational universities or colleges cannot fill their enrollment, which is a waste of social resources. Meanwhile, a considerable number of college graduates cannot find employment. Searching for the causes, we find problems in low-birth rate, student learning motivation, peer-assisted learning, and total quality teaching. Therefore, the confirmatory factor analysis of this research helps understand the effect of learning motivation, total quality teaching and peer-assisted learning on the study achievement of the technical and vocational college students in Taiwan, so that we may explore how to resolve the existing problems in the future.

Research Suggestions

1. Suggestions based on the Research Results
   (1) Suggestions on Improving Motivation
   Schools should cultivate a good study ing culture, through subtle suggestions, inspiring students to learn; additionally, schools can establish a healthy competition mechanism, awarding scholarships to students with good learning standing, or providing a portion of the class fees as rewards.
   (2) Suggestions on Improving Teaching Quality
   This research finds that teaching development and teaching auxiliaries affect study achievement. If the teaching quality is high, the study achievement will be high. For that reason, this research recommends that schools implement both tangible and intangible improvements:
tangible improvements include school hardware facilities, while intangible improvements include teaching attitudes, enthusiasm, and teaching methods. Schools can provide complete learning environment, and can further provide certification examination courses and after-school remedial classes to enhance student skills with certification assistance and remedial teaching. Moreover, this research believes that to improve teaching quality, from the teacher’s standpoint, there are four suggestions to be contemplated: 1. Teacher must have a macro view about education, not to be confined to a corner, and the viewpoints must be expanded both in depth and breadth. Teachers must be aware of the coming of the global village, and understand that the content of education is changing qualitatively. Improving teaching quality is the goal teachers strive for. 2. Teachers must continue to grow in areas which include professional development, skills enhancement and psychological growth. 3. Make good use of the multi-assessment concept, establishing systems for appropriate use. 4. Make good use of the resources, establish smooth communication channels between parents and teachers, and set up timely feedback system mechanisms.

(3) Suggestions for Improving the Effectiveness of Peer-Assisted Learning

Divide students into groups based on their abilities. Each group member prepares the subject that suits the individual’s own ability and produces handouts to share with other members of the group. When encountering problems that none of the group members can resolve, a representative can be chosen to inquire about solution from other groups. The purpose of such method is to minimize the differences in group member abilities. Once the students’ academic abilities are alike, it will be easier to proceed with mutual tutoring among students, and the learning effectiveness is more likely to be improved.

2. Suggestions to Future Researchers

Since the sampling method of this research is convenience sampling of the non-random sampling method, the sampled subjects lack diversification, or are too focused on a certain group. For this reason, this research recommends that future researchers choose a different sampling method for their sampling selection, so it helps obtain the result that is closer to the actual situation.

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