KEY DETERMINANTS OF EDUCATION QUALITY OF SECONDARY SCHOOLS IN BANGKOK

Pimsiri Pootrakul

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Pimsiri Pootrakul

School of Public Administration

Associate Professor.....C. Vadhanasindh.....Major Advisor

(Chindalak Vadhanasindhu, Ph.D.)

The Examining Committee Approved This Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Philosophy (Development Administration).

Assistant Professor.....Committee Chairperson

(Somsak Dumrichob, Ph.D.)

Associate Professor.....C. Vadhanasindh.....Committee

(Chindalak Vadhanasindhu, Ph.D.)

Assistant Professor.....Committee

(Thanapan Laiprakobsup, Ph.D.)

Professor.....Nisada Wedchayanon.....Dean

(Nisada Wedchayanon, Ph.D.)

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ABSTRACT

Title of Dissertation	Key Determinants of the Education Quality of Secondary Schools in Bangkok
Author	Miss Pimsiri Pootrakul
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This study aims to investigate the key determinants of the quality of education of upper-secondary schools in Thailand focusing on the Bangkok Metropolitan area. Among the 219 the upper-secondary schools located in the studied territory, 149 schools under the supervision of the Office of the Basic Education Commission, Bangkok Metropolitan Administration, the Office of the Higher Education Commission, and the Office of the Private Education Commission were randomly selected. This sample size provided a 95 percent confidence level for all statistical tests when expanded to estimate the behaviors of the entire population. The dependent variable was education quality, while the examined independent variables, which were expected to have significant influence on education quality, included the transformational leadership of the school principal, teacher quality, and school facilities. A self-administered survey was conducted using the questionnaire, which was comprised of a demographic profile and information regarding all three independent variables. To accurately evaluate the education quality of the students in the selected schools, the Ordinary National Educational Test (O-NET) and the General Aptitude Test (GAT) scores were employed. Both examinations are organized by the National Testing Service (Public Organization) and are considered as the most reliable and standardized assessments in the nation to measure student academic proficiency.

According to the respondents' demographic profile, 59.7 percent were female and the age groups were fairly distributed from 25 to 60 years. All of the respondents

were well educated, with 53.7, 44.3, and 2.0 percent receiving bachelor, master, and doctoral degrees, respectively. The average work experience was 19 years and most of the respondents had positive toward their career and planned to stay in their current job until retirement. This background information revealed that all of the respondents had sufficient qualifications and experience in their career so that the data obtained from their responses and opinions were precise and non-biased.

The results from the factor analysis revealed that among the three independent variables tested, only teacher quality and school facilities had a significant impact on education quality in terms of the O-NET and GAT scores at a 95 percent confidence level. Teacher quality explained 50.0 and 71.2 percent of the total variances for the O-NET and GAT scores, respectively, while school facilities provided 42.9 and 27.5 percent accurate predictions for the O-NET and GAT scores, correspondingly. Hence, they can be judged as the key determinants for education quality at the upper-secondary school level. On the other hand, the transformational leadership of the school principal was unexpectedly found to have no statistically-significant relationship with education quality, in terms of both the O-NET and GAT scores. Nonetheless, the constructed multiple regression equations for the O-NET and GAT scores, which comprised all three independent variables, could sufficiently explain the O-NET and GAT scores up to a 61.8 and 75.0 percent accuracy, respectively. The remaining uncertainties might have been a result of other factors not included in this study; however, they were minor factors as compared to teacher quality and school facilities.

Further analysis found that school facilities also had a significant impact on teacher quality, whereas transformational leadership did not. The teachers believed that 43 percent of their expertise and quality derived from the school facilities. Therefore, the consequent influence of the school facilities on the teacher's quality was examined through path analysis. The results indicated that among the 50.0 percent of the total variance in O-NET scores under the influence of teacher quality, 21.5 percent could be considered as a consequence of the school facilities. As a result, the influence of school facilities on the regression variance of the O-NET score rose from 42.9 to 64.4 percent. Similarly, of the 71.2 percent of the regression variance for the GAT score which could be explained by teacher quality, 30.6 percent of this value

could be considered as a consequence from school facilities through an indirect effect. Therefore, the total impact of school facilities on the GAT score increased from 27.5 percent (direct effect) to 58.1 percent. Nonetheless, this was still less than 71.2 percent of the direct effect of teacher quality. In conclusion, both teacher quality and school facilities can be considered as the key determinants of education quality in Thailand. Therefore, in order to raise the education quality of Thailand at this stage, education administrators and related parties should primarily focus on improving and developing teacher quality and school facilities.

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ABBREVIATIONS

Abbreviations	Equivalence
BMA	Bangkok Metropolitan Administration
EFA	Education for All
GAT	General Aptitude Test
GDP	Gross Domestic Product
IEA	The International Association for the Evaluation of Educational Achievement
IMD	International Institute for Management Development
MOE	Ministry of Education
NIETS	The National Institute of Educational Testing Service
NCES	National Center of Educational Achievement
Norad	The Norwegian Agenda for Development Cooperation
OBEC	Office of Basic Education Commission
OEC	The Office of Education and Curriculum
OECD	The Organization for Economic Co-operation and Development
OHEC	Office of Higher Education Commission
ONESQA	Office of National Education Standards and Quality Assessment
O-NET	Ordinary National Education Test
OPEC	Office of Private Education Commission
PISA	Program for International Student Assessment
UN	United Nation
UNDP	United Nations Development Program
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Emergency Fund

TDRI	Thailand Development Research Institute
TIMSS	Trends in International Mathematics and Sciences Study
WEF	World Economic Forum

CHAPTER 1

INTRODUCTION

Education is widely regarded as a key mechanism for improving the standard of the quality of life and the quality of an education can affect a nation's long-term economic growth (Hanushek and Woessmann, 2007; 2010). Porter (2008), a guru in management, has stated that every government in the nation must provide quality education in order to improve and enhance human well-being. People with knowledge are considered a valuable basic endowment, and create a competitive advantage for their countries. Furthermore, education is also used by the United Nations Development Program, UNDP (2013), its fundamental index, to measure human development.

1.1 Background of Thai Education

The Thai government has long recognized the necessity of education in the nation. Since 1979, the Thai government has consistently attempted to improve the nation's education and has realized the need for reforming educational curriculum to respond to rapid global change. Turning from agricultural society, Thailand now has moved into a knowledge-based society. As a result, education is necessary to equip Thai youths with valuable knowledge to raise their well-beings.

Realizing the importance of the quality of education, the Thai government has made an effort to provide efficient academy to Thai youths. In October 2002, the government amended the Compulsory Education Act which requires Thai adolescents to attend 12 years of free basic education. The scheme covers six years of primary school and the other six years in secondary school. In reality, the Thai basic education system is divided into three stages—kindergarten 1-3, 6 years of primary school, and another 6 years in secondary school—and therefore Thai children are required to enroll in an education program for 15 years in total.

The management of education in Thailand is carried out by the Office of the Prime Minister, the Ministry of Education (MOE), and the Ministry of Interior. In the global era nowadays, competition among nations is very intense; therefore, skillful and knowledgeable labor is crucial in order to compete with one's neighbors and to generate wealth for the homeland. Thailand has visualized the importance of education; as a result, its education plan was announced as the First National Economic Development Plan. Every Thai government has deep concern that Thai education is in a critical situation, and accordingly, the education budget has been allocated at the highest proportion of the Gross Domestic Product (GDP) for 10 years continuously—approximately 20 percent of the annual government statement of expenditure or 460 billion and 519 billion baht in 2013 and 2014 respectively, compared to 3.7 percent in 2000 (Office of National Education Standards and Quality Assessment: ONESQE, Bureau of the Budget 2013, 2014).

Nowadays, there are 52,520 schools in both the public and private sectors that are offering basic education in Thailand. Generally, in 2009, 849,710 students finished primary level, while 406,939 completed secondary school (Social and Quality of Life Database system). As reported by the World Economic Forum (2014-2015), 87 percent of the children are enrolled in secondary schools all over Thailand, and almost every Thai government has given priority to education. According to educational policy, the MOE has clearly declared the promotion of Thai education quality. Consequently, schools must provide quality education, an appropriate curriculum, and a life-long learning environment and yearning for knowledge. Moreover, the MOE aspires to have Thai students possess critical, systematic, and creative thinking skills as well as morality. The MOE has desired Thai basic education to have world-class standards and to be an educational hub in the region.

The Education Minister of Thailand recently announced an education policy to which the Ministry of Education needs to adapt itself. Centralizing and gathering all relevant information and other administration tasks were no more efficient and applicable in nowadays. Hence, decentralization is necessary to be executed at the local school level so that they can gain autonomy and be self-governing in order to enhance the quality of education for their stakeholders. Handbooks and official papers are distributed in order to guide, supervise, and assess overall school

performance to meet the MOE's goals. According to The United Nations Educational, Scientific and Cultural Organization (UNESCO), the MOE has allocated the highest budget if it is compared to other sectors in Thailand and in Asia as well. Interestingly, comparing the education budget in Thailand with other countries—Japan, South Korea, Hong Kong, Singapore,—it can be seen that Thailand's neighbors have allocated resources close to or even lower than those of the Thai education budget.

Regrettably, the mentioned countries have demonstrated better education performance than Thai students (The Organization for Economic Co-operation and Development: OECD). Although the government founded the Office for the National Education Standards and Quality Assessment (ONESQA), a self-governing unit, has the responsibility of supervising and enhancing the quality of education. In addition, ONESQA is expected to guide schools or educational institutions in providing morality, competency, and enjoyment for all students. It would be very good if the consequence of educational performance appeared as it had been planned. In fact, there are many obstacles to generating a high-quality Thai education system.

The Thailand Development Research Institute (TDRI) has pointed out many problems that hinder the development of the quality of Thai education. First of all, in the policy aspect, the Education Plan has been changed all over the time when new government came to govern the country. Again in 2013, the Minister of Education initiated a new education plan and removed the education plan that had just been launched. For this reason, the Thai education system was not only ineffective but also inefficient. In concordance with the International Institute for Management Development, the Thai education system was ranked forty-seventh out of fifty-eight countries, and is more likely to decline from now on.

From the ASIAN perspective, Pearson ranks Thai education quality sixth, which is behind Vietnamese education in its basic education program. Even worse, Thai higher education quality was just slightly ahead of that of Cambodia and The Philippines. In the meantime, the Malaysian education quality index has improved constantly. Moreover, the Word Economic Forum, The Global Competitive Report 2014-2015, asked business leaders about many aspects of the competitiveness of the nation, one of them being education. Not surprisingly, the report indicated that the quality of the Thai education system was rated at 3.4 on a 7 point scales and was

ranked 86th out of 148 countries, while the Laos PRD was rated 4.9 and 60th respectively. Thai basic education quality has an effect on higher education quality as well. It is comprehend that a high government budget allocated to education is not a factor in improving education quality. Moreover, if primary and secondary basic schools, as a backbone of education, cannot provide quality education, then higher education quality is almost impossible to achieve.

Dr. Somkiet Tangkitvanich from the TDRI has indicated that Thai youths study and spend a longer time in class than other countries' youth. Unfortunately, Thai youths that are studying at the basic education level cannot comprehend or understand what they have just read, thus the rate of failure is higher than in other nations. Furthermore, sharing common and unique characteristics, Thai students lack the ability to self-learn, do not set goals, have little enthusiasm, and are not willing to accept new knowledge and do not like to read (Somkiet Tangkitvanich, 2012).

Additionally, the TDRI illustrates many complicated problems that affect Thai education quality. One of prolonged myths that the TDRI points out regarding Thai education quality is that allocating a budget for education can improve education quality. Dr. Ammar Siamwalla, from the TDRI, proposed that new education reform should focus on resource-utilized management due to a lack of accountability in the Thai educational system. Accountability refers to persons that have responsibility for education quality: school principals, schools, and teachers. Moreover, Dr. Siamwalla recommends revealing exam results publicly and that rewards should be given to good-performing school principals. As a result, this revealing would lead to an attempt to boost their performance and all stakeholders would enjoy the benefits. To enjoy the benefits, the education system is requires sincerity, continuity, and clear procedures for the best social benefits.

On the subject of education quality, there are many components regarding the issue of viewing the school as a system. Leadership, the teachers, and the students alone are not absolute answers that lead to education quality solutions. The United Nations International Children's Emergency Fund has proposed a framework for education quality and its components as illustrated in Figure 1.1. It is clearly emphasized that there are four dimensions influencing the quality of education as follows:

1) Learner characteristic dimension; capacity, experience, socio-economic background, place of residence, health condition, gender, etc.

2) Contextual dimension; the labor market in the community, socio-cultural and religious factors, support infrastructure, public resources, peer affect, time in class and for homework, globalization, etc.

3) Enabling input dimension; teaching and learning (learning time, teaching methods, assessment, feedback, incentives, class size), teaching and learning materials, physical infrastructure and facilities, teachers, principals, supervision, etc.

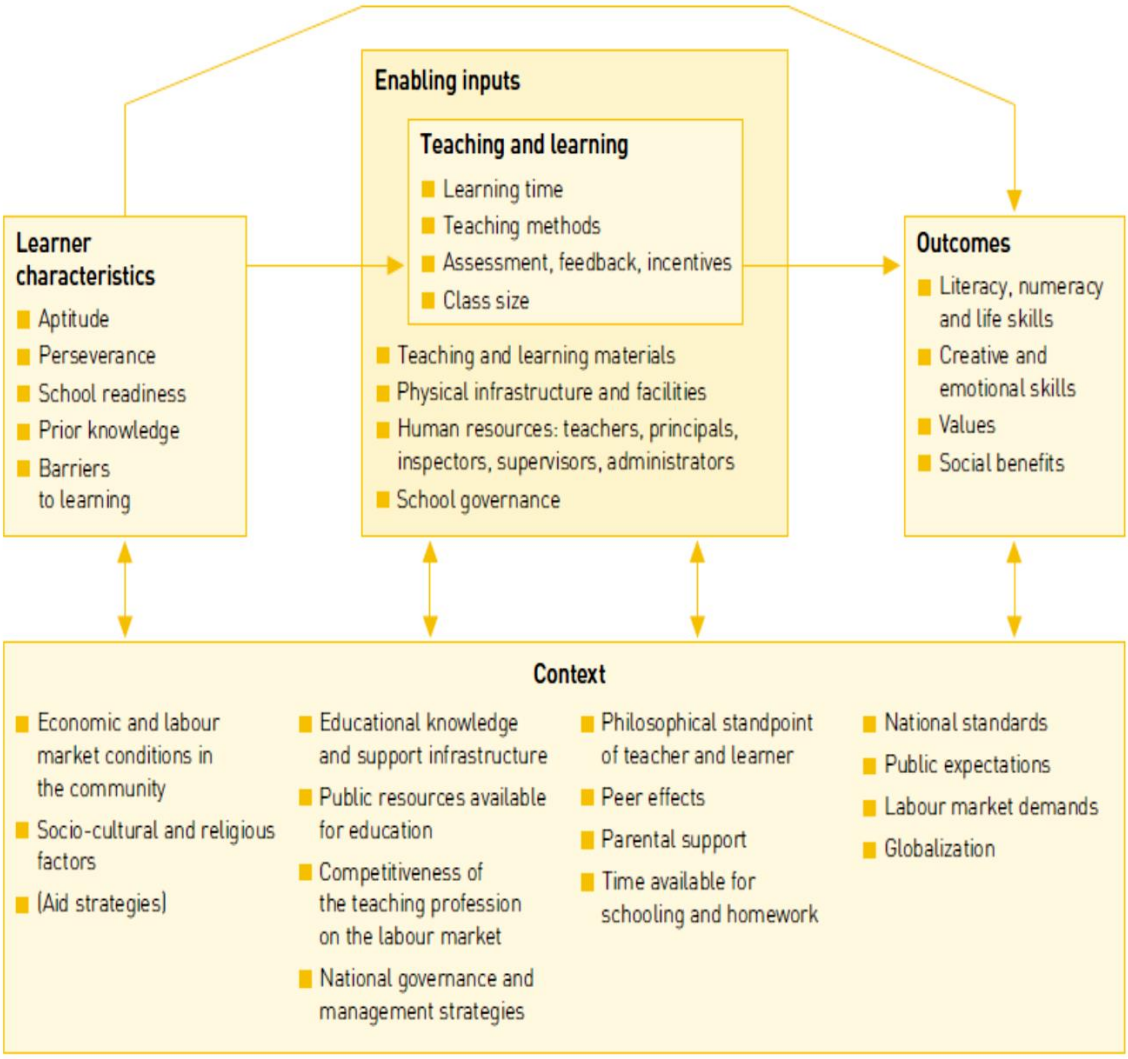


Figure 1.1 A Framework for Understanding Education Quality

Source: UNICEF, 2000.

4) Outcomes dimension; literacy, numeracy and life skills, creative and emotional skills, values, social benefits.

In accordance with Norad, an organization supervised by Norwegian Ministry of Foreign Affair, conducted research on Education quality in 2011. The following findings reveal six key elements for the quality of education as follows**:**

1) Each pupil's precondition: background, health condition, equal learning opportunity for boys and girls, socio-economic status, home location, etc.

2) Education content; curriculum relevant for the child's future

3) The teacher and teaching methodology; quality of the teachers, teacher training, the teachers' competence, teachers' incentive, etc.

4) Learning environment; safe, healthy, secure, learning stimulation, etc.

5) Learning achievement; learning results, student performance, etc.

6) Leadership in school; management system, resource allocation, etc.

Similarly, the findings for the factors affecting the achievement of diverse ethnic students by Wassa Wongsak (2013), Bann Tonchok school principal, found that student element, teacher element, school principal element, and parent element have an impact on student academic achievement.

In conclusion, all case studies from UNICEF, The Norwegian Agency for Development Cooperation (Norad), and Baan Chok, have shown similar fundamental elements involving school success. As described earlier, the common factors that affect education quality can be categorized into five elements; namely, student's background, student performance, teacher and teaching process, learning material and school facilities, and leadership. This study will focus on student performance, the teacher, and the teaching process, learning materials, and school facilities and leadership. Since the student's background is diverse and uncontrollable, it is not include in this study. This study intends to examine the variables that can be managed and operated by persons in charge of enhancing education quality or education policy makers.

1.2 Problem Statement

Education is considered as an essential mechanism to leverage the quality of life of people in nations. The Thai government has well recognized the importance of quality of education; as a result, the government has poured approximately twenty percent of its annual expenditure, or 460 billion baht in 2013 and 520 billion baht in 2014, into the support of local education. By setting education objectives as follows: enhancing the capacity of all learners, being endowed with basic knowledge and essential skills and attitudes toward life-long learning, learning and developing learners to their highest potentially, the MOE has established several strategies to fulfill these objectives. The MOE has expected five keys competencies to be developed among learners: communication, thinking capability, problem solving capability, capability of applying life skills, and the capacity of technological application.

Unfortunately, the quality of Thai education has not achieved the set objectives yet; it has totally failed to provide quality education. Likewise, according to the International Institute for Management Development (IMD), Thai education quality is ranked forty-seventh out of fifty-eight nations being considered. In Asia, Thai education quality lags behind Vietnam in basic education, while Malaysia's education quality has improved constantly. Only Cambodia and The Philippines were behind Thailand's quality of education in 2013. Regretfully, the 2014 World Economic Forum (WEF) just reported that the Thai education quality system was rated a score of 3.4 out of 7, behind the Laos PRD position of 20. On the other hand, newspapers have stated that Thai students have won many medals at the International Mathematics and Science Olympiad every year. What are the factors that make these awarded students so distinguish from other Thai students in the overall nation? Many studies and much research (UNESCO,2000; Norad, 2011; Education For All (EFA): Global Monitoring Report, 2005) have found that curricula, leadership style, teacher quality, school facilities, and student quality are significant factors in managing and enhancing school performance effectively. By the same token, a study was conducted to evaluate world-class standard schools in Thailand, and this obviously demonstrated that the similar three critical dominant factors—leadership, teacher, and the school

facilities and environment—have significant relevance for education quality. In short, unquestionably, revamping Thai education quality is essential.

1.3 Research Questions

This study examines the following questions:

1) Which of the studied variables, i.e., transformational leadership, teacher quality, and school facilities, are the key determinants of the education quality of secondary schools in Bangkok?

2) To what extent do transformational leadership, teacher quality, and school facilities influence the education quality of secondary schools in Bangkok?

3) To what extent do transformational leadership and school facilities have an influence on teacher quality?

1.4 Research Objectives

The main objective of this study was to identify the key determinants of education quality in the secondary schools in Thailand. In order to fulfill this objective, several specific objectives were established as follows:

1) To identify the key determinants of education quality of secondary schools in Bangkok.

2) To explore the influence of transformational leadership style, teacher quality, and school facilities on education quality.

3) To explore the influence of transformational leadership and school facilities on teacher quality.

1.5 Scope of the Study

This research aimed to investigate the impact of leadership style, particularly transformational leadership, teacher quality, and school facilities in upper-secondary schools in the Bangkok Metropolitan area on education quality. Bangkok was chosen

as a boundary for this study because the schools located in Bangkok are quite equivalent and comparable in education quality, whereas in other provinces the education quality is more diverse within their territories (from excellent to unacceptable education quality) and thus are not suitable for a statistical comparison regarding education quality, which is the dependent variable in this study. Nonetheless, it is important to note that the Trium Udom Suksa Secondary School was excluded from this study since most of the students at this school have an extremely high level of academic performance as compared to the remaining population; hence, this would have caused a huge bias and errors if it were included in the survey.

In addition, this study emphasized the upper-secondary education level (grade 10 to 12) where education quality can be accessed systematically and accurately with the national examinations, O-NET and GAT; hence, the statistical tests and resulting correlations were reliable and valid. In total, the population was 219 schools under the supervision of the Office of the Basic Education Commission, Bangkok Metropolitan Administration, the Office of Higher Education Commission, and the Office of Private Education Commission. The independent variables, i.e., the factors potentially affecting education quality, targeted in this study were transformational leadership, teacher quality, and school facilities.

1.6 Significance of the Study

Practically, the study of education quality and its determinants in Thai secondary schools is devoted to Thai education policy makers and all education domains. The study will point out some overlooked or unexpected problems to other principals to improve their school performance. Moreover, the findings may encourage other principals to adapt their leadership style and pay more attention to both teacher qualifications and school facilities in order to boost the education quality of the schools. In addition, most education research has focused on only one factor, either leadership style or quality teacher, that has affected education quality. Actually, education quality is comprised of multiple facets, as stated earlier; hence studying

only one factor may not reflect the actual picture of education quality as a whole. Finally, there are 2,184 schools awaiting for prototype to adapt for enhancing their education quality. Therefore, it would be benefit the nation as well if policy makers would take the findings into consideration for future education plans.

From an academic perspective, this study contributes to the present theoretical and empirical studies on the determinants of education quality in secondary schools. Constructing an alternative model for enhancing Thai education quality to be equivalent to that of Thailand's neighbors was the researcher's deep intention. Moreover, the researcher honestly wishes that Thai Government could integrate all factors that are relevant and take them into considerations and accommodate the problems of education quality as a whole picture. In this way, the Thai education system could produce better results for sustainable economic development and enhance its competitiveness among nations.

1.7 Limitations of the Study

As mentioned above, the study will focus only on upper-secondary schools in Bangkok due to time and financial constraints. In addition, the researcher confronted some difficulties in the course of the study. First of all, many school principals did not allow the researcher to collect the data. Secondly, many principals allowed the researcher to distribute the questionnaire only if the questionnaire was faxed directly to them so that they could skim and scan the questions in advance. Thirdly, the principals would assign a particular teacher to respond to the questionnaires. Lastly, many principals have announced a school policy that does not allow any teachers to conduct any questionnaire regarding school issues, and therefore many teachers were reluctant to hand over their responses to the researcher.

1.8 Definition of Terms

1) Quality: the desired characteristics of a specific thing or subject which are perceived to public.

2) Education quality: the desired characteristics that are related to educational system including students, teachers, curriculums, school environment and resources, etc.

3) Determinants: the factors or elements that determine or point out decisions under specific situations or conditions.

4) Secondary school: a school that provides education in intermediate level between elementary school and college.

1.9 The Organization of This Study

This dissertation is composed of 5 chapters:

Chapter 1: The first chapter outlines the introduction of this dissertation, including the Thai education background, the problem statement, research objectives, scope of the study, significance of the study, the limitations of the study, and lastly definitions of terms that are used in this paper.

Chapter 2: The reviewed literature focuses on the education system, quality and quality management, education quality, key elements of education quality, education evaluation and indicators, measures of education achievement in Thailand, leadership, teacher quality, school facilities, and the conceptual framework.

Chapter 3: This chapter begins with an introduction and continues to discuss the research process, the unit of analysis, population and sample size, operational definitions, measurements, the pretest, validity and reliability of the measurements, and the data collection and data analysis.

Chapter 4: The fourth chapter presents the descriptive statistics which provides the understanding about the characteristics of the respondents in this study. However, the inferential statistics convey the findings of this study, which are the key education quality determinants in Bangkok secondary schools.

Chapter 5: The final chapter presents the findings from study's summarization, and suggestions for policy makers as well as school principals to enhance education quality both from national and school perspectives. Theoretical recommendations for future research are also included in this chapter.

1.10 Chapter Summary

Thai education quality has been a problem for a long time. There is a great deal of evidence that shows that the Thai educational system has failed to provide quality education even though the Ministry of Education receives the largest amount of the government's expenditure, approximately 20 percent of the whole budget for the fiscal year. Unfortunately, Thai education has not improved at all, and has even gotten worse.

According to the Thailand Development Research Institute (TDRI), Thai youths study longer and spend a longer amount of time in class than their neighboring students. It is significant that neither money nor time spent in class has raised the education quality in Thailand. The education in a nation is one of the indicators that shows its well-being. Education reform in Thailand seems to be a fancy word for the announcement of government policy; it is an abstraction and illusion to soothe anxiety and pain. Therefore, it is very urgent that Thai education quality must be seriously reformed.

CHAPTER 2

LITERATURE REVIEW

Thai education has been reformed several times since the reign of King Chulalongkorn in 1892 when the MOE (initially named “Ministry of Dhamakarn”) was first established to administer schools in the nation. Since then, a couple major education reforms were launched in 1977 and 1999. The current Thai education system mainly stems from the latest reform under the 1999 National Education Act, which established several new organizational agencies, promoted the decentralization of the administration, and emphasized innovative learner-centered teaching practices. Despite being continuously reformed, Thai education quality is still far behind the expected goals; it has failed to provide quality education even though the Ministry of Education has been consistently allocated with the largest proportion of the annual government expenditure, approximately 20 percent of the total budget of any fiscal year. Unfortunately, Thai education has not improved significantly or rapidly enough to cope with the speed of globalization.

According to the TDRI, Thai youths study and spend a longer time in class than their corresponding neighbors. It is evident that neither the money nor the time spent in the classroom has raised the education quality as expected. As a result, the economic and social development of Thailand has proceeded slowly and has not been able to keep pace with other ASEAN countries since the education in nation is one of the most intrinsic indicators for the development of any country.

“Education reform” seems to be an extravagant phrase in the policy declaration of every Thai government. However, no decisive vision has been formulated and no effective measure has been implemented to fulfill the needs. At this moment, Thai education not only needs to be thoroughly reformed but also seriously remedied in order to reduce the gap with other countries. In order to do so, it is of utmost importance for education administers and related parties of the nation to have a real picture of the Thai education system and to realize the actual causes of

the problems so that any resolutions, strategies, and action plans can be executed wisely and correctly. In this chapter, the relevant literature covering the Thai basic education system, quality management, and leadership and leadership style concepts and theories were reviewed to gather all of the crucial and valuable information. These acquired documents and records served as a fundamental database for inquiring about the key determinants of secondary schools in Thailand.

2.1 Thai Basic Education System

According to the National Education Act 1999 (revised 2002) and the Compulsory Education Act 2002, Thai education can be categorized into three types, i.e. formal, non-formal, and informal. Formal education is the system in which the objectives, curricula, procedures, study period as well as evaluation have been specifically established by authorized agencies such as the Ministry of Education. Non-formal education is more flexible than formal approach; nonetheless, its contents and curricula have to be appropriate, respond to the needs of individual groups of learners. Informal education is very much a different system from the former two categories. This type of education will enable learners to learn by themselves according to their interests, potentialities, readiness, and opportunities available from individuals, society, environment, media, or other sources of knowledge. This study will only focus on formal education; non-formal and informal education is outside its scope.

2.1.1 Thai Formal Education Framework

Formal education is the main skeleton of Thai education and has been compulsory for all Thai children from pre-elementary to upper secondary education for a total of 15 years since 2009. It can be divided into two levels, i.e. basic and higher education. Basic education consists of three sub-levels: pre-elementary, elementary, and secondary. Table 2.1 shows the overall picture of the Thai formal education system from beginning to end.

The pre-elementary level aims to nurture and prepare preschoolers for elementary education. Children will develop in many aspects such as physical,

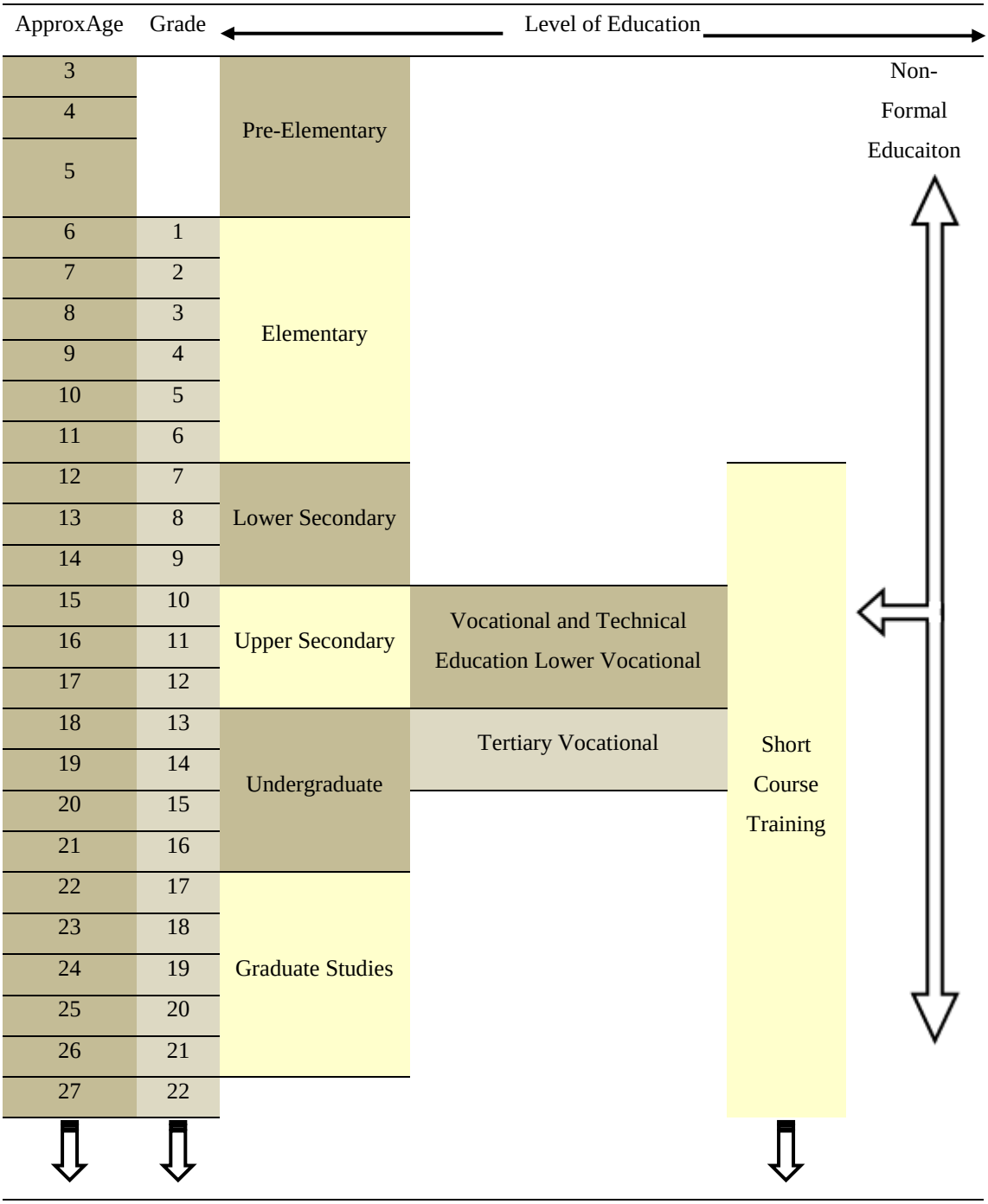
mental, intellectual and emotional skills during their study at the pre-elementary level. This pre-elementary education will generally extend for two years in public schools and three years in private schools. According to the Bureau of International Cooperation (2008), over 74 percent of Thai children aged between 3 and 5 years receive pre-elementary education. Among those getting pre-elementary education, the national average of 72 and 28 percent is provided by public and private schools, respectively. Nonetheless, in the Bangkok area, these percentages inversely became 41 and 59, respectively. This indicates that higher-income parents living in the capital prefer to send their children to private pre-elementary schools even though they have to pay more for the tuition fee.

At the elementary level, students will have to take six years to complete the program. Elementary education focuses on basic literacy and numeracy skills and on cultivating desirable behavior on the part of students. In addition, the Thai government also allows each school to establish flexible curricula in order to integrate local wisdom and culture into the core subject groups described in the National Curriculum. During the period of 2003 to 2007, 76.1 percent on average of Thai children between 6 to 11years old had attended elementary education, as shown in Figure 2.1. This ratio increased to 90.1 percent in 2009 (UNICEF, 2009).

The secondary education level can be divided into lower and upper secondary sub-levels; each takes three years to complete. Lower secondary education, which is compulsory education for all Thai children, aims to continuously develop students' ethics, knowledge, and abilities. It allows students to explore their needs and potential careers. According to the statistical data obtained from the academic year 2003 to 2007, it was found that 79.4 percent on average of Thai children aged between 12 and 14 years old have enrolled in lower secondary schools. This number is a little higher than the ratio for elementary education.

The annual enrollment rate for lower secondary schools in Thailand is illustrated in Figure 2.2. The upper secondary level aims to prepare students to move toward their profession goals and will be the focus of this research. This level provides two alternatives for students to choose, i.e., vocational-oriented and academic-oriented programs. It is, however, unfortunate that only 34.7 percent of

Table 2.1 Formal Education Scheme in Thailand



Source: Adapted and modified from The Thai Education System, Towards a Learning Society, MOE 2007.

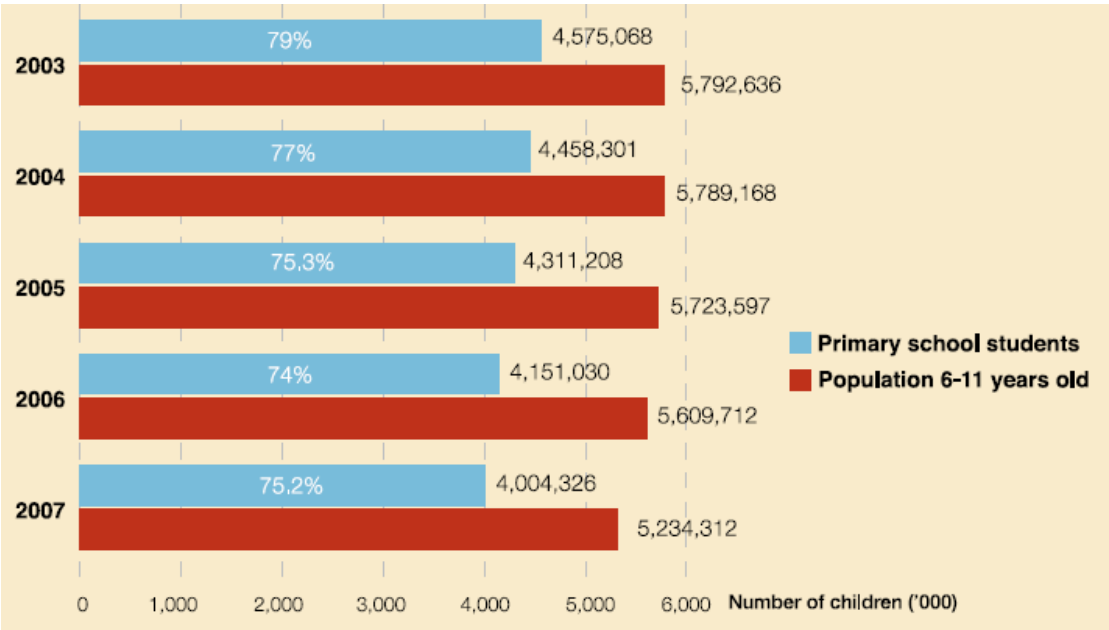


Figure 2.1 Enrollment of Thai children at the elementary education level during academic years 2003 to 2007

Source: Bureau of International Cooperation, 2008.

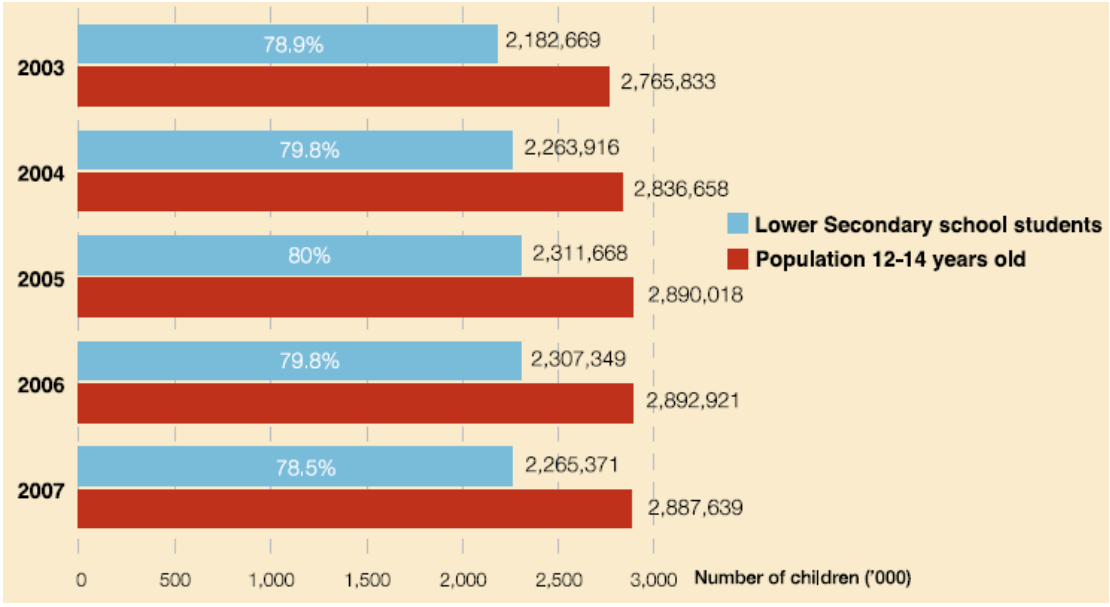


Figure 2.2 Enrollment of Thai children at the lower secondary education level during academic years 2003 to 2007

Source: Bureau of International Cooperation, 2008.

the children population aged between 15 and 17 years old are enrolled in the upper-secondary schools, as shown in Figure 2.3. This rate increased to 72.2 percent in the 2009 academic year (UNICEF, 2009).

The higher education level is divided into two sub-levels, i.e., the diploma and degree levels. The diploma level offers one- to four-year courses for upper secondary graduates. It aims to develop the learners' knowledge and vocational skills to enable them to initiate their entrepreneurships. The degree level is divided into two sub-levels. i.e., the undergraduate and graduate sub-levels. The undergraduate or bachelor degree normally offers a four-year course, except for some programs such as architecture, pharmacy, and medical science programs, for instance, which require more than four years to be completed. Undergraduate study aims to further develop the students' abilities and discipline. The graduate education sub-level offers one- and two-year programs for a graduate diploma and master degree, respectively. Students are stimulated to specialize and bring theories to practice. Master-degree graduates can pursue their doctoral degree, which usually takes a three-year period. At this level, Ph.D. candidates will be encouraged to broaden their vision and knowledge as

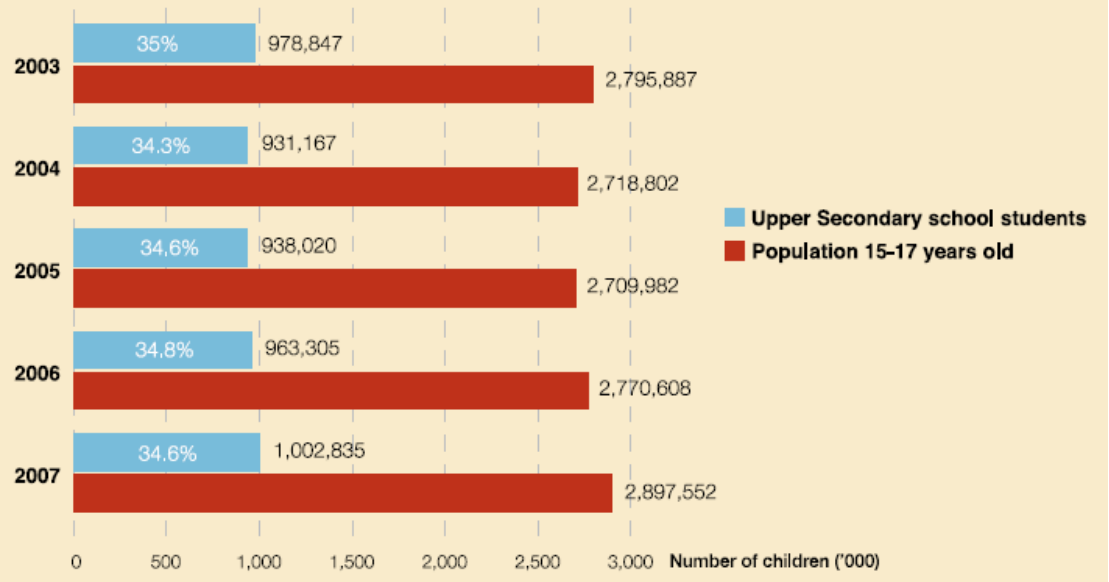


Figure 2.3 Enrollment of Thai children at the upper secondary education level during academic years 2003 to 2007

Source: Bureau of International Cooperation, 2008.

well as to obtain better perspectives both locally and internationally. Over 2.2 million students are currently enrolled in the higher education sector. The enrollment rate of university age students has increased continuously to more than 40 percent in recent years (Bureau of International Cooperation, 2008). This is because there has been a significant increase in higher education opportunities nationwide.

2.1.2 Concept and Importance of Thai Secondary School

As mentioned previously, this study is focused on the upper secondary school, which is one of the key players in Thai education. According to its major role, the upper secondary level intends to prepare students to move toward their professional goal, hence, providing students with the additional knowledge and skills necessary for professional learning. Moreover, it aims to respond to the capability, proficiency, and interest of individual learners, both academically and professionally. It is considered as a preliminary unit to develop the students' expertise to match the needs of the labor market. Investment in secondary school can provide a great outcome if it acts as a critical connection between elementary or primary education, undergraduate education, and the labor market. On the prospect of learners, upper secondary school students acquire technological know-how, skills, and advance their analytical thinking ability. In this way, the students can apply their skills and knowledge to their further studies or future work. Hence, the students can adopt appropriate roles and become leaders in the work place (National Institute Education Testing Service: NIETS, 1999).

2.1.3 Organizational Structure of Upper-Secondary Schools in Bangkok

There are over 37,000 educational institutes and nearly 20 million students in the Thai education system nationwide. The upper-secondary schools in the Bangkok metropolitan area are under the supervisions of four organizations: the Office of Basic Education Commission (OBEC), the Office of Higher Education Commission (OHEC), the Office of Private Education Commission (OPEC), and the Bangkok Metropolitan Administration (BMA). The former three offices are under the Ministry of Education of the national government, whereas the last organization is a local administrative organization. Public schools (under the OBEC, OHEC, and BMA) are

almost totally supported by the government, either directly or indirectly. They are typically free for Thai nationals, although in some schools students have to pay a small fraction of the entire school expenses. In most cases, parents are required to pay a nominal fee for books and necessities.

On the other hand, private schools, even though they are run by charitable organization, are run for profit; thus, students have to pay full fee. The curriculum may vary slightly between schools; however, the core courses are still controlled by the Ministry of Education. Each school has its own admission procedure, which can include placement tests and assessment of prior academic records.

Of the total 219 upper-secondary schools in the Bangkok area, 119 schools are under the supervision of the OBEC, which are regionally divided into 2 Education Service Areas (ESA): ESA 1 and ESA 2. ESA 1 comprises 67 upper-secondary schools while ESA 2 covers the remaining 52 schools. Moreover, there are 8 upper-secondary schools under the service of the BMA and 8 other demonstrate schools under OHEC responsibility. The remaining 81 schools are private and overseen by the OPEC.

2.2 Definition and Concept of Quality Management

The term “quality” relates to excellence or the superiority of one thing which is of concern for a particular issue. Hence, the aspects of quality vary vastly depending on the specific arbitrator. No universal agreement on the definition of “quality” is accepted for all professions; different definitions highlight different aspects of “quality.” Kelemen (2003) describes in "Managing Quality" that quality can be divided into many managerial approaches as follows:

1) Product-based approach: this approach mostly focuses on accuracy and measurability, since it is derived from the economic viewpoint, which is able to be numerically quantified. According to competitive market theory, if all products are homogenous, the market will be very competitive. On the other hand, if the products are unique in terms of quality, then customers will distinguish one from another and decide to choose the better one which leads to an increase in sales volume.

2) Manufacturing-based approach: quality in manufacturing covers a wide variety of characters of the product that makes it emerge from the rest such as performance, features, reliability, durability, etc. Thus, the term “quality” in manufacturing prospects will focus on the technical issues of the product.

3) Value-based approach: this approach considers that quality depends on the customers' perception of the product’s value. The higher the product's price is, the higher is the quality of the product perceived. Especially, in the high end market, the price of the product implies product quality.

4) User-based approach: this viewpoint comes from the service marketing discipline. Regarding customers expectation, if the provided service exceeds the customers' expectations for a particular service, it will satisfy them and this satisfaction will consequently indicate quality.

5) Transcendental approach: this perspective views quality in terms of intrinsic and innate perfection. Customers need to get involved and/or experience with a specific phenomenon. Quality is interpreted according to both rational and emotional outcomes, either positive or negative; for example, impression, enjoyment, disappointment, and so forth.

6) Social constructivist approach: this approach believes that quality is the product of the collective activities of various parties. Cooperation within many departments in an organization such as marketing, production, and outside parties such as customers, will result in the production of good-quality products.

7) Discursive approach: in this approach, the interdependence among language, power, and reality is of highly concern. This approach perceives quality as one of the many discourses present in the organization. Some researchers have specified quality according to the discursive approach as beyond material reality. de Cock (1998) for example has stated that quality is a “language game,” whereas Xu (1999) identified quality as a sign.

8) Slogan approach: quality under this approach is stipulated asa simple slogan so that everyone in the organization can understand it easily and clearly. Once the slogan is achieved, then the products and/or services are considered to be of high quality.

In conclusion, the quality of a service focuses more on customers' satisfaction including suitability, completeness, politeness, consistency, availability, truthfulness, and receptiveness, all of which are the most important dimensions of service quality, whereas quality in production mostly focuses on zero defect, defect free, being free of deficiencies (Jones, 2010). In today's globalization with intensive competition, quality comes into consideration as a competitive advantage (Macdonald, 2003). As stated in the work of Summers (2005), Dr. Armand Feigenbuam, who is considered the originator of the total quality movement, defined quality in terms of management based on a customer's actual experience with the product or service. He believed that quality would become a significant customer-satisfaction issue and should be managed intensively throughout any organization similar to the idea of Macdonald (2003).

According to Shewhart (1931), the word "quality" can be categorized into two aspects, i.e. the subjective aspect, which relates to the customer's needs, and the objective aspect relating to the physical properties of the goods and services, including the value/satisfaction received compared to the price paid. It is believed that if all process variables are under control, the process performance can be predicted within a certain limit. He finally developed a quality control chart which is applicable to any process in non-manufacturing processes. This paper also gathered several other meanings of quality as defined by many famous researchers in his book.

Edwards W. Deming, who is the most influential specialist on quality assurance working on the management of quality, stated that quality management is related to management involvement, continuous improvement, statistical analysis, goal setting, and communication. Deming defines quality as "non-faulty systems" to remove the causes of failure in the process by using the PDSA (Plan-Do-Study-Act) concept which was later developed to the PDCA and ISO 9000, which are widely accepted today.

Juran (1979) defined quality as a concept that needs to be found in all aspects of business, and the leaders of organizations must manage quality. According to him, quality improvement can be done through management leadership, continuous education, and appropriate planning. The quality improvement process can be initiated by identifying the need for improvement, followed by specifying strategies

to fulfill the needs, prioritizing appropriate projects, creating an organization structure that guides the diagnosis and analysis of the projects, implementing selected project, collecting the data/improvement, and finally summarizing the outcome of the projects being executed. This paper proposed a trilogy managerial concept of quality planning, quality control, and quality improvement which could lead to the organization's success.

Referred to in Shewhart (1931), Crosby (1979) argued that Feigenbaum's definition of quality seemed to be vague and intangible, so he attempted to identify the word "quality" in a quantifiable and tangible way as a precise and measurable variable. His approach put more weight on measuring and controlling by focusing on certain combinations of input rather than descriptive information. He proposed four absolutes of quality management set in order to fulfill the continuity of process improvement.

The first absolute of quality management is conformance to requirements (similar to Macdonald, 2003); however, to make it quantitative, customers' needs have to be transformed to measurable characteristics for the organization's product or services. To find out the needs of customers and to translate them into the service or products they expected is not an easy task; nonetheless, it is very crucial and could provide the organization with a promising start.

The second absolute is the prevention of any defects in products or services. It is necessary to identify the root cause of defects and eliminate it to prevent their reoccurrence, resulting in effective systems.

The third absolute is zero defects, which is a further improvement step from the second absolute. Making products or providing right service at the first time is the ultimate goal of the organization's production. If no loss or defects takes place, the organization will be managed at its optimal point, resulting in the most effective usage of all resources.

The fourth and the last absolute is the cost of quality, which refers to the cost associated with providing customers with a product or service that conforms to their expectations. Quality cost is composed of the cost of the customers' dissatisfaction, rework, scrap, downtime, and material costs. It also includes indirect costs that occur when the production has been unnecessary terminated or the provision of a service.

The American National Standard Institute and the American Society of Quality have defined quality as the totality of features and characteristics of product or service that bears on its ability to satisfy given needs. However, in today's highly competitive markets, merely satisfying customer needs may not make an organization achieve success. In order to beat the competition, the organizations have to provide service which exceeds the customers' expectations (Evans, 2011).

In the previous paragraph, quality was thoroughly defined in the organization managerial aspect, which is quite related to this research work. However, "quality" is not only used in the management field but also in other professions. Kelemen (2003) defined "quality" in a philosophical way as making useful things or acting in a contributing way to achieve desirable relationships within the group. Quality is intrinsic to the very notion of human existence and is interconnected with all related resources involved. Therefore, quality management requires strategic management skills.

According to a survey of managers in 86 firms in the Eastern United States in order to define the meaning of quality, the results were quite different depending on the organization's activity, goals, and perceptions. It covers a wide range of superior characters including completion, uniformity, cleaner productivity, punctuality, standardization, usability, precision and accuracy, friendliness, and satisfaction (Evans, 2011).

2.3 Implications of the Quality Concept for Education Quality

Education is another key index of the extent of a country's development. Therefore, many organizations, both profit and non-profit, have realized and focused on the importance of education, and many scholars have provided several definitions of education in many aspects as follows.

Aristotle defines education as "The root of education is bitter, but the fruit is sweet"(Moorcroft, 2005). On the other hand, John Dewy, a guru of education administration, explains education as "Education is not preparation for life, education is life itself" (Barnhard, 2001). Nelson Mandela, 1993 Nobel Peace Prize laureate

stated that "Education is the most powerful weapon which you can use to change the world" (Education for All, 2009).

According to NIEST, education is a learning process of individuals and society's advancement by passing on knowledge, training, apprenticing, cultural transferring, academic creativity and development, creating a body of knowledge from the management of the environment, society, learning and supporting individuals for life-long continued learning.

Pongpaiboon (2000), former permanent secretary of the Ministry of Education, indicated that education quality was the fifth requisite of life. Education produces knowledgeable and skillful people. Moreover, education is one of the most important factors in the era of globalization today.

In summary, education is not only about reading, writing, and arithmetic (the "3Rs") as commonly understood. Other abilities such as social, communication, cooperation, critical thinking, and problem-solving skills are also considered very crucial for people to behave and perform properly. Additionally, some extra skills related to an occupation such as technical and vocational practices are also required in order to be successful in the labor market (World Bank Group Education Strategy, 2002)

2.3.1 Education Quality

Quality in education is defined in various ways similar to quality in manufacturing and in service. Education quality is a multidisciplinary idea and cannot be easily accessed by only one indicator. According to the literature review, several authors have delineated the specific meaning of education quality differently including value (Feigenbaum, 1951), conformance to specifications (Crosby, 1979), defect avoidance (Crosby, 1979), excellence (Peters and Waterman, 1982), meeting and/or exceeding customers' expectations (Parasuraman et al., 1985), fitness for use (Juran and Gryma, 1988), etc. Apart from defining it according to a specific meaning, Cheng and Tam (1997) defined "education quality" in a multi-dimensional fashion as "the character of the set of elements in the input, process, and output of the education system that provide service that completely satisfy both internal and external strategic constituencies by meeting their explicit and implicit expectations." It can be seen that

although education quality is defined in various ways, all meanings are in the same direction, usually related to fitness of use and satisfaction of the needs of strategic constituencies, including policy makers, parents, school management committees, teachers, and students. Since it has several meanings, education quality can be measured using many different indicators.

Some researchers have focused on the quality of input while others have emphasized processes and outcomes. It is widely known that education represents one of the most interesting and challenging areas for quality improvement. Public schools in the United States have applied the principles of total quality (TQ) in their organizational management. In order to achieve the required quality, they have established four pillars: strong quality leadership (via planning and training), continuous improvement (via the performance appraisal review process, comprehensive local education plan, performance measurement system, and comprehensive local education plan), customer focus, and system/process focus, which serve as a foundation for the schools (Kelemen, 2003).

Quality in education is closely concerned with the system of accountability and performance appraisal to control desired quality, such as certain standards, knowledge, and skills in accordance with society and labor market expectations (Saiti, 2012). Quality assurance influences school strategy, especially in a competitive environment, to ensure that all stakeholders will achieve appropriate knowledge and fulfill their needs. Quality assurance is an important mechanism which can drive the change in school strategy.

Developing a framework for quality requires the involvement of all staff members. The concept of quality must be clearly defined and should be relevant and meaningful to all stakeholders. Responsibility, accountability, and ownership are critical factors in achieving quality assurance. Establishing a quality system will enable the school to identify the specific requirements of parents and students and make them happen. Most of the time, an organization’s standards, some of which are specific to resources and operation, will be established. A standard should clearly define the school’s true capability so that it is possible to be achieved and measurable.

In addition, quality assurance in the school is a continuing process because all involved parties, including parents, students, teachers, and administration, can change

their requirements over time. Therefore, persuading members to realize, understand, conform, and accept quality assurance continuously is a very challenging task. Schools must have a proper management structure and organization culture to raise the awareness and stimulate the involvement of every participant in the quality assurance process. Successful implementation of any activity to improve school quality requires the awareness of the entire staff, and two-way communication and staff development are strategically important to facilitate the achievement of the school's objectives. The strategies necessary for the success of quality improvement vary from school to school. Management commitment is considered the first step in quality implementation in schools to promote confidence and create unity among school staff members. Staff awareness and commitment are the most difficult part and typically are very time consuming processes of all stages. Certain actions might ease this process, such as information distribution to all members and ensuring that all of them understand everything clearly. As mentioned several times, quality improvement has to be carried out at all levels in the organization. Group discussion to determine the mechanism for identifying the needs of internal and external customers as well as the mechanisms for measuring performance against standards or benchmarks is one of the important stages for quality improvement. Staff development is also an essential element to promote quality improvement (Hawtin, 1994).

It is important to note that the education system is different from the production and service sectors in that it not only involves process input and output but also a multiple constituencies of an education institute. As a result, it is possible to find an excellent school with low quality in some aspects. As mentioned earlier, the indicators of education quality have many aspects depending on the school's interests and objectives, hence different schools will have different missions, strategies, and processes to improve their quality. This perception is in close agreement with the idea of Cheng and Tam (1997); thus, achievement of education quality in different schools can be achieved using dissimilar strategies and can be evaluated by various indicators. As a result, it is not worth concentrating on the indicators and strategies of all aspects of the input, process, and outcome of the educational institution. Nonetheless, a combination of some indicators might be

sufficient to statistically represent education quality in a specific prospect, which will serve as fundamental data for administrators or policy makers in reaching conclusions and making the right decisions to improve education quality. Nowadays, the role of quality management in education is gaining more and more importance. Quality management is currently one of the major issues in the educational institute. To enhance education quality, an effective and motivating environment has to be created, together with the concern for all stakeholders' requirements. The Dakar Framework for Action in 2000 declared that access to quality education was the right of every child and that quality was at the heart of education (World Bank, 2005). This declaration has expanded the definition of education quality to cover the whole education process, i.e., the desirable characteristics of learners (healthy and inspired), processes (capable teachers of using active teaching techniques), content (appropriate and approved curricula), and system (good governance and equitable resource allocation).Yulia (2010) considered student motivation as an essential element for the educational environment to improve education quality. Several management tools have been used successfully.

2.3.2 Key Elements for Education Quality

Although the definitions of education quality and opinions about quality in education are not well justified, three principle needs seem to be broadly accepted in international debates and policies related to education quality improvement, i.e., the needs for more relevance, greater equity of access and outcomes, and proper observance of individual rights. To fulfill these needs, several key contents have been identified by several educational experts.

In a report submitted to the World Bank (2005), several main elements affecting education quality were recognized. The learner characteristic dimension involves the background of the children that affects their ability to learn, including talent, persistence, willingness, knowledge and socio-economic backgrounds, hindrances, health, place of residence, etc. This dimension is the very first element necessary to prepare children to be ready for the educational development and to allow them to reach their highest potential in terms of cognitive, emotional and creative capacities. Children's capacities and experience have a strong influence on

their learning. The differences in learner characteristics often require special responses and supervisions, especially from the national government, if quality is to be improved.

Enabling inputs are the second element to be discussed. Teaching and learning can be successful if sufficient supporting resources are available and well managed. Inputs enable children's learning, including teaching and learning materials, physical infrastructure and facilities, human resources, school governance, etc. Schools without these essential resources will not be able to do an effective job. The teaching and learning dimension is quite related to enabling inputs and can be considered as a subset of the enabling input dimension; however, it is worth listing it separately and distinguishing it from other inputs. The teaching and learning dimensions include several factors such as learning time, teaching methods, evaluation system, response, motivations, and class size.

The contextual dimension is the surrounding environment that embraces all other elements and has positive and negative impacts on other elements. The contextual dimension covers very wide areas, some controllable and some uncontrollable. It characterizes the community and society textures such as economic and labor market conditions, social-cultural and religious factors, educational knowledge and support facilities and the environment, the public resources available for education, the competitiveness of the teaching profession int he labor market, national governance and management strategies, the philosophical standpoint of teachers and learners, peer effects, parental support, time available for schooling and homework, national standards, public expectations, labor market demands, globalization, etc. The links between these environmental factors and education are very strong and each influence the other, i.e. education can improve society in terms of skill strengthening and value intensification whereas surrounding conditions can promote the effectiveness and quality of the education in the community.

According to McKinsey & Company (2007), the available evidence suggests that the main driving force of student learning at school is the quality of the teacher. It was found that students study with high-performance teachers will advance three times more rapidly than those studied with low-performance teachers. In all of the schools surveyed, it was found that variations in the learning of students in different

classes derived primarily from teaching quality. As a result, high-performing schools regardless of paradigm and context always emphasize instruction improvement due to its direct and apparent impact on the students' achievement. The information gathered during visits to high-performing school revealed these institutes consistently achieve the following criteria: a) recruiting the right people to become teachers since the education quality of a school cannot exceed its teacher quality; b) continuously developing their teaching effectiveness through training and instruction; and c) providing essential supporting elements to ensure that every student is able to benefit from excellent instruction so that the education standard of every student is improved.

2.3.3 Education Quality and Indicators

In order to describe the conditions of schools, and to set targets, benchmarks, and standards for accessing progress and monitoring education processes, to evaluate education quality and compare with targeting goals, standardized performance indicators have to be well defined and carefully selected. A variety of indicators may be employed to monitor different aspects of the education system. Under different situations, phenomena, purposes, or levels of education administration, certain indicators might be more appropriate than the others in measuring progress or achievement or vice versa when conditions change. Therefore, it is important and necessary to have a better understanding of the types of educational indicators as well as their characteristics in order to correctly determine and select the most appropriate indicators to be used.

Suitable indicators can be anything that can provide a reliable and unbiased understanding of an object, a situation, an issue, a phenomenon, a happening, a motion, a development process, etc., to be evaluated. Indicators can be considered as an outcome of an analytical process of raw data transformation into meaningful information which can help to identify problems and issues, to define targets and strategies, to stipulate policies and plants to reach those targets, to monitor progress toward achieving a goal, and eventually to evaluate the final achievement. Hence, indicators are the very important and an essential component of any monitoring process. Oakes (1986) clearly defined the concept of indicators in the education system as a performance gauge for evaluation and monitoring. Most of the time, a

quantitative figure in the form of a simple number, a percentage, a ratio or rate, or a score but not limited to a "yes" or "no" answer or a piece of data is used. At UNESCO's website under the topic Systematic Monitoring of Education for All (Education for All, 2005), four approaches to classifying education indicators are introduced, including qualitative and quantitative measurement, monitoring and assessment of education, evaluation scale, all of which will be discussed in more detail in the following paragraphs.

For education monitoring purposes, selected educational indicators have to be able to cover all ranges of performance of each stage from the beginning to the end. For broad classification according to their sequential order, they can be categorized as input indicators, process indicators, output/outcome indicators, and impact indicators. Input and process indicators are used for monitoring the initiative and processing stages, which include suitable education policy issues, and adequate resource input allocation and implementation. On the other hand, output/outcome and impact indicators are used to evaluate the destination end, which involves the results, effectiveness, and impact of education policies and their implementations.

For the education system, input indicators focus on the human, financial, and material resources that have been placed into an educational system to support and stimulate the activities of the teaching and learning process, such as percentage of the government budget allocated to education, the student to teacher ratio, the number of students in class, etc. Once the input is introduced into the schools, the education process begins. Process indicators describe the use of resource inputs in delivering educational services as well as the actual conditions that occur in the classroom during the teaching and learning process. Process indicators can be the rate of students' attendance at school, the proportion of average class hours that the students participate to the total official class hours, the incidence of teaching and learning material usages, or repetition and dropout rates. Output/outcome indicators are used to evaluate the end results of all educational inputs and processes. They represent the effectiveness of the educational policies, strategies, and practices that have been implemented in an educational system by measuring actual achievements and comparing them with the set goals and targets. Output/outcome indicators can be enrolment ratios, completion rates, standardized examination scores, etc. Impact

indicators demonstrate the consequence of education on a larger scale rather than the student him/herself. These indicators should cover the effects on the well-being of individuals, families, communities, and the society and nation as a whole. Impact indicators typically include literacy rate, emotional development, skill improvement, students' values, attitudes, and behavior in relation to other people.

2.3.4 Measurement of Education Achievement in Thailand

The National Institute of Educational Testing Service (Public Organization) or NIETS under the Ministry of Education was established according to Royal Decree on September 3, 2005. NIETS's main objectives are to manage and administrate education, research, development, and to provide services for educational testing and measurement continuously. It also serves as a collaborative center for educational testing at both national and international levels. To fulfill its purposes, NIETS has to collect various educational statistical data from several related sources in the nation and plays a major role in selecting and assigning the performance indicators related to education quality for both local and international references. The outcomes are used as fundamental information for policy makers and other relevant units to be aware or to foresee existing as well as possible problems leading to correct decision making. It is very important to ensure that these designed and selected indicators are suitable benchmarks for evaluating the success or failure of the Thai education system. Many tests have been developed to evaluate students' performance according to their study areas such as the Ordinary National Education Test, I-NET (Islamic National Educational Test), N-NET (Non-Formal National Education Test), GAT (General Aptitude Test), PAT (Professional and Academic Aptitude Test), and so forth.

The O-NET is organized nationwide semi-annually (March and October) for 6^{th},9^{th}, and 12^{th}gradestudents. The assessment covers seven study areas including Thai, social studies, religion and culture, foreign language, mathematics, health and physical education, and arts and career and technology. In this study, O-NET and GAT are used as indicators for the study of education quality because of their nationwide coverage and standardization. From 2007 to 2012, the national average scores in five subjects were below 50 percent, except in 2007,when the Thai language average score was 50.7 percent. In 2012, Thai student performance in each subject

was as follows: 47.2 percent in Thai language, 36.3 percent in social study, religion and culture, 33.1 percent in sciences, 22.1 percent in foreign language, and 22.7 percent for mathematics(The Office of Education and Curriculum: OEC, 2012). As a result, it is urgent for related parties to determine the root cause of this education failure and to find proper solutions to improve the national education quality(retrieved from NIETS website).

The General Aptitude Test (GAT) is another national test organized by NIETS twice a year in March and October for grade 12thstudents. It comprises two parts: a) reading comprehension and analytical skills and b) communication in English. This test focuses on general knowledge and skills. Its main purpose is for the grade 12thstudents to use the test scores as a part of the criteria for university admission. The Professional and Academic Aptitude Test (PAT) is an assessment that measures student performance in 7 academic are as in higher education, which include PAT 1: calculating skills, PAT 2: scientific skills, PAT 3: engineering skills, PAT 4: teaching procession skills, PAT5: teaching profession skills, PAT6: fine arts skills, and PAT7: foreign language skills. NIETS is the responsible unit for conducting this test, normally twice a year, similar to the GAT. The PAT aims to assess the academic skills of grade 12thstudents necessary for each career path and is used as criteria for university admission.

The Program for International Student Assessment (PISA) is a large-scale assessment of the education system worldwide which is arranged every three years by the OECD. Randomly-selected students at the age of 15 are tested for their reading literacy, mathematic literacy, and scientific literacy performance. Only one subject is focused on for each year's assessment. The students and their school principals as well as parents for some countries also fill in background questionnaires to provide information on the students' family background and the way their schools are managed. The PISA is quite unique because its questions are not directly linked to the school curriculum but aim to assess the ability of students after finishing compulsory education to apply their knowledge to real-life situations and to be equipped for full participation in society. The PISA also provides a context through the background questionnaires which can help education analysts interpret the results, which can be very useful for local governments to develop their education-related policies. In 2009,

Thailand was ranked 50thout of the65 countries participating in the assessment. China-Shanghai, South Korea, China-Hong Kong and Singapore were in the top rankings.

The Trends in International Mathematics and Sciences Study (TIMSS) has been organized since the 1960s by the International Association for the Evaluation of Educational Achievement (IEA). The test is aimed at measuring the mathematics and sciences achievement of the 4th and 8thgrade students worldwide. The TIMSS is conducted every four years. In the latest assessment conducted in 2011, for the8thgrader exam, the results showed that Thai students were ranked28th in mathematics and the 25th in sciences among the 45 countries participating, whereas for the 4thgrader exam, Thai students were ranked34thand 29th in mathematics and sciences, respectively, out of52 participating countries.

Ironically, according to WEF's Global Competitiveness Report 2012-2013, presented at the World Economic Forum, which is an annual gathering of business leaders, governments, and civic groups, Thai education ranked at the bottom out of eight ASEAN countries surveyed, including Brunei Darussalam, Cambodia, Malaysia, Indonesia, Philippines, Singapore, and Vietnam (Myanmar and Laos were not included in the survey). The report also mentioned that money was not the most important factor in guaranteeing a good education.

2.4 Definition and Concept of Leadership

2.4.1 Definition of Leadership

The concept of "leadership" has a very broad meaning and denotation. In the beginning (old paradigm), "leadership" was defined as it is, a noun. Some researchers believed that "leadership" is a personal quality, born with a person as a gift, and cannot be either made or developed or taught; however, many others think differently. The definition of leadership is still unclear, and there are more than 100 definitions (Rose, 1991); however, most of them describe the behaviors relevant to leadership as power, prestige, ability, authority, influence, management, supremacy, and so forth (Bennis, 1959). These attitudes cause persons to show their actions and behaviors that other people trust and are willing to follow (Northouse, 2012).

However, this concept of the personal characteristics of the leader is not absolutely true for all cases. Not all great leaders are born with leadership properties and qualities like George Washington, Winston Churchill, or Bill Gates. Several shy, cowardly, and ordinary-born children could grow up to later be great leaders after proper training and with sufficient experience.

In another aspect, some other researchers believe that "leadership" is a transactional process/event that takes place between "leaders" and "followers," influencing others in their roles and taking proper action to accomplish their missions so that the group can achieve its goals (Hickman, 1998; Hughes, Ginnett, and Curphy, 2002; Yuki, 2006). One of the earliest works defining leadership as a process was that of Saal and Knight (1988),who believed that the "leadership" is not a product of in-born traits but is able to be developed by proper and effective training. It is a complex process of interaction between many stakeholders and variables, including the leader's traits, behaviors, situation, and environmental surrounding which vary from situation to situation, as shown in Figure 2.4.This contradicts earlier theories and researchers, who believed the "leadership" was related to internal qualities with which a person is born and was not affected by other.

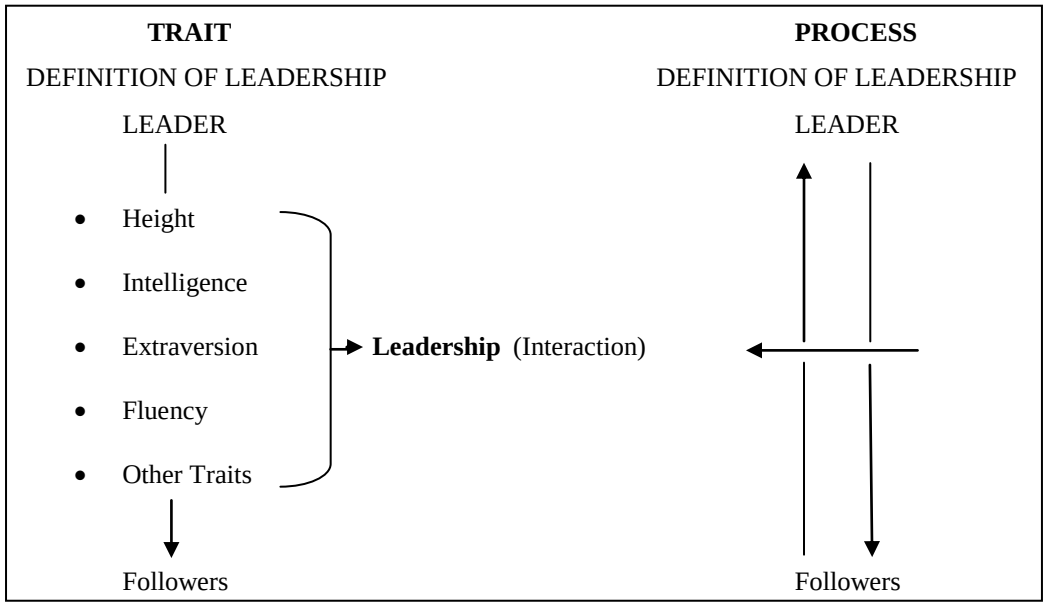


Figure 2.4 The Different Views of Leadership

Source: Northouse, 2010.

influences such as social, situational, and environmental factors. Daft (2005) reinforced the belief that "leadership is a process" by stating that leadership can be tremendously influenced by outside factors such as emerging technologies, globalization, social and political situation, competitive threats.

In conclusion, the meaning of "leadership" should be a combination of both conceptual ideas, i.e., leadership is a personal ability which can be developed by proper learning and experiencing (outside factors or process derivative), and personal attitudes, such as ambitious, wisdom, mature, etc., that also play a vital role in enhancing leadership ability (inside factors or trait derivative) (not all trained personnel become good/successful leaders). Leadership is a behavior that emerges from an individual in a group in order to achieve specific goals or to accomplish particular tasks. Different situations require different characteristics or personalities on the part of the leader; however, one of the essential characteristics of a leader is the ability to influence others.

Leadership plays a significant role in the education sector, which is very competitive nowadays. Leadership involves influencing teachers and students to accomplish designated goals. Moreover, many studies consider leadership as a crucial factor in organizational success or failure (Bass, 2008). Having experience, a clear vision, strategic management, the principal leader can motivate and change the school climate as well as student performance (Allen,1981; Hutchison, 1985). Leadership in the school is considered as an important factor in quality education and for the total quality system (Creech, 1914).

Educational institutions can provide quality or not; it all depends on people to make it happen. Humans can be capital or assets if their supervisors know how to manage people to create value for the organization. Supervisors need leadership skills to motivate their subordinates to pursue their goals. Thus, the leadership role is a significant factor in teacher development and entails education quality. Basic education schools are the lowest units in building quality education. In other words, schools are gateways and are like factories, producing quality goods to serve society. As a result, quality schools could create quality students and thus quality labor for the nation.

Peter Drucker wrote in “What Makes an Effective Executive” in the Harvard Business Review that “effective leaders have many features, characteristics, a variety of attributes and different style.”The leadership style in an organization can be reflected by the organization’s nurture and the relationships with its community. Therefore, leadership style and organizations are interrelated. According to “A Systematic Evaluation of World-Class Standard School Project” researched by Sealeewatt (2012), three important inputs were determined to exist in the world class schools in Thailand: the principals, teachers, and infrastructure. In this study, the school principals, the key persons in planning and policy implementing, are highly qualified. Most of them have experienced more than twenty six years in school management and have gone abroad on tour of schools for investigation many times. Thai world class school principals encourage and support their teachers to enhance their performance and to impart their knowledge to their students. In concordance with Abbasi (2012), it was discovered that world class schools typically have strong leadership, qualified teachers, and institutional integrity. Many studies and researches have been conducted on leadership in primary, secondary schools and higher education (Berry, 1997; Bush, 2008; Bushetal, 2010; Chapman, 2005). However, leadership style in world class schools is an important factor to study and would benefit policy makers and other schools as a model to adapt the leadership style to their schools.

2.4.2 Definition and Concept of Leadership Style

Leadership style is the behaviors or manners of the leaders expressed externally to the public, the community, and followers in order to influence and stimulate the followers to act or respond to the required directions in order to achieve the target goals. Today, leadership style is commonly believed to be a combination of gifted traits and skills developed from the learning process or obtained from personal experience. As a result, different leaders have dissimilar leadership styles; some will be successful in certain situations and environments whereas the others will flourish under different environments.

Leadership style can be categorized into many groups depending on various researchers or academic scholars. One of the earliest works was that of Lewin and his

associates at the University of Iowa (1947), who conducted a study about leadership style identified into 2 categories: autocratic and democratic manners. Autocratic leadership style is defined as a situation in which the leaders make all the decisions and tell the followers what to do under close supervision. On the other hand, the leaders with a democratic leadership style will encourage group members to participate in the decision making process to determine individual roles and duties and they do not supervise the followers closely. The results revealed that the leadership style usually fell in between these two opposite ends and with the changing trend from management to leadership, the leadership style of effective managers was moving away from the autocratic toward the democratic end (Achua and Lussier, 2004).

Leithwood and Jantzi (1999) reviewed the literature dealing with the leadership in educational administration and suggested five major categories of school leadership: instructional leadership, transformational leadership, moral leadership, participative and managerial leadership, and contingency leadership. Instructional leadership usually concentrates on the teachers' behavior, which greatly affects students' learning and growth. It is, however, not only a focus on teachers but also includes authority and formal administration. All counterparts in a teaching institute have to get involved to create effective instructional leadership to promote student achievement. The school principal alone cannot fulfill all of the needs for instructional leadership. Transformational leadership involves several issues, such as being charismatic, visionary, cultural, and empowering. The main focus of transformational leadership is the commitment and capacity of the members within the organization. This type of leadership will raise the target goals of the institute so that the productivity of the organization increases. Formal position staff members are important targets but not necessarily the only allocation. The best scenario should cover everyone involved in the organization's activities and to be able to inspire a higher level of personal commitment and promote the accomplishment of the organization's goals. Moral leadership is focused on the values and ethics of the leadership. Different approaches have been employed to strengthen moral leadership, such as good governance, transparent management, etc.

In an era of globalization, everyone agrees that leadership must entail a moral imperative to promote equity, a democratic community, and social justice. Participative and managerial leadership has been found to be able to increase the effectiveness of the organization. Participation in the decision-making process is one of the important vehicles for achieving goals. Contingency leadership is the responsive reaction of leaders to the unique organizational circumstances or problems that they are facing. All of these factors must be carefully considered in the context of the situation before any decision is made. Among all categories of leadership style, this study will focus on the effect of transformational leadership on education quality in secondary schools in Thailand. A number of studies on transformational leadership in the school, such as those of Leithwoood and Jantzi (1999), Silins and Harvey (1999),have asserted that transformational leadership style can build up motivation, and commitment to both teachers and students. Moreover, teachers were seen to be allowed to exercise and develop their performance and capabilities. Finally, evidence has shown that transformational leadership advocates school productivity and positive school outcomes. Hence, transformational leadership is discussed further in detail in the following section.

2.4.3 Transformational Leadership

As global changing rapidly, every organization and enterprise must adopt itself to these changes, as well as identify threats and opportunities to overcome obstacles and handle opportunities. To confront changing the environment, organizations need transformational leadership (Bass, Avolio, 1992). The concept of transformational leadership is well clarified by Bass and Avolio (1994), who used the term “Four I’s of Transformational Leadership” to described this character. These four elements are idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Dionne et al., 2004; Yu, 2002; Leithwood and Jantzi, 1999; Avolio and Yammarino, 2002; Avolio et al., 1999; Bass, 1988; Bycio et al., 1995; Bass and Avolio, 1994). These four components of the transformational leadership are critical factors for communication development, conflict management skills, and cohesion promotion within the organization and are closely linked to group performance.

The first two "I"—idealized influence and inspirational motivation—are related to the formation of the explicit vision of the organization, and the recognition and prioritization of future goals. Idealized influence and inspirational motivation are the necessary initial steps toward transformational leadership. Sharing visions, strengthening personality, inspiring followers to change their expectations and perceptions, and developing motivations and consensus about goals and priorities can stimulate followers to cooperate readily with the leader for the success of the organization. These actions can be done via several interactions within the organization on a daily basis, such as progressively creating the followers' pride in being associated with the leader, convincing followers to look at the organization as a whole rather than in terms of personal interests, promoting followers' confidence in achievement, encouraging them to face and overcome problems, etc. As a result, the organization will be united at all levels, from top to bottom. Consequently, the a collaborative culture and atmosphere will be created within the organization, which is a very crucial factor for effective team performance (Weaver et al., 1997). Many studies have found a strong relationship among cohesion, transformational leadership, and organization performance similar to the findings of Weaver et al. (1997). Carless et al. (1995) conducted a study on the financial performance of the banks in Australia and found that cohesion could significantly facilitate the transformational leadership within the organization. Sosik et al. (1997) also found that a cohesive environment could promote the relationship between transformational leadership and creative outcomes of the staff members interacting through computer networks. A later study by Bass et al. (2003) observed a relationship between transformational leadership and group performance as well. Dionne et al. (2004) attempted to characterize the relationship between intermediate outcomes and transformational leadership behaviors. They found that sharing a vision and committing to the leader had a positive impact on team cohesion and partially mediated the relationship among the idealized influence/inspirational motivation leadership and team performance.

The third "I", intellectual stimulation, aims to promote the intelligence, rationality, and effective problem solving ability of the followers. This can be done in several ways, including brainstorming in order to obtain different perspectives for problem solving from group members, tree analysis to gather new ways/approaches

to completing assignments, sharing decision-making structures and processes, etc. Chen and Tjosvold (2002) indicated that well-handled conflict in an organization could lead to the development of quality solutions as well as strengthen the relationships within the organization. Effective management of conflict, particularly cognitive or task-oriented, which prevents infighting and inconclusive decisions, can lead to better effectiveness and performance. Dionne et al. (2004) proposed that a leader's creation of functional conflict (conflict which supports the goals of the organization and improves the organization's performance) will positively impact group conflict management, and will partially mediate the relationship of intellectually-stimulating leadership with organization management.

The last "I", individualized consideration, is to consider and interact with followers as individuals using different manners/approaches, not just treating all members of the organization similarly. Behavior related to this factor includes teaching and training individuals in person to develop their strength as well as listening to and accepting others' concerns. It is generally accepted that increased listening, prompt feedback, and openness to suggestions within the organization are essential for effective performance (Dyer, 1995; Stevens and Campion, 1994; Zander, 1994). These individually-considerate behaviors may also serve to empower team members and open and extend lines of communication between the leader and each member of the organization, resulting in a positive impact of team communication (Dionne et al., 2004). However, individuals have different needs, abilities and aspirations, and time spent for teaching and training; thus, it is the leader's responsibility to construct a one-to-one relationship with each group member, listening to concerns and addressing individual needs (Bass, 1994; Yammarino et al., 1998). By doing so, transformational leadership in the dimension of individualized considerations may be an appropriate precursor to effective team communication.

Moreover, transformational leadership does not come by birth, but from training to be. Training to be principals is crucial, as transformational school principals must have people skills, communication skills, critical thinking skills, creativity, and so forth. Therefore, it is worth mentioning that transformational leadership in an organization requires decentralization by providing autonomy to

support their mission and their followers (Lynch, 2012; Gamage and Sooksomchitra, 2004; Somkid angkijvanich, 2012).

Transformational leadership is not a magic characteristic that any leader has so that the organization can always provide quality products or services. Bass and Riggio (2006) delineated authentic transformational leaders as socialized and morally uplifting. Transformational leadership, which involves egalitarian behavior, collective interest serving, and developing and empowering others (Bass, 1985), is a dynamic property which can be self-amplified through training and practice.

Not all school principals, in fact it should be a small fraction, were born with natural transformational-leadership talent. As a result, school principals without this internal talent have to acquire it externally in order to achieve high performance. It is obvious that teachers in developed countries have a better opportunity to acquire the necessary training for promoting their transformational leadership skills than those in the developing world, or in Thailand for example, where budgets for school principal improvement are very limited. In addition, according to Thai culture and tradition, questioning authority or higher seniority is considered uncomfortable, inappropriate, and impolite. Consequently, principals tend to accept the orders of their supervisors while teachers will conform to the orders of their principals, and so on (Hallinger, 2004). Halinger and Kantamara (2000) revealed that typical Thai principals manage schools by using position power; they naturally expect school personnel to follow their orders entirely with limiting discussions and questions.

It is necessary to note that little research has been done in the education quality domain and has found no relationship between principal transformational leadership and education quality, in contrast to many other studies as stated above. Greb (2011) studied the relationship between student achievement and principal leadership in public schools in Cooperative Education Service Agencies 2 to 12 in Wisconsin of the United States and found that there was no statistical significance or correlation between principal leadership, both transformational and instructional, and student performance.

2.4.4 Transformational Leadership, Teacher Quality, and Education Achievement

Numerous studies have attempted to determine the relationship among the transformational leadership of the school principal (leader of the organization), teacher quality, and educational achievement. Yang et al. (2010) pointed out the significantly positive relationship between transformational leadership and physical education teachers' teaching performance and effectiveness in Taipei elementary schools. By the same token, transformational leadership principals, as perceived by their teaching staff, can raise the staff's willingness and contribution as well as their job satisfaction, which are the causes of teacher self-efficacy (Lussiez, 2009). In Thailand, most studies in regards to transformational leadership have revealed a high level of statistical significance between transformational leadership on the part of school principals and school achievement (Chaweewan Junmeng, 2009; Udomsak Koolkrong, 2010) Likewise, Somkid Sakunsatapat (2009) conducted a study under the topic "A Model of Effective Transformational Leadership for Sustainable Education Reform" and concluded that there were both direct and indirect effects of transformational leadership on sustainable education reform at a very high significant level. Additionally, Onorato (2013) stated that transformational leadership in schools played crucial roles in leading the schools to reach high-standard levels as well as the enhancement of the school's performance as with typical business organizations. To adapt, respond to, mandate, establish strategies to confront changes, and motivate stakeholders to achieve the goals set are parts of the leadership that employs a transformational leadership style in both the business and education sectors.

As described previously, it can be concluded that transformational leadership is a necessary characteristic of the organization leader (in this research study, it is the school principal which is the leader of the school) that can direct the institute to success. Thus, transformation leadership is considered as a priority factor affecting education quality and hence is of concern and has been applied as one of the independent variables in this study.

2.5 Teacher Quality

2.5.1 Definition and Concept of Teacher Quality

Teaching as a profession can be considered as an asset or human resource of a school. The competencies of teaching professionals absolutely add value to the academic institute. According to human resource theory and practice, competency refers to an individual's demonstrated knowledge, skills, or abilities (Ulrich et al., 1995). Teachers can reveal their competencies by delivering ideas, programs, and initiatives to their schools in addition to their routine teaching work.

Teachers are also human capital that can create value and sustainable competitive advantages. Especially, service sectors like schools, teachers are the backbone of the organization. Schools are places that generate knowledge, new skills, morality, and so forth. According to a McKinsey Report (2007), the quality of teachers and the school principals have influence on the quality of the education system as well as the quality of students in classes. Therefore, the teacher is one of the key factors in producing qualified students so teachers are required to carry out their roles efficiently. Teachers must have competency to deliver a quality learning process to their students.

According to Barney (1995), all firms and many others need to find out their competitive advantages; otherwise, they will face an unfavorable situation and become low-performing firms. A competitive advantage is considered as a resource of the firm that is excellent compared to its competitors. Competitive advantage can be in many forms, either tangible or intangible assets, and should be internally created, such as financial stability, raw materials, skills, capacities, competence, technology, modern equipment, facilities or even brilliant employees in the firms. From the school perspective, teachers can be counted as a competitive advantage. Accordingly, schools principals have to take the issue of teacher quality into account as well. Qualified teachers can be created or trained. The more training they get, the more likely that positive outcomes will return to the schools. Highly-experienced and dedicated teachers are also counted as invaluable school assets.

Nowadays, the academic environment has changed rapidly; therefore, principals need the skill of management to monitor and handle these changes. School

principals must evaluate their strengths and weaknesses as well as those of the followers, and know how to utilize their strengths and remedy weaknesses to manage the schools. Qualified teachers and learning resources, modern technology and facilities are counted as schools' competitive advantages and produce competency. Students from many well-known schools in the Bangkok Metropolitan area such as Trium Udom Suksa, Mahidol and many Catholic Schools often have O-NET and GAT scores at the top rank of the nation (2014 O-NET and GAT Scores from NIETS). These schools are fully equipped with modern and high technologies that help to facilitate the teaching and learning processes. Under proper components, qualified teachers together with excellent resources and facilities, the education quality of the school can be assured.

2.5.2 Requiring Professional Training for Human Capital

For an organization to be successful, several components are involved, mainly technology and human resources. Nonetheless, according to Pfeffer (1994), human resources have become more vital in today's world than other factors conceived as the sources of success in the past, such as product, process technology, financial access, and economies of scale. These factors do not provide sustainable competitiveness like human do nowadays. A senior executive of a large forest products company in the United States said that "Machines don't make things, people do!" (as quoted in Pfeffer (1994)). As a result, competitive success now relies heavily on people and thus their skills are very crucial. A survey conducted by Carnevale and Goldstein (1990) in the United States revealed that education prior to work and training on the job accounted for 26% and 55% of the growth in the productive capacity of the country. This report is obvious evidence that human competence via learning and training is by far the most important factor behind the economic growth and productivity in the United States and should be similar to many other countries around the world, including Thailand.

Being school principals and teachers requires multiple skills other than just knowledge of teaching subjects. It is unfortunate that not all school principals and teachers possess the competent characteristics needed for education quality. Hence, the school principals' and teachers' development activities are required as in many

other professional fields. Regrettably, staff development has been surprisingly neglected in the field of educational management and administration. School personnel should not only focus on routine work and traditional practices but also consider the school's development and professional growth. Since school principals and teachers have different roles to play in the organization, their training or workshops should be different so that each need is fulfilled; for example financial, administrative, and transformational leadership aspects might be useful for school principals whereas up-to-date knowledge and teaching-aid technologies might be necessary for teachers. Even though school principals and teachers come from the same root, they have to be concerned with different dimensions at different stages of their career span. However, both of them have to work together in order to improve education quality. School development can move forward and successfully depending on the ability of school principals to plan, inspire, mobilize, and prepare the followers in their institutes to do things in different ways from usual. Teachers, apart from their teaching responsibilities, will have to play a supportive role to implement plans with full willingness. School improvement will not be achieved if school principals and teachers as well as the administrative staff do not fully and closely cooperate among one another. The basic processes associated with the dimensions of educating are well defined and include planning, implementation, and evaluation. School principals and teachers are expected to have relevant skills within each dimension as well as be able to make proper decisions about the application and adaptation of these skills. These general dimensions and processes are illustrated in Table 2.2. The first four dimensions are the key roles of teachers and school principals, whereas the last dimension is specific for school principals.

According to the literature survey, one of the most critical indicators to determine the quality of education is teacher qualifications and motivation. According to Lockheed and Verspoor (1991), who conducted a study in developed countries, an orderly school environment, academic emphasis, and the quality of leadership in schools were quality school determinants. However, in developing countries, these three factors are essential but not enough to guarantee effective schools. Acquisition, distribution, and use of material inputs are necessary supplementary factors to boost students' performance. Interestingly, in The Effective Educator: Raising Teacher

Table 2.2 School Principals' and Teachers' Development Scope Framework

Role Dimensions	**Basic Processes**		
	Planning	**Implementation**	**Evaluation**
Instruction	Instructional planning skills	Instructional implementation skills	Instructional evaluation skills
Classroom Management	Management planning skills	Management implementation skills	Student behavior
Human Relations	Skills and concepts	Acquisition and application	Parent attitudes and staff relations
Professional Leadership	Goal setting Planning	Problem solving Staff development	Performance review and program evaluation
Transformational Leadership	Goal setting Planning	Problem solving Staff development School development	Performance review and school evaluation

Source: Adapted and modified from Arizona Education Association Teacher Compensation Task Force (1986) and Keith and Girling (1991).

Quality Around the World written by Vivien Stewart (2011), it was stated that the Chairman of Thai Education Reform emphasized the importance of enhancing teachers' quality as essential to "lever up" Thai education quality. Moreover, many studies state that the teacher's characteristics have a positive relationship with twelfth-grade students' academic achievement (Wichien Ket-Sing, 2007). However, according to an International Mathematics and Science Study (TMSS) report, Thai teachers have low confidence in teaching mathematics and science. As a result, Thai

students have received low scores in mathematics and Sciences assessment for a very long time. Thus, in the Tenth National Economic and Social Plan, the government has poured a huge education budget particularly into teachers' and learners' development.

In 2006, the Office of the Basic Education Commission (OBEC) indicated that there were around 610,000 teachers at the basic education level and the figure has slightly risen until now. Around 88 percent of teachers are under MOE supervision; however, 80 percent of them teach at the basic education level. Moreover, 123,865 teachers work in private schools. The Bangkok Metropolitan Administration (BMA) and other municipals also have employed 61,863 teachers. To date, the MOE has been facing a shortage of teachers in all subsectors: basic education, tertiary, and non-formal education.

2.5.3 Overview of Thai Teachers

According to a Teacher Watch Report from the Ramajitit Foundation (http://www.ramajitti.com/info.php), Thai teachers have an average teaching load of 22 hours per week. Astoundingly, some teachers teach all 8 core subjects, including supplementary activity courses such as boy and girl scouts, and school guidance activities; therefore, many teachers have experience teaching all 10 subjects. Besides teaching, some have the responsibility of administrative tasks, for example, documentations, paper works, finance, etc. Asking Thai teachers about their attitude toward their careers, 48.5 percent and 34.5 percent of principals were willing to have new jobs, while 61.6 and 43.5 percent of the teachers and principals, respectively, were willing to voluntarily join early retirement programs. Interestingly, 91.7 percent of Thai teachers have joined only one professional development program in a year.

Among several factors that can have a significant impact on education quality, such as curriculum, teaching and learning environment, education policy, etc., teacher quality was the main topic in the 2nd Education Forum organized by PICO (Thailand) Public Company Limited. This event gathered many educational experts nationwide to discuss and suggest options that were applicable to educational institutes in order to improve the nation's education.

One of the most interesting issues raised by Dr. Jutarat Viboonpol, Associate Dean of the Faculty of Education, Chulalongkorn University, was the result from the

national assistant teacher's examination, where a very small portion of the examinees passed the test (Prachachart Turakij, 2013). According to 2013 data, only 6.5 percent or around 5,000 examinees passed the test. There are 5 ways to be eligible to take the assistant teacher's test and obtain a teaching license in Thailand, i.e., a) obtain a 5-year bachelor degree in education; b) obtain a graduate diploma for the teaching profession; c) obtain a special training certificate in teaching; d) pass an evaluation test for the teaching profession; and e) pass an equivalence test for the teaching profession. Among these five channels, the first two are the most popular routes in Thailand. Hence, several questions arise particularly on why so many bachelor degree graduates in the teaching profession could not pass the test, and if the teaching education institutes in the country are qualified for the job. It is very important and essential to pay attention to every step of training people to become effective teaching professionals, beginning from recruitment, curriculum design and development, teaching and training processes, etc. It is, however, very often found that only professors affiliated with a faculty of education take decisive responsibility for all previously-mentioned tasks without any involvement from academicians from other faculties, even though the students in the faculty of education have to take many courses from other faculties; for example, students with sciences and mathematics majors have to take several subjects from the faculty of science. In addition, basic education institutes that are the major users of these graduates rarely have a chance to participate in the teacher preparation stages. It has also been found that most teaching education institutes in Thailand emphasize quantity rather than quality, which is different from other advanced nations whose education management is highly successful.

In Korea and Singapore, for example, only high-quality students are recruited into the teaching education system. Finland has even established a multiple-step process to recruit qualified teachers, including writing exams, attitude tests, interviews, working observations, etc. Dr. Jutarat Viboonpol further questioned the standard of teaching education in Thailand among different institutes and learning modules as well as the quality of graduated students from various teaching education institutes. The Office of the Education Council has specified three major approaches to directly improve Thai education quality, including problem-based learning

curriculum, high quality teachers, and innovative teaching materials (from Daily World Today, September, 9, 2013).

According to Prof. Dr. Somwung Pitiyanuwat, ex-acting principal of the Office for National Education Standards and Quality Assessment (ONESQA), Thailand has a surplus of teacher graduates but many of them are not qualified to teach (Komchadluek, 2009). Conforming to earlier statements in regard to the McKinsey Report, Thai education quality is thought to be lower than that of its neighbors The Thai government has been confronted with a prolonged quality education problem for many decades. The MOE has launched a number of great education plans but has never accomplished its mission. The Tenth National Economic and Social Development Plan (2007-2011) indicated that it was necessary to improve the quality of education, especially in the area of teaching and learning, for example, investing in raising the quality of the entire educational system, adjusting teacher training and setting new standards for professional development to ensure quality and high moral standards among teachers in order to promote the intensive use of information technology to enhance learning efficiency.

2.5.4 Teacher Quality Attributes

McKinsey Report (2007) indicated that a major construct for enhancing quality education is the quality of the teacher: "The quality of an education system cannot exceed the quality of its teachers."Many researchers have studied this topic and found that there is a very positive relationship between effective teachers and student achievement (Dorfman et al., 2006; Santos, 2007; Chait, 2009; Education for All, 2005).

Teacher quality is a major determinant of quality education. The quality of teachers has many definitions; however, the most common characteristic of a quality teacher as stated in the EFA Global Monitoring Report 2005 is the following:"teacher quality is hard to express because it includes many indicators, and aspects including interactional behavior between students and teachers."Teacher quality is also defined as a set of indicators that demonstrate academic achievement, the student's high performance, as well as the achievement of setting school outcomes. Mostly, teacher

quality also works as a clue to imply teacher competence, instructional practice, etc. DuFour and Marzano (2011) insisted on the necessity of quality teachers in the school because quality teachers are human assets that are capable of delivering quality education. While many researchers define the quality of the teacher in the same direction, citing for example performance, knowledge, skills, professionals, motivation, accountability, etc., teaching qualifications are a prerequisite requirement in the assessment of quality teachers, such as skills, knowledge, etc. However, quality teachers are intangible attributes and difficult to assess, unlike the teaching qualification evaluation. Strong (2011) argued that the definitions of quality are often very broad and used interchangeably with many words such as effective, good. Therefore, under different circumstances, the definition of quality will vary in different contexts. With a broad definition, teacher qualification can be divided into numerous categories such as competency reflection (degree, exam score, etc.), the personal qualities of a teacher (kindliness, patience, fairness etc.), pedagogical standards, effective teaching (successful teaching, ability to draw students' intention in class) and so forth.

Goe and Stickler (2008) analyzed in "Teacher Quality and Student Achievement: Making the Most of Recent Research" that the quality of the teacher can be classified into 4 lenses to determine the quality of teachers as follows:

1) Teacher qualification: educational background and experience in the teaching field that may be considered as a particular attribute that the teacher brings to class (coursework, grade, degree, subject matter education, training, etc.)

2) Teacher characteristics: attributes and attitude toward teaching career(class expectation, kindliness, collaborative nature, gender, etc.)

3) Teacher practices: teaching styles or strategies which could lead to class satisfaction and expectations (communication skills, clear learning objectives and assessment methods, triggering students' intellectual challenge, etc.)

4) Teacher effectiveness: extra teachers' performance assessment while they are in class

As aforementioned, quality teachers are comprised of many facets, and the definitions and concepts of teacher quality can incorporate 2 attributes, i.e. good teaching: the teacher performs in class a set of teaching criteria; and the other

attribute is effective or successful teaching: the outperforming of both students and teachers (Berliner,2005; Fenstermacher and Richardson,2005; Blanton et al., 2006). In accordance with Bond et al. (2000), quality teachers are the product of abounding factors; moreover, quality teachers are expert in their subject matter. Quality teachers automatically draw their knowledge and use their rational judgment on what assignment to give to students to enhance their competency.

It is worth mentioning here that a number of research have found that there is a positive relationship between the children's family background, social economic status, parent education background, and the students' achievement. Many studies related to quality teacher state that teacher quality is an independent of personal licensure and personal measurements; thus, measuring quality teachers should include conducting teaching and learning activities in classes. In sum, the quality of a teacher is a personnel characteristic (Shober, 2012). Goldhaber et al. (1999) cited the difficulty of measuring and identifying quality teachers and their components since the idea of a quality teacher is very elusive. On the other hand, a McKinsey Report pointed out that top-performing schools and universities will have two things in common: effective mechanisms for selecting teachers for training, and paying good starting compensation. However, much of the research has attempted to identify a set of criteria and standards for being a quality teacher, which the researcher will describe in the upcoming part.

2.5.5 Indicators of Qualified Teacher

Many researchers have studied the characteristics of qualified teachers and have put their effort into categorizing and constructing a model to evaluate teacher quality. As reported by Goe (2007), quality teachers possess or have the following attributes. They have to be highly trained and have experience in the teaching subject matter, pay attention to and motivate students, particularly those that tend to have low achievement, create a nice environment and atmosphere in class, be willing to help students accomplish at the highest level, be happy to assist new teachers and to work hard with students with special needs.

The New South Wales Institute of Teachers expressed in the Professional Teaching Standards Report that there were seven standards for teachers: a) knowing

their subject/content and how to teach students, b) knowing their students, c) having plans, assessments, and reports for enhancing learning, d) having effective communication skills, e) creating and maintaining a learning environment, f) continuing to develop their professional knowledge and practice, and lastly, g) getting involved with professional members or the professional community. Similar to the EFA: Global Monitoring Report (2005), teacher quality can be evaluated by potential indicators dealing with adequate academic qualification, pedagogical training, years of experience, ability or aptitude, and content knowledge. Along the same lines, Kennedy (2008) also placed quality teaching into 3 categories: personal resources, performance, and effectiveness.

1) Personal resources mean the quality of a particular individual such as beliefs, attitudes, values and personality traits which represent the individual's knowledge, skills, expertise, and credentials.

2) Performance is the practice outside the classroom as well as inside the classroom, and activities held in class.

3) Effectiveness means the ability to motivate students to learn and influence students.

There are still a numerous studies of quality teachers and teaching quality, for example, Hightower, Delgado, Lloyd. Wittgenstein, Sellers and Swanson. In their studies, they found that teacher qualification had a relationship with students' performance, i.e., standard test scores. The conclusion can be drawn that there are several factors for assessing teacher quality as described below:

1) Academic degree: some research have stated that the academic degree held by teachers has a positive relationship with the teachers' and students' quality. Notwithstanding, several researchers have found contradictory findings, and therefore the teachers' academic degree still needs to be further studied in detail to confirm the results (Darling–Hammond, 2010).

2) Certification: teachers are required to have teacher certification by law. It is a prerequisite to enter the professional field, particularly a certificate for subject matter that provides positive effectiveness regarding student achievement (Darling-Hammond, 2010).

3) Coursework: a number of studies on this topic have ascertained that the specific content coursework that a teacher is assigned to teach can enhance the teacher quality for some subjects and grade levels, even though coursework explicitly affects teacher quality, especially in the sciences and mathematics.

At the same time, a study determined determinants of teaching quality by using student evaluation to identify the important teachers' characteristics that they preferred. The results showed that the most important characteristic of a qualified teacher was to develop effective teaching strategies which fill the class with joy (Dorfman et al., 2006). Darling-Hammond (2010) attempted to identify the variables that could be used to access teachers' quality. They found that the percentage of teachers with a full certificate in teaching subjects was a more appropriate predictor of students' achievement than the teacher's degree. In addition, they reported that teacher quality was more relevant to student achievement than class size, overall spending level, and the teachers' salary. According to the EFA: Global Monitoring Report 2005, the government should set and regulate standards on academic qualifications, adjust salary bases so that expertise is rewarded, and improve teacher development and motivation through testing and rewarding of competence (Kasprzyk, 1999). Chait (2009) found that the teachers' quality together with their experience was the main influence on student achievement.

In Thailand, teacher quality has also received much concern from education-related organizations similar to other well-developed countries. Unfortunately, the test scores both at the national and international levels of Thai students are often lower than the expectations of many educators. According to the national evaluation during the 2006-2007 period, of the 13,359 early-childhood schools, only 54.73 percent most of which were large private schools in the cities, obtained a "good" grade. For the elementary/primary education level of 15,097 schools, only 49.49 percent were at a "good" level. In addition, according to international education evaluators, such as the PISA Project, which surveyed the knowledge and skill of students at age 15 in the OECD member countries every three years in three areas, i.e., literacy, mathematics, and science, Thai students' performance was lower than the average in all three categories and placed below the top 40 ranking among 57 countries in accordance with the 2006 survey. The Office of the Education Council

has identified three causes of these poor performances. The first cause is the teaching and learning style in Thai education system. So much content has to be taught in one subject; hence, teachers try to cover all of the topics that appear in the course description. As a result, there is no flexibility in the class, causing students to be bored and to lack enthusiasm in the classroom. The second cause is an insufficient number of teachers due to early retirement policy. It was found that during the 2000 to 2006 period, 76,133 teachers entered the early retirement program whereas only 20,994 positions were replenished. As a result, the problem of teacher insufficiency arose, particularly for the main subjects such as mathematics, sciences, Thai and foreign languages. Consequently, with a limited workforce, several teachers have been assigned to teach more and many times in non-expertise subjects. The last cause is lack of a supporting budget for education management. It was found that the major portion of more than 70percent of the budget contributes to teachers' salaries, whereas only 6.4 percent and 22.1 percent were provided for operation and investment, respectively. No financial fund was provided for personnel development.

In sum, according to the literature review, as shown previously, there are many indicators that point out teacher quality. Numerous studies have been conducted to investigate this matter and they have reached several conclusions, with various suggestions. However, these studies have focused on different contexts; therefore, some indicators may be applicable only under certain situations or conditions. In this study, nonetheless, only the most common factors that applicable to Thai secondary schools were investigated and elaborated. Proper indicators used to evaluate Thai teacher quality were selected according to the standardized questionnaire developed by the National Center for Education Statistics (NCES), which includes education background, certification and training status, and professional development as described in detail below:

1) Education background refers to the highest academic degree earned by a teacher including quality of the institution, honors, certification, and subject matter credentials.

2) Teacher style and teaching proficiency include the teacher's attitude toward his or her teaching career and the ability to manage the class, draw student

attention, teaching strategies and assessment, and behavioral interaction with students in class as well as the methods used for instruction, etc.

3) Professional development is visibly noticing that teachers attempt to acquire and improve their skills and knowledge in teaching, and enhance their ability to gain new knowledge and technology in teaching using numerous approaches that facilitate learning opportunities.

2.5.6 Teacher Quality and Education Quality Relationship

Several studies, including those of Anderson (1982), Hoy et al. (1990), and Tarter et al. (1995), have indicated that teachers' satisfaction, commitment, and behavior are drastically affected by social dynamics. Once the attitude and behavior of teachers are affected by these factors, the achievement of students will be consequently influenced. Hoy and Sabo (1998) found that regarding middle school teacher affiliation, collegial and committed behavior showed a moderate relation to student achievement. However, Hoy et al. (1991) found the opposite direction for high school teachers, where disengaged and frustrated teacher behaviors did not have a statistically-significant relationship with student achievement.

Nonetheless, there has been strong evidence that student performance is drastically improved with the teacher's professionalism, i.e., proper attitudes, behaviors, and perceptions, commitment to students, engagement in the teaching process, and willingness to cooperate with others (Tschannen-Moran et al., 2006). By the same token, Darling-Hammond (2000) indicated that teacher quality is a good indicator of and has strong impact on student achievement. This finding is similar to that of Heck (2009), who also discovered that teacher effectiveness has a positive influence on students' reading and mathematics performance. Maria (2009), studying the relationship between teacher quality and student performance in a university in Italy, found that teacher quality had a statistically-significant effect on student performance.

2.6 Management of School Facilities

2.6.1 Importance and Role of School Facilities

Many people may think that large schools seem to be able to provide better education for children than small schools; several researches indicate however no reliable relationship between school size and achievement. Cotton (1996) found that achievement in small schools was at least equal to achievement in the larger schools if all necessary facilities were sufficiently provided. According to Drake and Roe (1994), school facilities act like a linkage between schools and communities in regard to the school's as well as the principals' value. Moreover, facilities also imply some academic aspects such as school performance and effectiveness. It is widely accepted in many studies that school facilities have an impact on both the students' and teachers' performance, which will be discussed below. With financial budget limitations, the following are some principles to follow for the optimal utilization of school facilities as suggested by DeArmond, Taggart and Hill (2002).

. 1) Learners must be the prime consideration; therefore, the facility should be designed to strengthen their skills, knowledge, and creativities.

2) Facilities must be flexible in terms of design and usage. Since investment in school facilities consumes a large amount of money, school facilities should be adjustable to multipurpose usages for future needs, such as technology advancement, and teaching and learning innovation. As a result, school administrators must have a broadened vision in predicting future change and requirements.

3) Facilities should be able to fulfill the needs of school principals and teachers considering their working space and environment.

. 4) Facility selections and procurement should be transparent and creditable. Principals and teachers have to ensure that all decision making regarding facilities is fair and transparent.

5) Facility provisions should be considered carefully and thoroughly with the support of necessary data and information. Planning facility requirements to fulfill future needs obviously requires accurate and precise information about space, location, function, specification, user, and service period.

6) Facilities should be economically feasible and efficient. Regardless of budget availability, principals and teachers should deliberate critically on economic considerations. All procurement should be worth the money spent and promote school productivity. It is wise to have external partners that possess innovative technologies related to teaching and learning to provide suggestions and support for facility procurement.

The school facility has been often shown to be another factor that significantly impacts the quality of education by several researchers and practitioners, particularly in developing countries; however, its relatively weighted effects vary significantly from country to country (Murillo and Roman, 2011).

In the overall picture, school facilities have considerable impacts on the students' and teachers' performance. Buckley et al. (2004) demonstrated that improving school facilities is likely to improve in academic achievement. In a later study, Uline and Tschannen-Moran (2008) conducted a survey of 80 middle schools in Virginia in the USA. The results from the bivariate correlation analysis confirmed the link between the quality of school facilities and student achievement in foreign language and mathematics. They also found that school climate had an impact on facility quality and student achievement.

2.6.2 School Facility Types

School facilities can be categorized into 2 main groups, i.e., a) basic facilities and environment and services such as buildings, water supply, electricity, sewage treatment and discharge, etc.; and b) didactic facilities covering sport installations, labs, libraries, information and communications technology (ICT), etc.

In this research, however, basic infrastructure and service will not be examined in detail since most secondary schools in Bangkok have some limitations in terms of land, buildings, and noise control. Hence, to expand building or land may not be possible in the current situation and the noise issue is also out of the school principal's control depending on the traffic conditions and environment nearby the schools. Moreover, water and electricity supply and sewage management are public services sufficiently provided by the BMA or the government and are accessible everywhere and at anytime in Bangkok and its vicinity. Therefore, this research will

not study in deep detail basic infrastructure and service but will pay more attention to didactic resources instead.

2.6.2.1 Basic Facilities, Environment, and Service

Facilities that support student learning vary vastly—from fundamental needs such as lighting (Schneider, 2002; Uline and Tschannan-Moran, 2008), temperature control (Cash, 1993; Chan, 1996; Hines, 1996; Lanham, 1999; Earthman, 2004), indoor air quality (Wargocki and Wyon, 2006; Buckley et al., 2004; Earthman, 2004), noise and acoustical control (Evans and Maxwell, 1997; Maxwell and Evans, 2000; Haines et al., 2001; Shield and Dockrell, 2004; Shield and Dockrell; 2008; Klatte et al., 2010), building condition (McGuffey, 1982), etc.—to education and instrument facilities such as the library (Lance et al., 1993; Wong and Webb, 2011), scientific and language laboratories, computers (Fuchs and Woessmann, 2004; Zandvliet and Straker, 2001), audio-visual aids, the Internet, etc. Tableman and Herron (2004) stated that the supportive facilities available in schools could significantly promote the school's environment for studying, hence leading to education quality. Studies by Holt (2009) and Deal and Peterson (1999) affirmed Tableman and Herron's findings, that school facilities together with the environment within the facility are the most critical component of student success.

Building conditions and building age also have an impact on student performance. Fritz (2007) studied the effect of new school facilities on student achievement and found that there was a statistically-significant difference in students' performance before moving and after moving into a new building. Studying in a new building, students' achievement in reading and science increased; however, there was no obvious evidence for writing, citizenship, or mathematics subjects. Similarly, Smith (2008) examined school building quality and student performance in South Carolina public schools and pointed out that there were five major areas affecting student performance: a) science labs, b) the decoration of painting and furniture, c) the degree of security measurements, d) the adequacy of the heating, ventilation and air condition in class, and e) the availability, functionally and size of athletic facilities.

Deteriorated buildings together with a poor learning environment not only have an adverse impact on students' learning but also have a significant effect

on the teacher's attitudes, behavior, and performance (Lowe, 1990; Dawson and Parker, 1998; Schneider, 2003; Buckley et al., 2004). In a study by Buckley et al., 2004, which involved a large number of teacher samples in Chicago and Washington D.C., USA, it was revealed that the retention and attrition of school teachers were highly related to the quality of school facilities and environment. It was surprisingly found that about 33 percent and more than 50 percent of Chicago and Washington D.C. teachers, respectively, were not satisfied with their physical working conditions. According to the study, the most direct environmental factors affecting teacher work life were indoor air quality, thermal controls, noise level and acoustics, classroom lighting, and natural daylight. Affected teachers that could not tolerate these adverse impacts were more likely to attempt to transfer to other schools. Likewise, Bishop (2009) also supports the idea that the studied variables of natural lighting and climate controlling system, as well as wide, open hallways and shared student space, did have a positive impact on the behavior and attitudes of students and school staff.

Numerous studies have also investigated the influence of school facilities on teacher quality. Leung, Chan, and Wang (2006) examined facility management in regards to the teacher's work behavior. The finding revealed that teachers and staff were more significantly productive under sufficient and good-condition facilities, even though the teachers did not recognize their work behavior change. By the same token, Buckley, Schneider, and Shang (2004b) indicated that the quality of school facilities had a statistical significance in relation to teacher retention and could be used as a good predictor of teacher turnover rate in the Washington, D.C. public schools.

2.6.2.2 Didactic Resources

In this study, the investigation of school facilities affecting education quality also focused on instrument resources or didactic facilities. Didactic resources refer to library, scientific and language laboratories, teaching and learning materials, computers, audio-visual aid, Internet, and ICT, rather than fundamental hardware or facilities and environment resources. This is because the improvement in software consumes less investment than fundamental structure renovation. Due to budget constraints, Thailand does not have a sufficient budget for large investments such as building reconstruction or renovation for all schools. Hence, it should be a more

applicable alternative for schools to use their limited funds on instrument facility improvement rather than other prospects that are directly under the control of the ministry and government.

1) Library

The school library provides access to information, both electronic and traditional resources, and facilitates their use. New articles or books are published almost every week so the library is the main source for students to search for up-to-date knowledge and to learn, resulting in an increases in education quality. A study in Pennsylvania, USA, indicated that students performed better academically in the schools advocating good libraries with sufficient information literacy support (Lance et al., 2000). One key factor affecting student performance according to Tanner (2000) was the availability of information and communication technology for teachers and students. Computers are a powerful educational tool and are widely adapted in many schools at present. However, balancing between the use of computers and the significance of socio-culture, intellectual, or physical of individuals' aspects that are relevant to the teaching and learning , are crucial. (Zandvliet and Straker, 2001).

2) Scientific and Language Laboratories

Laboratories for science and language are other essential facilities that schools should provide to enhance student achievement and promote education quality. Science is becoming more integrated with other disciplines such as mathematic and social issues. Global warming, bioengineered food, and cloning, for example, make science education an integral component of an interdisciplinary curriculum. According to the American Association for the Advancement of Science (AAAS), To encourage and retain students' enthusiasm in sciences, science teaching method should base on experiment and inquiry, with 40 to 80 percent of science education devoted to laboratory time through project-based learning (PBL). A PBL is a systematic teaching method that motivate students to learn ,hand on experiments , investigate, explore, debate, and deliberate conclusion for meaningful solutions of the problems. (Coffey, 2008) To accommodate this PBL approach, science facilities should be well-designed, flexible, and adequate for all students. In addition, as is well known, ten ASEAN countries will form the ASEAN Economic Community (AEC) in

2015 and become a single market and production base. The AEC will become an ASEAN market that products, services, assets, financial transactions, and skilled labors can move freely among member countries. Since all ten ASEAN members have different languages, the English language is expected to be central for communication. Hence, the English language will become a very important second language for Thais in the near future. Effective means to encourage Thais to be familiar with English is to let Thai children learn English beginning in childhood. English-language labs can play a major role in inducing English listening and speaking ability among Thai students. Thus qualified language labs should be also established in schools that are ready to promote the education quality of the country. As aforementioned, Smith (2008) discovered that scientific labs were one of the five major areas that significantly improve student effectiveness. In addition, Hofstein, Shore and Kipnis (2007) have implemented an inquiry-type laboratory into the chemistry curriculum in high schools in Israel in order to provide students with an authentic environment to which they could develop their interest and knowledge in chemistry. The results revealed that students under the inquiry-type laboratory environment obviously improved their abilities in inquiry learning in the chemistry laboratory.

3) Teaching and Learning Aid Materials

The final instruction facilities which will be focused on in this study are the information and communications technology (ICT) system, including the wireless technology environment that connects computers, notebooks, printers, whiteboards, and other accessory devices such as video projection system, LCD, internet, etc. The emergence and evolution of Internet technologies has led to the development of useful and interactive studying tools. Computer-based learning is becoming increasing more and more important and helps make the learning process easier and more effective in many contexts. ICT is currently considered one of the most important driving forces that promote economic growth worldwide, enhancing political accountability, improving the delivery of basic services and intensifying local development opportunities. Nonetheless, economists are still not clear about whether the positive impact of ICT stems from higher total factor productivity (TFP) growth or from improvement of production efficiency due to a better educated

workforce. With the advancement in ICT, numerous new techniques have been adopted by many schools and universities. Teaching with usage of ICT obviously improves learning efficiency as well as changes in the concept of teaching (Robin, 2009). ICT has rapidly become involved in education and training at all levels in the EU and OECD (Organization for Economic Co-operation and Development) countries as well as in Thailand. However, the benefit of ICT usage in the educational sector is inconclusive. Balanskat et al. (2006) reviewed several studies on the impact of ICT on student performance in Europe and found the evidence to be scarce and controversial. Trucano (2005) reviewed early studies on ICT's impact on schools and concluded that the impact of ICT use on learning achievement is unclear. Moreover, Kirkpatrick and Cuban (1998) found no solid evidence to support the observed benefits that arise from the use of ICT in schools. In contrast, several other studies have argued that ICT helps to improve the quality of learning and magnify educational outcomes (Yusuf and Afolabi, 2010; Jayson, 2008; Shaheeda et al., 2007). Lqbal and Ahmed (2010) even encouraged each country to implement effective and robust ICT policies in order to successfully improve its education system. From these literature reviews, it can be seen that the relationship between the use of ICT and educational performance is still inconclusive, which is in consistent with the reviews of Youssel and Dahmani (2008). Therefore, it is worth exploring this topic in order to obtain precise conclusions.

Several studies have revealed that instruction facilities have impacts on teachers' performance as well. Lack of these resources in a school can cause a burden on teachers, resulting in lowering their teaching effectiveness and educational outcomes (Tapper, 1995). Mumtaz (2000) conducted a literature review in order to determine the factors affecting teachers' use of ICT and found that a lack of access to resources as well as software and hardware were the leading cause preventing teachers from using ICT in class.

As stated earlier, it is essential to take the purpose of facilities into account when considering education quality. The major limitation of this research was in determining the degree to which school facilities can be the actual cause of student achievement because there are many variables that are able to influence education quality. Roberts (2009) attempted to connect the

engineering/scientific assessment of school facilities (objective aspect) with the teachers' assessment (subjective aspect) to the quality of learning environments and education quality. The outcomes are instructive and provide several prospects for measuring, monitoring, and managing school facilities. Moreover, he found the significant relationship between the utilizing school facilities, from the educators' point of view, and learning outcomes. Powell (1992) attempted to demonstrate the connections between library use and student achievement and suggested outcomes to which academic libraries contribute, such as retention (students that continue in school and do not drop out), and grade point average.

2.7 Related Studies

Roberts (2009) attempted to determine the effect of school facilities on learning outcomes. A number of research literature related to school facilities and student performance were thoroughly reviewed. It was found that the relationships between school facilities and students were inconclusive, i.e., they had both positive and negative correlations. The author believed that these contrary results derived from the differences in the assessment of school facilities, i.e., conventional engineering versus educational viewpoints. The former perspective emphasizes quantitative engineering measurement, which takes no account of the purposes of schools. On the other hand, the latter measure does take the educational purposes of schools into account. The concern for educational purposes may serve as a key link to learning outcomes. Therefore, this paper has attempted to verify these differences by using an empirical test of the educational relevance of how school facilities were measured. The selected schools in this study were in a Canadian division, and the conditions of the school facilities were evaluated from both engineering and educational perspectives. The school facility ratings obtained from the assessment were correlated with the schools' quality of teaching and learning environments (QTLE). To measure the school facilities via the engineering approach, the "Facility Condition Index (FCI)" was employed. The FCI is a standardized approach to measuring the physical condition of facilities. An FCI score can be obtained by dividing the value of a

building's deferred maintenance by its total replacement cost. The higher the FCI score, the worse the building's condition is. On the other hand, the evaluation of school facilities based on the educational perspective will consider these assets in terms of their educational consequences. In general practice, a questionnaire with a wide number of descriptive questions related to school facilities like those of the Commonwealth Assessment of Physical Facilities (CAPE) is used. The CAPE scoring protocol creates a facility index score ranging between 25 and 75; higher scores indicating better facility condition. The CAPE sores below 41 are considered as "substandard;" over 60 are labeled "standard;" and between 41 and 60 are classified as ambivalent. Six major aspects of facility condition, including the general condition of buildings, heating and/or cooling systems, lighting systems, acoustic systems, indoor air quality, and instructional space, were assessed and evaluated both from engineering and educational perspectives. This study covered 38 schools with a complete K-12 spectrum in the school division in western Canada. Engineering staff members visited all schools and rated over 700 facility system components and then the FCI score for each school was calculated. During the engineering assessment at the schools, all of the principals in the 38 sampled schools were asked to complete a survey, including six major aspects of facility condition as specified previously, and additional learning environments covering three component themes, i.e., student morale and commitment, teacher morale and commitment, and student and teacher-related factors affecting achievement. As a result, the CAPE index was formulated. The results revealed that there was no correlation between educational perspective (CAPE index) and engineering perspective (FCI index) at a 99 percent confidence level. In addition, the educational perspective on school facilities had statistically-significant relationships with student performance, whereas the use of the FCI index (engineering approach) was not statistically related to the school's learning environment and or school outcomes. This paper is a good example that proper measures, variables, and approaches have to be carefully identified in order to obtain relevant information for managing schools toward an educational mission and education quality.

Omidinia, Masrom, and Selamat (2012) intended to identify the key factors for the smart schools achievement that redefined the concept of teaching, practices

and school management in response to the modern era. Fourteen smart schools in Selangor State of Malaysia were selected out of the total of 88 schools nationwide. A total of 211 and 430 questionnaires were distributed to teachers and students, respectively. The questionnaire for the students inquired about computer-based education, environment, challenges, curriculum assessment, and skills, whereas the questionnaire for the teachers asked about interest and training, curriculum assessment, challenges, environment, and career. According to the survey, most of the responding teachers were female (84.8 percent) with a major ethnicity of Malaysian (84.8 percent). Their ages were distributed in the age groups of 20-30, 30-40, 40-50, and > 50 at 27.0, 35.1, 30.8, and 7.1 percent, respectively. Their background educations were 1.9 percent certificate, 4.7 percent diploma, 83.4 percent bachelor, 9.5 masters, and 0.5 other. On the student side, 5.3, 11.1, 43.9, 20.6, 14.8, and 4.0 percent were in year 1, 2, 3, 4, 5 and 6, respectively. The results revealed that all independent variables being tested were statistically significant for smart school success at a confidence level greater than 95 percent, meaning that using the ICT framework can make learning easy and effective. Nonetheless, teacher training and development should get more attention from education administers.

Yu (2005) wanted to determine the influence of transformational leadership on teachers' job satisfaction and school commitment in Taiwan. A total of 1,250 questionnaires were distributed to secondary school teachers nationwide in 2003; however, less than a half of 565 questionnaires were returned and usable for statistical analysis, which included descriptive statistics, multiple correlation, and regression models. Apart from general questions about personal and school characteristics, the contents in the questionnaire also included principal leadership style, the teachers' job satisfaction, and school commitment. The results showed that the model of transformational leadership had a significant and positive impact on job satisfaction and school commitment among the secondary school teachers in Taiwan. In addition, the responding teachers seemed to be highly satisfied and committed when they perceived their principals as someone that truly understood the school condition, had a future vision for the school, provided appropriate actions to serve the school's vision, promoted the acceptance of group goals, supported individual followers, and generated high performance expectations.

Griffin (2009) studied the relationship between the self-efficacy of teachers and their perception of the school principal's leadership style in the United States. This topic is of interest because little work has been conducted in this area. This study used a causal comparative design to address the research questions. The survey was conducted online though 435 teachers at four southeastern U.S. schools. A multifactor leadership questionnaire was used to obtain necessary information regarding transformational, transactional, and laissez-faire leadership. The self-efficacy of teachers was measured by using the Ohio State Teacher Efficacy Scale. The results revealed that the teachers that perceived their principals as transformational leaders rated their classroom management efficacy higher than those that perceived their principals as laissez-faire. The data also suggested that the teacher's perceptions of self-efficacy existed on different levels. However, the teacher's self-efficacy did not necessarily rely on the principals' leadership style but rather depended more on other factors, including personal judgment, education, professional development, motivation, self-reflection, capability, experience, and collegial relationship to affect student achievement. This research also suggested that school principals should focus more on transformational leadership if they want to improve teacher self-efficacy. Without active interaction with teachers or recognizing others' contributions, principals are likely to reduce the self-efficacy among teachers. As a result, since teacher self-efficacy is strongly related to classroom management, the expectations, achievements, and efficacy of students will deteriorate.

Yu (2000) investigated the effect of the transformational leadership of school principals on teachers' commitment to change in Hong Kong in 1998. Two types of questionnaires were created, i.e., leadership and change process questionnaires. From 112 primary schools, 1,140 and 952 teachers returned the leadership and change process questionnaires, respectively. The validity of the selected variables was performed using a combination of exploratory and confirmatory factor analyses. Obtained data were further analyzed for correlation determination, analysis of variance, t-test, linear regression analysis, standard regression analysis, and sequential regression analysis. The outcomes indicated that the teachers' perception of transformational leadership of the school principals had a positive influence on thei r commitment to change. Among the transformational leadership dimensions, "goal"

and “vision” were found to be the most pronounced factors in the teachers’ professional commitment. However, the impact of transformational leadership was still lower than other in-school conditions, i.e., organizational, principal, and teacher characteristics. In addition, six key determinants were identified in this study:leader academic qualification, leader gender, school size, school sponsoring body, teacher age, and teacher post.

Wicks (2005) studied the relationship among new school buildings, student academic performance, and school climate in Mississippi of the United States. The researcher contacted the officials of high schools under the supervision of the Mississippi State Department of Education and found that there were ten schools with new school buildings (in use for 5 years or less). Thirty students from grades 9 to 12 that were transitioned from an old school building to a new building were randomly selected and asked to fill out the School Climate Profile Questionnaire. At the same time, the faculty members that were involved in the transition process were also asked to complete the School Climate Profile Instrument. The building principals of each school were also questioned about the building condition, description, and age. In this study, the independent variable was school buildings and the dependent variables were student academic achievement and the perception of school climate among the students and staff members. The dependent variables from the building principals’ data were their perceptions of whether the amenities within the new school buildings are conductive to providing quality education. The results revealed that the students’ overall mean GPAs were slightly higher after moving into the new buildings; however, it was not statistically significant. Nevertheless, the building principals of all ten schools selected believed that new buildings are conducive to providing quality education. In addition, the majority of students and faculty members involved in the transition period felt that the school climate got better when they moved to the new buildings with a statistical significance.

2.8 Conceptual Framework

According to the literature review, the relationship among the dependent variable, i.e., education quality, and independent variables, i.e. transformational

leadership, teacher quality, and school facilities, were constructed and conceptualized in a model as shown in Figure 2.5. According to the diagram in Figure 2.5, the following eight hypotheses were derived and were statistically tested for their validation (rejection or acceptance) so that the behavior, relationships, or characteristics of the population (upper-secondary schools in Bangkok) could be correctly explained, which will aid local administrators and policy makers in making appropriate decisions regarding equation quality improvement.

Hypothesis 1: The transformational leadership of the school principal has a significant impact on the O-NET score of students.

Hypothesis 2: Teacher quality has a significant impact on the O-NET score of students.

Hypothesis 3: School facilities have a significant impact on the O-NET score of students.

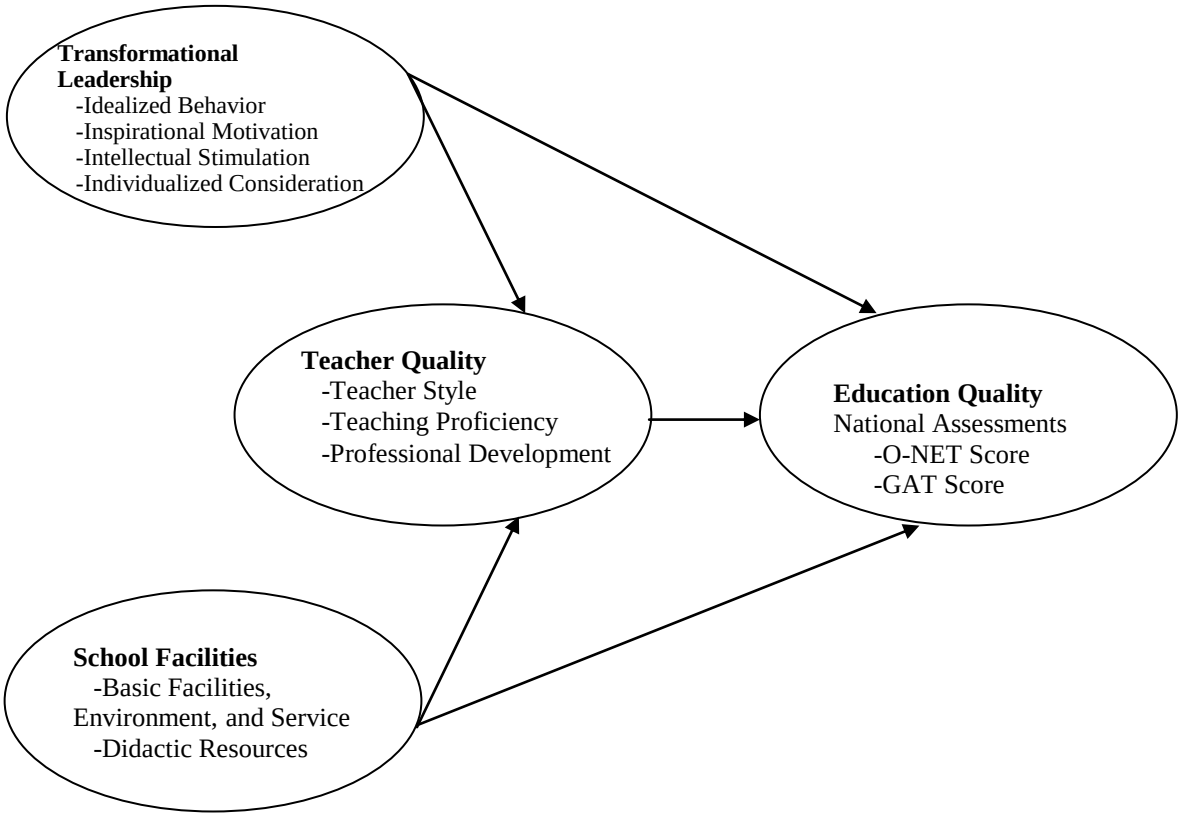


Figure 2.5 Conceptual framework

Hypothesis 4: The transformational leadership of the school principal has a significant impact on the GAT score of students.

Hypothesis 5: Teacher quality has as significant impact on the GAT score of students.

Hypothesis 6: School facilities have a significant impact on the GAT score of students.

Hypothesis 7: The transformational leadership of the school principal has a significant impact on teacher quality.

Hypothesis 8: School facilities have a significant impact on teacher quality.

2.9 Summary of Related Theories and Literature Review

In this chapter, the theories and literature related to this research have been thoroughly reviewed, as illustrated in the previous sections. Due to the amount of information presented in this chapter, important pieces of information and data were selected and tabulated in Tables 2.3 to 2.7 in order to classify and provide easy access for the author index and contents contained in this chapter.

Table 2.3 Summary of Key Literature Reviews Related to Theories and Disciplines of Education Quality

Theories and Discipline	**Related Studies**
Management Quality Management Service Quality Management	Demming(1986); Crosby(1976), Fiegenbaum (1951); Shewhart (1931), Cock (1998); Xu (1999); Jones (2010); Macdonald (2003); Summers (2005); Juran (1979); Evans (2011); Parasuraman, et al. (1985); Cheng and Tam (1997); Peter and Waterman (1982); Juan and Gryma (1988); Saiti (2012); Hawtin (1994); Yulia (2010); World Bank (2005); McKinsey et al. (2007)

Table 2.4 Summary of Key Literature Reviews Related to the Relationship between Transformational Leadership and Education Quality

Relationship	Theories and Discipline	Related Studies
Positive	Leadership Theory Leadership Style Human Resource Management Training and Development	Bass (2008); Allen (1981); Bass and Avolio (1992); Bass et al. (2003); Hutchison (1985); Creech (1914); Sealeewat (2012); Abbsai (2012); Berry (1997); Bush (2008); Bushetal (2010); Chapman (2005); Leithwood and Jantzi (1999); Weaver et al. (1997);Sosik et al (1997); Dionne et al. (2004); Chen and Tjosvold (2002); Dyer (1995); Stevens and Campion (1994); Zandra (1994); Yang et al. (2010); Junment (2009), Udomsak Koolkrong (2010); Somkid Sakunsstapat (2009); Onorato (2013); Lockheed and Verspoor (1991)

Table 2.5 Summary of Key Literature Reviews Related to the Relationship between Transformational Leadership and Teacher Quality

Relationship	Theories and Discipline	Related Studies
Positive	Management Resource Based View Human Capital Competitive Advantage Training and Development	Leithwood and Jantzi (1999); Abbasi (2012); Sillins and Harvey (1999); Yang et al. (2010); Lussiez (2009); Carnevale and Goldstein (1990)

Table 2.6 Summary of Key Literature Reviews Related to the Relationship between Teacher Quality and Education Quality

Relationship	Theories and Discipline	Related Studies
Positive	Quality Management Resource-Based View Human Capital Concept Training and Development	Lockheed and Vespoor (1991); Stewart (2011); Wichien Ket-Sing (2007); Dorfman et al. (2006); Santos (2007); Chait (2009); DuFour and Marzano (2011); Goe and Stickler (2008); Berliner (2005); Frentermacher and Richardson (2005); Blanton et al. (2006); Bond et al. (2000); Chait (2009); Anderson (1982); Hoy et al. (1990); Tarter et al. (1995); Tschannen-Moran et al.(2006); Darling-Hammond (2000); Heck (2009); Maria (2009).
Moderate		Hoy and Sabo (1998)
No Relationship		Hoy et al. (1991), Grab (2001)

Table 2.7 Summary of Key Literature Reviews Related to the Relationship between School Facilities and Teacher Quality

Relationship	Theories and Discipline	Related Studies
Positive	Quality Management Resource-Based View Competitive Advantage Strategy	Schneider (2008);Uline and Tschannan-Moran (2008); Cash (1993); Chan (1996); Hines (1996); Lanham (1999); Earthman (2004); Wargocki and Wyon (2006); Buckley et al. (2004); Evans and Maxwell (1997); Evans and Maxwell (2000); Haines et al. (2001); Shield and Dockrell (2004); Shield and Dockrell (2008); Klatte et al.(2010), McGuffey (1982); Lowe (1990); Dawson and Parker (1998); Leung et al. (2006); Bishop (2009); Buckley et al. (2005); Holt (2009); Deal and Peterson (1999); Tableman and Herron (2004)

CHAPTER 3

RESEARCH METHODOLOGY

The objective of this study was to examine the impact and the relationship of the three determinants (independent variables)—i.e. transformation leadership, teacher quality, and school facility—on education quality represented by the averaged O-NET and GAT scores of the schools (dependent variable) in secondary schools in Thailand. This chapter analyzes every facet of each determinant, already reviewed in detail in Chapter Two, which would have major possible effects on the quality of education in the Thai context. Hopefully, the findings of this study will point out some benefits and convey them to policy makers in the Thai education sector.

Since this study is a quantitative-method approach or an exploratory research, it was necessary to clearly define and describe the research design, independent variables, the independent variable as a mediator, the dependent variable, the unit of analysis, the population and sample design, instrumentation, operational definitions, the validity and reliability test, data collection, and data analysis.

3.1 Research Process

The quantitative method was employed in this cross-sectional research. The intent of the study was to examine the influence among transformational leadership, teacher quality, school facility, and education quality represented by the O-NET and GAT averaged scores of grade twelve students. Data analyses, separated into two sections, namely descriptive statistics and inferential statistics, were performed.

Descriptive statistics, percentage, frequency, mean, standard deviation, and so forth were used to provide an overall picture of the sample characteristics or properties while the other parameters generated possible interaction effects among the independent and dependent variables. Factor analysis, stepwise multiple regression,

and the path analysis test were the main statistic tools for performing the inferential statistical measure.

3.2 Unit of Analysis

In this research, grade ten to twelve schools are under the supervision of the Office of Basic Education Commission (OBEC), Bangkok Metropolitan Administration (BMA), the Office of Higher Education Commission (OHEC), as well as private schools under the Office of Private Education Commission (OPEC) in the Bangkok metropolitan area were the unit of analysis. There are several hundred schools, both public and private, in Bangkok. However, only 219 schools have grade ten to twelve education, as shown in Table 3.1. The average O-NET, GAT of the school's scores were used as means to measure quality education. As a result, 219 secondary schools were the unit of analysis in this study.

3.3 Population and Sample Size

Site location for the data collection for this study focused only on the Bangkok metropolitan area. As this research studied the relationship between the key

Table 3.1 Unit of the Analysis

Supervision	**Number of secondary schools**	**Percent**
Total	219	100
OBEC (District 1 and 2)	119	54.40
BMA	8	3.65
OHEC	8	3.65
OPEC	84	38.30

Source: The National Institutes of Educational Testing Service, NIETS.

determinants and education quality, the teachers in selected schools also were involved in the survey. The selected teachers in a particular school were considered as a proxy of the school. Part-time, intern, and temporary employees, and probationary teachers were excluded from the study. Moreover, school principals that had had work experience in a particular school less than 1 year were not counted. The major reason for this exclusion was because this research needed to ensure that the respondents had gained sufficient experience and had enough information to fill out the questionnaire appropriately.

3.3.1 Sample Size

For an inferential statistical analysis, it is essential that the samples selected for the survey truly represent the whole population. Therefore, the sample size had to be carefully specified. Numerous tools have been developed to determine an appropriate sample size to ensure that the number of samples can be generalized to the population of the research. In this study, the samples were drawn from Thai secondary schools located in the Bangkok area. The teachers that have taught at the upper secondary education level in the selected schools were considered as the targeted samples. An appropriate sample size was calculated by using Kerjcies and Morgan's formula. Krejcies and Morgan(1970)have articulated a simple but applicable formula to calculate a sample size that is large enough to represent the population. According to Krejcies and Morgan's table for determining the sample size, it was found that the appropriate sample size for the population of 219 schools was 140,which was enough to provide a 95 percent confidence level for statistical significance or, in other words, it would generate a margin of 5 percent error for population interpretation.

3.3.2 Sampling Method

Convenience sampling is the most appropriate method in this study due to the difficulty in accessing schools. However, this research has put the best effort into distributing questionnaires to cover all types of schools, including public schools, private schools, BMA schools, and demonstration schools to ensure the sample diversity.

3.4 Operational Definitions

An operational definition is one of the research processes that aims to identify all theoretical variables (both dependent and independent variables). By identifying the variables in terms of their processes and measurements, the operation definition provided a clear prospect and understanding of all the variables involved in this research as well as suggested appropriate standard criteria to weight the variables. An operation definition is important in quantitative research and has to be clearly stated for its content, as shown in Tables 3.2 and 3.3.

3.5 Measurement

In the social sciences, many hypothetical entities or constructs are typically used for explaining or predicting behavior, perception, motivation, etc. Not all of the types of constructs are directly observed; they are abstract, and they are likely to imply and explain something that are intangible, such as phenomena, cognition, perception, preference, and so forth. To measure constructs, a series of relatively-

Table 3.2 Operational Definition of the Dependent Variables

Variables	**Definition**	**Operationalization**
Education Quality	Quality of education is the design of an excellently education system, which is able to increase students' value, cognitive development, school effectiveness and academic achievement.	-National assessment -Ratio scale -O-NET scores -GAT scores

Table 3.3 Operational Definition of the Independent Variables

Variables	**Definitions**	**Operationalization**
Transformational Leadership	Transformational leadership is composed of 4 I' s as follows: 1) Idealized influence 2) Inspirational motivation 3) Intellectual stimulation 4) Individualized consideration	
Idealized Behavior Transformational Leadership Style	The ideal characteristic of the leaders' interaction with followers in order to motivate the followers' to set their goals, including building trust, respecting followers, and showing support and encouragement.	-10 Likert scale -Rating leader's idealized behavior scales in designed questionnaire focusing on trust building, respect, encouraging followers, and supporting followers to attain the goals of the organization.

Table 3.3 (Continued)

Variables	**Definitions**	**Operationalization**
Intellectual Stimulation Transformational Leadership Style	The leaders influence their followers to be creative and innovative by asking questions to find out solutions using new approaches. The leaders attempt to induce followers to view problems or obstacles in many possible facets and to stimulate them to make decisions based on their beliefs and values, which are consonant with those of organizations.	-10 Likert scale -Rating leader's intellectual stimulation behavior scales were in designed questionnaire. This part of the questionnaire asks if the principals encourage teachers to express their creativity, innovation, and find new ways to solve problems.
Individualized Consideration Transformational Leadership Style	The leaders will pay attention to each follower, and understand the follower's ability, needs, and goals. Followers need coaching and mentoring differently to achieve their tasks. A supportive climate is also necessary to develop followers' ability and to enhance their effectiveness.	-10 Likert scale -Rating leaders' individualized consideration behavior in designed questionnaire. This part of questionnaire asks the followers about leaders' empathy, assistance, aspiration, and time spent.

Table 3.3 (Continued)

Variables	**Definitions**	**Operationalization**
Teacher Quality (Independent variable and as a mediator)	The quality of the teacher is a set of indicators that demonstrate academic achievement, students' high performance, and the achievement of setting school outcomes.	
Educational Background	Respondents' education background.	-Ordinal scale, nominal scale -Highest degree earned -Major field of study -Graduated institutions
Teacher Style and Teaching Proficiency	Teacher style and teaching proficiency comprise Individual attitude toward teaching career and ability to manage the class, drawing the student's attention, teaching strategies, assessment, and behavior with students in class.	-10 Likert scale -This part of questionnaire asks the teachers about attitude toward their career, prestige, class expectations, class climate, comprehension ability, class management, teaching strategies, class preparation, class assessment, and students' performance satisfaction.

Table 3.3 (Continued)

Variables	Definitions	Operationalization
Professional Development	Teachers acquire and improve their skills and knowledge in teaching, and enhance their ability to gain new knowledge and technology in teaching using numerous approaches which facilitate learning opportunities.	-10 Likert scale -Participation in professional development activities, workshops, conferences as participants or presenters, attending professional development activities focused on subject matter.
School Facility	All available means of support which are provided by the school to facilitate teaching and learning. School facilities, can be categorized into 2 groups, i.e., basic facilities and environment and services, and didactic facilities.	
Basic Facilities and Environment and Services	Main constructions and systems of the school that facilitate teaching and learning activities such as buildings, water supply, electricity, safety, etc.	-10 Likert scale -Rating designed questionnaire focus on -Perception of basic facilities and environment and service quality, light, physical evidence both in class and instructors' room, cleanliness, etc.

Table 3.3 (Continued)

Variables	Definitions	Operationalization
Didactics Resources	Supporting resources and teaching materials that are necessary to enhance teaching and learning activities, and to lever academic performance.	-10 Likert scale -Satisfaction with and perception of the utilization of resources, library, laboratory time spent in using resources, database online, information and communication technologies (ICTs), library, science and linguistic laboratory, and Internet access (availability)

designed questions was essential. All of the designed questions were derived from the literature review, as mentioned previously in Chapter 2.

In this research, the education quality construct, as a dependent variable, employed a ratio scale in terms of O-NET and GAT scores. Transformational leadership, teacher quality (except educational background part), school facility constructs were measured on a1-10 scale. For the educational background construct, i.e., highest degree earned, major field of study, and graduate institutions, was assessed by using nominal and ordinal scales.

3.6 Pretest

The pretest is an essential step prior to real data collection and analysis in order to ensure the accuracy and precision of the collected data and information once the questionnaires have been distributed. The pretest aims to determine the validity of the designed research constraints and instrument in conditions as similar as possible to those of the main research characters. It should be conducted systematically with potential respondents with similar methods specified in the research methodology. Care should be taken when carrying out the pretest, and the temptation to hurry over

the pretest process such as testing only with convenient or limited samples should be avoided. In addition, pretesting the questionnaire with experienced specialists about the construction of proper questions has been found to be beneficial since they are able to provide essential information from different angles. Potential difficulties or vague points which might not be identified in a pretest with regular respondents may be revealed. For the questionnaire with different respondent types, it is necessary to conduct a pretest with all respondent types. Furthermore, if the questionnaire is to be in several languages, the pretest should be carried out for all languages.

The data obtained from pretest were not used in either the statistical analysis or the hypothesis test. The results from the pretest were only used to check for wording errors in the questionnaire, clarity of instructions, sufficiency and validity of obtained data, etc. Anything that could impede the instrument's ability to collect accurate data in an economical and systematic fashion should be revised or redesigned. This study selected 25 schools for the pretest, and found 2 questions in the questionnaire that were not clear, so both questions had to be revised for better understanding.

3.7 Validity and Reliability

Measurement tools are composed of many constructs; thus, it is essential to ensure that the designed and selected measurements are correct in order to quantify and qualify the targeted characters and properties. Therefore, the researcher must analyze the validity of the constructs to ensure that the measurements obtained from t operational definition actually represent or describe the constructs. Validity and reliability are the two technical terms that have been developed to evaluate the quality of any measurement.

Validity is an analytical tool to confirm that the selected measurement procedure actually measures the variable(s) intended to measure, not something else. A high degree of validity of a particular measurement reflects the validity of the characteristic intended to measure and thus provides valuable and meaningful data for further comparison and analysis. In this study, confirmatory factor analysis was

performed to verify the construct validity, i.e., scores or data obtained from a measure were directly related to the studied variable itself. On the other hand, reliability is the dependability or consistency of the measurement procedure that can produce the same or nearly the same results no matter whether the measurement is taken with the same or different respondents under similar conditions. Reliability is also one of the crucial parts in the research methodology together with validity. To test the reliability in this research, the Cronbach's alpha statistics approach was adopted in order to provide internal consistency of the scales.

Factor analysis is a statistical technique for data reduction. Factor analysis is beneficial to researchers in many ways, i.e. to study the variables' aggregation into groups, to identify the observed variables' relative scores to construct composite measures (using in Chapter 4), to remedy the multicollinearity problems among the independent variables, and lastly, to confirm the validity of the constructs (Suchart Prasith-rathsint, 2005). Confirmatory factor analysis can indicate whether the constructed questions measure what the researchers want to measure. Both reliability and validity enhance and ensure the quality of research findings. The following tables show the reliability coefficient and factor loading of the questions used in this study.

Table 3.4 presents the reliability test of all items in the questionnaires from the pretest. Obviously, the Cronbach's alpha coefficient for each construct showed a very high level, ranging from .891 to .961. Teacher quality obtained the highest

Table 3.4 Reliability Coefficients of the Scale Items

Scale	**Number of item**	**Reliability Coefficients (Cronbach's Alpha)**
Transformational Leadership	12	.897
Teacher Quality	22	.961
School Building	9	.891
Didactic Resources	14	.905

reliability coefficient value at .961, while school building and physical evidence had the lowest value at .891.

Transformational leadership was composed of 12 questions from 4 latent variables to measure the transformational leadership of the school principals, as shown in Table 3.5. As mentioned in Chapter 2, transformation leadership consisted of idealize behavior, inspirational motivation, intellectual stimulation, and individual consideration. The loading scores for transformation leadership were in the range of.697 to .902. The loading scores were considered very high, which reflected that the observed variables were valid in accordance with the derived theory. Interestingly, the question that asked if all of the teachers and staff clearly understood the school's goals and objectives revealed the lowest the score at .679 in the pretest, while the question that asked if the school principals were capable persons and good role models had the highest loading score at .902.

Table 3.6 presents the factor scores for teacher quality, which are composed of 3 constructs, i.e. teachers' attitude toward their career, teaching style and proficiency, and professional training and development. At first glance, all 3 construct loading scores were in the appropriate range to indicate the validity of teacher quality. The factor analysis results for the teachers' attitude toward their career revealed that all items had relatively high factor loading scores, from .895 to .793. Regarding the teaching style and proficiency questions, the loading scores as shown in Table 3.7 were distributed from .692 to .895. Likewise, the third part of teacher quality, professional training and development, also generated results in the same direction as the aforementioned constructs. In conclusion, the observed items for teacher quality were valid for measuring overall teacher quality.

School facilities and environment were comprised of 2 main dimensions, i.e., school facilities, environment and didactic resources, and the many perspectives were included in each dimension. The result of the factor loading scores indicated in Table 3.7 that the scores were between .615 and .828. Similar to the didactic resources, the factor loading produced favorable figures. The highest loading score was laboratory condition at .825, while the others were aligned in the same line direction. Thus, all of the items demonstrated validity.

Table 3.5 Factor Analysis Results for Transformational Leadership

Variables	Content	Factor Loading
Factor 1	IDEALIZED INFLUENCE	
IDE1	School principals can achieve most goals and objectives.	.736
IDE2	School principals are capable persons and good role models.	.902
IDE3	Feeling fortunate to have an opportunity to work with your school principals.	.847
Factor 2	INSPIRATIONAL MOTIVATION	
INS1	The school's principal always motivates, inspires, and encourage you.	.733
INS2	Part of your achievements derives from the principal's support and assistance.	.801
INS3	All of the teachers and staff clearly understand the school's goals and objectives.	.697
Factor 3	INTELLECTUAL STIMULATION	
INT 1	The school's principal allows each follower to perform freely.	.715
INT2	You think that your school's principal is rational.	.844
INT3	The school's principal is always willing to give counsel and advice for problem solving when you are in trouble.	.849
Factor 4	INDIVIDUAL CONSIDERATION	
INV1	The school's principal is open minded and accepts new solutions, as well as, realizes differences in the teachers' performance individually.	.796
INV2	Most teachers will consult the school's principal when facing problems and difficulties.	.809
INV3	Your school's principal is always willing to give counsel and advice for problem solving when you are in trouble.	.735

Table 3.6 Factor Analysis Results for Teacher Quality

Variables	Content	Factor Loading
Factor 1	ATTITUDE TOWARD CAREER	
	You are proud to be a teacher.	.873
	You will be in your career until retirement.	.811
	You are well organized and prepared before class.	.773
	You attempt to make students understand class content.	.788
	Your students gained knowledge and understanding after the class.	.806
Factor 2	TEACHING STYLE AND PROFICIENCY	
	You generally have a test or quiz in class to assess student learning.	.721
	The students in class always participate in answering your questions.	.713
	You always give contemporary examples for the class content.	.895
	You always assign students to do some activities in the class.	.748
	You use various teaching techniques during class time.	.829
	The class atmosphere is nice.	.783
	You give advice, monitor, and pay attention to low-performing students.	.780
	Students discuss and share different points of view in class.	.701
	You encourage and support students to inquire additional knowledge from online databases to do their assignments.	.790
	You often use computer-assisted instruction (CAI) in class.	.698
	You are very familiar with the ICT system and always use it in class.	.687

Table 3.6 (Continued)

Variables	Content	Factor Loading
Factor 3	PROFESSIONAL TRAINING AND DEVELOPMENT	
	Participating in training is necessary for the teacher profession.	.895
	Most available training is focused on strengthening new knowledge and the skills of teachers.	.884
	Participating in training will strengthen new knowledge and teaching skills.	.894
	The knowledge obtained from the training will be applied to teaching development.	.793
	Occasionally, the training you taken are to fulfill the KPI obligations.	.807

Table 3.7 Factor Analysis Results for School Facilities

Variables	Content	Factor Loading
Factor 1	BASIC SCHOOL FACILITIES AND ENVIRONMENT	
	School buildings are in good condition.	.787
	The classrooms are well furnished and clean.	.828
	Teaching equipment and instruments, such as PC, projector, etc., are modern and ready to use.	.739
	The classroom is equipped with proper lighting, and is not too gloomy or too bright.	.769
	Electric fans and air conditioners are in good condition and function well.	.710
	The desks and chairs in classrooms are in good condition.	.752
	The classrooms are comfortable and have enough space for class activities.	.794

Table 3.7 (Continued)

Variables	Content	Factor Loading
	The teachers' rooms are in good condition, have a positive atmosphere for working, are not congested, have enough air ventilation proper temperature.	.750
	Schools have a good security and safety system.	.689
Factor 2	DIADATIC RESOURCES	
	The school library is modern and informative.	.779
	The school library is equipped with modern instruments accessible to sources of knowledge sources.	.678
	The school collects up-to-date texts, journals, magazines, etc.	.615
	Most students use the library for acquiring the knowledge and information needed for accomplishing assigned reports or projects.	.723
	The library is an important element for supporting for your teaching.	.791
	The acquisition of instruments, didactic facilities, and textbooks fulfills the needs of teachers and students.	.747
	Most science and foreign language classes are taught in scientific and language laboratories, respectively.	.774
	Laboratories are in good condition and are spacious with proper lighting.	.813
	Laboratory instruments are in good condition and ready to use.	.862
	The didactic devices and instructional media are sufficient for all students.	.721
	Teachers and students can always access the Internet and WiFi.	.701
	You encourage students to use ICT to present their assignments.	.699
	The Internet and WiFi are very important for you to prepare for your class teaching.	.825
	Teachers and students can always communicate via electronic communications such as e-mail, Facebook, Line, etc.	.618
	The ICT system of the school is up to date and accessible all the time.	.710

3.8 Data Collection

In this research, the data and information came from two sources, i.e., primary and secondary. All of the independent variable data, including transformational leadership, teacher quality, and school facilities, were directly collected from the survey and questionnaires, which were answered personally by the selected teachers. Hence, the data obtained from the survey were considered as primary data. On the other hand, for the dependent variable, which was the education quality-O-NET and GAT scores, the scores were provided by the NIETS and thus the O-NET and GAT scores were considered as secondary data

Self-assessment questionnaires were distributed to the teachers that taught basic core subjects from grade ten to twelve in the Bangkok area. The questionnaires were handed out. In this study, the researcher wished to study the students' performance in 5 core subjects: mathematics, sciences, the Thai language, foreign language, and social studies religion, and culture only. It is important to note that part-time, intern, and temporary employees and probationary teachers were excluded from this study. Request letters were issued and mailed to school principals for permission to distribute and collect the questionnaires from grade ten and twelve core subject teachers. The questionnaires and data collection were performed by the researcher and 3 other research assistants.

3.9 Data Analysis

In this research, the data analysis was divided into two parts: descriptive and inferential statistical analysis, which was run using IBM SPSS program (IBM Corporation). Details on the data analysis will be discussed further in the following sections.

3.9.1 Descriptive Statistical Analysis

The analytical measure described the main characteristics of the collected data and attempted to summarize the data set in the numerical data for comparison or

descriptive purposes. This descriptive statistical analysis is generally used to report, explain, and describe the nature of the sample. Descriptive statistics are commonly used in most scientific and social science research and were employed in this research. The parameters for the descriptive statistical analysis include frequency, percentage, mean, standard deviation, minimum, maximum, skewness, kurtosis, etc. The descriptive statistics demonstrated the demographic attributes of the teachers and schools and were presented in the form of figures for providing general attributes of the samples and for inferential statistical analysis in the next step.

3.9.2 Inferential Statistical Analysis

The inferential statistics approach allows researchers to use samples to generalize about the population from which the samples were drawn. Statistical measures attempt to infer any information obtained from the samples partially collected to explain the population. Inferential statistical analysis is necessary since errors will always occur unavoidably no matter on how carefully the sampling process is carried out. As a result, any sample cannot absolutely and perfectly represent the population. Inferential statistical analysis is very useful for defining the probability of the characteristics of the population based on the collected samples. Inferential statistical analysis also assesses the strength of the relationship between the independent(causal)and dependent (effect) variables.

Moreover, inferential statistical analysis can assess the relative impact of various program inputs on program outcomes/objectives as well. The methods of inferential statistics involve mainly the estimation of parameters and the testing of statistical hypotheses. In this research, the inferential statistical analyses to be used were Pearson correlation, factor analysis, stepwise multiple regression, and path analysis. The results from these analyses explain the interactions or influence of the independent variables on education quality, which is the dependent variable in the study.

3.10 Chapter Summary

This chapter described the research methods used in the study step by step. Since this study is a quantitative research, descriptive statistics were employed to categorize the sample demographic profile in the forms of percentage, mean, standard deviation, minimum, maximum, skewness, kurtosis, etc. In addition, factor analysis, stepwise multiple regression, Pearson's correlation, and path analysis were used to answer the research questions. Because this is a quantitative research, the unit of analysis, population, sample size, sampling method, operational definitions, measurements and instruments, pretest, validity, reliability, data collection, and data analysis were necessarily required.

CHAPTER 4

FINDINGS AND PRESENTATION OF THE RESULTS

This chapter presents the quantitative results of both dependent and independent variables. The results cover 2 parts: descriptive statistical analysis an univariate analysis. This is followed by the second part concerning the inferential statistics, which examines the relationship among the variables and hypothesis testing as well as both direct and indirect effects. For better understanding, the study uses abbreviations throughout in Chapter 4 as follows:

TOTAL_LD	=	Total Transformational Leadership
TOTTQ	=	Total Teacher Quality
TOTSFAC	=	Total School Facilities

4.1 Descriptive Statistical Analysis

This chapter is composed of two parts. The first part demonstrates the main demographic characteristics of the respondents such as gender, age, education background. In the second part, career background, teaching subjects, professional training and development, teachers' attitude towards training and development programs, teachers' attitude toward their careers, teaching style and proficiency, condition of buildings, classrooms, and overall belongings in schools, condition and utilization of libraries, condition and utilization of laboratories, ICT utilization and finally, transformational leadership will be used for the univariate analysis with regard to the descriptive statistics.

The basic demographic information on the respondents provides the general background of the respondents. Table 4.1 shows the basic background of the characteristics of the respondents, of the total samples of this study (N=149): the majority of the respondents were female teachers (59.7 percent). Most respondents

Table 4.1 Descriptive Results for Demographic Characteristics of the Respondents (N = 149)

Variables	**Categories**	**Percent**
Gender	Female	59.7
	Male	40.3
Age group	25-30 years	18.1
	31-35 years	16.1
	36-40 years	14.8
	41-45 years	6.7
	46-50 years	4.7
	51-55 years	22.1
	56-60 years	17.4
Level of education	Bachelor level	53.7
	Master level	44.3
	Doctoral level	2.0
Major subject	Thai	10.7
	Mathematics	11.4
	Sciences	18.8
	Social sciences, culture, and religion	11.4
	Foreign language	13.4
	Educational administration, and related educational fields	34.9
	Others	1.3
Teaching subject	Thai	15.4
	Mathematics	21.5
	Sciences	26.2
	Social sciences, culture, and religion	20.8
	Foreign Language	15.4
	Other	0.7

were in the 51-55 age group (22.1 percent), followed by the 25-30 age group (18.1 percent) and 56-60 age group (17.4 percent). It can be seen in Table 4.1 that roughly 50 percent of the samples were under the age of 40, whereas another 50 percent were above 40 years old, implying that the selected samples were equal and well distributed regarding age. The data and information obtained from the questionnaires covered the opinions, perspectives, and sentiments of new generation and elder generation, which might be different from each other regarding the testing parameters, i.e., transformational leadership, teacher quality, school facilities, and quality education.

More than half of the respondents held a bachelor degree (53.7 percent) followed by a master degree (44.3 percent) and doctoral degree (2.0 percent). This indicated that all of the respondents were well educated and should have understood the questions in the questionnaire clearly; hence, their answers should have represented their truthful opinions without any bias. Of the total samples, a few respondents graduated from Rajamangala Universities (0.7 percent); on the other hand, the respondents mostly graduated from other public universities (73.6 percent). The major subject of most of the respondents was educational administration and related educational fields (34.9 percent), followed the sciences (26.8 percent) and English (13.4 percent). The majority of respondents were teaching in the sciences (26.2 percent), mathematics (21.5 percent), and social studies, religion, and culture (20.8 percent). This diversity in fields provided an overview of every angle and stakeholders of the key education structure in the school.

As mentioned previously, the 2014 O-NET and GAT scores were used as indicators of education quality in Thailand. It is important to note that the O-NET and GAT scores of the students that did not complete all of their examinations (5 subjects for O-NET and 2 parts for the GAT) were excluded from the analysis. In addition, the data points that deviated from a mean greater than 3 times the standard deviation (99.8 percent)of the normal-distributed population should be in between the mean plus and minus three standard deviations) were considered as outliers and hence were excluded from the calculation.

Table 4.2 shows that the averaged O-NET scores of secondary schools in Bangkok (from 149 schools) was 34.89 (which was averaged from 5 core subjects,

Table 4.2 Descriptive Results for the Dependent Variables in 2014 (N = 149)

Variables	Min	Max	Mean	S.D.	Skewness		Kurtosis	
					Stat.	S.E.	Stat.	S.E.
O-NET score*	22.87	59.78	34.885	7.528	1.099	.199	.748	.395
GAT score*	17.95	82.63	51.073	13.405	.182	.199	.616	.395

*transformed to 0-100 scale

Source: National Institute of Educational Testing Services, 2014.

i.e., Thai, foreign language, mathematics, sciences, and social studies, religion, and culture), while minimum and maximum scores at 22.87 and 59.78, respectively. Similarly, the average GAT score was 51.073 while the minimum and maximum scores were 17.95 and 82.63, respectively. It is worth remarking that both the O-NET and GAT scores presented in this research were transformed to a 0-100 scale.

According to Table 4.3, which presents the work experience of the sampling teacher group, it was found that the average, maximum, and minimum work experience were 18.83, 44, and 1 year(s), respectively. However, the work periods at the current schools when the survey was conducted were shorter, i.e., 13.61, 38, and 1 year(s) for the average, maximum, and minimum, respectively. This large span of working period (from 1 to 38 years) the ensured that the opinions obtained from the survey reflected the viewpoint of both less-experienced and long-term experienced teachers concerning the factors affecting education quality. The descriptive statistical analyses, including standard deviation, skewness, and kurtosis indicated that the samples being tested were normally distributed regarding work experience and work period in the current school.

According to the questions as regards the training and professional development for the academic year as shown in Table 4.4, it indicates that, in addition to their strong academic background, most of the responding teachers also attended outside-school training programs 4 times in one academic year on average. They also participated in seminar workshops and in-house training 2.5 times in an academic

Table 4.3 Descriptive Results for Years of Work Experience and Years of Working in Current Schools (N = 149)

Variables	**Min**	**Max**	**Mean**	**S.D.**	**Skewness**		**Kurtosis**	
					Stat.	**S.E.**	**Stat.**	**S.E.**
Work Experience	1.0	44.0	18.834	11.937	.118	.199	-1.332	.395
Working in current schools	1.0	38.0	13.608	10.661	.546	.199	-.885	.395

Table 4.4 Descriptive Results for the Training and Professional Development of the Respondents' Profile (N = 149)

Variables	Min	Max	Mean	S.D.	Skewness		Kurtosis	
					Stat.	S.E.	Stat.	S.E.
Training	0	10	3.87	2.548	.714	.199	-.058	.395
Workshop	0	8	2.55	1.988	1.201	.199	1.118	.395
Field trip	0	5	1.93	1.085	.728	.199	1.04	.395
Guest speakers	0	6	2.45	1.629	.528	.199	-.162	.395

year each, while they had a field trip twice a year on average. This information indicated that these responding teachers were very active and keen to learn new knowledge and technologies, which is a good sign and should be of benefit to the education quality of the nation.

Regarding the teachers' attitude towards training and professional development programs, Table 4.5 indicates that the teachers realized the importance of training and professional development programs with a mean of 8.71 (the highest score in this category). They also applied the knowledge and teaching skills obtained from the training and development programs in the classroom with a mean of 8.01.

Table 4.5 Descriptive Results for the Independent Variables, and the Teachers' Professional Training and Development Programs(N = 149)

Variables	Min	Max	Mean	S.D.	Skewness		Kurtosis	
					Stat.	S.E.	Stat.	S.E.
Participating in training is necessary for the teacher's profession.	3	10	8.71	1.472	-1.164	.199	1.152	.395
Most of the training is focused on strengthening knowledge and teaching skills.	2	10	7.99	1.619	-.956	.199	1.443	.395
The knowledge obtained from the training will be applied to teaching development.	3	10	8.01	1.496	-.741	.199	.490	.396
In your viewpoint, you are satisfied with the school's training on strengthening knowledge and teaching skills.	3	9	7.60	1.350	-1.118	.199	.703	.395
Occasionally, the training you taken are to fulfill the KPI obligations.	2	10	7.68	1.682	-1.078	.199	1.192	..395

However, the teachers indicated that they were only moderately satisfied with the training and professional development programs they took with a mean of 7.60, which was the lowest value in this category.

The descriptive results for the teachers' attitude toward their careers are illustrated in Table 4.6. The information covered both opinion and behavior questions and showed the highest rating mean of 9.40 and 9.38 in regard to the questions whether they were proud to be teachers and whether they attempted to make students understand the teaching content, respectively. The lowest mean was rated at 8.12 with

Table 4.6 Descriptive Results for the Teachers' Attitude toward Their Careers (N=149)

Variables	Min	Max	Mean	S.D.	Skewness		Kurtosis	
					Stat.	S.E.	Stat.	S.E.
You are proud to be a teacher.	3	10	9.40	1.174	-2.534	.199	7.508	.395
You will be in your career until retirement.	1	10	9.30	1.671	-3.035	.199	9.697	.395
You are always well-organized and prepared for class.	5	10	8.95	1.129	-1.134	.199	1.241	.395
You attempt to make students clearly understand the class content.	5	10	9.38	.850	-1.678	.199	1.169	.395
Your students gained knowledge and understanding after the class.	4	10	8.12	1.179	-.663	.199	1.095	.394

the question about whether they ensured that their students understood clearly.

The following section discusses the descriptive results of teaching style and proficiency, as shown in Table 4.7. The teachers responded that they strongly agreed that they always provided examples while teaching in class with a mean score of 8.85. Furthermore, regarding the questions of whether they always conducted a test in the class to assess learning achievement and whether they perceived that the atmosphere in the class was pleasant, the means were 8.53, and 8.23, respectively. It is noticeable that the question regarding the use of computer-assisted instruction (CAI) in class had a standard deviation greater than that of others, indicating that the replies were widely dispersed from the mean value as compared with other questions. This might be due to the age difference among the respondents. Senior teachers might not have gotten used to preparing class materials in electronic files as compared to new-generation teachers. As a result, not only was the standard deviation significantly higher than that of the others, but also the mean of this issue was considerably lower

Table 4.7 Descriptive Results for Independent Variable Teaching Style and Proficiency (N = 149)

Variables	Min	Max	Mean	S.D.	Skewness		Kurtosis	
					Stat.	S.E.	Stat.	S.E.
You generally have a test or quiz in class to assess student learning.	4	10	8.52	1.318	-1.041	.199	.755	.395
Students in class always participate in answering your questions.	1	10	7.14	1.611	-1.038	.199	1.229	.395
You always give current examples in class.	5	10	8.85	1.076	-.907	.199	.779	.395
You always assign students to do some activities in class.	4	10	8.21	1.358	-.774	.199	.565	.395
You use various teaching techniques while teaching.	4	10	7.99	1.211	-.658	.199	.736	.395
The class atmosphere is nice.	3	10	8.23	1.372	-1.164	.199	2.093	.395
You give advice, monitor, and pay more attention to low-performance students closely.	4	10	7.84	1.415	-.814	.199	.673	.395
Students discuss and share different points of view in class.	2	10	7.55	1.593	-.883	.200	1.390	.397
You encourage students to use ICT in class presentations.	3	10	7.97	1.392	-.686	.199	.754	.395
You often use computer-assisted instruction (CAI) in class.	1	10	6.34	2.468	-.612	.199	-.348	.395

than the others.

The next part inquires about the teachers' opinion of the school facilities, which include buildings, classrooms, air conditioning or electric fans, and the condition of desks and chairs. Moreover, the questions were also extended to cover the area of the library, science and sound laboratory conditions, as well as the library, science and sound laboratory sufficiency and utilization. Table 4.8 indicates that the teachers felt that the ambient light in class was of appropriate brightness with the highest mean value at 8.26. The runner-ups according to the respondents were that

Table 4.8 Descriptive Results for Facilities and Environment (N= 149)

Variables	**Min**	**Max**	**Mean**	**S.D.**	**Skewness**		**Kurtosis**	
					Stat.	**S.E.**	**Stat.**	**S.E.**
The buildings are in good condition.	3	10	8.09	1.416	.863	.199	3.812	.395
The classrooms are well furnished and clean.	4	10	8.08	1.417	-.708	.199	3.639	.395
Instructional media are up to date, and ready to use.	1	10	7.46	2.126	-1.059	.199	.948	.395
The ambient light in the class is of appropriate brightness.	1	10	8.26	1.733	-1.791	.199	3.974	.395
The AC and electric fans are in good condition.	1	10	7.83	1.916	-1.184	.199	1.401	.395
The desks and chairs in the class are in good condition.	1	10	7.96	1.845	-1.275	.199	1.981	.395
The classrooms are comfortable and have enough space for class activities.	1	10	7.73	2.029	-1.183	.199	1.176	.395
The teachers' rooms have a nice environment.	1	10	7.97	1.929	-1.148	.199	.956	.395
The schools have good security and safety measure systems.	1	10	6.52	1.727	-.085	.199	.484	.395

the buildings were in good condition and the classrooms were well furnished and clean with the means of 8.09 and 8.08, respectively.

Surprisingly and interestingly, it was found that security and safety measurement in The teachers' view were not satisfactory, with the lowest mean score of 6.52. In addition, teachers moderately acquired new knowledge from the school library with the mean score of only 6.95. Most of the remaining questions indicated moderate satisfaction with occasionally, the training you taken are to fulfill the KPI obligations, mean scores varying in a narrow range between 7.03 and 7.96. Similar to previous cases, the standard deviations for the questions "The classrooms are comfortable and have enough space for class activities" and "Instructional media are up to date and ready to use" were considerably higher than the remaining. This variation in standard deviation values might have contributed to the diverse budget allocation among the schools, particularly between the public and private schools. To recruit a large number of students, private schools may need to invest heavily in classroom and instructional media to raise the school's reputation and to attract parents' concern.

According to Table 4.9, it was found that the teachers believed that WiFi was important to them for teaching and preparing the most, with the highest mean scores of 8.09. Moreover, Thai teachers nowadays contact their students by using social media such as Line, Facebook, etc. at mean of 7.99. Most teachers also encouraged their students to use resources available online to do assignments. The rest of the questions were rated almost the same, somewhere from 7.97 to 7.03. Again, the standard deviations of the scores from "The library is an important element that supports your teaching" and "Didactic devices and instrument media are sufficient for all students" questions were greater than 2. This might be because new-generation teachers may typically obtain necessary information for class from the Internet or electronic sources rather than going to the library. Regarding the sufficiency of didactic devices, the cause might be similar to that in the case of the classroom and instructional media, in which the private and public schools were very diverse from each other causing the data distribution to vary widely from the mean value.

Table 4.9 Descriptive Results for Didactic Resources (N=149)

Variables	Min	Max	Mean	S.D.	Skewness		Kurtosis	
					Stat.	S.E.	Stat.	S.E.
The school library is modern and informative.	1	10	7.76	1.880	-1.097	.199	1.344	.395
The school library is equipped with modern instruments accessible to sources of knowledge.	1	10	7.63	1.988	-1.209	.199	1.649	.395
Most students use the library for acquiring the knowledge and information needed for accomplishing assigned reports or projects.	1	10	7.03	1.946	-.901	.199	.807	.396
Most students use the library for acquiring the knowledge and information needed for accomplishing assigned reports or projects.	1	10	7.03	1.946	-.901	.199	.807	.396
Most students use the library for acquiring the knowledge and information needed for accomplishing assigned reports or projects.	1	10	7.03	1.946	-.901	.199	.807	.396
Most students use the library for acquiring the knowledge and information needed for accomplishing assigned reports or projects.	1	10	7.03	1.946	-.901	.199	.807	.396
The library is an important element that supports your teaching.	1	10	6.95	2.110	-.712	.199	.229	.395

Table 4.9 (Continued)

Variables	Min	Max	Mean	S.D.	Skewness		Kurtosis	
					Stat.	S.E.	Stat.	S.E.
The acquisition of instruments, didactic facilities, and textbooks fulfills the need of teachers and students.	1	10	7.64	1.790	-1.149	.199	1.774	.395
Most science and foreign language classes are taught in scientific and language laboratories, respectively.	2	10	7.57	1.828	-.770	.199	.426	.395
Laboratories are in good condition and spacious, with proper lighting.	1	10	7.41	1.697	-8.14	.199	1.042	.395
Laboratory instrument are in good condition and are ready to use.	1	10	7.34	1.770	-.718	.199	.674	.395
Didactic devices and instrument media are sufficient for all students.	1	10	7.33	2.081	-1.086	.199	1.265	.395
Teachers and students can always access the Internet and WiFi.	1	10	7.56	1.548	-.669	.199	1.262	.395
You encourage and support students to inquire additional knowledge from online databases to do their assignments.	3	10	7.97	1.392	-.686	.199	.754	.395
The Internet and WiFi are very important for you to prepare for class teaching.	2	10	8.09	1.539	-.712	.199	.768	.395

Table 4.9 (Continued)

Variables	Min	Max	Mean	S.D.	Skewness		Kurtosis	
					Stat.	S.E.	Stat.	S.E.
The ICT system in the school is modern and accessible most of the time.	1	10	7.44	1.897	-.875	.199	1.127	.395
Teachers and students can always communicate via electronic communications such as e-mail, Facebook, Line, etc.	3	10	7.99	.9155	-.247	.199	.080	.395

Regarding the transformation leadership of the school principal, most of the questioned teachers felt that their principals were willing to provide advice when subordinates faced difficulties, with the highest rating mean of 8.07,as shown in Table 4.10. Nonetheless, they seemed not to be comfortable to consult their school principals when they were under such a situation (the mean score was the lowest of 6.97). A large numbers of teachers perceived their principals as having open minds as well as accepting new approaches to solving problems. Additionally, the teachers and staff thoroughly knew their school's objectives quite well. The rating scores in regard to their principals were in the positive range, implying that most of the teachers had an optimistic attitude toward the transformation leadership of their principals.

4.2 Factor Analysis

Factor analysis is a statistical technique with several purposes. The first purpose for the present study was data reduction by relying on the relationship among the variables. The other purpose was to confirm the constructed measurements, which was derived from theories in the literature review section, and to check if the latent variables were measured accurately. The researcher constructed many of the questions in order to measure the latent variables which could not be measured

Table 4.10 Descriptive Results for Transformational Leadership (N=149)

Variables	**Min**	**Max**	**Mean**	**S.D.**	**Skewness**		**Kurtosis**	
					Stat.	**S.E.**	**Stat.**	**S.E.**
You think your school principal can accomplish most targeted goals and objectives	1	10	7.70	1.828	-1.199	.199	1.631	.396
Your school's principal is a very capable person as well as a good role model	1	10	7.51	1.905	-.693	.199	3.250	.395
You feel fortunate to have an opportunity to work with your school principal.	1	10	7.83	1.802	-.903	.199	2.261	.395
The school's principal is open minded and accepts new solutions, as well as, realizes differences in the teachers' performance individually.	1	10	8.03	1.799	-.941	.199	.815	.395
Your school's principal always motivates, inspires, and encourages teachers to achieve their goals.	1	10	7.99	1.968	-1.253	.199	1.944	.395
Part of your achievements derives from your principal's support and assistance.	1	10	7.87	2.062	-1.317	.199	1.896	.395
All teachers and personnel clearly know and understand the school's goals and objectives.	4	10	8.01	1.470	-.644	.199	1.17	.935

Table 4.10 (Continued)

Variables	Min	Max	Mean	S.D.	Skewness		Kurtosis	
					Stat.	S.E.	Stat.	S.E.
Most teachers consult the school's principal when facing problems and difficulties.	1	10	6.91	2.148	-.710	.199	.442	.395
Your school's principal allows each follower to perform freely and to his/her utmost ability.	1	10	7.88	1.863	-1.041	.199	1.237	.395
You think that your school's principal is rational.	1	10	7.98	1.847	-.863	.199	.447	.395
Your school's principal is always willing to give counsel and advice for problem solving when you are in trouble.	1	10	8.07	1.973	-1.350	.199	2.135	.395
All teachers and personnel are always involved in the school's planning, vision establishing, and objective setting.	1	10	7.97	1.869	-1.172	.199	1.621	.395

directly. Therefore, factor analysis was employed to confirm or test the validity of the measurements in Chapter 3.

This paper was composed of 3 unobserved variables: transformational leadership, teacher quality, and school facilities. First, transformational leadership consisted of 4 latent variables; i.e. ideal influence, inspirational motivation, intellectual stimulation, and individual consideration. In order to measure transformational leadership, the researcher constructed 12 questions to assess the transformational leadership of the school principals. The second unobserved variable was teacher quality, which was composed of 3 latent variables and 22 questions; and

the last one was school facilities, comprised from 2 latent variables which covered 23 observed variables. The following discusses the composition of 3 new variables in the factor analysis by using the SPSS program.

4.2.1 Results of the Factor Analysis of Transformational Leadership

The Factor analysis results for transformational leadership indicated that all 12 observable variables were appropriately measured. The results of the factor analysis in Table 4.11 point out the scale measuring transformational leadership, with factor loading scores ranging from .936 to .688. However, for the following factor loading scores shown in the Table 4.11 ,the researcher ran SPSS and used the factor scores for constructing the composition of total transformational leadership .In other words, the researcher created a new variable, total transformational leadership, which was composed of 12 questions by using the loading score for each question to construct the new variable using the SPSS program. The details of the transformation leadership observable variables and factor loading are shown in Table 4.11.

4.2.2 Results of Factor Analysis of Teacher Quality

There were 22 observable variables that measured teacher quality and which were divided into 3 parts, i.e. the teacher's background, teaching style and proficiency, and the teacher's professional training and development. Incidentally, the teacher's background and professional training and development questions were measured in ratio scales separately. Therefore, the factor analysis of the teachers' attitude toward his or her career, as well as teaching style and proficiency, was only analyzed as shown in Tables 4.12 and 4.13. The results of the factor loading scores were relatively high, except for the question about whether they had quizzes during the class.

4.2.3 Results of Factor Analysis of School Facilities

Regarding the school facilities, in the research, 2 school facilities' aspects were rated using 10 Likert scales. First, the basic facility and environment and service questions covered the physical evidence which supported the teaching and studying

Table 4.11 Results of Factor Analysis of Transformational Leadership (N=149)

Variables	**Content**	**Factor Loading**
Factor 1	IDEALIZED INFLUENCE	
	School principals can achieve most goals and objectives	.741
	The school principal is a capable person and good role model.	.706
	You feel fortunate to have an opportunity to work with your school principals.	.822
Factor 2	INSPIRATIONAL MOTIVATION	
	The school's principal always motivates, inspires, and encourages you.	.924
	Part of your achievements derives from the principal's support and assistance.	.902
	All teachers and staff clearly understand the school's goals and objectives.	.724
Factor 3	INTELLCTUAL STIMULATION	
	Your school's principal allows each follower to perform freely and to his/her utmost ability.	.885
	You think that your school's principal is a sensible administrator.	.936
	The school's principal is always willing to give counsel and advice for problem solving when you are in trouble.	.932
Factor 4	INDIVIDUAL CONSIDERATION	
	The school's principal is open minded and accepts new solutions, as well as, realizes differences in the teachers' performance individually.	.905
	Most teachers will consult the school's principal when faced with problems and difficulties.	.801
	Your school's principal is always willing to give counsel and advice for problem solving when you are in trouble.	.688

Table 4.12 Results of Factor Analysis of Teachers' Attitude toward Their Careers (N= 149)

Variables	Content	Factor Loading
Factor 1	ATTITUDE TOWARD CAREER	
	You are proud to be a teacher.	.805
	You will be in your career until retirement.	.849
	You are well organized and prepared before class.	.909
	You attempt to make students understand the class content.	.830
	Your students gained knowledge and understanding after the class.	.683

Table 4.13 Results of Factor Analysis of Teaching Style and Proficiency (N=149)

Variables	Content	Factor Loading
Factor 1	TEACHING STYLE AND PROFICIENCY	
	You generally have a test or quiz in class to assess student learning.	.630
	The students in class always answer your questions.	.651
	You always give contemporary examples for the class content.	.713
	You always assign students to do some activities in the class.	.697
	You use various teaching techniques during class time.	.753
	The atmosphere in the classroom is nice.	.699
	You give advice and monitor low-performance students.	.734
	Students discuss and share different points of view in class.	.704
	You encourage and support students to acquire additional knowledge from online databases.	.721

Table 4.13 (Continued)

Variables	Content	Factor Loading
	You are familiar with the ICT system and always use it in class.	.803
	You often use computer-assisted instruction (CAI) in class.	.702
	You encourage students to use ICT in class presentation.	.791
Factor 2	PROFESSIONAL TRAINING AND DEVELOPMENT	
	The knowledge obtained from the training will be applied to teaching development.	.830
	In your viewpoint, you are satisfied with the school's training on strengthening knowledge and teaching skills.	.683
	Occasionally, the training you taken are to fulfill the KPI obligations.	.690

processes in schools, such as buildings, classrooms, study room conditions, and so forth. On the other hand, the didactic resources in the schools were all of the facilitating equipment, teaching and learning-aid material to improve education quality. The results of the factor analysis of the school's facilities are presented in Table 4.14.

4.3 Factors Determining Education Quality with Multiple Regression and Path Analysis

Path analysis was employed to analyze the relationship among the variables, which were derived from intensive reviewing of many studies. Moreover, all of the variables were found to influence or affect each other to some extent. Two types of variables, exogenous and endogenous variables, were presented in the model. The exogenous variables were composed of transformational leadership, school facilities, and teacher quality, while the endogenous variables were education quality and

Table 4.14 Results of Factor Analysis of School Facilities

Variables	Content	Factor Loading
Factor 1	BASIC FACILITIES AND ENVIRONMENT	
	The school facilities and environment are in good condition.	.710
	Classrooms are well furnished and clean.	.738
	Instructional media, such as PCs, projectors, etc., are modern and ready to use.	.805
	Classrooms are equipped with proper lighting, and are not too gloomy or too bright.	.601
	Electric fans and air conditioners are in good condition and function well.	.824
	The desks and chairs in the classrooms are in good condition.	.833
	The classrooms are comfortable and have enough space for class activities.	.725
	The teacher s' rooms are in good condition and have a positive atmosphere for working, and not congested, have enough air ventilation and proper temperature.	.715
	The school has a good security and safety measure system.	.761
Factor 2	DIADATIC RESOURCES	
	The school library is modern and useful.	.747
	The school library is equipped with sophisticated instruments and the students have access to sources of knowledge.	.797
	The school library collects up-to-date texts, journals, magazines, etc.	.774
	Most students use the library for acquiring the knowledge and information needed for accomplishing assigned reports or projects.	.781
	The library is an important element that supports your teaching.	.671
	The acquisition of instruments, didactic facilities, and textbooks fulfills the needs of teachers and students.	.747
	Most science and foreign language classes are taught in scientific and language laboratories, respectively.	.647

Table 4.14 (Continued)

Variables	Content	Factor Loading
	Laboratories are in good condition and are spacious with proper lighting.	.788
	Laboratory instruments are in good condition and are ready to use.	.749
	Didactic devices and instruction media are sufficient for all students.	.795
	You encourage and support students to inquire additional knowledge from online databases to do their assignments.	.754
	The Internet and WiFi are very important for you to prepare for class teaching.	.825
	The ICT system of the school is up to date and accessible all the time.	.702
	Most students have knowledge, capability, skill, and expertise in using ICT for work presentations.	.730
	Teachers and students always communicate via electronic communications such as e-mail, Facebook, Line, etc.	.678

teacher quality. The following table demonstrates the correlation matrix as well as descriptive statistics for the exogenous and endogenous variables.

According to Table 4.15, a mild relationship among predictors was found as follows: the correlation between TOTQ and TOTAL_LD and between TOTSAF and TOTAL_LD was at .073 and .327, respectively. Meanwhile, the correlation between TOTSFAC and TOTQ was moderate at .430. Table 4.15 shows no sign of multicollinerity violation. The predictors were labeled as TOTAL-LD (total transformational leadership), TOTQ (total teachers' quality), and TOTSFAC (total school facilities), respectively. According to Suchart Prasith-Rathsint (2005), the correlation between two independent variables should be equal or less than .75. Moreover, the tolerance and VIF values re-confirmed that the data were good enough to use in the next step.

Table 4.15 Descriptive Results and Correlation Matrix for Exogenous Variables (N=149)

Variables	TOTAL_LD	TOTQ	TOTSFAC
TOTAL_LD	1.00		
TOTQ	.073	1.00	
TOTSFAC	.327	.430	
Mean	26.7623	7.5275	7.5889
S.D.	5.0232	1.5840	1.3864
Max	36.17	9.810	10.00
Min	14.08	3.160	4.945

Due to multicollinearity, the tolerance and VIF values indicated that there was no problem of multicollinearity among the independent variables. The suggested tolerance and VIF value should be greater than .2 and less than 10, respectively. Table 4.16 presents no assumption violation in regard to multicollinearity

4.3.1 Multiple Regression Analysis for Education Quality

In this study, there were 2 dependent variables, O-NET and GAT scores, both of which represented the extent of knowledge that the students gained from classes.

Table 4.16 Collinearity Statistic for the Independent Variables

Variables	**Collinearity Statistics**	
	Tolerance	**VIF**
TOTAL_LD	.888	1.126
TOTQ	.810	1.234
TOTSFAC	.728	1.374

The extent of knowledge was one of the key indicators that reflected education quality, which are presumed to be under the influence of leadership, teacher quality, and school facilities. The following are the general equations of the multiple regression equations for Total O-NET and TOTAL GAT.

$$\text{TOTAL O-NET} = \beta_0 + \beta_1 \text{ TOTTQ} + \beta_2 \text{ TOTAL\_LD} + \beta_3 \text{ TOTSFAC}$$

$$\text{TOTTQ} = \beta_8 + \beta_9 \text{ TOTAL\_LD} + \beta_{10} \text{ TOTSFAC}.$$

$$\text{TOTALGAT} = \beta_4 + \beta_5 \text{ TOTTQ} + \beta_6 \text{ TOTAL\_LD} + \beta_7 \text{ TOTSFAC}$$

However, as suggested by Suchart Prasith-Rathsint (2005), stepwise regression is the most appropriate multiple regression method for performing path analysis. The stepwise multiple regression output provides the standardized coefficients of independent variables that only have statistical significance and excludes those of the non-significant variables. The following Figures 4.1 and 4.2 contain the path diagrams that show the relationship among the independent variables and dependent variable.

The path analysis equations were composed of only the standardized coefficients for the independent variables (Suchart Prasith-rathsint, 2005) as follows:

$$\text{TOTAL O-NET} = \beta_1 \text{ TOTTQ} + \beta_2 \text{ TOTAL\_LD} + \beta_3 \text{ TOTSFAC} \quad \text{.....(4.1)}$$

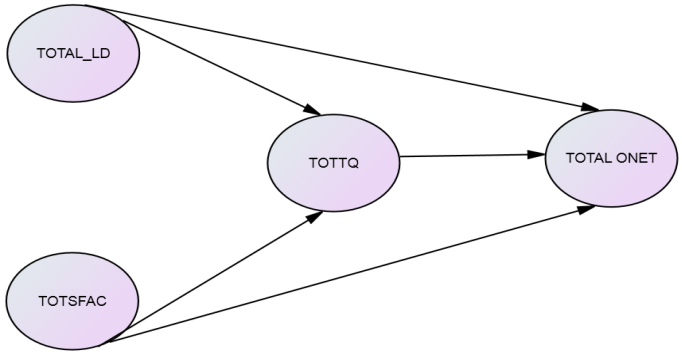


Figure 4.1 Path Model for Education Quality 1 (O-NET)

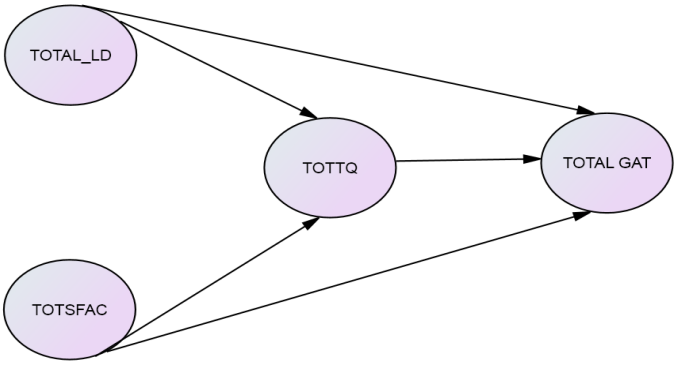


Figure 4.2 Path Model for Education Quality 2 (GAT)

$$TOTTQ = \beta_4 TOTAL\_LD + \beta_5 TOTSFAC \quad (4.2)$$

Figure 4.2 provides an additional path analysis equation regarding the GAT score as illustrated below:

$$TOTAL\ GAT = \beta_6 TOTTQ + \beta_7 TOTAL\_LD + \beta_8 TOTSFAC \quad (4.3)$$

Table 4.17 demonstrates the results for the coefficients of stepwise multiple regression between the independent variables (transformational leadership, teacher quality, and school facilities) and the dependent variable (education quality represented in terms of O-NET scores). The results of the analysis pointed out that

Table 4.17 Results of the Stepwise Multiple Regression Coefficients for the O-NET Score

Variables	**Standardized Coefficients**	**t-value**	**Sig**
TOTAL_LD	-.103	1.531	.128
TOTTQ	.500	8.814	.000*
TOTSFAC	.429	5.775	.000*
R = .786	R^2 = .618	SEE = 22.083	F = 117.860	Sig of F =.000

*$p < .05$

although transformational leadership did not have any significant impact on the O-NET score (inferred to education quality), teacher quality and school facilities did have a statistical significance ($p < 0.05$). Teacher quality and school facilities each directly affected the O-NET scores at 50 percent and 43 percent of variance, respectively. From a combination prospect, teacher quality and school facilities were able to sufficiently explain the O-NET scores at 62 percent of variance.

Further analysis of equation 4.2 to determine the possible relationship between transformational leadership or school facilities as an independent variable and teacher quality as an intermediate dependent variable revealed that teacher quality was affected by school facilities at 43 percent of variance but had no relation with transformational leadership at .95 confidence level.

As a result from Tables 4.17 and 4.18, coefficients "β_1", "β_2", and "β_3" could be determined and equations 4.1 and 4.2 were sequentially transformed to:

O-NET = -.103 TOTAL_LD + .500 TOTTQ + .429 TOTSFAC.....(4.4)
(1.513) (8.814) (5.775)

TOTTQ = -.075 TOTAL_LD + .430 TOTSFAC.....(4.5)
(-.952) (7.560)

Table 4.18 Results of the Stepwise Multiple Regression Coefficients for Teacher Quality

Variables	**Standardized Coefficients**	**t-value**	**Sig**
TOTAL_LD	-.075	-.952	.343
TOTSFAC	.430	7.560	.000*

R = .430 R^2 = .205 SEE = 1.434 F = 33.348 Sig of F =.000 *$p < .05$*

Further, the stepwise multiple regressions with the GAT score as the dependent variable showed similar results as in the case of the O-NET score, i.e., teacher quality and school facilities had a statistically-significant impact on the GAT scores at a .95 confidence level. Both predictors could explain 75 percent of the total variance in the GAT scores. Teacher quality itself had an impact on the GAT scores at about 72 percent of variance while school facilities to a lesser degree could explain the GAT score at 27.5 percent of variance. Transformational leadership repeatedly showed a very small impact and no statistical significance in relation to the GAT score. By substituting "β_6", "β_7", and "β_8" from Table 4.19 into equation 4.3, the regression equation of the GAT score with transformational leadership, teacher quality, and school facilities became equation 4.6. Finally, the path analysis for investigating the direct and indirect impact of the independent variables (transformational leadership, school facilities, and teacher quality) on the O-NET and GAT scores was performed using equations 4.4 to 4.6. The outcomes are illustrated in Figures 4.3 and 4.4 for the O-NET and GAT scores, respectively.

4.3.2 Path Analysis of the Effect of the Predictors on Education Quality

The results of the path analysis showed one indirect effect on teacher quality and two direct effects on the O-NET and GAT scores (Figures 4.3 and 4.4). As hypothesized, teacher quality was significant in predicting the O-NET scores at about 50 percent of variance (β = .500).Likewise, school facilities were found to affect the

Table 4.19 Results of the Stepwise Multiple Regression Coefficients for the GAT Score

Variables	**Standardized Coefficients**	**t-value**	**Sig**
TOTAL_LD	.055	1.181	.235
TOTQ	.712	15.526	.000*
TOTSFAC	.275	5.991	.000*
R = .868	R^2 = .750	SEE = 13.498	F = 218.966	Sig of F =. 000

**p < .05*

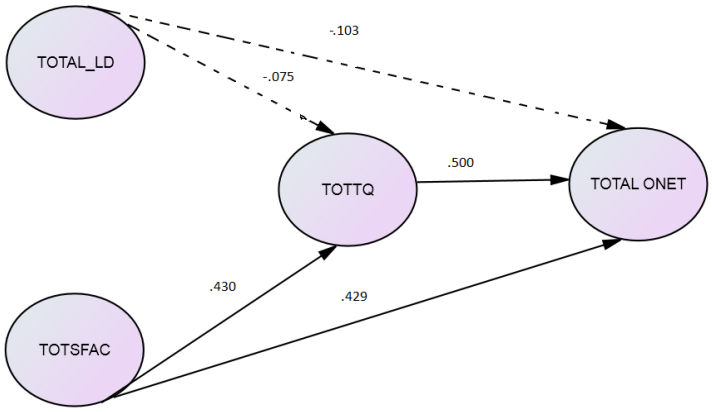


Figure 4.3 Path Model for O-NET Scores (N=149)

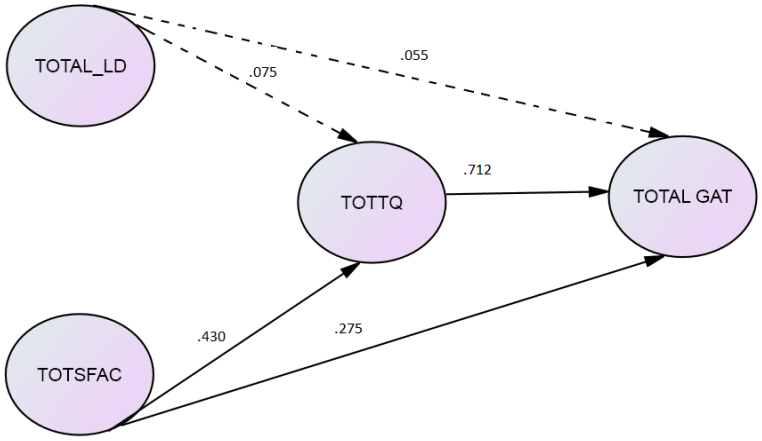


Figure 4.4 Path Model for GAT Score(N= 149)

O-Net score and teacher quality similarly at approximately 43 percent ($\beta_{\text{school facility}}$ =.430,$\beta_{\text{teacher quality}}$ = .429). It is worth mentioning that transformational leadership surprisingly showed no statistically-significant effect on either the O-NET score, GAT score, or teacher quality. Interestingly, the path model indicated that teacher quality had a highly positively impact on the GAT score at almost 72 percent ($\beta_{\text{teacher quality}}$ = .712). Similar to the O-NET score, school facilities could explain the change in the GAT score and teacher quality at 43 and 27.5 percent ($\beta_{\text{school facility}}$ = .430, $\beta_{\text{teacher quality}}$ = .275), respectively.

TOTAL GAT = .055 TOTAL_LD + .712 TOTQ + .275 TOTSFAC.....(4.6)
(1.181) (15.526) (5.991)

Moreover, school facilities also had an indirect effect on O-NET through teacher quality, which accounted for 22 percent of the total variance. Regarding another key point, the path model demonstrated that teacher quality had the most impact at approximately 72 percent of variance on the GAT score as compared to other variables. School facilities also had an effect on the GAT scores, both directly and indirectly, at around 59 percent of variance. Table 4.20 shows both the direct and indirect effects among the variables in the path model established in this research.

According to the diagrams in Figures 4.3 and 4.4 above, and the test results, eight hypotheses as identified in section 2.11 could be validated as shown in the following Table 4.21.

Table 4.20 Results of the Causal Effect of the Predictors on O-NET and GAT Scores

Variables	**Causal effect**		
	Direct	**Indirect**	**Total**
Education quality			
O -Net Score			
Teacher quality	.500		.500
School facilities	.429	.215	**.644**
GAT Score			
Teacher quality	.712		.712
School facilities	.275	.306	**.581**
Teachers quality			
School facility	.430		.430

Table 4.21 Summary of Test Results for the Hypotheses

Hypothesis No.	Hypotheses	Outcome
1	Transformational leadership of school principal has significant impact on O-NET score of students	Rejected
2	Teacher quality has significant impact on O-NET score of students	Accepted
3	School facilities have significant impact on O-NET score of students	Accepted
4	Transformational leadership of school principal has significant impact on GAT score of students	Rejected
5	Teacher quality has significant impact on GAT score of students.	Accepted
6	School facilities have significant impact on GAT score of students	Accepted
7	Transformational leadership of school principal has significant impact teacher quality	Rejected
8	School facilities have significant impact on teacher quality	Accepted

4.4 Conclusion and Discussion

Among the potential key determinants, i.e., transformational leadership, teacher quality, school facilities being tested, it was found that education quality where the ONET and GAT scores were used as the indicators, significantly depended on teacher quality and school facilities. However, the other key determinant, transformational leadership, did not have a significant impact on either the ONET or GAT scores, which was unexpected since according to the literature review as demonstrated in Chapter 2, most studies conducted in developed countries found a statistically-significant relation among this determinant, teacher quality, and

education quality. This might be due to the nature, attitude, perception, and behavior of Thai people, which are quite different from those in developed countries. According to the sample groups surveyed in this study, 119 (54.40%), 8 (3.65%), 8 (3.65%), and 84 (38.30%) schools were under the supervision of the OBEC, BMA, OHEC, and OPEC, respectively. The first three groups are considered to be under governmental administration. However, the demonstrating schools under the OHEC, have some advantages, such as the and earning more income compared to that of other public schools. Moreover, demonstrating schools are administered similarly to private schools, i.e., more flexibility in school management. As a result, the majority of schools (58.05%) can be considered as government agencies, and school principals and teachers are civil servants or officers. The principals in these public schools are considered as very high-ranking officers of the government agencies. It has to take a long time for an ordinary teacher to progress in his/her profession and to be promoted as a school principal. As a result, it might be possible that most principals are aging and getting used to routine work and customary responsibilities. In addition, as mentioned in Chapter 3, the training programs or activities for the school principals regarding their leadership role are very limited and not of concern by education administrators and related agencies. Their transformational leadership is not fully developed due to limiting training and practice. Hence, the nature of these public school principals, as a majority in the studied samples, led to the statistical conclusion that there was no statistical significance between transformational leadership and education quality. In fact, as mentioned in Chapter 2, some studies found no correlation between transformational leadership and education quality, as in this study. To mention one example, which is quite similar to this study except for the studied country and school type, Greb (2011) examined the relationship between the principal's leadership and students' achievement in public schools only. The outcome showed that there was no statistical relationship between student performance and school principal leadership either regarding the transformational or instructional aspects.

From the statistical analysis of teacher quality and school facilities with education quality in terms of the O-NET and GAT scores, the results revealed significant relations between these two determinants and education quality, as

initially expected. The results obtained from this study are in agreement with most research and reports, which demonstrated that teacher quality and school facilities had a significant impact on education quality based on the O-NET and GAT scores (see Chapter 2). According to this study, the data revealed that teacher quality and school facilities are extremely influential regarding the O-NET and GAT scores. According to the multiple regression analysis, it revealed up to 50 and 43 percent (a total of 93 percent of variance) of the O-NET score and 71 and 28 percent (a total of 99 percent of variance) of the GAT score. Therefore, under this circumstance, the government should focus its strategies on improving teacher quality and school facilities in order to raise the nation's education quality. It is important to note that the outcomes from this study are only specific to this period. The transformational leadership of the school principal and other factors should not be neglected entirely. The results only indicate that at this stage of the country's conditions, it is more effective to promote the education quality in Thailand through the improvement of teacher quality and school facilities. However, after implementing the strategies in this direction for some time, the educational situations and conditions will change as the education quality of the nation moves to a higher level. It will then be at that stage that transformational leadership and other factors might become a major player in lifting education quality. Similar study to this research should be launched to evaluate the correlation between education quality and several possible determinants to find new key factors which have a significant impact on education quality. Proper actions and strategies will then be sequentially changed or modified to match the new situations.

Considering teacher quality, it was found that, at this moment, it is under the influence of school facilities much more intensely than the transformational leadership of the school principals. Nonetheless, the results from the stepwise multiple regression showed that both school facilities and transformational leadership could explain only 20.5 (R^2 = .205) percent of the quality of the teacher. The remaining portion of teacher quality was under the influence of other factors or variables which have were not included in this study. This finding is understandable since, unlike the O-NET and GAT scores which are objective numeric data, teacher quality was more diverse and depended on several factors, both objective and subjective, as described in Chapter 2. Hence, teacher quality could not be accurately

and sufficiently predicted by only two variables. Nonetheless, to enhance teacher quality in the present condition, which will sequentially lead to the progress of education quality as a whole, improvement in school facilities is one of the key measures to be taken.

CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECCOMMENDATIONS

In this chapter is the summary of major findings, discussion, conclusions as well as recommendations regarding the key determinants of education quality of secondary schools in Bangkok. This chapter encompasses 4 sequential sections, which are described as follows:

Section 5.1 is the summary of the main findings.

Section 5.2 is the conclusion of the study.

Section 5.3 is the contributions of the findings.

Section 5.4 is the suggestion for future research.

5.1 Summary of the Main Findings

Education quality has been a highlighted agenda of every Thai government. Nonetheless as we know, Thai education quality keeps falling down in both regional and world rankings. As a result, this study aimed to investigate the key determinants of education quality in Thailand in order to disclose the key factors affecting the nation's education quality. Nonetheless, due to several limitations such as research budget, time, labor, etc., the studied area had to be reduced to only Bangkok secondary schools. However, the procedures and outcomes from this study can be used as a protocol for further studies in other areas of Thailand. The main objectives of this research were:

1) To identify the key determinants of education quality of secondary schools in Bangkok

2) To explore the influence of transformational leadership style, teacher quality, and school facilities on education quality

3) To explore the influence of transformational leadership and school facilities on teacher quality

The unit of analysis of this study was upper-secondary schools located in the Bangkok metropolitan area. There are 219 schools under the supervision of the OBEC, BMA, OHEC, and OPEC. Among the whole population of 219 schools, 149 schools, composed of public, private, and demonstrating schools, were selected as the studied samples using the convenience sampling method. Since the respondents were teachers in the selected schools, they were considered as the representatives of their schools. This study was initiated by using self-administered surveys, and questionnaires were distributed to 198 schools; however, only 149 were returned with completeness. The questions in the questionnaires comprised of 4 main parts: demographic profile, transformational leadership, teacher quality, and overall school facilities. In the meantime, the education quality indicators in this study were the O-NET and GAT scores, which are the most reliable and standardized tests in the nation. The study was a quantitative research and employed both descriptive statistics and advance inferential statistics to test several hypotheses and to examine the interaction among variables to answer the aforementioned research questions.

5.1.1 Respondents' demographic profile

The respondents mostly were female and accounted for 59.7 percent. The age groups were quite symmetrically distributed, with most in the 56-60 and 25-30 age groups at 22.1 and 18.1 percent, respectively. All of the respondents were well educated, i.e., 53.7, 44.3, and 2.0 percent obtained bachelor, master, and doctoral degrees, respectively. Almost 35 percent of the respondents had a major in education and administration or related area, and 27 percent were responsible for science teaching. Asking them about their work experience, the amount of time that a teacher worked the longest was 44 years while the minimum was 1 year. However, the average work experience was around 19 years. Most of the teachers had a positive attitude toward their career and planned to be in it until retirement.

5.1.2 Summary of the Findings Based on the Research Objectives

This section discusses the findings corresponding to 3 research objectives: a) To identify the key determinant(s) of education quality of secondary schools in Bangkok; b) To explore the influence of transformational leadership, teacher quality, and school facilities on the education quality of secondary schools; c) To explore the influence of transformational leadership and school facilities on teacher quality. The following are the findings regarding the research objectives.

1) To identify the key determinant(s) of education quality of secondary schools in Bangkok.

Regarding the findings, transformational leadership had no influence on education quality. In other words, transformational leadership revealed no statistically-significant relationship with education quality accessed via the O-NET and GAT scores at a 95 percent level of confidence. In contrast, both teacher quality and school facilities were the key determinants of the O-NET and GAT scores.

2) To explore the influence of transformational leadership, teacher quality, and school facilities on the education quality of secondary schools.

As mentioned above, transformational leadership had no significant influence on either the O-NET or GAT scores, while teacher quality alone could predict the O-NET score and accounted for 50.0 percent of the total variance. Moreover, school facilities also explained the O-NET score at 42.9 percent of the total variance. It is worth noting that transformational leadership, teacher quality, and school facilities, the 3 tested independent variables in this study, could sufficiently explain the O-NET score at 62 percent ($R^2 = .618$) whereas the remaining 38 percent of the deviations derived from other independent variables which were not included in this study. This implied that the independent variables chosen for this study were appropriate and contributed vastly to the O-NET score, which was one of the major constraints that correlated with education quality.

According to the GAT scores, both teacher quality and school facilities significantly impact the GAT scores. According to the structure of equation model 2, teacher quality alone could predict the GAT score up to 71.2 percent of the total variance, which was very high compared to 50.0 percent in the case of the O-NET score. School facilities could explain the GAT score only at 27.5 percent of the total

variance, down from 42.9 percent in the O-NET case. These results imply that teacher quality is more important for developing students' reading comprehension and analytical skills as well as English communication (covering GAT) than students' subject knowledge (covering O-NET). The three determinants (transformational leadership, teacher quality, and school facilities)could sufficiently explain the GAT score at 75 percent of total variance (R^2 = .750) whereas the remaining 25 percent of deviations derived from other independent variables which were not included in this study.

3) To explore the influence of transformational leadership and school facilities on teacher quality

As mentioned in one of the research objectives, it was expected that both transformational leadership and school facilities should have the potential to promote teacher quality. However, the test results indicated that transformational leadership was not statistically significant in relation to teacher quality, whereas the school facilities were. In other words, the teachers felt that their existing capability and superiority were not driven strongly by the transformational leadership of the school principals. However, they did believe that 43 percent of their excellence derived from school facilities. Other factors apart from these two determinants also played a major role in developing teacher quality according to their views. Nonetheless, to prevent any misunderstanding, it is essential to mention that these data were only applicable during the time period in which the survey was launched. These conclusions can either continue to be true or change depending on the conditions in the future.

5.1.3 Summary of the Findings Based on the Research Objectives from the Path Analysis

The results of the causal effect of predictors on the O-NET and GAT scores revealed that teacher quality had a direct effect on the O-NET and GAT scores, accounting for 50 and 71.2 percent of the total variance. By the same token, school facilities also had a direct impact on the O-NET and GAT scores and teacher quality at around 43, 27.5 and 43 percent of the total variance, respectively. Moreover, school facilities also had a indirect effect on education quality as well. By passing

from teacher quality to education quality, the indirect impact on both O-NET and GAT was around 22 and 31 percent of variance, respectively.

In sum, transformational leadership had no effect on either education quality or teacher quality. On the contrary, this study revealed the considerably direct effect of teacher quality and school facilities on education quality (O-NET and GAT scores). More than that, school facilities also had an indirect effect on education quality through teacher quality as well. The total effect that school facilities had on both O-NET and GAT scores was 64.4 and 58 percent, respectively while teacher quality had a direct impact on O-NET and GAT scores at 50 and 71.2 percent of total variance.

5.2 Conclusions of the Study

This study quantitatively investigated the key determinants of education quality in secondary schools by using primary data from teacher surveys of 149 schools in Bangkok. In this study, the O-NET and GAT scores were selected as the indices of education quality. The studied information and variables included the teacher's demographic profile, education background, work experiences, teaching style and proficiency, professional training and development, school facilities, and transformational leadership. The determinants of education quality were identified statistically using SPSS Software.

According to the statistical testing results, they surprisingly revealed that the transformational leadership of the school principal had no significant relationship with the teacher or education qualities. On the contrary, teacher quality and school facilities had a remarkable influence on education quality, as expected. Moreover, school facilities also affected directly teacher quality, which consequently influenced education quality as a whole. Based on both the direct and indirect effects, teacher quality showed the most influence on education quality in terms of the students' GAT score, whereas, school facilities played a major role in the education quality in terms of the students' O-NET score. For a better understanding, Figure 5.1 demonstrates the relationship between the key

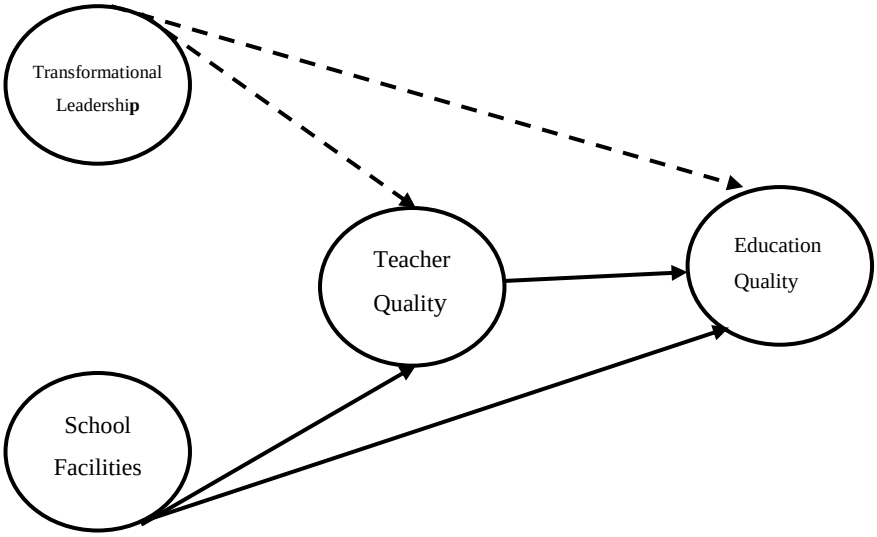


Figure 5.1 Model of Key Determinants of Education Quality in Secondary Schools in Bangkok

determinants and education quality. Hence, both teacher quality and school facilities are currently the key determinants in education quality.

5.3 Contribution of the Findings

Education quality is one of the crucial issues that every sector, both public and private, in Thailand has to be concerned about seriously. With today's globalization, the education quality of each nation is considered as a competitive advantage of its homeland. As a result, many researchers worldwide have attempted to identify the key factors that can significantly improve and enhance the education quality in their countries. Thailand is not exempted from this strategic action either. The findings from this study will fulfill the important need to clarify the factors affecting Thai education quality so that the concerned parties or organizations can effectively decide, plan, and launch the necessary measures to improve the quality of the nation's education system and consequently produce human resources that are able to compete with foreign rivals in the global market.

5.3.1 Academic Contributions

This dissertation covered vast areas of human resource development, specifically transformational leadership styles and from management perspectives, i.e., organization behavior in terms of attitude toward job, and professional training and development. Moreover, strategic management was also clarified in this study in terms of planning, setting vision, sharing objectives, achieving the setting objectives, and quality management. This study constructed and unified the concept of the framework based on Bass's leadership concept and quality management concept, both of which are able to be applied to all types of organization including schools, SMEs, hotels, and so forth.

Among the three key determinants tested, i.e., transformational leadership, teacher quality, and school facilities, only transformational leadership showed no statistically-significant relationship with either teacher quality or education quality. This is in contrast to Chapter 2, the literature review, in which many researches and scholars (most in developed countries) indicated that there was a very convincing relationship between transformational leadership and organizations performance. This is understandable since the situation, condition, and attitude of the school principals in Thailand, which is still a developing country, are different from those in developed countries. Transformational leadership is everything about inspiration, goal commitment, motivation, influence, trust, achievement, rationale, confidence, a sense of belonging, and so forth. Transformational leaders are also capable of coping with change, continuing to pursue goals, and making abstractions concrete; in other words, making the setting of goals a reality. As stated in Chapter 2, training is one of the important factors that can promote the transformational leadership of school principals. Unfortunately, principals in Thailand seem to be limited in terms of being able to access this channel as compared to those in developed countries for several reasons, such as an insufficient budget, overloaded routine work, aging, etc. Together with the Thai tradition of seniority, Thai principals tend to underemphasize their transformational leadership. As a consequence, the role of the principals related to their transformational leadership does not have as much impact on education quality as it should, in agreement with the findings in this study.

Most research and dissertations conducted in Thailand have focused on the transformational leadership of school principals or education administrators, and have discovered excellent transformational leadership in the studied schools. However, according to the literature review, there has been no study relating transformational leadership to school performance. Among several examinations which upper-level secondary school students are typically taking, the O-NET and GAT scores are the best indicators of education quality in Bangkok in terms of reflecting education quality. Measuring with the same testing criteria, the good thing is that schools can assess and evaluate their positions. Additionally, active principals can design their strategies to compete with their competitors, i.e. public schools, private schools, demonstrating schools, within their sector and across sectors.

5.3.2 Management and Organizational Contributions

From the aspect of the contribution of management and the organization, this study could be beneficial to both public and private schools. This study has explored the key determinants of education quality. At least this study has been able to demonstrate some of the key factors of education quality, i.e. school facilities and teacher quality, that have profound effects on the overall quality of education. Therefore, education-related agencies should pay more attentions to these two determinants.

The results from this study indicate that school principals should realize the importance of the professional development of teachers. Therefore, principals can promote their teachers' quality by providing appropriate programs. By the same token, teachers can develop themselves to be value assets, and should engage in professional training.

Nowadays, schools, both public and private, are very competitive, especially private schools. Principals have to adapt themselves to cope with rapid change. Going back 10 years, it can be remembered that personal computers or laptops employed in learning and teaching processes were rarely seen. Teachers, textbooks, and blackboards were enough for teaching and learning processes. Today, textbooks and blackboards are not enough—principals need to seek appropriate and modern equipment and technology to assist both teachers and learners. It is also important for

private school principals to find out how to create sustainable competitive advantages that can attract students to study in their schools.

Investment in human capital is also crucial for intensive competition. Schools will be nothing if there are no qualified teachers. This study has pointed out clearly that teacher quality is another key determinant of education quality. Therefore, school principals should properly design their human resource management, which covers planning, recruitment, selection, maintaining, and development processes. HR planning is the upstream of education quality; therefore, principals need strategic planning skills to attract the right people, for the right subjects, with the right skills and at the right time. The most compelling evidence why some schools, both public and private, are confronting the problem of surplus demand is the number of applicants exceeds the quota every year, whereas some schools has never experienced this problem.

Even though the results from this study indicated that at present transformational leadership did not have any significant impact on education quality, this determinant should not be overlooked or neglected. The Royal Thai Government should observe those in developed countries and prepare the nation to be ready when the local society has changed to a western lifestyle, where the school principal will play an important role in school development. At present, the Minister of Education and related agencies should begin and continuously provide necessary training or workshops for school principals so that their vision and attitude toward school management can be improved. Nonetheless, it would not be wise if Thailand totally followed the education system and management of other countries without any modification or adaptation since the attitude, tradition, and culture of Thai people are different from those of other people.

5.4 Future Research

This study aimed to investigate the overall upper-secondary schools in the Bangkok metropolitan area to verify the key determinants of education quality. Hence, all schools were treated equally regardless of any possible differences among them. In other words, public schools under the OBEC or BMA, private schools under

the OPEC, and demonstrating schools under the OHEC may have dissimilar internal management and environments that may have affected the selected independent variables, i.e., transformational leadership, teacher quality, and school facilities, as well as the dependent variable of education quality in terms of O-NET and GAT scores. Hence, it would be interesting to further investigate this issue and to take these differences into account.

In addition, the multiple regression equations derived in this study, even though they successfully provided reliable correlations between the selected independent variables and dependent variable (expressed in terms of O-NET and GAT scores) with the coefficients of determination (R^2) of .618 and .750 for the O-NET and GAT scores, respectively, they can still be further improved. Other independent variables, particularly regarding the aspects of the student, such as family background, student attitude, and perception, etc., might also play a significant role in education quality in addition to those selected in this study.

Finally, if it is possible, this kind of test should be repeatedly conducted at appropriate time intervals, such as every3 to 5 years, in order to observe the development of Thai education quality and key determinants. More sets of systematic data will allow responsible parties to observe the progression of education quality as well as the changes in its key factors/determinants so that proper policies, strategies, and action plans can be established and launched to continuously improve the education quality of the nation, which is the researcher' s wholehearted intention.

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APPENDICES

APPENDIX A

CONSENT LETTER

คณะรัฐประศาสนศาสตร์
สถาบันบัณฑิตพัฒนบริหารศาสตร์
คลองจั่น บางกะปิ กทม. ๑๐๒๔๐

กรกฎาคม ๒๕๕๗

เรื่อง ขอความอนุเคราะห์ข้อมูลผลคะแนนONETและ คะแนน GAT ของโรงเรียนมัธยมปลายในกรุงเทพมหานคร

เรียน ผู้อำนวยการสถาบันทดสอบทางการศึกษาแห่งชาติ

เนื่องด้วย นางสาวพิมสิริ ภู่ตระกูล นักศึกษาหลักสูตรปรัชญาดุษฎีบัณฑิต (การบริหารการพัฒนา) หลักสูตรนานาชาติ คณะรัฐประศาสนศาสตร์ สถาบันบัณฑิตพัฒนบริหารศาสตร์ ได้รับอนุมัติให้ทำวิทยานิพนธ์เรื่อง “Key Education Quality Determinants in Thai Secondary Schools in Bangkok” โดยมี รศ.ดร. จินดาลักษณ์ วัฒนสินธุ์ เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ซึ่งมีวัตถุประสงค์เพื่อศึกษาองค์ประกอบต่างๆที่คาดว่ามีผลต่อคุณภาพการศึกษาในภาพรวมเพื่อสามารถนำไปสู่การสร้างโมเดลการพัฒนาคุณภาพการศึกษาของไทยในอนาคต

ด้วยเหตุนี้ ผู้วิจัยมีความจำเป็นอย่างยิ่งที่จะต้องขอความอนุเคราะห์ในข้อมูลผลคะแนน ONET และคะแนน GATของมัธยมปลายปีที่ ๖ในของแต่ละโรงเรียนมัธยมปลายในกรุงเทพมหานคร เพื่อประกอบการทำวิทยานิพนธ์ในเรื่องดังกล่าวให้เป็นผลสำเร็จ และเพื่อเป็นแนวทางปฏิบัติให้แก่โรงเรียนทั่วไป คณะรัฐประศาสนศาสตร์ จึงเรียนมาเพื่อขอความอนุเคราะห์จากท่านในการจัดหาข้อมูลผลคะแนนONET และ GAT ของมัธยมปลายปีที่๖ โดยข้อมูลที่รวบรวมได้จะถูกเก็บไว้เป็นความลับและใช้เพื่อประโยชน์ในการดำเนินงานวิจัยเท่านั้น ทั้งนี้นักศึกษาจะเป็นผู้ติดต่อประสานงานกับท่านด้วยตนเอง หรือหากหน่วยงานของท่านประสงค์จะติดต่อกับนักศึกษาเพื่อขอทราบรายละเอียดเพิ่มเติม ขอความกรุณาติดต่อโดยตรงที่หมายเลขโทรศัพท์ ๐๘๔-๐๕๐-๓๒๒๓ และ Email address ที่ mercy.hcu@gmail.com

จึงเรียนมาเพื่อขอความอนุเคราะห์จากท่านและข้อมูลที่ได้รับจะนำไปใช้เป็นเพื่อประโยชน์ในการดำเนินงานวิจัยเท่านั้น ทั้งนี้นักศึกษาจะเป็นผู้ติดต่อประสานงานกับหน่วยงานของท่านและหวังเป็นอย่างยิ่งว่าคงได้รับความอนุเคราะห์จากท่านเป็นอย่างดี จึงขอขอบคุณล่วงหน้ามา ณ โอกาสนี้

ขอแสดงความนับถือ

พิมสิริ ภู่ตระกูล

APPENDIX B

CONSENT LETTER TO NATIONAL INSTITUTE OF EDUCATIONAL TESTING SERVICES FOR O-NET AND GAT SCORES

คณะรัฐประศาสนศาสตร์
สถาบันบัณฑิตพัฒนบริหารศาสตร์
คลองจั่น บางกะปิ กทม. ๑๐๒๔๐

กรกฎาคม ๒๕๕๗

เรื่อง ขอความอนุเคราะห์ข้อมูลผลคะแนนโอเน็ตและ คะแนน GATของโรงเรียนมัธยมปลายในกรุงเทพ
เรียน ผู้อำนวยการสถาบันทดสอบทางการศึกษาแห่งชาติ
สิ่งที่แนบมาด้วย ๑. เค้าโครงร่างดุษฎีนิพนธ์เรื่อง “Key Education Quality Determinants Thai Secondary Schools in Bangkok”

เนื่องด้วย นางสาวพิมสิริ ภู่ตระกูล นักศึกษาหลักสูตรปรัชญาดุษฎีบัณฑิต (การบริหารการพัฒนา) หลักสูตรนานาชาติ คณะรัฐประศาสนศาตร์ สถาบันบัณฑิตพัฒนบริหารศาสตร์ ได้รับอนุมัติให้ทำวิทยานิพนธ์เรื่อง “Key Education Quality Determinants: In Thai Secondary Schools” โดยมี รศ.ดร. จินดาลักษณ์ วัฒนสินธุ์ เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์ซึ่งมีวัตถุประสงค์เพื่อศึกษาองค์ประกอบต่างๆที่คาดว่ามีผลต่อคุณภาพการศึกษาในภาพรวมเพื่อสามารถนำไปสู่การสร้างโมเดลการพัฒนาคุณภาพการศึกษาของไทยในอนาคต

ด้วยเหตุนี้ ผู้วิจัยมีความจำเป็นอย่างยิ่งที่จะต้องขอความอนุเคราะห์ในข้อมูลผลคะแนนโอเน็ตของมัธยมปลายปีที่ ๖ในกลุ่มสาระดังต่อไปนี้ ๑. ภาษาไทย ๒.สังคมศึกษา ศาสนาและวัฒนธรรม ๓.ภาษาต่างประเทศ (ภาษาอังกฤษ) ๔. คณิตศาสตร์ ๕. วิทยาศาสตร์และผลคะแนน GAT ของมัธยมปลายปีที่ ๖ ของแต่ละโรงเรียนมัธยมปลายในกรุงเทพมหานคร เพื่อประกอบการทำวิทยานิพนธ์ในเรื่องดังกล่าวให้เป็นผลสำเร็จ และเพื่อเป็นแนวทางปฏิบัติให้แก่โรงเรียนทั่วไป

คณะรัฐประศาสนศาสตร์ จึงเรียนมาเพื่อขอความอนุเคราะห์จากท่านในการจัดหาข้อมูลผลคะแนนโอเน็ตและผลคะแนน GATของมัธยมปลายปีที่๖ โดยข้อมูลที่รวบรวมได้จะถูกเก็บไว้เป็นความลับและใช้เพื่อประโยชน์ในการดำเนินงานวิจัยเท่านั้น ทั้งนี้นักศึกษาจะเป็นผู้ติดต่อประสานงานกับท่านด้วยตนเอง หรือหากหน่วยงานของท่านประสงค์จะติดต่อกับนักศึกษาเพื่อขอทราบรายละเอียดเพิ่มเติม ขอความกรุณาติดต่อโดยตรงที่หมายเลขโทรศัพท์ ๐๘๔-๐๕๐-๓๒๒๓

จึงเรียนมาเพื่อขอความอนุเคราะห์จากท่านและข้อมูลที่ได้รับจะนำไปใช้เป็นเพื่อประโยชน์ในการดำเนินงานวิจัยเท่านั้น ทั้งนี้นักศึกษาจะเป็นผู้ติดต่อประสานงานกับหน่วยงานของท่านและหวังเป็นอย่างยิ่งว่าคงได้รับความอนุเคราะห์จากท่านเป็นอย่างดี จึงขอขอบคุณล่วงหน้ามา ณ โอกาสนี้

ขอแสดงความนับถือ

พิมสิริ ภู่ตระกูล

APPENDIX C

QUESTIONNAIRE

School Name: _____

Questionnaire

Description: This questionnaire consists of 6 pages, including this cover page. The purpose of this questionnaire is to investigate the influence of leadership on the alteration of teacher quality and school conditions, including the classroom and teaching facilities that affect education quality. This study does not intend to evaluate the performance of any specific person or school. **This study only explores the overall prospect of education quality leading to the development of national education quality. The individual's responses to the questionnaire will be treated confidently and will not be able to be related to or describe identifiable characteristics of the respondent or school.** Therefore, your honest answers and opinions to the questions in this survey will be very much appreciated and will play an important role in the development of the education quality in Thailand in the future.

Please answer the following questions as accurately as possible.

Part 1 Demographic and School Background Information

1. Gender ☐ Female ☐ Male

2. Age ☐ 25-30 ☐ 31-35 ☐ 36-40 ☐ 41-45 ☐ 46-50 ☐ 51-55 ☐ 56 -60

3. Academic qualification ☐ Bachelor degree from _____ Field of Study_____

☐ Master degree from _____ Field of study_____

☐ Ph.D. degree from _____ Field of study_____

4. Length of service in teaching career _____ year(s)

5. Length of service at current school _____ year(s)

6. Responsible learning group at current school

☐ Thai language learning group ☐ Mathematics learning group

☐ Science learning group ☐ Social study, religion, and culture learning group

☐ Foreign language learning group

7. Responsible subjects at current school: 1) _____ 2) _____ 3) _____

8. Average O-NET score of the current school: 2013-Academic Year _____ 2012-Academic Year _____

9. Average LAS score of the current school: 2013-Academic Year _____ 2012-Academic Year _____

Part 2 Professional Development

1. During the last 12 months, you have participated in outside seminars or trainings _____ time(s)

2. During the last 12 months, you have participated in teacher-career development workshops _____ time(s)

3. During the last 12 months, you have been to learning centers _____ time(s)

4. During the last 12 months, your school has invited external experts to give a special lecture to teaching staffs _____ time(s)

5. During the last 12 months, your school has sent the students to join the basic subject contest activities _____ times and receive the awards _____ time(s)

	Strongly Disagree									Strongly Agree
Part 3 Teacher Career Perception and Attitudes	1	2	3	4	5	6	7	8	9	10
1. Participating in trainings is necessary for the teacher's profession.										
2. Most of the training is focused on strengthening knowledge and teaching skills.										
3. Knowledge obtained from the training will be applied in teaching development.										
4. In your viewpoint, you are satisfied with the school's trainings on strengthening knowledge and teaching skills.										
5. Occasionally, the trainings you taken are to fulfill the KPI obligations.										
6. You are proud to be a teacher.										
7. You will be in your career until retirement.										
8. You are always well-organized and prepared for class.										
9. You attempt to make students clearly understand the class content.										
10. Your students gained knowledge and understanding after the class.										
11 You generally have a test or quiz in class to assess student learning.										
12. Students in class always participate in answering your questions.										
13. You always give current examples in class.										
14. You always assign students to do some activities in class.										
15. You use various teaching techniques while teaching.										
16. The class atmosphere is nice.										
17. You give advice, monitor, and pay more attention to low-performance students closely.										
18. Students discuss and share different points of view in class.										
19. You encourage students to use ICT in class presentations.										
20. You often use computer-assisted instruction (CAI) in class.										

	Strongly Disagree									Strongly Agree
Part 4 School Facilities and Environment	1	2	3	4	5	6	7	8	9	10
1. The buildings are in good condition.										
2. The classrooms are well furnished and clean.										
3. Instructional media are up to date, and ready to use.										
4. The ambient light in the class is of appropriate brightness.										
5. The AC and electric fans are in good condition.										
6. The desks and chairs in the class are in good condition.										
7. The classrooms are comfortable and have enough space for class activities.										
8. The teachers' rooms have a nice environment.										
9. The schools have good security and safety measure systems.										
10. The school library is modern and informative.										
11 The school library is equipped with modern instruments accessible to sources of knowledge.										
12. Most students use the library for acquiring the knowledge and information needed for accomplishing assigned reports or projects.										
13. The library is an important element that supports your teaching.										
14. The acquisition of instruments, didactic facilities, and textbooks fulfills the need of teachers and students.										
15. Most science and foreign language classes are taught in scientific and language laboratories, respectively.										
16. Laboratories are in good condition and spacious, with proper lighting.										
17. Laboratory instrument are in good condition and are ready to use.										
18. Didactic devices and instrument media are sufficient for all students.										

	Strongly Disagree									Strongly Agree
Part 4 School Facilities and Environment	1	2	3	4	5	6	7	8	9	10
19. Teachers and students can always access the Internet and WiFi.										
20. You encourage and support students to inquire additional knowledge from online databases to do their assignments.										
21. The Internet and WiFi are very important for you to prepare for class teaching.										
22. The ICT system in the school is modern and accessible most of the time.										
23. Teachers and students can always communicate via electronic communications such as e-mail, Facebook, Line, etc.										
24. You think your school principal can accomplish most targeted goals and objectives										
25. Your school's principal is a very capable person as well as a good role model										
26. You feel fortunate to have an opportunity to work with your school principal.										
27. The school's principal is open minded and accepts new solutions, as well as, realizes differences in the teachers' performance individually.										
28. Your school's principal always motivates, inspires, and encourages teachers to achieve their goals.										
29. Part of your achievements derives from your principal's support and assistance.										
30. All teachers and personnel clearly know and understand the school's goals and objectives.										
31. Most teachers consult the school's principal when facing problems and difficulties.										
32. Your school's principal allows each follower to perform freely and to his/her utmost ability.										
33. You think that your school's principal is rational.										
34. Your school's principal is always willing to give counsel and advice for problem solving when you are in trouble.										
35. All teachers and personnel are always involved in the school's planning, vision establishing, and objective setting.										

Additional opinion_____

Thank you very much for your time and cooperation. All your information will be kept strictly confidential.

APPENDIX D

STATISTICAL OUTPUTS FROM SPSS

Demographic respondent

sex1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	female	89	59.7	59.7	59.7
	male	60	40.3	40.3	100.0
	Total	149	100.0	100.0	

age_2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25-30 year	27	18.1	18.1	18.1
	31-35 year	24	16.1	16.1	34.2
	36-40 year	22	14.8	14.8	49.0
	41-45 year	10	6.7	6.7	55.7
	46-50 year	7	4.7	4.7	60.4
	51-55 year	33	22.1	22.1	82.6
	56-60 year	26	17.4	17.4	100.0
	Total	149	100.0	100.0	

edu_3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	bachelor degree	80	53.7	53.7	53.7
	master degree	66	44.3	44.3	98.0
	doctoral degree	3	2.0	2.0	100.0
	Total	149	100.0	100.0	

Working Experience

Descriptives

			Statistic	Std. Error
careeryear_4	Mean		18.834	.9780
	95% Confidence Interval for Mean	Lower Bound	16.901	
		Upper Bound	20.767	
	5% Trimmed Mean		18.702	
	Median		18.000	
	Variance		142.513	
	Std. Deviation		11.9379	
	Minimum		1.0	
	Maximum		44.0	
	Range		43.0	
	Interquartile Range		22.0	
	Skewness		.118	.199
	Kurtosis		-1.332	.395
yrsintheschl_5	Mean		13.604	.8732
	95% Confidence Interval for Mean	Lower Bound	11.878	
		Upper Bound	15.330	
	5% Trimmed Mean		13.115	
	Median		11.000	
	Variance		113.619	
	Std. Deviation		10.6592	
	Minimum		1.0	
	Maximum		38.0	
	Range		37.0	
	Interquartile Range		19.0	
	Skewness		.547	.199
	Kurtosis		-.885	.395

Teachers' Attitude toward Training

Descriptives				
			Statistic	Std. Error
TA1	Mean		8.72	.119
	95% Confidence Interval for Mean	Lower Bound	8.50	
		Upper Bound	8.97	
	5% Trimmed Mean		8.88	
	Median		9.00	
	Variance		2.087	
	Std. Deviation		1.444	
	Minimum		3	
	Maximum		10	
	Range		7	
	Interquartile Range		2	
	Skewness		-1.176	.199
	Kurtosis		1.285	.396
TA2	Mean		7.99	.129
	95% Confidence Interval for Mean	Lower Bound	7.77	
		Upper Bound	8.28	
	5% Trimmed Mean		8.14	
	Median		8.00	
	Variance		2.469	
	Std. Deviation		1.571	
	Minimum		2	
	Maximum		10	
	Range		8	
	Interquartile Range		2	
	Skewness		-.898	.199
	Kurtosis		1.410	.396
TA3	Mean		8.01	.123
	95% Confidence Interval for Mean	Lower Bound	7.76	
		Upper Bound	8.25	
	5% Trimmed Mean		8.10	
	Median		8.00	
	Variance		2.238	
	Std. Deviation		1.496	
	Minimum		3	
	Maximum		10	
	Range		7	
	Interquartile Range		2	
	Skewness		-.741	.199
	Kurtosis		.490	.396

Descriptives				
			Statistic	Std. Error
TA4	Mean		7.60	.111
	95% Confidence Interval for Mean	Lower Bound	7.38	
		Upper Bound	7.82	
	5% Trimmed Mean		7.71	
	Median		8.00	
	Variance		1.833	
	Std. Deviation		1.354	
	Minimum		3	
	Maximum		9	
	Range		6	
	Interquartile Range		2	
	Skewness		-1.109	.199
	Kurtosis		.673	.396
TA5	Mean		7.70	.136
	95% Confidence Interval for Mean	Lower Bound	7.43	
		Upper Bound	7.97	
	5% Trimmed Mean		7.82	
	Median		8.00	
	Variance		2.755	
	Std. Deviation		1.660	
	Minimum		2	
	Maximum		10	
	Range		8	
	Interquartile Range		2	
	Skewness		-1.100	.199
	Kurtosis		1.349	.396

Teaching style and proficiency

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
having quiz in class	149	4	10	8.52	1.324	-1.009	.199	.664	.395
using questions and answer in class	149	1	10	7.14	1.611	-1.038	.199	1.229	.395
you give contemporary examples for class content	149	5	10	8.85	1.076	-.907	.199	.779	.395
assigning some activities in class	149	4	10	8.21	1.358	-.774	.199	.565	.395
using various of techniques	149	4	10	7.99	1.211	-.658	.199	.736	.395
atmosphere is pleasant	149	3	10	8.23	1.372	-1.164	.199	2.093	.395
advising, monitoring for under performance students	149	4	10	7.84	1.415	-.814	.199	.673	.395
student share and discuss in class	149	2	10	7.55	1.548	-.973	.199	1.546	.395
you encourage students to use ICT in class presentation	149	1	10	7.97	1.914	-.916	.199	1.154	.395
you often use CAI in class	149	1	10	6.34	2.468	-.612	.199	-.348	.395
Valid N (listwise)	149								

Training in last academic year

Descriptives

		Statistic	Std. Error
outsidetraining	Mean	3.87	.209
	Std. Deviation	2.548	
	Minimum	0	
	Maximum	10	
	Interquartile Range	4	
	Skewness	.714	.199
	Kurtosis	-.058	.395
workshop	Mean	2.55	.179
	Std. Deviation	2.180	
	Minimum	0	
	Maximum	12	
	Interquartile Range	3	
	Skewness	1.680	.199
	Kurtosis	3.445	.395
fieldtrip	Mean	1.93	.088
	Variance	1.158	
	Std. Deviation	1.076	
	Minimum	0	
	Maximum	5	
	Interquartile Range	1	
	Skewness	.762	.199
	Kurtosis	1.100	.395
guestspeakers	Mean	2.67	.180
	Variance	4.830	
	Std. Deviation	2.198	
	Minimum	0	
	Maximum	15	
	Interquartile Range	2	
	Skewness	2.308	.199
	Kurtosis	8.324	.395

O-NET and GAT Scores

Descriptives

			Statistic	Std. Error
onet14	Mean		34.8854	.61675
	95% Confidence Interval for Mean	Lower Bound	33.6666	
		Upper Bound	36.1041	
	5% Trimmed Mean		34.3243	
	Median		32.0500	
	Variance		56.677	
	Std. Deviation		7.52839	
	Minimum		22.87	
	Maximum		59.78	
	Range		36.91	
	Interquartile Range		10.32	
	Skewness		1.099	.199
	Kurtosis		.748	.395
Gat2	Mean		51.0730	1.09826
	95% Confidence Interval for Mean	Lower Bound	48.9027	
		Upper Bound	53.2432	
	5% Trimmed Mean		51.0585	
	Median		49.2400	
	Variance		179.719	
	Std. Deviation		13.40592	
	Minimum		17.95	
	Maximum		82.63	
	Range		64.68	
	Interquartile Range		21.59	
	Skewness		.182	.199
	Kurtosis		-.616	.395

Descriptive Statistical Results for School Facility

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
building is good condition	149	3	10	8.09	1.416
classroom is good condition	149	4	10	8.08	1.417
teaching equipment are modern	149	1	10	7.46	2.126
classroom is equipped with proper light	149	1	10	7.79	1.608
electric fan and A/C are in good conditions	149	1	10	7.83	1.916
desk and chairs in class are good conditions	149	1	10	7.96	1.845
classroom are comfort and have enough space for class activities	149	1	10	7.73	2.029
teacher rooms are in good condition	149	1	10	7.97	1.925

]

Descriptive Results for Didactic Resources

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
school library is modern	149	1	10	7.76	1.880	-1.097	.199	1.344	.395
library is equipped with modern instruments accessible to source of knowledge	149	1	10	7.63	1.988	-1.209	.199	1.649	.395
library has update textbooks	149	1	10	7.77	1.737	-1.066	.199	1.484	.395
most students us library for acquiring knowledge	148	1	10	7.03	1.946	-.901	.199	.807	.396
library is an important thing to support your teaching	149	1	10	6.95	2.110	-.712	.199	.229	.395
acquisition of instruments, didactic facilities, and textbooks	149	1	10	7.64	1.790	-1.149	.199	1.774	.395
most science and English are taught in labs	149	2	10	7.57	1.828	-.770	.199	.426	.395
laboratories are in good condition	149	1	10	7.41	1.697	-.814	.199	1.042	.395
laboratories instruments are in good conditions and ready to use	149	1	10	7.34	1.770	-.718	.199	.674	.395
Didactic devices and instruction media are sufficient for all students	149	1	10	7.33	2.081	-1.026	.199	1.265	.395
teachers and students can access internet and Wifi at any time	149	1	10	7.35	2.165	-1.006	.199	.800	.395
you encourage students to acquire knowledge from online database	149	3	10	7.97	1.392	-.686	.199	.754	.395
internet and Wi-Fi are very important for you to prepare for class teaching	149	2	10	8.09	1.539	-.712	.199	.768	.395
ICT system is up to date and accessible all the time	149	1	10	7.44	1.897	-.875	.199	1.127	.395
teacher and students usually use e-mail face book, or lines to communicate	149	1	10	7.99	1.847	-1.222	.199	1.830	.395
most teachers in school have sufficient skills in using ICT media and device	148	4	10	7.51	1.421	-.028	.199	-.750	.396
Valid N (listwise)	147								

Descriptive Results for Transformational Leadership

	N	Min	Max	Mean	S.D	Skewness		Kurtosis	
					Statistic	Statistic	Std. Error	Statistic	Std. Error
school principal can accomplish most of goals and objectives	149	1	10	7.69	1.823	-1.194	.199	1.640	.395
school principal is very capable and is your role model	149	1	10	7.51	1.905	-.693	.199	.817	.395
you are very lucky to work with the principal	149	1	10	7.83	1.802	-.903	.199	.758	.395
principal is open minded to new idea and accept new solutions which differ	149	1	10	8.03	1.799	-.941	.199	.815	.395
your principal always motivate, inspire, and encourage you	149	1	10	7.99	1.968	-1.253	.199	1.944	.395
part of your achievements comes from principal support	149	1	10	7.87	2.062	-1.317	.199	1.896	.395
teachers and personnel understand intended goals and objectives of school	149	4	10	8.01	1.470	-.644	.199	.117	.395
most of teachers will consult principal when facing the problems	149	1	10	6.91	2.148	-.710	.199	.442	.395
principal allow teacher to perform freely	149	1	10	7.88	1.863	-1.041	.199	1.237	.395
principal is rationale	149	1	10	7.98	1.847	-.863	.199	.447	.395
principal is willing to advise for problem solving	149	1	10	8.07	1.973	-1.350	.199	2.135	.395
all teachers and personnel participate in formulating vision and objectives	149	1	10	7.97	1.869	-1.172	.199	1.621	.395
Valid N (listwise)	149								

Factor Analysis

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.712
Bartlett's Test of Sphericity	Approx. Chi-Square	144.214
	df	3
	Sig.	.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.168	72.270	72.270	2.168	72.270	72.270
2	.448	14.945	87.215			
3	.384	12.785	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
school principal can accomplish most of goals and objectives	.741
school principal is very capable and is your role model	.706
you are very lucky to work with the principal	.822

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Factor Analysis Inspiration attribute

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.686
Bartlett's Test of Sphericity	Approx. Chi-Square	244.700
	df	3
	Sig.	.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.384	79.454	79.454	2.384	79.454	79.454
2	.436	14.533	93.987			
3	.180	6.013	100.000			

Extraction Method: Principal Component Analysis.

Factor Analysis Intellectual attribute

Communalities

	Initial	Extraction
principal allow teacher to perform freely	1.000	.884
principal is rationale	1.000	.912
princial is willing to advise for problem solving	1.000	.893

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.689	89.648	89.648	2.689	89.648	89.648
2	.179	5.970	95.618			
3	.131	4.382	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
principal allow teacher to perform freely	.885
principal is rationale	.936
princial is willing to advise for problem solving	.932

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Factor Analysis Results for Individual attributes

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.706
Bartlett's Test of Sphericity	Approx. Chi-Square	188.245
	df	3
	Sig.	.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.279	75.975	75.975	2.279	75.975	75.975
2	.454	15.148	91.122			
3	.266	8.878	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
principal is open minded to new idea and accept new solutions which differ	.905
most of teachers will consult principal when facing the problems	.801
all teachers and personnel participate in formulating vision and objectives	.688

Extraction Method: Principal Component Analysis.

Factor Analysis Results for Teacher Attitude

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.636
Bartlett's Test of Sphericity	Approx. Chi-Square	71.463
	df	10
	Sig.	.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.884	37.681	37.681	1.884	37.681	37.681
2	.989	19.789	57.470			
3	.943	18.855	76.326			
4	.638	12.758	89.084			
5	.546	10.916	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
proud to be a teacher	.805
being a teacher til retirement	.849
well organized for class	.909
attempt to make student understand	.830
students gain knowledge after class	.683

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Factor Analysis Results for Teacher Style and Proficiency

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.837
Bartlett's Test of Sphericity	Approx. Chi-Square	598.893
	df	78
	Sig.	.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.697	36.132	36.132	4.697	36.132	36.132
2	1.446	11.121	47.253			
3	1.097	8.439	55.692			
4	.966	7.433	63.125			
5	.895	6.887	70.013			
6	.689	5.303	75.316			
7	.635	4.881	80.197			
8	.578	4.443	84.640			
9	.529	4.069	88.709			
10	.440	3.381	92.091			
11	.378	2.909	94.999			
12	.339	2.610	97.609			
13	.311	2.391	100.000			

Extraction Method: Principal Component Analysis.

Continued

Component Matrix[a]

	Component 1
well organized for class	.581
having quiz in class	.570
using questions and answer in class	.152
most students in class attempting to answer your question	.713
you give contemporary examples for class content	.685
assigning some activities in class	.676
using various of techniques	.663
atmosphere is pleasant	.669
advising, monitoring for under perfomance students	.702
student share and discuss in class	.677
teacher use ICT in class	.440
students gain knowledge after class	.573
you encourage students to use ICT in class presentation	.463

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Factor Analysis Result for School Facilities

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.903
Bartlett's Test of Sphericity	Approx. Chi-Square	838.867
	df	28
	Sig.	.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.274	65.925	65.925	5.274	65.925	65.925
2	.633	7.912	73.837			
3	.591	7.384	81.220			
4	.546	6.828	88.048			
5	.308	3.849	91.897			
6	.280	3.498	95.395			
7	.223	2.783	98.178			
8	.146	1.822	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
buliding is good condition	.710
classroom is good condition	.735
teaching equipment are modern	.805
classroom is equipped with proper light	.601
electric fand and A/C are in good conditions	.824
desk and chairs in class are good conditions	.833
classroom are comfort and have enough space for class activities	.725
teacher rooms are in good condition	.715

Factor Analysis Result of Didactics Resources

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.900
Bartlett's Test of Sphericity	Approx. Chi-Square	1445.315
	df	78
	Sig.	.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.194	55.341	55.341	7.194	55.341	55.341
2	1.511	11.621	66.962			
3	.866	6.660	73.623			
4	.713	5.482	79.104			
5	.596	4.583	83.688			
6	.526	4.048	87.735			
7	.391	3.010	90.745			
8	.311	2.390	93.136			
9	.242	1.865	95.001			
10	.223	1.712	96.713			
11	.134	1.032	99.140			
12	.112	.860	100.000			

Extraction Method: Principal Component Analysis	Component
	1
School library is modern	.747
Library is equipped with modern instruments accessible to source of knowledge	.797
Most students us library for acquiring knowledge	781.
Library has update textbooks	.774
Most science and English are taught in labs	.647
Laboratories are in good condition	.788
Liaboratories instruments are in good conditions and ready to use	.749
Didactic devices and instruction media are sufficient for all students	.795
Library is an important thing to support your teaching	.671
You encourage students to acquire knowledge from online database	.754
ICT system is up to date and accessible all the time	.702
Most students have skill and expertise in presenting by ICT	.730

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Results for Pearson Correlation

		TOTALONET	TOTAL_LD	TOTTQ	TOTSFAC
Pearson Correlation	TOTALONET	1.000	.086	.684	.643
	TOTAL_LD	.086	1.000	.073	.327
	TOTTQ	.684	.073	1.000	.430
	TOTSFAC	.643	.327	.430	1.000
Sig. (1-tailed)	TOTALONET	.	.150	.000	.000
	TOTAL_LD	.150	.	.187	.000
	TOTTQ	.000	.187	.	.000
	TOTSFAC	.000	.000	.000	.
N	TOTALONET	149	149	149	149
	TOTAL_LD	149	149	149	149
	TOTTQ	149	149	149	149
	TOTSFAC	149	149	149	149

Coefficients[a]

		Sig.	Collinearity Statistics		Standardized Coefficients	t	Sig		
			B	Std. Error	Beta			Tolerance	VIF
1	(Constant)		-1.789	2.996		-.597	.551		
	TOTTQ		7.022	.390	.830	18.025	.000	1.000	1.000
2	(Constant)		-14.365	3.415		-4.206	.000		
	TOTTQ		6.023	.776	.712	15.526	.000	.815	1.227
	TOTSFAC		2.656	.886	.275	5.991	.000	.815	1.227

a. Dependent Variable: Gat2

Results for Stepwise Multiple Regression Analysis

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18312.862	1	18312.862	324.903	.000[b]
	Residual	8285.513	147	56.364		
	Total	26598.375	148			
2	Regression	19948.016	2	9974.008	218.966	.000[c]
	Residual	6650.359	146	45.550		
	Total	26598.375	148			

a. Dependent Variable: Gat2

b. Predictors: (Constant), TOTTQ

c. Predictors: (Constant), TOTTQ, TOTSFAC

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	58.479	10.362		5.644	.000		
TOTTQ	15.314	1.347	.684	11.367	.000	1.000	1.000
(Constant)	6.556	11.174		.587	.558		
TOTTQ	11.187	1.269	.500	8.814	.000	.815	1.227
TOTSFAC	10.964	1.450	.429	7.560	.000	.815	1.227

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	TOTALLD	.747	1.339
	TOTALSFC	.675	1.481
	TOTALTQ	.827	1.209

a. Dependent Variable: TOTALEQ

Construct Validity

Validity Testing: Confirmative Factor Analysis (Pretest)

Component Matrix[a]

	Component
	1
training in important for teachers	.895
mostly training to increase knowledge and skills	.884
Getting knowledge and skills and training	.894
Applying knowledge from training	.793
Training satisfaction	.810
Training for KPI	.807

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.850	64.161	64.161	3.850	64.161	64.161
2	.708	11.799	75.961			
3	.627	10.450	86.410			
4	.367	6.111	92.521			
5	.320	5.327	97.849			
6	.129	2.151	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Proud to be a teacher	.873
Being teacher until retirement	.811
Preparing teaching before class	.773
teaching dedication	.788
Your student gain knowledge and knowledge and understand after class	.806

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Validity Testing: Confirmative Factor Analysis (Pretest)

Component Matrix[a]

	Component
	1
quizzes during class for assessment	.721
teacher always raise questions during class	.793
students corporate in answering questions	.713
Example providing in teaching	.895
Assigning students for class activities	.748
Assigning exercise after class	.584
teachers return feedback to students' homework or homework checking	.491
teachers have used variety of teaching technique	.829
atmosphere in classroom is not serious	.783
monitoring ,following and extra lecture for poor performance students	.780
students freely express and share their views	.701
You encourage and support student to inquire additional knowledge from online database	.790
You often use computer assisted instruction (CAI) in classes	

Extraction Method: Principal

a. 1 components extracted.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.633	57.553	57.553	8.633	57.553	57.553
2	.996	6.638	64.191			
3	.927	6.178	70.369			
4	.697	4.649	75.018			
5	.635	4.231	79.249			
6	.397	2.644	88.361			
7	.380	2.535	90.896			
8	.325	2.169	93.065			
9	.270	1.798	94.864			
10	.241	1.606	96.470			
11	.216	1.440	97.909			
12	.189	1.261	99.171			
13	.124	.829	100.000			

Construct Validity Pretest

Component Matrix[a]

	Component
	1
modern library in school	.779
modern equipment in lib to access learning source	.678
new and up to date books	.615
students using lib to search new knowledge	.723
library materials are requested by teachers and students	.791
Library is an important element supporting your teaching	.747
science teaching and foreign language is mostly done in labs	.774
language and science labs are in good condition	.813
Equipment in both labs are in usable and ready to use	.862
Didactic devices and instructional media are sufficient for all students	.721
Teacher and students are always access to the internet and WiFi	.701
Teacher and students are always communicate via electronic communication : email, etc	.618
Internet and WiFi are very important for you to prepare for class teaching	.825
no. of equipments and multimedia are sufficient	.721

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.101	51.015	51.015	5.101	51.015	51.015
2	1.063	10.628	61.643			
3	.737	7.368	69.012			
4	.645	6.452	75.464			
5	.613	6.126	81.590			
6	.544	5.444	87.033			
7	.434	4.343	91.376			
8	.355	3.547	94.923			
9	.283	2.832	97.756			
10	.224	2.244	100.000			

Extraction Method: Principal Component Analysis.

Construct Validity Pretest

Component Matrix[a]

	Component
	1
Mostly principals have achieved their goals and objectives	.736
Principals are capable and good role model	.902
Feeling lucky to work with the director	.847

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.944	64.794	64.794	1.944	64.794	64.794
2	.663	22.112	86.906			
3	.393	13.094	100.000			

Extraction Method: Principal Component Analysis.

Construct Validity Pretest

Component Matrix[a]

	Component
	1
Principals always motivate and support teachers working	.733
Part of your succeed comes form principals support and and help	.801
teachers and staffs clearly knows school's objectives	.697

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.074	69.120	69.120	2.074	69.120	69.120
2	.642	21.408	90.528			
3	.284	9.472	100.000			

Extraction Method: Principal Component Analysis.

Construct Validity Pretest

Component Matrix[a]

	Component
	1
Principals let their staffs to work freely	.715
Principals are rational in running business	.844
Principals are willing to provide consultant and guiding when u facing problems	.849

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.664	55.475	55.475	1.664	55.475	55.475
2	.754	25.136	80.610			
3	.582	19.390	100.000			

Extraction Method: Principal Component Analysis.

Construct Validity Pretest

Component Matrix[a]

	Component
	1
Principals are open mind and accept new way to solve problems	.796
Mostly teachers ask for director advice when they facing problems	.806
Teachers and staffs have participated in planning, visions and objective school setting very time	.735

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.824	60.807	60.807	1.824	60.807	60.807
2	.654	21.789	82.596			
3	.522	17.404	100.000			

Extraction Method: Principal Component Analysis.

Reliability Pretest
N=25

Case Processing Summary

		N	%
Cases	Valid	23	92.0
	Excluded[a]	2	8.0
	Total	25	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.923	.985	62

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
training in important for teachers	483.1304	3376.937	.813	.	.920
mostly training to increase knowledge and skills	483.7391	3415.929	.726	.	.920
Getting knowledge and skills and training	483.8261	3469.968	.360	.	.922
Applying knowledge from training	482.8261	3449.968	.727	.	.921
Training satisfaction	483.3913	3427.158	.838	.	.920
Training for KPI	483.0870	3403.447	.833	.	.920
Proud to be a teacher	483.3043	3402.767	.727	.	.920
Being teacher until retire	483.3478	3451.601	.630	.	.921
Preparing teaching before class	483.0870	3498.810	.480	.	.922
teaching dedication	483.1304	3474.391	.629	.	.922
students understanding all what you teach	483.3478	3422.055	.817	.	.920
quizzes during class for assessment	483.4348	3458.348	.673	.	.921

Item-Total Statistics

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
teacher always raise questions during class	483.3478	3439.692	.698	.	.921
students corporate in answering questions	483.6087	3406.522	.717	.	.920
Example providing in teaching	483.3913	3465.522	.598	.	.921
Assigning students for class activities	483.2174	3453.542	.734	.	.921
Assigning exercise after class	483.3478	3437.328	.727	.	.921
being happy in student performance	483.6522	3421.783	.743	.	.920
teachers have used variety of teaching technique	483.2609	3441.474	.713	.	.921
atmosphere in classroom is not serious	483.3913	3456.794	.669	.	.921
monitoring ,following and extra lecture for poor performance students	483.5652	3457.530	.654	.	.921
students freely express and share their views	483.4783	3477.806	.634	.	.922
building in good condition	482.6957	3436.130	.770	.	.921
study rooms are in good condition	483.3478	3445.964	.743	.	.921
teaching equipments are up to date, modern, and ready to use	483.2609	3465.474	.629	.	.921
appropriate light in class	483.1739	3419.787	.804	.	.920
AC and electric fans are in good condition and workable	483.5217	3452.715	.579	.	.921
desk and chair in good condition and workable	483.2174	3456.269	.737	.	.921
study room are roomy enough to do activities	483.2174	3451.269	.710	.	.921
Having good atmosphere in teachers' room	483.2609	3428.838	.806	.	.921
Having school security measure	480.0435	3871.225	-.286	.	.986
modern library in school	483.3043	3462.312	.748	.	.921
modern equipment in lib to access learning source	482.7391	3470.202	.713	.	.921
students using library to search new knowledge	483.0000	3473.545	.727	.	.921
teachers acquire knowledge from library	483.3478	3449.601	.783	.	.921
lib materials are requested by teachers and students	483.2609	3457.838	.678	.	.921
science teaching and foreign language is mostly done in lab	483.3478	3461.510	.747	.	.921
language and science labs are in good condition	483.2609	3444.565	.786	.	.921
equipment in both labs are in usable and ready to use	483.3913	3442.976	.721	.	.921
no. of equipments and multimedia are sufficient	483.2609	3469.020	.734	.	.921

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
teachers and students can access internet wifi all the time	483.4348	3458.984	.687	.	.921
teachers mostly using ICT to teach in class	483.2609	3451.656	.739	.	.921
teachers always encourage students to acquire knowledge by using online	483.4783	3445.988	.750	.	.921
Wifi is important for teachers for teaching preparation	483.3043	3421.040	.847	.	.920
teachers and students can communicate via electronic medium	483.2174	3450.087	.758	.	.921
teachers mostly have skill and proficiency in using ICT	483.4783	3367.352	.894	.	.919
ICT system in school is up to date	482.4348	3447.257	.788	.	.921
students are promoted to use ICT in class presentation	483.1304	3478.119	.767	.	.922
CAI is used in teaching and studying assisting	483.0000	3467.364	.695	.	.921
Mostly students have knowledge and skill in ICT using	483.0870	3480.356	.641	.	.922
Mostly directors have achieved their goals and objectives	483.3478	3454.419	.689	.	.921
Directors are capable and good role model	482.9130	3472.447	.690	.	.921
Feeling lucky to work with the director	483.1304	3439.028	.808	.	.921
Directors are open mind and accept new way to solve problems	482.9565	3442.407	.772	.	.921
Directors always motivate and support teachers working	483.0435	3470.316	.660	.	.921
Part of your succeed comes from directors support and help	483.6087	3506.340	.492	.	.922

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
491.1304	3565.300	59.71014	62

BIOGRAPHY

NAME	Pimsiri Pootrakul.
ACADEMIC BACKGROUND	Bachelor's Degree with a major in Economics from Ramkhamhaeng University, Bangkok, Thailand in 2005 and a Master's Degree in Business and Administration (Marketing), from LaSalle University, Philadelphia, PA, USA. Certificate in Survey Research: Theory and Practice. Certificate in Fundamental of Statistical Application in Research According to International Standard: Theory and Practice. Certificate in Measurement in Social Science Research: International Standard (Theory and Practice). Certificate in Intermediate Statistical Analysis According to International Standard: Theory and Practice.
PRESENT POSITION	Lecturer, Department of Marketing, Faculty of Business and Administration, Hauchiew Chalermprakiet University, Samut Prakan, Thailand.
EXPERIENCES	Coordinator, ASIAN NEWS.

Coordinator, VISNEWS (BANGKOK).

Sale Manager, CHINA NEWS, Philadelphia, PA, USA.

Foreign Affairs Manager, GP Solutions, Ltd.

Foreign Affairs Manager, Growing Point Company.

Key Speaker in Strategic Management, Service Management, Excellent Service, Service Mind, etc. for both public and private sectors.