BANGKOK PROJECT CENTER

Curricular Development at Photharam Technical College

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Abstract

This project focused on making recommendations for possible curricular improvements that would help future graduates of Photharam Technical College (PTC) to be well prepared to enter the rapidly evolving Thai textile industry. PTC is a textile-based vocational school located near several textile factories in Ratchaburi Province, Thailand. We sought to determine the effectiveness of the school's curriculum by analyzing the perceptions of four stakeholders: textile employers, alumni, faculty, and students. Through comparisons of these different viewpoints, we were able to determine areas where the school's curriculum might be enhanced. Furthermore, feedback concerning our findings was obtained from experts in the fields of education, labor, and textiles, which was used to help refine our final recommendations.

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Executive Summary

The Asian economic crisis of the late 1990s resulted in a collapse of the Thai economy. Thailand's economy had expanded and prospered on the availability of low-cost labor and extensive export markets. Due to the down-turning economy and the continued rise of labor wages, labor-intensive industries moved to neighboring countries, such as China and Indonesia, where cheap labor was still widely available. One of the industries hardest hit by the economic downfall was the textile industry.

The Thai textile industry played a critical role in propelling the economy prior to its collapse. It still plays a role in Thailand's economy, but is currently in the process of restructuring. As Thailand attempts to gain the status of a world leader in the manufacture of quality textiles, technology in factories is in the process of being improved to allow for the production of high quality, modern fabrics with minimal labor. Upgrading technology requires not only changes in machinery, but changes in the skills and abilities of the labor force as well. An effective means of facilitating these changes is to begin educating, training, and preparing future employees before they enter the industry.

Workers entering the textile field are usually trained in vocational schools. Industry reforms are likely to progress more rapidly if supplemented by curricular reforms that develop a broader range of skills for students. Such areas are deemed crucial for future success of the Thai Textile industry. Calls have been made that education at the vocational level undergo reform and continue to be evaluated in order to help Thailand continue its recovery in the wake of the economic crisis. However, vocational schools face challenges that limit their ability to independently prepare students adequately for the labor force. Examples include the lack of funds required for schools to upgrade expensive training equipment, such as looms and dyeing machines, or to hire native English speakers, all of which could help in upgrading the knowledge of students and better preparing them for work in the 21st century Thai textile factories. The challenges faced by vocational institutions emphasize the need for cooperation with industry and innovative reform of the curriculum to enhance the education that students receive.

The aim of this project was to explore the textile curriculum of Photharam Technical College (PTC), identify possible areas of concern for the future, and make recommendations intended to enhance student success in the workplace upon graduation. To accomplish this, we searched for differences between stakeholders' perceptions of current abilities of PTC students and opinions of what is most important for students' future in the textile industry. We gathered information from local textile employers, PTC alumni, faculty, and students. We analyzed our data to determine any discrepancies between the perceived skills of Photharam students and those considered important for their future success. Then, we investigated methods of supplementing the Photharam curriculum and enhancing its effectiveness in developing these desired skills. We

intend for our ideas and suggestions to help the Photharam students obtain as much background as possible while in school, in order to have more opportunities and success upon entering the Thai textile industry. While our study focused on one particular Thai vocational school, we intended for our recommendations to be applicable to all such institutions in Thailand.

Research Methodology

We sought to determine what skills are important for students' future success from the perception of four stakeholders: students, faculty, and alumni of Photharam Technical College, and local employers in the textile industry. Interviews and surveys were used in an effort to answer the following research questions:

- What are the strengths and weaknesses in the current vocational school curriculum?
- What skills are necessary for graduates to be successful in the Thai textile industry?
- What steps are currently being taken to adapt vocational school curricula to the needs of industry?
- What are possible methods for improving the skills of future graduates?

To answer to these questions, we proceeded to analyze the survey and interview results with the objective of identifying key areas for reform efforts at the school. Once the specific areas with the largest difference between current and desired skills were determined, we brainstormed ideas, and used interview and questionnaire information to develop suggestions for curricular enhancement at PTC. In order to supplement these ideas we also conducted research on previous similar reforms that have occurred in other countries. Initial suggestions were developed and presented at a workshop to various experts in the fields of labor, education, and textiles. The participants provided feedback on our ideas, which permitted us to refine and finalize recommendations aimed at enhancing the curriculum of the Photharam Technical College.

Findings

Through our research and observations, we learned that PTC has already begun looking towards the future by implementing many new and innovative reforms. It was clear to us that the advantages of the information age, such as specialized computer software, Internet access, and many kinds of visual aids were being used extensively to enhance different areas of the curriculum. We also found that nearly all stakeholders agreed that practical textile skills and corresponding theories taught to students were sufficient for a clean transition to the workplace. However, according to our analysis, there were several skills that could benefit from some improvements. Based on stakeholder data and workshop feedback, we determined that there were five distinct areas where a clear disparity was evident between desired skills and the perceived current skills of students: English language, teamwork, leadership, problem solving,

and mathematics. A sixth area, business, was added based on interviews with school faculty and opinions of experts who attended the workshop. Each of these areas will be described, along with some possible ideas for curricular enhancement.

English Language: Our research showed that proficiency in the English language can increase chances for promotion and facilitate everyday processes in the textile field. Having a better grasp of the English language will help employees to read machine manuals, use computer software, and communicate with technicians and/or higher level management.

Teamwork: In the workplace teams are called upon to cooperate to finish projects within an allotted time. Having good teamwork skills can lead to improved production, creativity, and efficiency. These skills are also helpful in increasing communication between workers and encouraging the sharing of ideas.

Leadership: It is evident that innovative ideas and self sufficient workers are increasingly sought after in the textile industry. With advances in technology, all processes are becoming more automated, which has resulted in an increase in workplace competition. Those employees who have the ability to convey new ideas and take charge in completing tasks will most likely excel and be preferred over others.

Problem Solving: In today's changing economy, good problem-solving skills are essential to maintain and succeed in any job. Having a good grasp on how to solve problems of all varieties can provide a significant advantage over those with little or no ability in this area. From our data, this skill was identified as very important by all stakeholders.

Mathematics: Having a solid grasp of basic mathematical concepts and skills is essential for almost any position working in the textile industry. Many aspects of textile production are dominated by mathematical processes or computations, such as the creation of weaving patterns. Math skills are also necessary for other areas of the industry, such as accounting or marketing.

Business: As factories become more technologically advanced, it is important for workers to possess skills which will set them apart from their peers, to help secure work in the future. In addition to this, graduates with business skills would be better prepared to undertake entrepreneurial endeavors.

Recommendations

Our group hosted a workshop that was attended by representatives from the different stakeholder groups, as well as experts from the Ministry of Labor, Education, and the Thai Textile Institute. We presented our data and proceeded to convey some broad suggestions for improvements in all of the identified problem areas. Our recommendations were purposely general, because we wanted the attendees to have no limitations, express their full views, and give detailed suggestions which we could use to create a module for enhancing the Photharam

Technical College curriculum. The following list of recommendations is a compilation of our proposals coupled with those received during the course of the workshop.

English language enhancement recommendations for PTC:

- Develop a system which rewards any spoken English
- Start an English language tour of the school for foreigners to see the process behind the development of fabric (opportunities for school to sell products as well)--Students would lead tours
- Invite or hire fluent English speakers to the school who could assist teachers and give speeches
- Develop a new English course which is more intensive and meant for advanced students (student entrance is based on grades and teacher recommendations)
- Place more emphasis on students learning textile based vocabulary (technical terms) for manual reading, interactions with technicians, and using specialized computer software. This is for the different textile disciplines and courses available at the school (i.e. weaving, knitting, dying, etc.)
- Coordinate practice interviews and writing resumes in English

Teamwork enhancement recommendations for PTC:

- Expand the SME (Small and medium enterprise) program at the school. Set up student teams to make different product, and a school shop to sell them at
- Host prominent school alumni to give talks and specific examples of teamwork they have been involved with in the workplace. Encourage them to focus on telling students the benefits you can receive in the workplace if you are strong in the following areas:
    - Team dynamics
    - Group problem solving
    - Idea sharing
    - Efficiency (Multi-tasking)
- Encourage peer review. Allow students to correct the work of each other. This is a means for them to interact, communicate, and learn from one another

Leadership enhancement recommendations:

- Presenting completed projects or reports in front of teachers and peers, which can develop public speaking, organizational, and presenting skills
- Providing peer leadership opportunities for older and academically advanced students, which includes creating such programs as:
    - Peer tutor program (tutor younger students)

- Peer advisor program (advise younger students in general educational areas)
- Peer mentor program (help or advise students on issues outside of the classroom setting)

Problem solving enhancement recommendations for PTC:

- Develop student brainstorming techniques
- Use case studies to show methods of looking at things from different perspectives and considering alternative ways of approaching and solving problems (Puzzle-solving)
- Face students with difficult or complicated tasks with no set methodology or single "right" answer

Mathematics enhancement recommendations for PTC:

- Integrate more applied mathematics to textile-based courses
- Introduce marketing and business mathematics to textile-based courses
- Host mathematics competition

Business skills enhancement recommendations for PTC:

- Teach time management, organizational, and planning skills
- Stress or expand business aspect of SME program (Allow students to have more control over business and financial processes)
- Initiate projects in which students get experience in business by including activities such as:
  - Students think of an item that they want to produce
  - Students investigate the market and determine whether their product would be profitable to develop
  - Students develop design specifications and create product while working with a set budget and having complete control over finances and resource allocation
  - Student take part in selling or distributing item(s) that were produced

Conclusion

The Photharam Technical College is an established institution, and one of the very few schools in Thailand providing education for students entering the textile industry, a major revenue producer for the Thai economy. Based on observations and data gathered on the school, we can confidently report that innovative reforms have already begun to be implemented at the school. The director and faculty realize that vocational education is faced with a great challenge, keeping up with a rapidly modernizing industry. The administration of the school

showed great interest and resolve in helping us with our study, so that further enhancements could be made to the curriculum to keep pace with new technology and skill level prevalent in the Thai textile factories. Based on all of the information we gathered, as well as all possible reform possibilities presented, we are very hopeful that our study will be beneficial to the school. While our focus was strictly on PTC, the recommendations are meant to be feasible and applicable to other Thai vocational schools, so students are better prepared and have more opportunities for advancements in the workplace, as well as the capability to contribute to future prosperity in Thailand.

Table of Contents

List of Figures

List of Tables

1 Introduction

The Thai textile industry is currently undergoing a transition from low-skilled labor to value-added labor, fueled by an increase in technology. This transition comes as a direct result of the economic crisis that hit Thailand in the late 1990s. The downfall of the economy came after a decade of prosperity that helped the textile industry become, at one point, the second largest revenue generator for Thailand. Unfortunately, the crash led to decreases in both industrial growth and Thailand's rank among world textile producers. Competition, due partially to the low cost of labor in surrounding Asian countries, has forced Thailand to shift its textile focus from quantity to quality. This in turn has necessitated a need for more skilled labor within the industry.

In order to facilitate a move from low-skilled labor to value-added labor, human resource development is currently being addressed at all levels within the Thai textile industry. Increasing the knowledge and skills of both the current and future labor force is a key factor in assisting Thailand to remain competitive in the global marketplace. Employees with enhanced knowledge and better developed skills will allow the industry to utilize advanced technology. An approach to augmenting the overall skill levels of the workers is to train and educate future employees before they enter the industry by focusing on the Thai education system.

Emphasis on early training and education will help provide future employees with the needed skills that can assist the industry in future development and expansion. The most recent and significant educational reform in Thailand was the Education Act of 1999 (2542), which mandated that every Thai citizen be entitled to 12 years of government-funded education, in addition to increasing mandatory education from 6 to 9 years. Other key education issues addressed in this reform act include an increased emphasis on creativity, critical thinking, and problem solving skills all of which are important for future employees in Thai industries.

The educational institutions that prepare workers for specific industrial fields are predominantly vocational schools. Many employees of the textile industry receive their secondary education and sometimes post-secondary education from vocational or technical schools. These schools train students for future jobs in industry by providing both a general education and specialized technical training.

The oldest technical college in Thailand is Photharam Technical College (PTC), which has the most extensive textile-based curriculum among all vocational schools in the country. Its location in Ratchaburi Province is near several medium-sized textile factories, which helps in facilitating the training of students, in addition to being future sites of employment for many PTC graduates. This school has recently been going through a period of extensive curricular reform, driven by the new director. Our mission was to research, collect, and analyze data to create a set of recommendations for further enhancement of the curriculum.

More specifically, this project was aimed at discovering distinct skills that will contribute to the future success of PTC graduates entering the textile industry in order to make suggestions for possible improvements to the current curriculum in those particular areas. To accomplish this, we searched for differences between perceptions of current abilities of PTC students and opinions of what is most important and necessary for their future success in the textile industry. This data was collected through interviews and questionnaires of four distinct stakeholders; local textile employers, PTC alumni, faculty, and students. We used the information to identify skill areas that would benefit the most from improvement. After analyzing the data and supplementing it through research on previous such reforms, we developed curricular enhancement ideas to address the different skill areas. The most important part of our project was presenting our findings and suggestions in a workshop attended by stakeholders and other educational, labor, or textile experts. Based on their feedback we made our final recommendations for enhancing the Photharam Technical College curriculum to address future concerns.

2 Background Information

Although Thailand's economy was crippled by the Asian crisis in 1997 (2540), is has since begun to recover and advance. A major influence on future success and growth is likely to be the textile industry, which is one of the largest and most important in the Kingdom. Within the next 20 years, Thailand has visions of becoming the hub of the Asian fashion world, and therefore is currently in the process of upgrading and trying to make the necessary changes in the textile industry to fulfill this vision.[1] Many challenges lay ahead, as better equipment and a better-prepared workforce are necessary in order to survive competition from other rising economies, such as China, which can mass produce through the use of cheap labor. Because of higher wages in Thailand, the industry is attempting to shift to "value-added labor"—a more educated workforce to remain competitive. One way to facilitate this move is to reform the current vocational school curriculum, so it produces better-prepared workers who are capable of contributing significantly to the future success of the Thai textile industry.

This chapter will convey an understanding of the textile industry, its importance to the Thai economy and previous educational reforms, both in Thailand and other countries, that sought to upgrade the knowledge level of graduates. We will also introduce information concerning Photharam Technical College (PTC), the vocational school which is the focus of this study.

2.1 Development of Textile Technology

The practice of creating cloth from various raw materials is a concept that dates back many thousands of years. Before machines were used in textile processes, the craft was isolated to the household. As a result, industrial manufacturing of textiles merely dates back a few hundred years. This section gives a brief history of the textile industry, in terms of industrial mechanization.

The process of creating pieces of finished cloth is a two-phase procedure that involves spinning and weaving. Spinning creates spools of yarn from raw products. Weaving, which generally uses a loom, is the process of taking spools of yarn and interlacing them into fabric. In the early days of spinning and weaving, each process was slow, laborious, and completely independent of the other. It was not until the 18th century that textile processes became fully mechanized. The invention of the spinning jenny in 1764 by an English carpenter named John Hargreaves[2] was an important part of the spinning industry's development. Through further evolution, spinning machines have reached their current status, which includes machines that produce hundreds of spools of yarn at a time with minimal manpower.

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[1] Watcharapong Thongrung, "Fashion hub plan for Kingdom," [online] ([cited 18 February 2003]); available from <http://siamfuture.com/ThaiNews/ThNewsTxt.asp?tid=1174 >8 March 2002, The Nation

[2] J.E. Hayes, Mill and Related Textile History [Website] ([cited 7 November 2002]); available from http://www.riverpointlace.com/lippitt_mill_history.htm.

Weaving was first industrialized by an Englishman named John Kay, who invented the loom in 1733[3]. The loom has undergone many stages of evolution through mechanization, yet has maintained the basic principles behind its process. A Weaving processes traditionally have used a device called a shuttle, which carries a thread of yarn horizontally back and forth between the vertical layers of fabric that are being interlaced. To this day, shuttles are still employed in some older machines used in less developed countries around the world. However, in modern weaving machinery, the shuttle has been replaced by methods such as air, water, or projectile propulsion where the yarn is shot through the layers of yarn instead of being carried. Modern textile factories utilize the latest in technology and training in order to maximize efficiency and increase production in an effort to stay competitive. These factories are highly automated and require skilled technicians to operate and work on the machinery.

2.2 The Thai Textile Industry

Cheap labor became the backbone of the textile industry in Thailand during the economic boom of the late 1980s and the early 1990s. This low wage labor force helped to fuel mass production and large economic gains in Thailand during the period. Traditionally more labor provided greater production capacity because textile machinery was not yet as automated as current technology. The times have changed however, and the future of the clothing and textiles industry in Thailand depends much more upon modernization and change.[4] The textile industry in Thailand is comprised of a wide spectrum of factories and human resources. Both outdated and new facilities exist, with a mix of both skilled and unskilled labor.

The following sections provide information concerning the industry as a whole as it relates to the Thai economy. Some labor demographics are given to present a sense of the labor force and wage structure in Thailand, followed by sections explaining the importance of the textile industry by highlighting export revenues and profits attained by the industry as a whole.

2.2.1 Labor Demographics

This section explores the overall workforce of Thailand, taking into special consideration the composition of the labor force associated with the textile industry. Such topics to be explored include wages, employment, educational levels, and worker unions.

Of the total Thai population of 63.6 million people in 2002 (2545), approximately 34 million make up the total labor force.[5] A large portion of the total workforce consists of uneducated

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[3] *Idem.*

[4] *Number of Graduates Classified by Subjects : Academic Year 2000* [website] (Department of Vocational Education, Ministry of Education, Thailand, 2001 [cited 11 January 2003]); available from http://www.dovenet.moe.go.th/english/dove/statistics/table18.htm.

[5] Thailand National Statistics Office, *Number of Population aged 13 and over by Labor Force Status and Sex: 1989-2000* (2001 [cited 10 January 2003]); available from http://www.nso.go.th/eng/stat/lfs/lfstab8.htm.

employees, due primarily to the availability of low-skilled labor opportunities. Of the 34 million total workers, approximately 66% have had no more than a primary school education.[6]

The average workweek for a Thai employee is 50 hours, while the national unemployment rate is 3.7%.[7] The current minimum wage ranges from 133 to 165 baht (about U.S $3 to $4), depending on the particular region of employment.[8] In 1999 (2542), 6% of the workforce received pay under the minimum wage, while approximately 20% were earning the minimum wage[9]. Although the current minimum wage has risen from a maximum of 135 baht in 1994 (2537) to a maximum of 165 baht in 2001 (2544), it is still barely enough for a Thai citizen to survive on. Many factory workers maintain other jobs to supplement their income so they can support their families[10]. Along with long days and low wages, there are few benefits or compensation for workers. Unsanitary working facilities and faulty equipment have caused the number of work-related accidents to increase dramatically in the past few years[11]. The growth of organized worker unions in Thailand has begun, but faces much opposition from textile companies, which are owned primarily by foreign investors.

2.2.2 Contribution to the Overall Economy

Thailand's economy has changed dramatically since the economic boom that began in 1985 (2528). Although Thailand's textile industry was not a major contributor to the economy before 1985 (2528), its role since then has increased tremendously. Textiles are now a vital component of the Thai economy. In fact, the industry employed over one million people, or 22.2% of the total industrial workforce in 2000 (2543).[12] Ensuring the success of this industry is necessary in order for the country to keep growing, expanding, and being an important contributor to the global economy.

The importance of the textile industry to Thailand's economy can be seen through the following statistics:

- Textile industry exports overtook rice in 1985 (2528) to become the number one export of Thailand.

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[6] Thailand National Statistics Office

[7] National Statistics Office, *Number of Employed Persons by Level of Educational Attainment for Whole Kingdom: 1999-2000* (2001 [cited 9 January 2003]); available from http://www.nso.go.th/eng/stat/lfs/lfstab5.htm.

[8] ICEM Update, *Thai Workers Demand Four Dollars a Day* (2001 [cited 15 November 2002]); available from http://www.icem.org/update/upd2001/upd01-52.html.

[9] Gosah Arya, 2002, Wage and Youth Employment in Thailand, <http://www.ilo.org/public/english/region/asro/bangkok/conf/youth/con_stu/thailand.pdf> (11 January 2003)

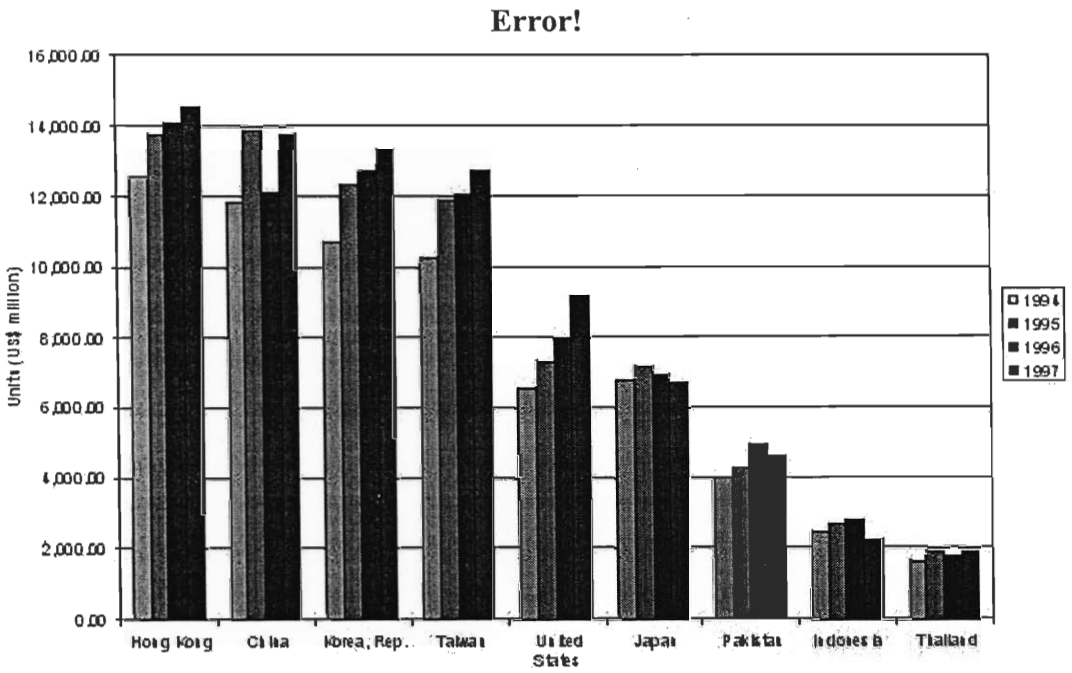
[10] Eve-Laure Moros, "Made in Thailand," , ed. Linzy Emery (New York, N.Y.: Women Make Movies, 1999).

[11] *Ibid.*

[12] Pramode Vidtayasuk and Banpot Tekacharin, "The Textile Industry in Thailand" (paper presented at the The 7th Asia-Pacific Textile and Clothing Industry Forum, Chinese Tapei, 9-11 December, 2002 2002).

- Textiles comprise the highest percentage of the gross domestic product in the manufacturing sector, which amounted to 13.8% of the total manufacturing value-added in 2000 (2543).
- The textile industry had the top rate of employment in the manufacturing sector, amounting to 21.2% of total industrial work force in 2001 (2544) (estimated 1.1 million employees).
- Total export earnings amounted to 8.1% of the total national export value in 2001 (2544) (worth U.S. $5.3 billion).[13]

Figure 1 shows major textile exporters between the years of 1994-1998, with a focus on Asian producers. Thailand ranked 17th in the world, in textile exporting, during this time period. These statistics show that Asian countries are large textile producers and major players in the global market.



Compiled by Textile Economics Study & Research Group Textile Industry Division

Figure 1: Thailand Textile Exporting vs. Major Competitors[14]

These countries are Thailand's largest competitors, as they thrive off cheap labor or current automated technology. With higher automation and more highly trained textile workers, however, it is possible for the Thai textile industry to surpass these previous rankings. A more

[13] Pramode Vidtayasuk, pg 3.

[14] "Exports, Industry Outlook, World Textile Exports" [cited 11 January 2003]; available from http://www.thailand.com/exports/html/industry_worldtextiles.htm.

skilled work force would make it possible for the Thai textile industry to modernize and either maintain or improve upon its current world standing.

Thailand recognizes the need for changes in the textile industry to ensure its contribution to the economy. According to Thailand's 7th and 8th National Economic and Social Development Plan (1992 (2535)-1996 (2539) and 1997 (2540)-2001 (2544)), guidelines for the development of the textiles and clothing industry are as follows:

1. Improving productivity by using modern technology (including machinery), upgrading manpower and introducing modern management;
2. Moving toward higher-value-added products;
3. Upgrading the quality and standard of the products;
4. Promoting investment from abroad; and
5. Encouraging Thai industries to invest abroad.[15]

Guidelines numbered one, two and three above can be facilitated by the enhanced training of students who are posed to enter the textile industry. One way in which the Thai labor force is being improved upon is through better education for future workers.

2.3 Vocational Education in Thailand

The area of education that correlates most directly with future employees in industrial sectors is vocational education, which provides both general and technical training for students. The following sections describe the formal vocational education system in Thailand. We begin by explaining how it is structured and funded, then present a more detailed look at one vocational school in particular: Photharam Technical College.

2.3.1 Organization of Formal Vocational Education

The Department of Vocational Education in Thailand (D.O.V.E.) offers many different vocational education programs at the secondary and post secondary levels. Education at the secondary level includes vocational schools or upper secondary schools that allow vocational concentrations. At the post secondary level are vocational and technical universities and other types of non-formal education such as certificate programs. Thailand has revised its education policy to include provisions that allow for equal opportunity for all those who desire vocational education. Thailand's education policy states that it will:

- Provide the opportunity for those who have completed compulsory education (grade 9) and basic education (grade 12), together with the unemployed and the elderly, to be able

[15] *Idem.*

to undergo vocational training in at least one profession, supporting them to become self-employed.[16]

- Reform and improve the quality of vocational training, upgrading the curriculum of vocational schools so that they can confer bachelor's degrees. Such reforms are undertaken in light of the increasing demand for vocational training in the agricultural, industrial and service sectors. Vocational education should also encourage on-the-job training by students.

The schools associated with D.O.V.E. offer an upper secondary level Certificate in Vocational Education (Skilled Level), which is a three-year program offered only to students after completion of lower secondary school. Graduates of the three-year certificate program are eligible to apply to the Diploma in Vocational Education (Technical Level) program, which is two years in duration.

While working toward completion of a vocational upper secondary education, students are exposed to basic core subjects, such as mathematics and science, as well as some specialized subjects that are typically adapted to local conditions and needs.[17] In these vocational schools the Department of Curriculum and Instruction Development has tried to stimulate the students' interests by offering subjects they can choose based on special interests and hobbies. These subjects are especially important for the local economies in the vicinity of the vocational school, as they reflect whatever the major local industries are. The most prominent areas of specialization include construction, electrical power, electronics machine shop, auto-mechanics, and textiles, among several other less common ones. Within the textiles area students can choose to specialize in Textile Technology, Upholstery, Chemical Textile, or Industrial Ready-made Clothing.

Students with a diploma in vocational education may then continue their education towards a Higher Diploma of Technical Education, which is the equivalent of a bachelor's degree. The higher diploma program is a two-year program which offers courses in production technology, auto-mechanics, electrical technology, civil engineering, fishery, architectural technology, business computer, and accounting, among many others.

There is a dual vocational training program (DVT) in Thailand as well as the customary vocational programs. The dual vocational programs are completed at institutions that provide theory classes, in conjunction with a partner company that provides practical on-the-job training for students. The chance to earn a certificate in dual vocational training is offered to students

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[16] *Thailand's Education Policy* [website] (Ministry of Foreign Affairs, Kingdom of Thailand, [cited 10 November 2002]); available from http://www.mfa.go.th/web/17.php.

[17] Office of the National Education Commission, *Education in Thailand 2001/2001* (Bangkok: Kurusapa Lardprao Press, 2001), pg 34.

after they have completed upper secondary education, the requirement being the completion of an additional two-year program.

Short course training programs and dual enrollment type programs are also available to Thai students. Short course training programs of 6-225 hours are offered by various institutions and require no entrance examinations. Vocational training programs for general secondary school students allow students at regular secondary schools to choose vocational areas for their major or minor elective subjects and attend the vocational component of their training at D.O.V.E. colleges.

Although major steps have been taken by the government to increase educational opportunities for students, there remain several concerns that must be addressed in order to continue moving forward. Numbers of students entering lower secondary school are increasing now that there are stricter compulsory educational laws that have been installed, yet the percent increase of jobs attained by enrollment in vocational technical schools and job placement for graduates has not been that impressive. According to Gosah Arya, the number of employees with a secondary education tripled from 1985 (2528) – 2000 (2543), while the number of university graduates with jobs more than quadrupled in that same period. In the case of vocational schools, the results are not all that significant, having a rise from about 1.9% to 3% in that 15 year span[18]. While some of the low numbers can be explained by students pursuing university studies after graduating from vocational schools, much of it cannot. In 2000 (2543), the numbers of employed graduates from both upper secondary level and university level vocational programs were quite low. In fact, only those with less than a primary education and those from teacher training schools, which have extremely low enrollment numbers to begin with, had fewer employed graduates than vocational schools[19]. The rate of unemployment is greater for vocational school graduates than secondary school graduates as well[20]. It is expected that with the strengthening of industry, unemployment and underemployment will be decreased.

2.3.2 Photharam Technical College

This project focuses on one vocational school in particular: Photharam Technical College (PTC). This establishment is the oldest technical school in Thailand, having been founded in 1938. It also has the most extensive textile-based curriculum in Thailand. The Photharam School is located in the province of Ratchaburi, which is approximately 100 kilometers (65 miles) southwest of Bangkok. The current curriculum, educational program options, and graduation criteria are discussed in this section.

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[18] Unknown Author, "Wage and Youth Employment in Thailand."
<http://www.ilo.org/public/english/region/asro/bangkok/conf/youth/con_stu/thailand.pd> (10 January 2003).

[19] National Statistics Office, *Number of Employed Persons by Level of Educational Attainment for Whole Kingdom: 1999-2000* (2001 [cited 9 January 2003]); available from http://www.nso.go.th/eng/stat/lfs/lfstab5.htm.

[20] Wage and Youth Employment in Thailand, page 15.

The Photharam School offers both formal and dual vocational training programs. The dual vocational training system is a derivative of the system used in Germany[21] and is based on a program of formal instruction as well as apprenticeship training. Both formal and dual curriculums can be entered after completing lower secondary education. If the formal system is entered, a certificate can be obtained after 3 years of study, which can be followed by a diploma after an additional 2 years of study.

Three different streams of study can be pursued at the college: courses in trade and industry, courses in arts, or courses in commerce and business administration. If a course of study in trade and industry is pursued, then one of the following disciplines can be studied: chemical textiles, textile technology, Thai silk and traditional textile weaving where no chemicals are used, industrial ready made clothing, electrical power, and welding. In all but the silk weaving discipline, both a certificate and a diploma can be obtained; in silk weaving, only the diploma can be earned. Study in arts can result in a certificate in fine arts or commercial arts design; study in commerce can result in either a certificate in commerce or a diploma in business accounting, marketing, or business computer systems.

If a student enters the dual vocational training program, only a diploma is available in the following disciplines: chemical technology, textile technology, and electrical power. The students practice their skills in the different disciplines by working in a factory. This allows for both work and study. The Photharam School provides the dual vocational training system as a result of a policy created by the Vocational Education Department of the Thai Ministry of Education (MOE) and in participation with entrepreneurs. This cooperative effort was made in an attempt to create a skilled workforce of both quality and quantity. In addition, it is intended that by working with entrepreneurs, those students graduating from the Photharam School will have a grasp on other aspects of work, such as business and management.

To help them prepare for the workplace, both certificate and diploma students at PTC are also required to complete 400 hours of training or project time, which is done over a two month period. The students are given the choice to complete a project on campus or travel off campus to train at a factory. In either case, they must complete all classes in theory before beginning training. If a project is chosen, students must find a faculty advisor for their project. (The PTC curriculum is given in Appendix A)

Students of the Photharam School can choose to continue their studies once they have received their degrees. They may also change between certificate or diploma study as well as change between subjects of study. Upon receipt of a certificate or diploma, a bachelor's degree can be pursued, which is granted after four years of study. However, the Photharam School does

[21] Sobsan Utakrit, "The Technical-Vocational Education and Training System in Thailand," *International Journal of Sociology* 29, no. 1: 55.

not grant bachelors degrees. These can be obtained from the Rachapat Institute, the Rajamongkon Institute, or any private university.

2.4 Education Reform Efforts

New industry demands call for enhanced employee capabilities which can be accomplished through the strengthening of education. Educational reform is an ongoing process which seeks to strengthen educational opportunities for students by evaluating and changing current educational systems and methods. This reform process is a crucial element of a developing nation's advancement. The first section gives examples of educational reform efforts that have taken place or are currently taking place in different regions around the world. We then examine reforms in Thailand, along with recent curricular modifications at the Photharam School.

2.4.1 Worldwide Reform

Internationally, there have been large leaps in educational standards and coinciding reforms during the past few decades. Many of these changes have been motivated by improvements and advancements in technology. In today's society, educational concerns often center on information technology and language skills. The common knowledge that communication is essential for continued development and increased commerce has fueled the shift toward education geared for the "Information Age". This topic has been a common theme in education reform in the last decade and likely will continue to influence education. According to Philip Hallinger, one consequence of the information revolution that exists is that consumers are beginning to define the meaning of quality education in a global context, rather than a local or national context.[22] This phenomenon is due partially to the accessibility of media images that enlighten people about other cultures and the services provided to them; these services include international schools and exam preparation courses as well as other educational material. As advertisements and media become global endeavors, so has the educational ideal.[23]

In his paper on "Educational change in Southeast Asia," Philip Hallinger explains perceptions of quality education in the east:

> Increasingly, policymakers (and parents) throughout the Asia Pacific region view a quality education as preparing students to be:
>
> - Lifelong learners;
> - Able communicators in both a native and an international language (e.g. English, Mandarin);
> - Technologically skilled for the workplace and daily living;
> - Cognitively prepared for complex tasks, problem solving, and the creation of knowledge;

[22] Philip Hallinger, "Educational change in Southeast Asia: The challenge of creating learning systems," *Journal of Educational Administration* 36, no. 5 (1998): 494.

[23] *Ibid.*

- Socially, politically and culturally responsible citizens[24]

These perceptions of a quality education are becoming the goal of many eastern educational systems and have been the goal of western systems for some time. Specifically, the need for education based on problem solving skills instead of rote learning and memorization is being addressed. Ng Aik Kwang believes that although Asian students score highly in international competitions in science and math, many Asian students do not develop the same creative abilities as many western students.[25] He explains that the Asian education system has proved successful in creating students who are extraordinarily skilled at test-taking and memorization.[26] However, he implies that these skills alone will not succeed in advancing society.[27]

In the United States, there is a continuous stream of education reform movements that drives the educational system. One recent trend in American education is toward interactivity and active learning.[28] This trend reflects the many different learning styles which exist and must be satisfied in order to achieve effective learning for all students. Also, there is research that indicates there are many benefits to active rather than passive learning.[29] It is thought that children remember more about what they are learning when they are engaged in the classroom rather than being in a typical lecture.

Some American school systems have started to integrate more evaluation methods into their educational programs. In Massachusetts, a system called the Massachusetts Comprehensive Assessment System (MCAS) has been developed within the past five years to give schools an equal standard of quality education. Students at the secondary level must take and pass the MCAS test before they are allowed to graduate from secondary school. The test is first administered in the 10th grade and every year after until the student passes. This testing system assures that all students graduating from secondary school in Massachusetts have a grasp on the same core education as their peers.

Along with regular education reform, vocational education reform is undergoing changes. However, vocational education reform has concentrated in different areas than regular education reform, due to the differences in philosophies of the two education systems. As a model, some vocational systems are looking toward the German or French vocational systems which both utilize a system of dual training involving theory and practice through apprenticeship opportunities. While the German dual system has been praised as an efficient training system in

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[24] *Ibid.*

[25] Ng Aik Kwang, *why Asians are LESS creative than Westerners* (Hong Kong: Prentice Hall, 2001), 99.

[26] *Idem.*

[27] *Idem.*

[28] Donald R. Paulson and Jennifer L. Faust, "Active Learning for the College Classroom" http://chemistry.calstatela.edu/Chem&BioChem/active/main.htm (15 January 2003)

[29] David W. Johnson, Roger T. Johnson, Karl A. Smith, *Active Learning: Cooperation in the College Classroom* (Edina, MN: Interaction Book Company, 1991)

the past, recent figures of unemployment show that the system may have some flaws. It is also possible that these figures are do to some other situation exclusive to Germany or Europe. Angela Paul-Kohlhoff, a professor at the Technological University of Darmstadt has commented on the unemployment figures in Germany in one of her papers. She says, "the fact that the completion of a professional training obviously leads less and less into the learnt profession raises fundamental problems regarding vocational training in the dual system, and clearly challenges one of the traditional legitimating models."[30] It is not clear whether the system has been more effective recently in other nations.

The Korean system of vocational training has been reformed greatly since the 1960s. The training system has been strengthened by the improvement of junior college education, policies to increase enrollment in vocational secondary schools, a "two plus one" program giving two years formal and one year practical training, and the creation of a "Lifelong Vocational Education System." Current recommendations from the Korean Research Institute for Vocational Education and Training (KRIVET) include:

1. An emphasis on basic rather than specialized education
2. The integration of senior secondary school curriculums in the areas of vocational and regular education to allow students a wider selection of courses in the second and third year
3. Lifelong education availability to all
4. Implementation of a school-to-work transition (STWT) system which should begin in the earliest years of schooling
5. The encouragement of enterprise training at work places[31]

While education continues to change with reform efforts, so will affected industries. It must be understood that an intrinsic part of reform is that it is never a stagnant process. The systems that require reform dictate that it evolve and continue to create new, innovative ways to solve new issues and challenges. For developing countries, such as Thailand, all of these concerns have been acknowledged and are being attended to with the utmost of importance, but whether they can make the necessary adjustments is a question that can only be answered through time.

2.4.2 Education Reform in Thailand

This section is intended to describe the educational reforms that have taken place throughout Thailand in the recent past. One major improvement has been the increase in government

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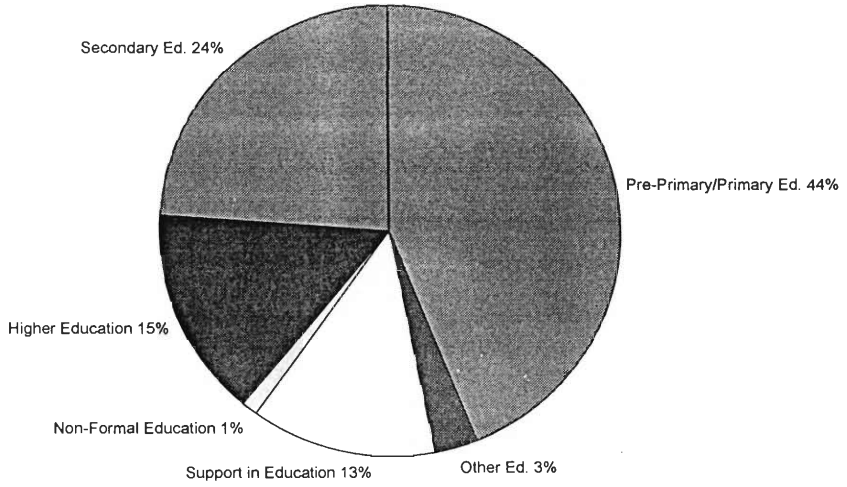
[30] Angela Angela Paul-Kohlhoff, *The Present Situation of the Vocational Education System in Germany* ([cited 29 January 2002]); available from http://ns.kli.re.kr/news/seminar%20&%20discussion/news2-103(1)%20Paul-Kohlhof(E).pdf.

[31] *Reform and Innovation of Technical and Vocational Education in the Republic of Korea* (Korean Research Institute for Vocational Education and Training (KRIVET), [cited 11 January 2003]); available from http://www.unevoc.de/congress/pdf/ref-rok-e.pdf.

educational spending. For a decade, education has received the largest share of total public expenditures in Thailand. In 2000 (2543)alone, government support for education was shown by the allocation of almost 30% of the total budget.[32] In fact, the education sector in Thailand has received the highest share of public expenditure since 1991.[33] Figure 2 depicts the distribution of education funding among the many different education areas.



Source: Budget Bureau

Figure 2: Distribution of Thai Educational Budget in 1999 (2542)[34]

Primary and pre-primary education received the highest portion of educational funding followed by secondary education and higher education. It is noticeable that the biggest emphasis is placed on making sure that all Thai children receive at least the basic education provided by the primary schools, while secondary school funding is second on the budget priorities. This reflects the recent passing of the National Education Act of 1999 (2542), which increased the number of years of compulsory education from six to nine and the number of government-funded years of education to twelve. This was a significant step for the educational system in Thailand, as it was a major governmental undertaking.

In 2000, vocational education received close to 1/3 of the funding allotted to secondary education, as is shown in Figure 3. Recently there has been a trend of less expenditure for vocational education, with a 3.7% decrease from 1999 (2542) to 2000 (2543). In general secondary education there has been a 3.7% increase in expenditures between 1999 (2542) and

[32] *Idem.*

[33] *Idem.*

[34] Office of the National Education Commission (ONEC). Education in Thailand 2000/2001 (Bangkok: KurusapaLandprao Press, 2000).

2000 (2543). Forms of secondary education other than general or vocational receive very little of the budget.

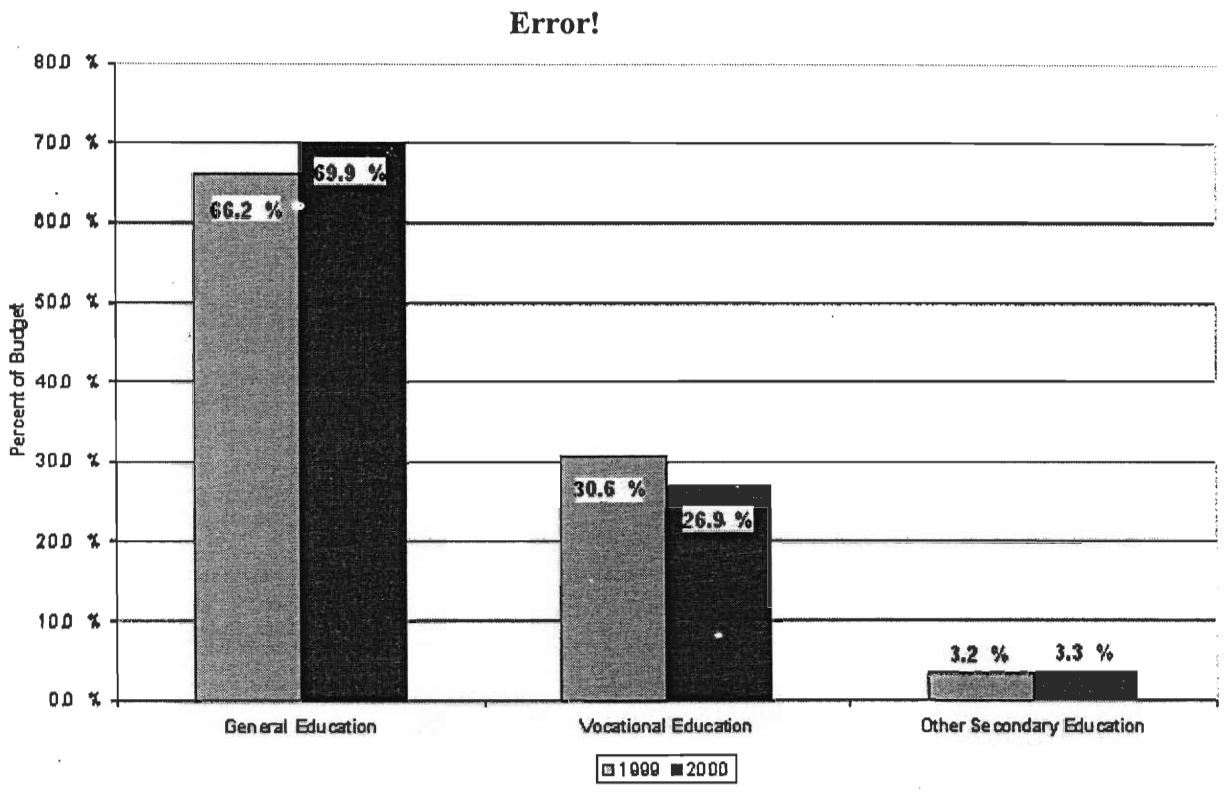


Figure 3: Distribution of Thailand's Budget for Secondary Education – Fiscal Year 1999 (2542) - 2000 (2543)[35]

Recently, the control of various vocational education institutions has been shifted to keep on track with the Education Reform Act of 1999 (2542). In addition to increased government subsidized spending on education, the act also emphasized a move away from rote learning and towards more innovative techniques that focus on problem solving and creative thinking. The approval of this act has begun a wave of educational reforms which focus on shifting current curricula to be in-line with the philosophies of the Educational Reform Act of 1999 (2542).

2.4.3 Photharam Technical College

This particular vocational school has undergone several large changes starting in 2002 with the coming of a new director, Dr. Kamol Pinrath. The school's new focus is on independent learning for core classes such as language, Internet Technology (IT), math, and science. This is an attempt to break away from the traditional lecture style, theory-based structure and move into a new independent hands-on, practice-based structure, in order to better stimulate the minds and

[35] Office of the National Education Commission (ONEC). Education in Thailand 2000/2001 (Bangkok: KurusapaLandprao Press, 2000).

creativity of the students. The program has been introduced for the first year students and courses, but will be extended to many more areas of the curriculum in the future. The current students above the freshman level who have already begun their academic programs with the traditional lecture-style system will complete their Photharam degrees in the same system.

In the new curriculum, the academic calendar consists of 20 week semesters, during which the students are expected to learn a certain amount of material in each subject. They do not have set class times. The students create their own schedule and choose when and how they wish to complete the requirements for each class. The teachers are placed in more of a supervisory role than a lecturing role; they help students when they are asked for assistance and point them in the right direction. Students move through this independent learning program by completing worksheets. Once the worksheet set is completed by a student, he or she is done with that particular class. There is no homework given, and few exams are taken. Use of internet in classes is becoming more and more common as well.

Another significant change has been the importance and focus placed on learning the English language. New and innovative methods for teaching English have been implemented into the curriculum, such as having students watch videos and listen to audio recordings while filling out English language worksheets. In addition, the new curriculum requires students to study English every semester, which was not mandatory previously.

In general, under the new curriculum, the students have more freedom to complete coursework whenever and however they please. It is intended that these new methods will improve students' creativity levels and problem solving skills. However, there remains a lot of work to be done to address educational concerns that have been facing both the Photharam School and the entire vocational education system.

3 Methodology

This project was aimed at supplementing the current curriculum at Photharam Technical College (PTC) to provide students with skills that are important for them to excel in the Thai textile industry. In order to accomplish this goal we developed the following objectives:

1. Gather data on perceptions of the current and desired skills of PTC students from various stakeholders;
2. Analyze data to determine any areas where there are disparities between the perceived skills of PTC students and those that are important for their future success;
3. Determine possible methods of supplementing the curriculum in those areas to enhance its effectiveness; and
4. Create feasible recommendations for supplementing the curriculum.

Our research and analysis took place over a period of approximately five months. The first three months, beginning in October 2002 (2545), were spent at Worcester Polytechnic Institute (WPI) in the United States where we examined both the textile industry and vocational school education in the US and Thailand. The following two months (January and February 2003) were spent in the Thailand where we completed our project. During our stay in Thailand, the majority of our time was spent at Chulalongkorn University, located in Bangkok. Field research was done at both PTC and several textile factories located in Ratchaburi province. In the following sections, the methodology behind each of our objectives will be explained in detail.

3.1 Perceptions of Skills

Our first objective was to gather perceptions of both desired and current skills in students at PTC. We sought to determine the perceived strengths and weaknesses of the curriculum, as viewed by a variety of significant stakeholders, including employers in the textile industry, PTC faculty, alumni, and students. We developed the following series of research questions to aid in our data collection:

- What are the overall strengths and weaknesses in the current vocational school curriculum?
- What skills are necessary for graduates to succeed in the Thai textile industry both now and in the future?
- What steps are currently being taken to adapt vocational school curriculum's to the economy?
- What are possible ways of improving the skills of future graduates?

Since each stakeholder group would be viewing these issues from slightly different perspectives, we sought somewhat different information from each and designed several data gathering instruments accordingly. Our general strategy was to use questionnaires to obtain a core set of information from each stakeholder group for purposes of cross-comparison with other groups, and to be able to gather many viewpoints in a short period of time. However, we also wanted more in-depth information, for which we conducted interviews with all stakeholder groups except students. After reviewing the curriculum of the school, we sought to identify all of the skills that we wanted our stakeholders to comment on. The list which we devised was a compilation of skills which students were currently obtaining (cased on the curriculum) as well as other areas which we deemed important for the future, based on our research and some preliminary faculty feedback. The following sections explain the specific information requirements and data gathering instruments for each stakeholder group.

3.1.1 Textile Industry Employers

From textile industry employers we sought an understanding of the current state of the industry, in addition to where they felt it was heading in the future. Also, we were interested in their views on the skills and knowledge that was desired in future employees. More specifically, we wanted to understand which types of skills they looked for in vocational school graduates and which particular areas they recommended the Photharam curriculum focus more on in the future. In close proximity to PTC are several medium and small-sized textile factories.* We were able to visit and speak with top level representatives from six of them. We used both questionnaires and interviews to collect information from these employers.

Employers were asked to fill out a short questionnaire which required them to comment on the proficiency of vocational graduates entering the filed, as well important skills necessary for future success of workers in textiles. The data was intended mainly as a quantitative representation of the employers' thoughts on our questions, used for the purpose of comparison with the other stakeholders. The full questionnaire can be found in Appendix B.

In order to probe more deeply into the issues with the employers, we designed interviews which allowed us to discover issues that had not occurred to us when we designed the questionnaires. We created a series of questions that acted as general interview guidelines. These stemmed directly from our previously defined research questions. The first few questions were aimed at acquiring some general background information about the interviewee and his or her company. The rest of the questions focused on topics such as views on the Photharam curriculum, desired technical and general skills, as well as both hiring and promotion parameters within their company.

* For the purposes of this project, a small sized textile factory was defined as having between 0 and 500 total employees, whereas a medium sized one has between 500 and 2500.

Although we had specific questions to ask, a semi-structured interview atmosphere was employed in order to maximize question flexibility and participant feedback. Questions were asked methodically, but depending on the answers some were expounded on further in order to gain a better perception of the employer's complete thoughts on the subject. Extra questions were thought of and often added on the spot to gain additional feedback from the person being interviewed. The set of questions that were asked can be found in Appendix B.

There were two separate interviewing sessions on two different days, the first on January 30th and the second on February 5th. Each session began with a brief explanation of our project and the circumstances of our research, followed by the interview questions. In the majority of the interviews, an interpreter was used to ask our questions and explain employer answers and comments. Detailed notes were taken for future reference.

3.1.2 Alumni of Photharam School

Another source of information was alumni of the Photharam School who were employed by local factories. We were interested in their perspective since they could provide insight into the skills needed to facilitate a smooth transition from school to work. They could also inform us about skills or characteristics that helped them to succeed in the workplace. Another beneficial aspect of the alumni perspective was that they could provide information about the Photharam School's curriculum. We wanted to know how well the school prepared them for their current job. We sought their opinions on the strengths and weaknesses of the curriculum and asked for possible suggestions and/or recommendations for future improvements based on both their school and job experiences. The fact that they could relate their Photharam education directly with a job in the textile industry made them an especially useful resource. The questionnaires that were distributed to the alumni made it feasible to gather many viewpoints. They also provided us with a simple means of cross-comparison of data between the different stakeholders. This data was augmented by the interviews we conducted with the alumni, which went more in depth about specific concerns with the Photharam curriculum, as well as industry trends and suggestions they could offer for our project.

Questionnaires were used as a means for data collection from alumni due to a variety of reasons. They provided quantitative data concerning their perceptions of the relative strengths and weaknesses of the Photharam curriculum, based on their educational experience. Also, because it was easy to distribute many of our questionnaires, we were able to receive many viewpoints as well as some specific concerns that all the participants shared on various skills essential for the future.

The questionnaires were kept very simple and translated from English to Thai. Statement or questions were listed followed by either "Yes" and "No" checkboxes or a group of scaled numbers as choices. These numbers were in increments of one and went from the number "1"

to the number "5," each number corresponding to the degree of agreement with a corresponding statement. This was done so that we would not have to get the responses translated back into English. Using a master copy, we could tell exactly which questions related to which answers. The questionnaires were given to the Director of the Photharam School on January 30th to be distributed to factories where school alumni worked. Completed questionnaires were returned to the school and collected by us on February 5th. The specific questions that we asked in the questionnaires can be found in Appendix B.

Our interviews with the alumni were aimed at supplementing the feedback received from the interviews, and also going into more depth and detail about both problems with the PTC curriculum, and workplace skills which students must have to ensure success. We intended to gain information on how prepared the alumni felt when they entered the workforce from PTC and which skills they felt were important for their particular jobs. We also desired information on technological advancement and the policies for advancement within their company.

The interviewing sessions were conducted in a similar manner as the employer interviews, with a set of questions prepared beforehand that acted as guidelines for data collection. The first few questions were meant to acquire some general background information about the interviewee, such as their initial and current position within the company, as well as when they graduated from the Photharam School. Following these general questions, more specific ones were asked; many of these were very similar to those asked of the employers. The main difference between the two groups was that there were no questions about hiring employees, and more about the Photharam curriculum was asked of the alumni. The structure of the interview was also similar. Alumni's comments were recorded in writing and sometimes questions were expanded upon to gain greater detail in response. With many alumni interviews to conduct, however, combined with time constraints these interviews were generally shorter and more to the point than those with the employers. We interviewed the participants individually, because they worked in different areas of textiles and could provide different responses from their colleagues. The set of questions asked during the interviews with alumni can be found in Appendix B.

The alumni and textile employers combined to form our basis of skills important to the future success of students in the Thai textile industry. They were not used as much for perceptions of the current education of students, simply because they did not have as much knowledge in this particular area. For this information we went directly to the Photharam School and used the faculty and students to gather views on the current skills of students.

3.1.3 Photharam School Faculty

The Photharam faculty could help in providing with perceptions of the current curriculum of the school. As the educators, they knew both the structure and status of current classes and the student body as a whole. We sought their insight into the strengths and weaknesses of the

curriculum from their point of view. They knew how well the students were doing in the current system, so they could tell us what areas the student were not performing well in and what areas they excelled in. Several of the teachers also had experience working in textile factories, so from them we sought information concerning necessary skills for the workplace. Topics that were discussed included skill levels (i.e. performance) in core and professional level classes, as well as their personal recommendations for curricular improvement. In order to gain both quantitative and qualitative data from the school faculty, both interviews and questionnaires were used for data gathering.

Simple questionnaires were used to attain quantitative information from the faculty concerning the performance of students in different areas of the curriculum. We were also interested in their perceptions of students' skills in general areas such as teamwork, leadership, problem-solving abilities, and ethics. Asking questions in this manner could provide us with a means of easily cross-referencing results between the different stakeholders. The questionnaires were completed by 32 textile and non-textile educators. The non-textile educators were those that taught general classes, such as basic math, science, or English. The rationale behind this was to gather information about the general education of the students in addition to specific textile education. In an attempt to ensure a high return rate, the questionnaires were created to be simple and easy to fill out. Simple questions that could be answered using either a numbered scale (1 – 5) or marking "Yes" or "No" were used, just as with the alumni questionnaire. The questions were translated into Thai before being administered to the faculty. These questionnaires were delivered to the school on January 30th, 2003. The participants were given approximately one week to complete the questionnaires before they were collected by us on our next visit on February 5th, 2003. The specific questions used for this questionnaire are found in Appendix B.

To add to our questionnaire feedback, we conducted faculty interviews intended to provide more in-depth information. In this instance, the interviews were conducted in a round-table setting, as opposed to individually. The main purpose was to gather perceptions and viewpoints about where curricular changes would be most beneficial to the students. For this discussion, we developed a broad set of questions that acted as guidelines. The reactions of the faculty and flow of the discussion determined the placement of each topic and related questions.

We visited the school on two occasions. The first visit was for general introductions and an explanation of our project. The second visit was to conduct the faculty interviews. We wanted at least one representative from each area of the textile department present at the discussion. We asked our questions in English, and then an interpreter translated them for the group in Thai. The group format for interviews helped us maximize the information gathered, as time was a concern. There are drawbacks however, as responses might be influenced by the presence of other colleagues in the room. Once the discussion began, all observations or relevant comments

were recorded in text form and referred to when necessary for analysis. The particular questions that were used during this session can be found in Appendix B.

3.1.4 Photharam School Students

Students of the school were given questionnaires so that we could acquire their opinions on the effectiveness of Photharam School's current curriculum. We looked at this group to find out how they viewed certain aspects of the school, their classes, and the curriculum on a whole. We wanted to know which areas students felt they did well in and where they felt they did poorly.

Using our broad research questions as guidelines, we developed a questionnaire that would provide us with students' perceptions of the school. Our initial goal was to have all of the textile students complete the questionnaire. However, with many of them in training programs at local factories, it was only possible to distribute the questionnaires to a portion of the textile students.

To make the data processing and analysis easier, the surveys were constructed in a very simple manner, using questions that could be answered with using a numbered scale (1 – 5), just as with the alumni and faculty questionnaires. The questions themselves were created by us and then translated into Thai before being administered to the students. With the number system in place and a master copy in our hands, very little translation was necessary upon completion of the surveys.

The questionnaires were given to the school Director during our visit on January 30th. Our requested method of administration was to have teachers distribute the questionnaires to students while in a classroom setting. In this closed atmosphere they would be forced to complete the questionnaire on their own, without any outside assistance or influence. The students were to be allowed enough time to complete the questionnaire, and confidentially assurances given to them, so their answers could truly represent their own individual views. We would then collect these questionnaires on our visit to the school on February 5th, 2003.

Once all of the data was gathered concerning perceptions of current and desired skills, we were able to move onto the next step of our project, which was to compare and contrast all of the collected data from each of our sources and correlate them to determine what the most important areas for improvements were.

3.2 Analysis Methods

Our analysis of the collected data was accomplished using a few different methods. First we will describe the analysis performed on the different forms of data collected (qualitative and quantitative). Then we explain how the data gathered was used to identify the largest disparities between the current and needed skills of students from the perspectives of the various stakeholders.

3.2.1 Qualitative Analysis of Interview Results

Due to all of the interviews we conducted, we needed to analyze and sort through quite a bit of information. While all of the stakeholders had unique answers for the questions we posed, we still employed a strategy of looking for any general reoccurring themes which all groups pointed to. Our project was intent on compiling recommendations for curricular enhancement, which reflected the needs, concerns, and suggestions of all the groups. In order to ensure success for the PTC students upon entering the textile field, any repetition of areas most in need for improvement from all the stakeholders, were given particular attention.

Comparing and contrasting the different responses between the groups of stakeholders was also a large portion of our analysis methods. For future skills needed in the textile industry we focused more on the employers' perception, due to their direct knowledge of what the marketplace will look like in the future. To identify current state of student skills, we placed more attention on analyzing faculty feedback, due to their everyday exposure to students.

The driving motivation behind the interviews we conducted with the different stakeholder are listed below, through an emphasis of questions which best convey what the main idea behind each stakeholder interview was.

- Employers: What particular areas of PTC curriculum need improvement in order for future graduates to excel in the textile industry?
- Alumni and Faculty: What were strengths and weaknesses of the PTC curriculum?

Through these questions, we wanted to see mainly where agreements occurred. This was our most secure way of isolating the areas most in need of our attention.

3.2.2 Quantitative Analysis of Questionnaire Results

Numerous questionnaires were used for collecting the various stakeholder perspectives. These surveys asked the various stakeholders their views on the current and needed skills of students that will be entering the Thai textile industry labor force. The questions reflect the specific skill areas that we had brainstormed.

The data gathered through these surveys was compiled into the statistical analysis software SPSS. Using SPSS, the mean of the responses to each skill listed was found, keeping the different stakeholder groups separate. In addition, the standard deviation of the responses was determined for each of the questions in each of the stakeholder groups to show the consensus of the responses.

3.2.3 Identifying Areas for Curricular Enhancement

Using the quantitative data that we gathered, we proceeded to identify skill areas that future curricular development at PTC could focus on. We wanted to show skill areas of concern by demonstrating that a difference exists between the current skills that students are gaining in school and those needed currently and in the future of the textile industry using the perceptions of the four stakeholder groups. This was done by comparing stakeholder ratings of the importance of certain skills with the perceptions of stakeholders on the current skills of students.

Three different scales (importance, agreement, and preparedness) were used in our survey questions, depending on the stakeholder questioned. These different scales were directly compared in our analysis of stakeholder survey data. Therefore, examples of the exact questions posed are presented. To determine how well students at PTC were learning skills currently, we asked faculty to answer the following question using levels of agreement ranging from strongly agree to strongly disagree:

- "Students are learning the following skills well."

Faculty were asked to circle numbers beside the skill areas that accompanied the question, ranging from 1-5 representing the range stated above. To understand the differences between what are currently the skill levels and what are the desired skill levels of students, we asked the faculty a second question. This question was asked using an importance scale that ranged from not important to extremely important:

- "Based on future industrial needs, please rate the importance of the following skills [...] in relation to the other skill listed."

Once again, this was accompanied by skills with numbers from 1-5 that corresponded with the importance scale given above. Variations on the questions were asked and other scales used that corresponded with the questions, but all followed a 5 point scaling system. These variations were done to more appropriately fit the questions to the different stakeholder groups being questioned and did not effect the underlying concept we were trying to understand.

By taking these survey results and finding the mean of each question for each stakeholder, we could then compare the current state ("what is") with the desired state of skills ("what should be") that students and the workforce had. The difference between the mean values of what the needed skills are and the skills that are currently being learned gave us a quantitative representation of the "gap" between what are and what should be the skills that students are learning. This subtraction of mean value of the current skills from the needed skills was done for the faculty responses, the employer responses, and a combination of the alumni and student

responses. Alumni and student responses were combined as PTC students were only asked how they felt they were learning the skills listed and we felt that PTC alumni perceptions of needed skills corresponded well to student data.

Using this method for determining difference in current and needed skills was effective in part because it eliminated skills that may have been rated as being very important but are currently being learned well. In addition, it eliminated skills that were not being learned well but were deemed less important and are thus not very important for future curricular development. This approach permitted only the skills with high differences between the mean responses of what is and what should be to be considered "gap" areas.

Following the determination of the differences in mean value, the "gaps" were graphed for the faculty, employer, and alumni/student in descending order, with the greatest different (largest "gap") to the left of the graph. This allowed us to visually inspect the relationship between the quantitative "gap" values for each skill in each stakeholder group. Through inspection, the "gap" graphs were divided into three clusters using a color code: those with the greatest "gap" were circled in red, those with a medium "gap" were circled in orange, and those with the smallest positive or a negative "gap" were circled in yellow. The criteria for combining "gap" values into groups were that adjacent gap values must not show an extensive jump. Any difference over two tenths was where the clusters were divided. This visual division effectively grouped the "gap" values.

The resulting division of "gaps" was combined using a table, where all the skills that we probed were represented using the cluster color code that showed the relative discrepancy of the skill areas in a stakeholder group. By combing all "gap" results into a table, we were able to conduct tabular analysis of the results and determine which areas showed the highest concentration of concern between groups. The skill areas are given on the horizontal axis and the different groups on the vertical axis. If a row contained two red (representing high disparity) and one yellow (representing medium disparity) color, then we established that that skill was a high concern area. Rows with all red were also established to be high concern areas.

In this manner, several skill areas that needed attention in the curriculum were determined using quantitative survey data. Using our interview results, this list of skill areas was adjusted to represent the concerns of the interviewees. Adjustments were made in terms of prioritization, addition, and subtraction of skills. Skill areas may not have been completely represented on our questionnaires. This allowed for any oversights on our part to be corrected. As an example, if an area of study was not given to be rated on the surveys but was an area of concern amongst stakeholders, it would have been brought up extensively in the interview sessions and would therefore need to be represented. Also, skills brought up in interview sessions that were not highly rated as being needed on the questionnaires would be given more weight in our final list of skill areas.

3.3 Methods for Developing Possible Suggestions

Once we established which skill areas were the most important and could benefit from improvement, the next step was to develop ways of enhancing these skills within the curriculum. We wanted to find and formulate a set of possible suggestions for the PTC curriculum, as well as developed ways of implementing these suggestions into the current curriculum. Our methods of formulating ideas and conclusions were to use a combination of brainstorming, interview and questionnaire results, as well as research of other reform efforts. We then presented our possible suggestions in a workshop consisting of experts in the fields of education, the textile industry, and labor to attain their feedback on our suggestions for curricular reform at PTC, in addition to obtaining any new ideas which could be used to enhance the PTC curriculum.

After identifying the areas where a gap existed between what are and what should be the skills of PTC students, we proceeded by developing some possible suggestions for curricular enhancement that could be used to narrow the gaps. The areas that needed the most assistance were focused on much more than those that only needed minor reforms. We began at the top of the list of concern areas and brainstormed ideas in each area. We also did some internet and book searches for ideas. Once we had compiled many suggestions, we reviewed the recommendations from faculty, alumni, and employers that we received during our interviews and from our questionnaires. We took these into account and began eliminating the ideas that we deemed impractical or out of the scope of this project. The remaining ideas were placed into a final list of suggestions for improving the curriculum at PTC.

After this brainstorming session, and review of the gathered data, we went a step further and attempted to supplement our ideas by investigating previous such reforms in other schools around the world. Vocational school reform in countries such as United States, Germany, and Korea, based on success they had achieved, was investigated to gain knowledge of the specific measures they took to fix the same discrepancies which existed between the current and future skills of students at PTC. Through this research we also obtained more insight on what possible barriers are, which can make implementation of suggestions difficult.

Based on brainstorming, data analysis, as well as the research of the other reform efforts, we compiled a more complete set of ideas we had for curriculum enhancement at PTC. These were presented at a one day workshop attended by education and textile experts, who would critique, add, and finalize our recommendations.

3.4 Finalizing Recommendations

A one day workshop was held on February 22, 2003 in order to provide different stakeholders with information concerning our suggested reforms, and obtain their feedback to make final recommendations.

The workshop participants included a mix of representatives, ranging from local textile employers and Photharam school faculty to members of the Department of Vocational Education (DOVE), Ministry of Education (MOE), and the Department of Labor. With all of these persons present, the workshop was organized with intent to clearly state our findings in a creative and interesting way, so as to stimulate the interest of the stakeholders. By accomplishing this we wanted to obtain both positive and negative feedback from them concerning our curriculum enhancement suggestions. In addition to their comments on our findings we also needed the participants of the workshop to brainstorm additional ideas, as well as offer further enhancement possibilities for the particular areas we had identified as having a large gap between what is and what should be the skill level of students at PTC.

The workshop proceedings started with us presenting our findings, and continued with a round table discussion. Each representative heard our presentation concerning our research, findings, and reform suggestions, and then gave their questions, comments, and improvement ideas in an open forum. This particular method allowed for everyone to give us their input at the end of the presentation, after they had seen our research methods, data analysis techniques, and results. The ensuing discussion was partially intended to promote interactions between all groups that were present. Topics to be talked about during the open discussion period were taken from participants' comments and/or questions concerning our work.

Comments and suggestions made by participants during the open discussion session were analyzed with respect to our specific focus areas of the curriculum. Other general recommendations provided by the experts were also taken into consideration and recorded for use by the PTC. Once the workshop was completed, we began the final phase of our project, which was to organize and analyze the feedback that we received and make our final recommendations for curricular improvements at PTC.

4 Results and Analysis

The sections of this chapter follow each of our objectives and tasks in order. The first section presents short summaries and graphs of the data that were collected from each of the four separate stakeholders. This is followed by an analysis of the collected data, including the identification of disparities between perceptions of current student skills and desired skills. The next section describes possible ideas for curricular supplements at PTC. Finally, the data collected at the workshop is analyzed and used as a basis for our final recommendations that address gaps between current and desired skills, which will be presented in Chapter 5. All of the data presented or referred to throughout the chapter are included in Appendices C and D.

4.1 Perceptions of Stakeholders

In order to determine some possible recommendations for supplements to the PTC curriculum, we have gathered data regarding perceptions of the current and desired skills of students from various stakeholders. The four stakeholders that were questioned were textile industry employers, Photharam alumni, faculty, and students. The following sections present summaries of the collected data from each individual source. Each section begins with select demographics of the group that was questioned, followed by a presentation of their survey responses regarding the curriculum and/or skills of employers or students. The survey statistics and interview summaries which are discussed have been included in Appendices C and D.

4.1.1 Textile Employers

The following information represents the results of our interactions with textile employers in different fields of production. During our factory visits, we strived to discern general areas of concern from those that reflected distinct skills needed primarily for their particular field of production. Each of the employers had recent Photharam graduates working in their factories and had some level of understanding of their abilities. We do, however, recognize that the curriculum at PTC has gone through some major reforms over the past year and that employers' perceptions of graduates will not reflect the reforms that PTC has recently implemented.

Table 1 lists the locations, names, and positions of each of the six managers from six different factories that were both interviewed and asked to complete a questionnaire.

Location	Interviewee	Position
RTD Textile Co. Ltd.	Mr. Nopniti Chotikasatein	Assistant Factory Manager
Luckytex Public Co. Ltd.	Mr. Puchong Temcharoen	General Manager of Human Resource Department
Mun Ying Co. Ltd.	Mr. Vichit Cheevaprawatdamrong	Deputy Managing Director
Jiam Patana Knitting Co. Ltd.		Textile Manager
Kangval Textile Co. Ltd.	Mr. Niphan Wongphanleart	Textile Manager
Sri Thong Textile Co. Ltd.	Ms. Suwimol Thanthong	Chief of Human Resource Department

Table 1: Names, Companies, and Positions of Employers who were interviewed

Key results from the six questionnaires completed by employers are presented in Figures Figure 4 and Figure 5, which show perceived skill levels of Photharam graduates working in the factories and the related importance of those same skills for future industrial success.

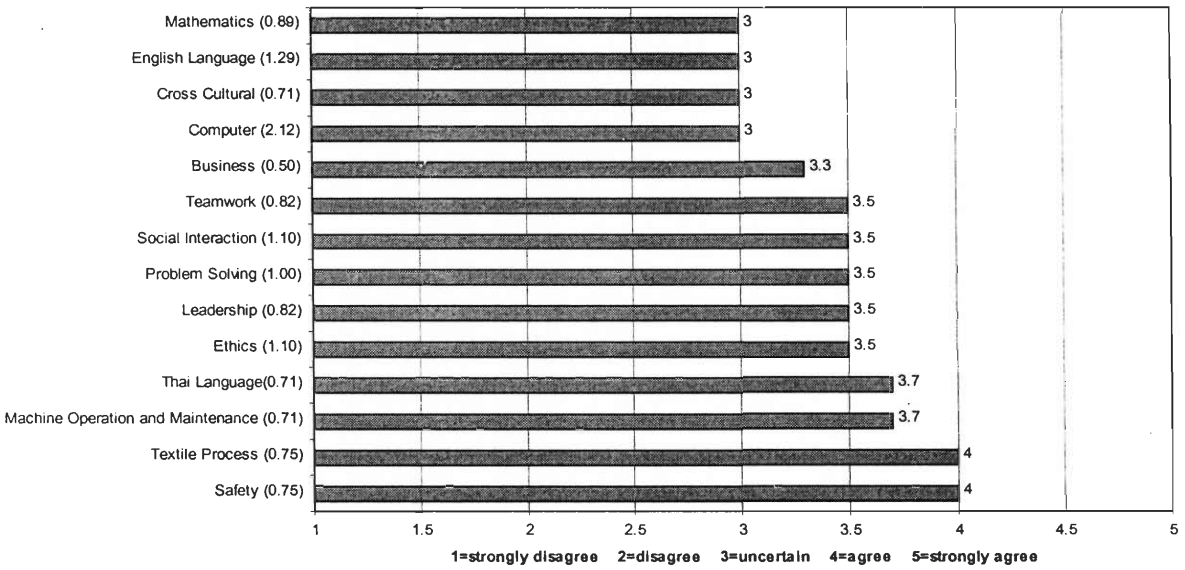


Figure 4: Mean of employer agreement with the statement "Workers who graduated from PTC know the following skills well" (Standard deviation in parenthesis, N = 6).

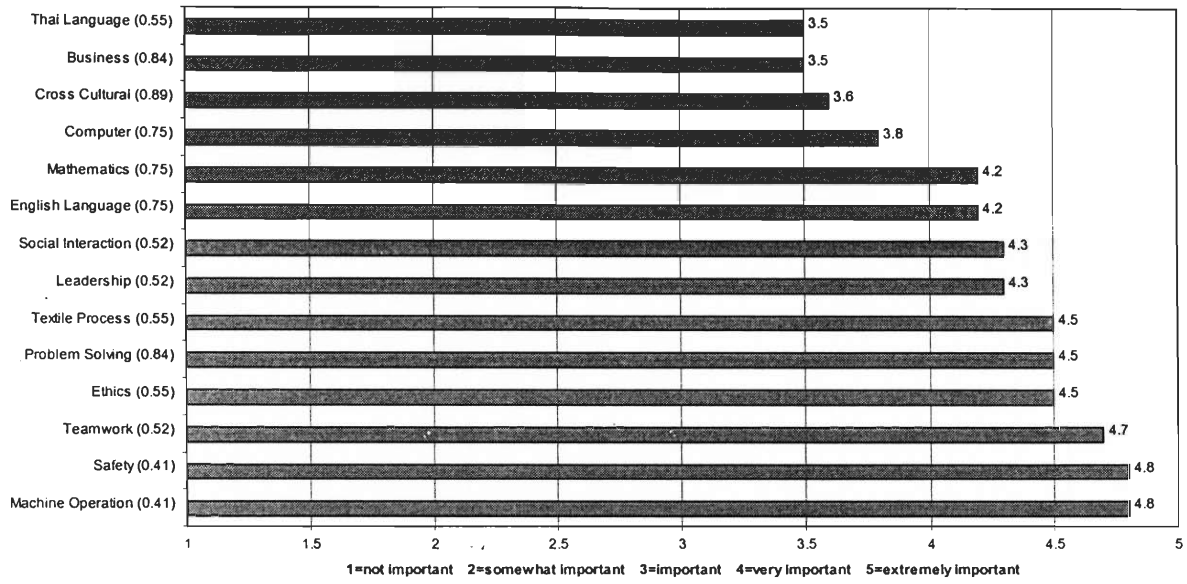


Figure 5: Mean of employer response to the statement: "Based on future industrial needs, please rate the importance of the following skills" (Standard deviation in parenthesis, N = 6).

With such a small number of completed questionnaires from this particular source, the standard deviations for each skill are relatively high. However, some basic ideas can be gained through an analysis of the data. Figure 4 shows that these employers viewed textile processes and safety as the skills that were learned best by Photharam graduates that work in their factories. The lowest rated items, even though they were only at the "Uncertain" level, were math, English, cross-cultural, and computer skills. These were judged to have been learned less well than other skills that were listed.

The results of the question concerning skills which are important for students' success in the textile industry, represented in Figure 5, indicate that machine operation, safety, and teamwork were seen to be most important. The employers also rated Thai language, business, and cross cultural skills as least important, in relation to the other skills listed. It should be noted that all of the skills received at least a rating of "Important."

The interviews were meant as a way for us to probe deeper by getting viewpoints and opinions, along with the quantitative data. This gave us an idea of the reasoning behind answers that were given in the questionnaires. Full descriptions of each session can be found in Appendix D. Following is a brief summary of the answers that the employers supplied to our questions, organized according to our research questions. The first topic focuses on the relative strengths and weaknesses of Photharam graduates (Table 2), followed by skills that they viewed as important for success within the textile industry, and finally recommendations concerning future curricular improvements. It should be noted that some of the answers seemed to be biased towards their particular industrial sector, not surprisingly, and are marked with "*." It

should also be mentioned that some answers are listed in both the strengths and weaknesses columns, which shows the different experiences and viewpoints expressed by employers concerning Photharam graduates. Each bulleted item in Table 2 represents a different statement or idea stated by employers that were interviewed.

Areas identified by employers as relative strengths of Photharam graduates:	Areas identified by employers as relative weaknesses of Photharam graduates:
▪ Base knowledge of textile processes ▪ Work ethic ▪ Adjusting to the workplace ▪ Adaptation to machinery upgrades ▪ Technical weaving knowledge	▪ Textile theory ▪ English language skills ▪ Adapting to the workplace environment ▪ Lack of initiative and enthusiasm ▪ Lack of responsibility and discipline ▪ Poor knowledge of dying and garments* ▪ Poor knowledge of fabric structure*

Table 2: Relative Strengths and Weaknesses of Photharam Graduates as identified by Employers

Following are the desired skills of future employees mentioned by textile employers in interviews:

- Communication, leadership, creative thinking, and problem solving skills
- Enthusiasm, motivation, and good school records (grades)
- English language skills
- Teamwork and social skills
- Aspirations to succeed and excel
- Independent thinking and expression of ideas
- Work ethic and positive attitude
- Life-long learning and adaptability to workplace changes

Here are some recommendations made by employers for future curricular improvements at PTC:

- More emphasis on software and multimedia training
- More focus on English reading, writing, and speaking skills
- Students should be more exposed to textile training before they obtain jobs
- Emphasize communication, independent thinking, and leadership skills

- Work on teamwork, responsibility, problem-solving, computer, and social skills
- Better understanding of the theory behind the structure of fabrics and the finishing of all materials*

Overall, the interviews provided us with significant information concerning the skills of PTC graduates, as well as those that were looked for in future employees. The employers felt that strengths of PTC graduates are in the textile area, and focused their recommendations on aspects such as students' attitude towards work and independence. Some skills that were identified as less strong in both surveys and interviews were English language, teamwork, social, problem-solving, and leadership.

4.1.2 Photharam Alumni

Alumni are in the particular position to comment on both the current state of the industry as well as the effectiveness of the preparation that they received while at PTC. However, we did not rely heavily on alumni responses about how prepared they felt after graduating from Photharam, since 53% of the alumni respondents graduated over 10 years ago. The reasoning behind this was simply that the committee in charge of reforms to the school's curriculum makes changes to it at least once every 5 years.

We received a total of 30 completed questionnaires from several of the factories that were visited. All of the data collected from the questionnaires is presented graphically in Appendix C. The most important aspects of the collected data are presented here, beginning with some basic respondent demographics.

Demographic information provided by the surveys indicated that 66% of the respondents were female, 27% male and 7% did not respond. The age range of alumni respondents was from 20-60 years old. 73% of respondents were 35 years old or younger, 24% older and 3% did not respond. The vast majority of the alumni respondents graduated between 1996 (2539) and 2002 (2545). When asked what textile major they graduated from, 60% of respondents indicated Textile Technology while 37% indicated Chemical Textile and only 1 respondent indicated another major. Approximately two-thirds of the respondents graduated from the diploma program, 10% graduated from the dual diploma program and 20% graduated from the certificate program.

Figure 6 and Figure 7 show the mean responses of alumni regarding the skills that they felt were most important for their jobs and their level of preparedness in those same areas upon entering the workforce.

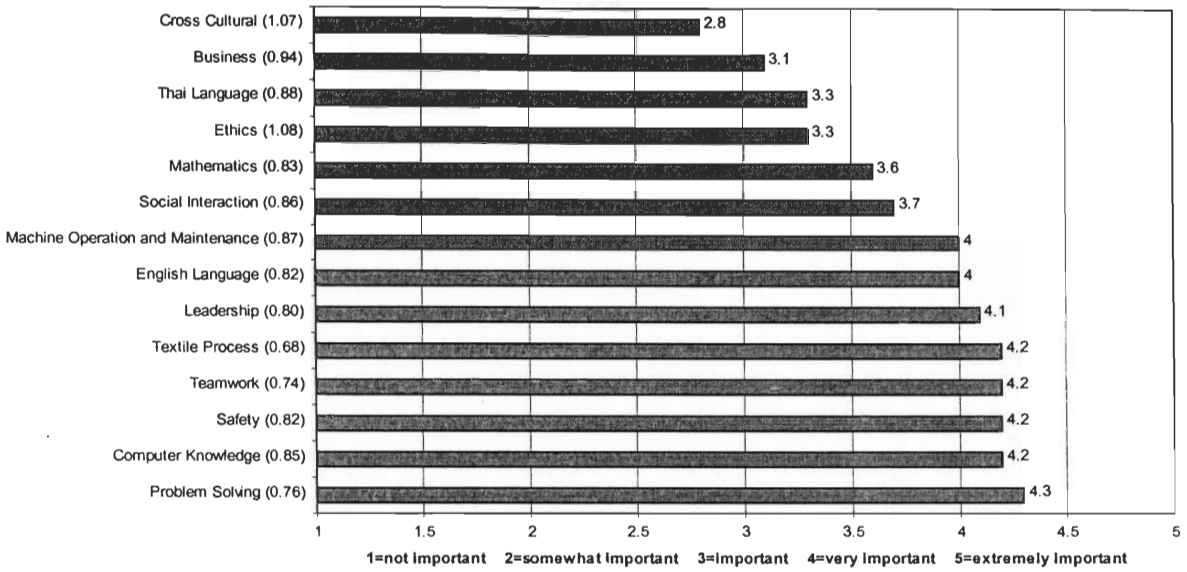


Figure 6: Mean of alumni response to the question: "Which of the following areas are most important for your career in the textile industry" (Std. deviation in parenthesis, N = 30)

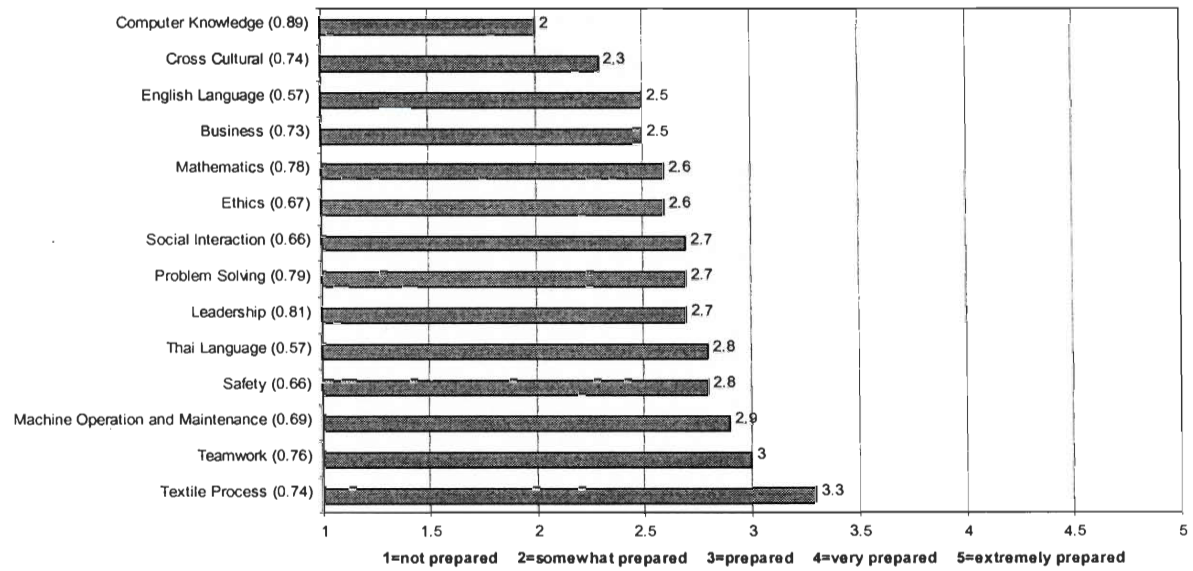


Figure 7: Mean of alumni response to the question: "How well did your education at Photharam prepare you in the following areas" (Std. deviation in parenthesis, N = 30)

As can be seen from Figure 6, alumni felt as though problem solving, textile process, teamwork, safety, and computer skills were the most important for their jobs, while cross-cultural, business, Thai language, and ethics were not as important. In Figure 7 we see that alumni began their jobs feeling most prepared in the areas of textile processes and teamwork, while they felt least prepared in cross-cultural and computer skills.

Just as with employers, interviews with alumni were conducted in order to gain opinions and ideas that could not be conveyed on paper through the questionnaires. Table 3 lists the location and number of alumni interviews conducted.

Location	Number of Alumni Interviews
Sri Thong Textile	1
Kangwal Textile Co. LTD.	8
Mun Ying Co. Ltd.	6
Jiam Patana Knitting Co. Ltd.	2
Total	17

Table 3: Dates, locations, and numbers of alumni interviews conducted

Since many of the alumni were in supervisory roles, they were in a good position to comment on the skills of recent PTC graduates as well as their own. However, since there were 17 total interviews to conduct, the alumni interviews were not as in depth or thorough as the employer interviews. A brief summary of the interview data will now be described, beginning with strengths and weaknesses of graduates as perceived by the alumni in Table 4, followed by a list of skills that are important to possess in order to be successful in the textile industry. After this, recommendations and suggestions made by the alumni for future curricular reforms at PTC are presented.

Areas identified by alumni as relative strengths of recent Photharam graduates:	Areas identified by alumni as relative weaknesses of recent Photharam graduates:
▪ General knowledge base ▪ Work ethic ▪ Textile theory and practice ▪ Desire to succeed and excel	▪ Problem solving and planning skills ▪ Adjusting to the workplace ▪ Lack of responsibility in younger workers ▪ Poor English language skills (Reading, writing, and speaking) ▪ Lack of supervisory and leadership training ▪ Outdated training machinery at PTC

Table 4: Relative Strengths and Weaknesses of Photharam Graduates as identified by Alumni

Important skills and attitudes needed to excel in the textile industry identified by PTC alumni include:

- Knowledge of information technology (IT) and computer skills
- Intentions to work diligently, be productive, devoted, and able to solve as well as avoid problems
- Strong social, communication, and management skills
- Enthusiasm, dignity, pride, and respect towards work and others.
- English reading, writing, and speaking skills
- Teamwork, leadership, and problem solving skills
- Public/human relations, organizational management (getting the right job to the right person), planning, work safety, and quality assessment skills
- Maintaining and understanding the machinery used in the factories
- Thorough knowledge of spinning and weaving

Below are alumni recommendations for future curricular improvements at PTC:

- More focus on problem solving at both the certificate and diploma level.
- Invite alumni to visit, lecture, or teach at the school to show how theories are applied in the industry
- Field trips to factories to observe new machinery and better correlate theory with reality
- Supervisory and leadership skills need attention and improvement while students are still in school
- Improve English and Computer programs
- Improve and upgrade the machinery at the school

Overall, the alumni seemed satisfied with the education they had gotten at Photharam with respect to knowledge of textile processes. Similar to employers, however, they thought that students would benefit from personal and social development. They also stated that whatever one got out of the school was directly related to the effort and devotion to learning that was put forth while in school. Some alumni noted a lack of devotion, respect, and interest in current graduates. To sum up, some agreement existed between the questionnaires and interview results, with respect to important skills and relative strengths and weaknesses of the PTC curriculum. In both cases we noted that textile knowledge was judged to be sufficient and helpful in the workplace, but English, leadership, and problem solving skills were seen as somewhat lacking.

4.1.3 Photharam Faculty

The Faculty of the Photharam School was another valuable source of information concerning perceptions of current skills of students. The questionnaire results will be presented first, followed by ideas gathered during the interviewing session, which expounded upon our research questions in greater detail.

We received 32 completed surveys from PTC faculty, the results of which are presented in graphical form in Appendix C. Among faculty respondents, 53% were female, 44% were male, and 3% did not indicate gender. 69% of faculty respondents were between 36-50 years old, 25% were younger than 36, and 6% were older than 50. The overwhelming majority of faculty, 85%, had received a Bachelor's degree or equivalent. 9% of the faculty had received some higher degree and 3% had less than a Bachelor's degree education. Faculty respondents have taught at PTC for anywhere from 1-33 years. However, only 33% have taught at the school for over 16 yrs. The same respondents also indicated the number of years of total teaching experience they had. This question indicated that 53% of faculty has taught for a total of more than 16 years.

Figure 8 and Figure 9 indicate the responses from faculty concerning the importance of certain skills for student success in the workplace, and the skill levels students develop at Photharam, respectively. These figures indicate mean responses and list standard deviations for each question.

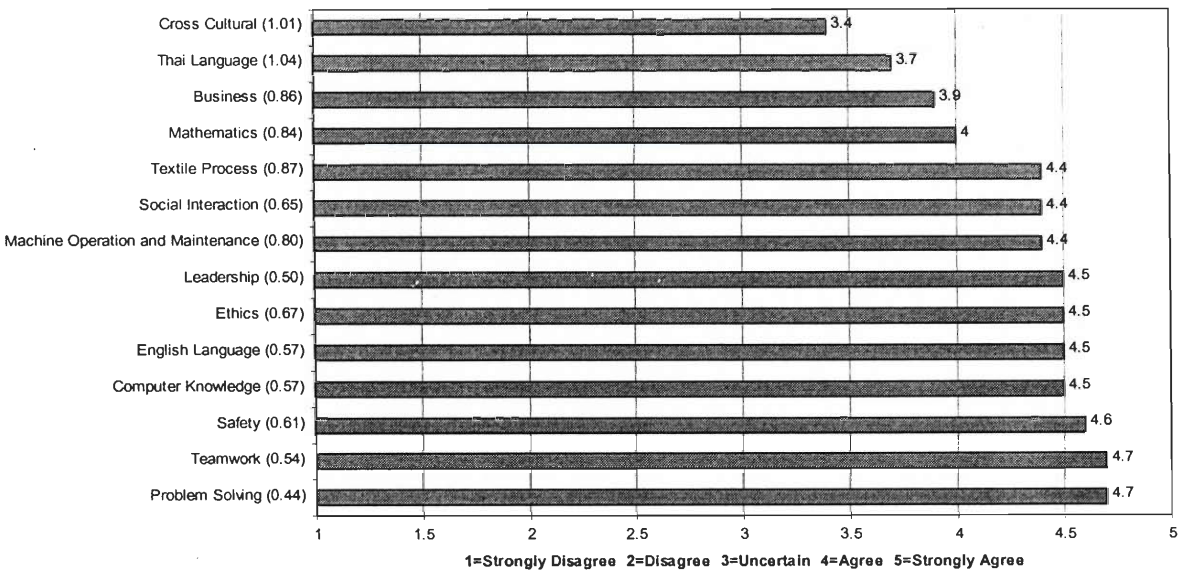


Figure 8: Mean faculty agreement with the statement: "The following skills are very important for success in the textile industry" (Std. deviation in parenthesis, N = 32)

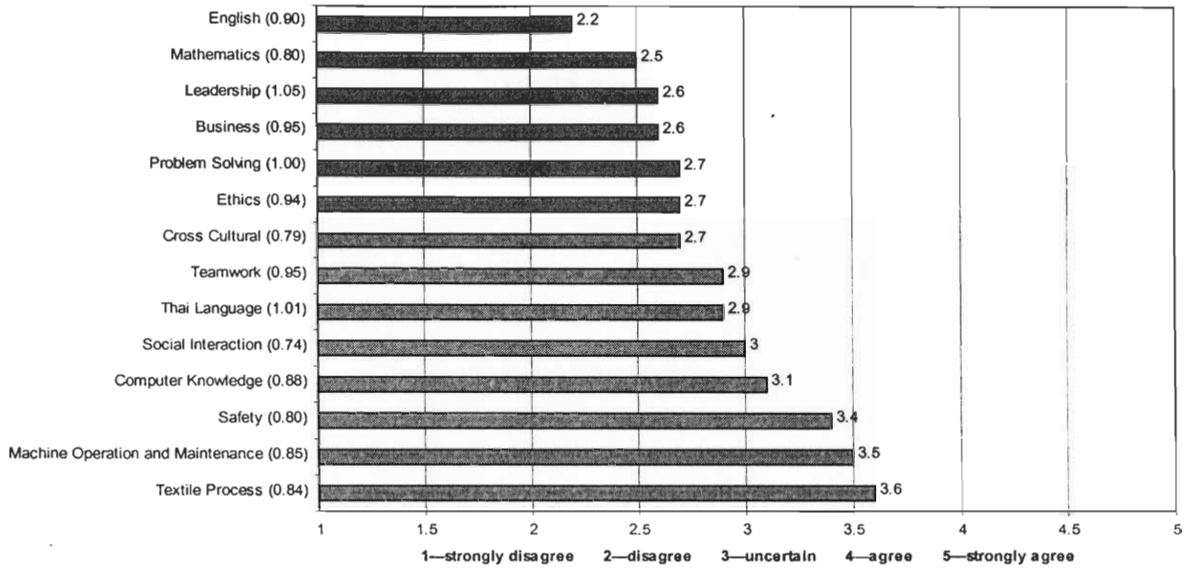


Figure 9: Mean faculty agreement with the statement: "Students are learning the following skills well" (Std. deviation in parenthesis, N = 32)

Each of the skills that were listed and rated in terms of importance by the faculty were above the "Uncertain" range, which shows that all of them were seen as important to some extent. The least important skills rated were cross-cultural, Thai language, and business, while those rated most important were safety, teamwork, and problem solving. When asked which skills the students were currently learning well, the faculty identified English and math as the weakest areas, while safety, textile processes, and machine operation and maintenance were viewed as the strongest areas. It should be noted that only four of the 14 total skills were rated above the "Uncertain" mark, with none of them above the "Agree" mark. This indicates that the faculty does not believe that the students are learning the majority of the listed skills well.

The faculty interview was in the form of a roundtable discussion with six of the Photharam faculty, representing each of the different textile departments. Our interview questions were centered on our research questions, but the discussion often led to other topics or ideas that were on the minds of the teachers. Following are some of the interesting points that were brought to our attention during the course of these talks:

- Teachers in the garment department join the industry for 2 months (when school is not in session) to gain valuable industry experience to aid them in their teaching.
- The teachers are free to set up their own curriculum, but must follow the local ideas and industrial needs.

- Evaluations in textile classes involve observations for practice and tests given on a topic by topic basis, including tests on work done in lab.
- Other universities send students to PTC because of its strength in textiles.
- The curriculum is good, but is also dependent upon the teachers' abilities and willingness to seek help when necessary to provide more opportunities to students (e.g. by asking specialists to teach classes in areas where they are not as comfortable).
- The curriculum is not the issue but more the limited budget that the school has, resulting in the technology and machinery not being up-to-date.
- The limited budget that the government allots PTC makes it critical that they work with local factories, which possess the technology and are willing to help.

Several other issues came up during the discussion session as well. First of all, we found out that students traditionally would try to work out problems on their own without going for extra help. Students would often employ the Internet, library, or classmates for help. However, with the new independent curriculum in place, younger students have been utilizing teacher assistance more. This is mainly a result of the new role of teachers as supervisors instead of lecturers. This requires students to have an increased amount of direct contact with the faculty for explanations of problems and help with comprehension and completion of work. Although the faculty thought it was good for students to take the time to learn on their own, they were unsure as to whether all the students were capable of this. This is an issue that will likely be faced by the school's administration as it tracks the success of the recent curricular reforms.

Another interesting topic that arose during our discussions was that the teachers thought that it would be very beneficial for the school to hire people from the factories to come to Photharam to train students and give talks or lectures in certain specialized areas where the teachers' knowledge is limited. This would be advantageous to both the students and the teachers, as they would both be learning new things. As it is now, employers currently help develop the curriculum and make suggestions and recommendations that would help students prepare for the workplace. Sending factory workers to teach students in a certain area for a short period of time would possibly be even more valuable in some ways than just making general recommendations.

On another note, the faculty was in complete agreement with the system of students completing work orders for factories. These school-sponsored projects are completed on campus, but consist of actual work that the students have financial control over, and in the end receive money for the completed product. This program gives students the opportunity to explore the business aspect of the textile industry, as well as get further practice using machinery and applying concepts that they learn.

One recurring theme during the discussion session was the notion that students are not independent enough in thought, according to faculty. This was a major issue and concern that

the faculty shared, as they cited several examples to clarify this point to us. One particular example used to show the students' lack of independence was by citing their reluctance to move away from home and leave their family and friends, even though they may have great employment opportunities elsewhere. Students can also easily pursue further education if they desire but decline for this same reason. This is a problem that the faculty wishes to address immediately.

During the discussion we spoke with the teachers about possible improvements to the curriculum, which led to several good ideas. The following is a brief summary of their recommendations for curricular improvements:

- More work on English language skills (reading, writing, and speaking)
- More attention to independent thinking skills
- Better organizational and planning skills need to be taught
- More emphasis on teaching students ethics, responsibility, and morals
- Cooperation with local factories needs to be encouraged more

A more in-depth summary of the interview session with the faculty is presented in Appendix D.

4.1.4 Photharam Students

The students of PTC were surveyed to gather their perspectives on how well they felt they were learning their school subjects. We received 253 completed questionnaires from students concentrating in textile-based subjects. The students were from both certificate and diploma programs. However, many of the third and fifth year students were off-campus at training sites at the time that surveys were distributed, so there are not as many respondents from these grade levels as we would have liked. The responses of those particular students would have provided the best perspectives, seeing as they are the students who are in their last year of either the certificate or diploma program and would have the best insight into the total education that they have received at the school. All of the individual question results can be found in graphical form in Appendix C.

Table 5 and Table 6 list the number of questionnaires completed by students in each program and major offered at the Photharam School. Of student respondents, 68% were female, 31% male and 1% did not indicate gender. 37% of the respondents had a GPA between 2.1 and 2.5, 34% between 2.6 and 3.0, 19% above 3.0, and 10% did not indicate GPA.

Program	Number of Completed Questionnaires
Certificate	101
Diploma	144
Unmarked (but rest of questionnaire was completed)	8
Total	253

Table 5: Number of completed questionnaires for each program

Major	Number of Completed Questionnaires
Textile Technology	116
Chemical Textile	89
Garment Manufacturing	38
Unchecked	10
Total	253

Table 6: Number of completed questionnaires for each major

Figure 10 represents the mean response of students concerning how well they feel that they are learning certain subjects. Student respondents rated themselves higher overall than faculty respondents in the same skills. This could be the result of students not wanting to be too critical of themselves or the teaching staff. Responses from students indicate that they feel they are learning cross cultural skills, mathematics, business and English language less well than other skills listed. The students also indicated that they felt as though they are learning safety, computer, and teamwork skills the best out of those listed.

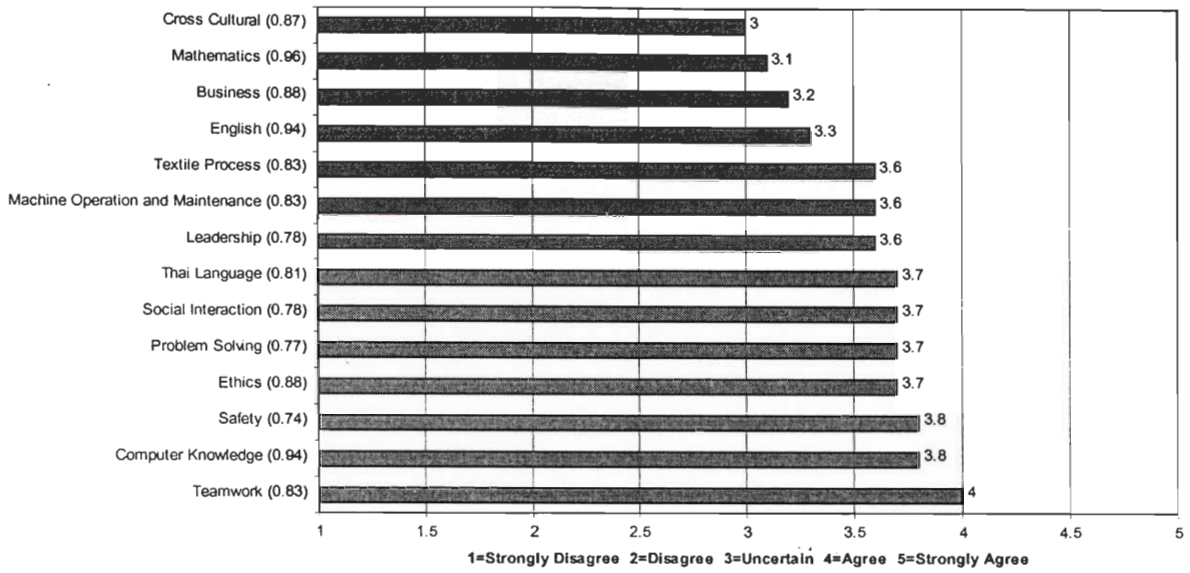


Figure 10: Mean of Student Agreement with the statement: "I am learning the following subjects well" (Std. deviation in parenthesis, N = 253)

Once we had gathered perceptions from our targeted stakeholders, we were ready to move onto the next phase of our project, which was to analyze the data further and identify the largest disparities between the desired and current skills of PTC students, which could then serve as a basis for future improvements.

4.2 Identifying Areas for Future Improvement

The questionnaire and interview data was analyzed to determine the areas that showed the most disparity between perceptions of what is being learned by students and what is most important for students' future success. This section will describe our analysis and compilation of the data gathered, which will provide us with a basis for determining the specific areas that need the most improvement.

There were many different viewpoints presented in our interviews and surveys. The surveys indicated which skills were either learned the best or were the most important, according to various respondents. The qualitative data received during interviews allowed us to understand the reasoning behind certain viewpoints or opinions of stakeholders, which clarified much of the quantitative data and gave us more insight into the different perspectives of the various stakeholders.

After a review of the questionnaire data, we noticed that although there was a general agreement about the status of many skills, the scales seemed to be shifted between different stakeholders. For instance, survey responses indicated that, overall, students viewed that they were learning most of the subjects well. It was no surprise to us that students rated themselves

more generously then they were rated by the teachers, who scored them somewhat lower in most areas.

Instead of comparing the scales directly, we looked for the greatest differences between the perceptions of current skills and needed skills. We used the faculty's and employers' responses from surveys and interviews, as well as a comparison between what skills the students felt that they learned well and what the alumni felt was most important for students to be learning. This data was put in tabular form for an easier analysis of the major disparities. The construction of this table is described in section 3.2.2.

Figure 11, Figure 12, and Figure 13 show the mean difference of needed skills and current skills according to different stakeholder groups. These figures also indicate the grouping of skills into largest (red), medium (orange) and smallest (yellow) disparities which were used on our final table. In each case, the possible scale for the mean difference ranges from negative four to four.

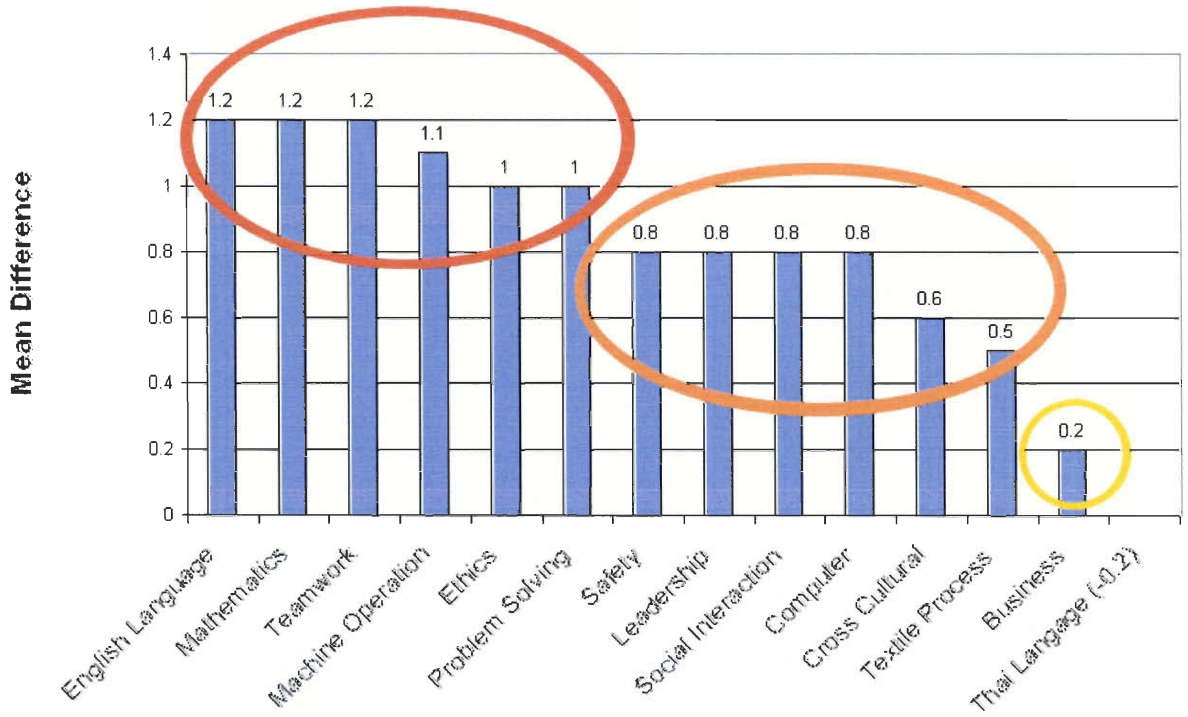


Figure 11: Employer indicated difference between mean rating of needed skills and mean rating of current skills

Figure 12: Faculty indicated mean difference between needed skills and current skills

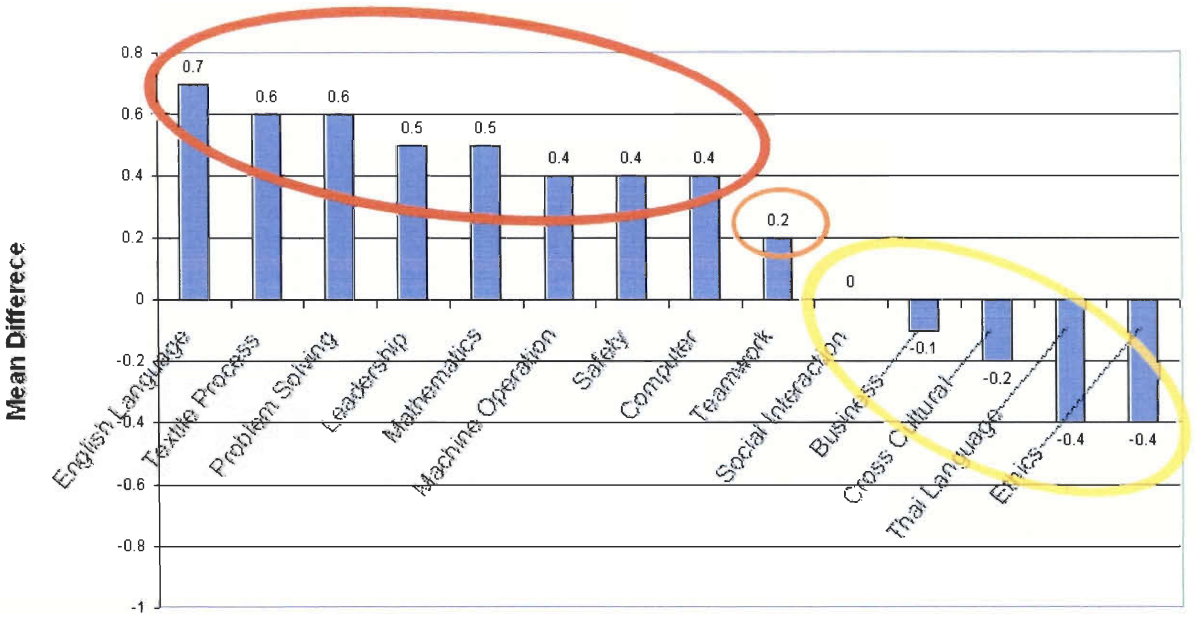
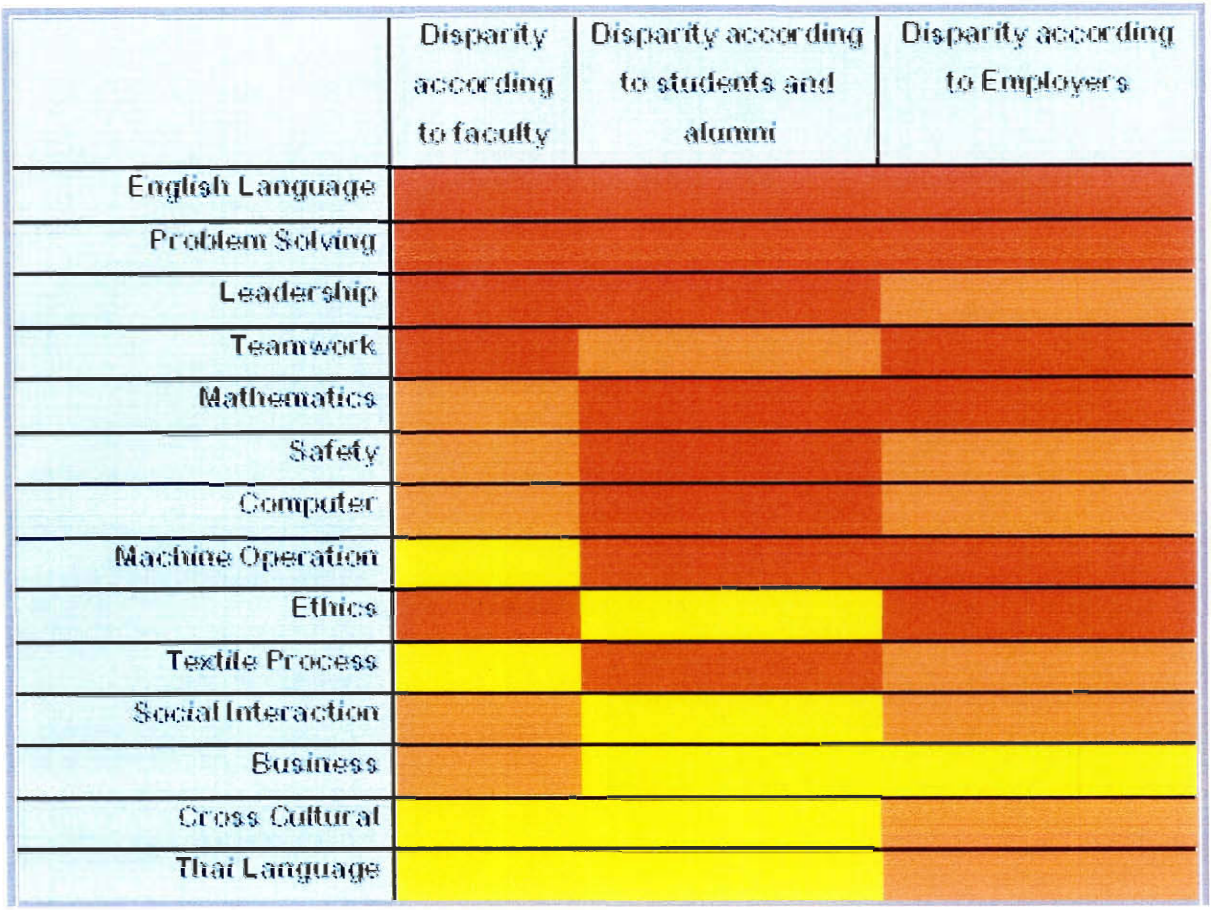


Figure 13: Alumni/student indicated mean difference between needed skills and current skills

The table is color coded to indicate which skills show the greatest and smallest discrepancies. Red indicates the largest disparity, orange indicates a medium sized disparity and yellow indicates the smallest disparity. Using this coloring scheme, it is easy to see trends along rows of the table which indicate agreement between different stakeholder groups.



RED=Large Disparity **ORANGE**=Some Disparity **YELLOW**=Little or No Disparity

Table 7: Disparity between the Current Skill Levels of Students and Importance of Skills for Future Success According to Perceptions of Various Stakeholder Groups

Inspection of Table 7 shows that stakeholders agree that problem solving and English language skills are among those which currently have the biggest disparity between what exists and what should exist. There is also some agreement that leadership and teamwork has a large disparity as well.

We found it interesting that business skill is not one of the skills with a high disparity between what exists and what should exist. At the start of our work with PTC, we were told a number of times that faculty felt entrepreneurship was important and business skills would be an important part of the industry. Although survey responses and interviews with alumni and employers did not yield data indicating a gap between current business skills and future ones, we believe that this should be focused on more. It is possible that the reason that this skill was not singled out along with the others is because employers do not need workers who are highly skilled at business. The business aspects of the company are handled by the higher executives. However, if a student wishes to become an entrepreneur and start his or her own business, these skills will be essential. While ideally the curriculum of the school would prepare students for all

aspects of the workplace, improvements must be implemented one at a time and therefore prioritized according to which show the most need. However, we do notice an opportunity to make some recommendations which can begin to address and improve business skills of students at Photharam Technical School as well as other areas which we have found have the highest disparities between current skills and future needs.

In conclusion, there are six skills which we have identified as skills which the PTC curriculum should focus more attention and resources. The skills are listed in order of the relative size of the disparity as was indicated by our tabular analysis only. The results and analysis of our workshop, as provided in section 4.4, will reprioritize these skills as a result of feedback given at the workshop. These skills are:

1. English Language
2. Problem Solving
3. Leadership
4. Teamwork
5. Mathematics
6. Business

To the extent that we can, we would like to make recommendations for curricular supplements to improve these skills in students entering the workforce from PTC.

4.3 Methods of Curricular Enhancement

Based on our research we have identified several areas where a gap exists between perceptions of the effectiveness of the current Photharam curriculum and what is desired in future graduates. These perceptions indicate areas that could benefit from some adjustments aimed at enhancing the skill levels of students. For guidance we researched previous reforms that have taken place and been successful in other countries of the world. Based on these findings, as well as our research and observations at the school, we came up with a list of ideas intended to support the need of the Thai textile industry for more skilled labor. Each area will be addressed individually in this section, with curricular improvement suggestions provided for each one.

4.3.1 English Language

While for a regular worker this might not be essential criteria for finding a job, our research showed that proficiency in the English language can increase chances for promotion and facilitate everyday processes in the textile field. Having a better grasp of the English language will help employees to read machine manuals and computer commands, as well as communicate better with technicians and/or higher level executives.

The English language program at PTC has gone through a very recent reform which restructured the methods of instruction at the school. Instead of attending regular lectures, the students must fill out a variety of worksheets and are required to watch movies and listen to music to hear native English speakers. We believe that these methods will greatly improve the English language instruction at the school and motivate the students in this subject.

However, we also found that the students did not have the opportunity to speak English very often. From our observations, speaking English is highly encouraged at PTC, but required only for oral exams given in English classes. Although spoken English language is not necessary for most entry level factory positions, it is important for those who wish to get involved in higher levels of management, particularly at international companies. Also, those graduates who have desires to start their own business will benefit tremendously if they have a solid understanding of reading, writing, and speaking English. In addition to speaking, suggestions from employers and alumni during interviews included incorporating more textile based vocabulary into English courses to facilitate manual reading and knowledge of technical terms used in the industry. We developed the following ideas for improvements in this area for PTC.

- **Possibility #1: Group discussions**
  Hold meetings or discussion groups between students in which they speak only English (with dictionaries for assistance), and discuss English classroom material or swap technical word knowledge relating to the textile field.[36]

- **Possibility #2: Learning textile based vocabulary for manual reading**
  The necessity for students to be prepared for new technology was evident through the research we gathered. Being able to read manuals to understand the machinery better and/or to fix small malfunctions can make a difference in production and profit by saving both time and money that would have otherwise been spent on technicians.[37]

- **Possibility #3: Focus on marketing and business language**
  Due to industry demands which call for more broadly educated students, this could be a great opportunity to practice English as well as increase the students' knowledge on other aspects of the textile industry, such as marketing and business.[38]

- **Possibility #4: Practice interviews and resume writing in English**
  This could be a means a practicing English and preparing for factory interviews. Some of these interviews include some English questions, and could make the student more

[36] An adaptation of a technique currently being used at PTC.
[37] Suggested by many alumni during interviews.
[38] Suggested by alumni and employers of Kangwal Textile Co. LTD.

attractive to the company. They can also learn how to better display their skills and make themselves more presentable.[39]

- **Possibility #5: Invite or hire fluent English speakers to the school**
  They could give talks or lectures to students about the importance of knowing the language or provide classroom assistance in the following areas: writing, pronunciation, reading and word recognition.[40]

- **Possibility #6: Incorporate English into other areas of the curriculum**
  If English was used in other areas of the curriculum besides the mandatory English class, students would be able to learn a more extensive vocabulary and get further practice in speaking, reading, and writing.[41]

4.3.2 Problem Solving

In today's changing economy, good problem-solving skills are essential to maintain and succeed in any job. Having a good grasp on how to solve problems of all varieties will provide a significant advantage over those with little or no ability in this area. In our research, problem solving was identified as very important by all stakeholders. Currently at PTC, there has been an increased emphasis on promoting this particular skill, as well as creativity and innovation, which are related to this area. Some possible recommendations for further improving upon the curriculum to offer enhanced training in this area are as follows:

- **Possibility #1: Encourage "thinking outside the box"**
  This broad statement encompasses several different ideas that fit together, all of which are aimed at getting students to become more open-minded when approaching and/or solving problems. Basically, this concept emphasizes the notion that there is no one "Right" way of solving a problem, but a plethora of possible approaches and solutions.[42]

- **Possibility #2: Promote group problem solving practices**
  Using groups to promote problem solving can be quite effective through the use of brainstorming and idea sharing techniques. Hearing and evaluating different methods of

[39] Brainstormed idea based on employer interviews which mentioned student interviewing techniques.
[40] Brainstormed idea based on interviews with faculty which indicated that English teachers did not want to speak English in the classroom.
[41] Brainstormed idea based on the need for industry specific vocabulary.
[42] Based on: Susan Johns, Sue Kilpatrick, Bill Mulford and Ian Falk, "Thinking outside the box: a remote VET in Schools program challenges traditional boundaries." (2001) found at <http://www.avetra.org.au/2001%20conference%20pages/PAPERS%202001/Johns%20Kilpatrick%20Mulford%20Falk.pdf>

approaching or solving problems, in addition to group discussions and collaborations to arrive at conclusions can enhance each student's skill level in this area.[43]

- **Possibility #3: Support creativity and innovation in school projects and assignments**
  Allowing students to be more creative and innovative in their everyday assignments can help foster more problem solving skills. Coming up with effective and/or interesting ways of solving problems at school or in the workplace requires some degree of creative thinking and innovation, which can help students to excel in either environment.[44]

4.3.3 Leadership

From our research, we realized that innovative ideas and self sufficient workers are desired in the textile industry. With rapid advances in technology, all processes are becoming more automated, which has resulted in an increase in workplace competition. Those employees who have the ability to convey new ideas and take charge in completing tasks will most likely excel and be preferred over other, less-outspoken and independent employees.

One of the most frequent responses we obtained from employers and alumni working in the textile filed regarding PTC students was, "... they lack leadership skills." Leadership skills were recognized by both parties to be a large contributing factor behind promotions and other opportunities. Successful and higher level workers have the ability to take charge during work and share their ideas so that better and faster results are obtained. Most graduates of the school were judged proficient in textile processes, but also to put little or no effort forth when it came to providing new or alternative ideas concerning general or specific textile processes. As the textile industry moves towards a more value added labor system, current and future employees with good leadership skills are highly sought after. To cultivate and increase leadership skills we propose the following:

- **Possibility #1: Stress goal setting and self regulation/management**
  Reward students for achieving "personal best" goals and emphasize the need for punctuality and task completion.

- **Possibility #2: Supplement evaluation processes with student self-assessments**
  Teach student to evaluate their own work, and to know when they have achieved the necessary results. If they can learn how to do this, it should facilitate evaluations of others, which is something that they would have to do in a leadership position in the workplace.

[43] Based on brainstorming from personal teamwork experience.

- **Possibility #3: Stress leadership roles in group work**
  In this manner students are working in a team and at the same time delegating responsibilities, and learning to lead by example. This can lead to better leadership skills that might one day be necessary for promotion in the workplace.

- **Possibility #4: Presenting projects or reports in front of teachers and peers**
  Such exercises can lead to better presentation skills as well as a reduced fear of public speaking, which is necessary if a leadership position is attained in a factory. Learning how to organize and convey ideas clearly in front of others in an effective manner can also give your work more credibility.

- **Possibility #5: Invite experts to give talks on ways of developing better leadership skills**
  High ranking industry or education officials can teach students about what it takes to obtain a leadership position in the working field. They can present ideas, assignments, or exercise which can enhance leadership skills.[45]

- **Possibility #6: Peer leadership opportunities for older students**
  Students that have already completed the bulk of their classes can assist in teaching younger students how to succeed in school. While providing this service, older students can enhance their leadership skills and help other students out at the same time.

4.3.4 Teamwork

In the workplace teams are often called upon to cooperate and finish projects within an allotted period of time. Having good teamwork skills can lead to improved production, creativity, and efficiency. These skills are also helpful in increasing communication between workers and encouraging the sharing of ideas.

Employers and alumni of the school both cited in interviews that these skills are essential for factory employees. Sharing ideas can enhance productivity in both the workplace and classroom. Experts agree that teamwork is one of the best means of improving social skills and leadership skills as well. Based on our observations, the new curriculum includes a lot more emphasis on teamwork than in the past, but is an area that can always use improvement. Following are possible suggestions for improving this aspect of the Photharam curriculum.

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[44] Based on internet research on problem solving.
[45] Suggested by some alumni and employers of Kangwal Textile Co. LTD.

- **Possibility #1: Foster teamwork through group work and problem solving experiences**

  Set up different kind of assignments which can be completed only through teamwork. Initialize projects with several parts to encourage work sharing in order for completion in some allotted period of time.

- **Possibility #2: Use group projects to foster team dynamics, idea sharing, and efficiency**

  Adding more group projects or activities can help students to learn and practice brainstorming techniques, as well as deal with problems which might arise in a group setting. Place emphasis on idea sharing and reviewing techniques to maximize efficiency (Multi-tasking)

- **Possibility #3: Group competitions in classroom activities**

  Through competition the students might be more focused and enticed to cooperate in order to win. Some sort of reward program could be set up for the team which achieves the best results.

4.3.5 Mathematics

Having a good understanding of mathematics can help students in a variety of ways once they enter the textile industry. Taking measurements, tallying numbers, or designing patterns all take a certain degree of comprehension of certain mathematical concepts and skills. It was noted by a number of PTC alumni that they use a significant amount of math in their everyday jobs, which emphasizes the importance of having a solid background in this particular area. The following possibilities are concerned with developing better mathematical skills for PTC students:

- **Possibility #1: Assign homework in math classes**

  Although homework has been eliminated in the new PTC curriculum, assigning some could help in developing better math skills through practice and repetition. Spending more time working on basic math skills and concepts is one way of possibly enhancing the abilities of current students in this particular subject.

- **Possibility #2: Offer math assistance outside of regular class time**

  One way that students can get further practice or assistance in math is to offer programs outside of regular class periods, such as after school help sessions or peer tutors. Being

able to get help with math work and acquire different perspectives on approaches to solving different types of mathematical problems is one possible way that PTC students could attain better skills in this area before entering the workplace.

4.3.6 Business

As factories become more technologically advanced, it has become important for workers to possess skills which will set them apart from their peers, to help to secure work in the future. Although business skills did not show a significant disparity in our analysis, we deemed them important based on faculty interviews. Developing entrepreneurial skills in students would be beneficial if they were ever inclined to start their own business in the future. The following suggestions are intended to improve these skills:

- **Possibility #1: Teach good business practices and ethics**
  Have specific classes which focus on the business aspect of the textile industry. Focus on the importance of foreign relations and economies, as pertaining to the trade the local companies conduct. School is a good time to point out the right and wrong ways to conduct business, as well as ways in which graduates can make the right decisions in difficult situations.[46]

- **Possibility #2: Offer more Small to Medium Enterprise (SME) type programs**
  SME or similar type programs link technology and business, and might be a means for stimulating students' interest in the field. Through such programs students could learn what it takes to run a business and also find out which aspect of the industry they prefer the most.[47]

4.4 Analysis of Workshop Discussion

The workshop that took place was organized in an attempt to present our ideas and suggestions to experts who are knowledgeable and in a strong position to comment on the feasibility and appropriateness of our recommendations. There were representatives from the fields of education, labor, and industry present at the workshop. Following is a list of each of the organizations that were represented:

- Education
  - Chulalongkorn University
  - Ratchamangkol Technology Institute

[46] Suggested by some alumni and faculty of PTC.
[47] Based on discussions with faculty about the success of current efforts and student involvement.

- Bangkok Technical College
- Photharam Technical College
- Thai Textile Institute

- Labor
  - Thai Labor Department
- Industry
  - Everest Textile Co. Ltd.
  - Jiam Patana Co. Ltd.
  - Tangprasiti Weaving Co. Ltd.
  - Mun Ying Co. Ltd.
  - Saengvanich Textile Co. Ltd.
  - Kangwal Textile Co. Ltd.
  - Federation of Thai Industries
  - Federation of Weaving Industries

Following the presentation of our initial recommendations, we received feedback concerning the feasibility and practicality of our suggestions as well as obtaining some general ideas about curricular reform from those present. The attendees' thoughts about our ideas for curricular reform enhancement at PTC are given, followed by issues that emerged during discussion. An analysis of overall workshop feedback is then presented. It should be noted that the workshop discussion proceeded in Thai and as a result, the feedback presented here are the bits and pieces that were translated into English for us. It should also be noted that mathematics was not presented as an area for improvement in our workshop. This topic was added to our recommendations after completion of the workshop and further review of our data.

4.4.1 Workshop Feedback

The clear consensus about our recommendations for the curriculum of PTC was that we had identified areas that could benefit from certain curricular enhancements. We did not receive any negative feedback about the suggestions that we derived. One thing that must be noted was that one of our identified skills, mathematics, was not presented during the course of the workshop; therefore there was no feedback in this area. For this reason, we will only be dealing with the five areas that were discussed during the workshop in this particular section.

One attendee suggested that all the areas we identified were important, but that they needed to be reprioritized from their initial order as derived from our stakeholder data, and another stated that the five areas were important for worldwide human resource development. The order of priority suggested by the first speaker, a representative of the Thai Textile Institute, was:

1. Problem Solving
2. Teamwork
3. Leadership
4. Business
5. English

The initial recommendations that we presented specified English as the area of highest concern. Although the input from this attendee was considered, reprioritization incorporated more input.

In the above list, problem solving was an area that was specified as needing reform concentration. This reflects the concerns and efforts of the director of PTC, who has been trying to improve student problem solving skills. Although this area was widely regarded as important, it was also mentioned that a different approach to reform of problem solving could be pursued. Instead of concentrating on training students to simply solve problems, the area that reform should concentrate on is to help students develop their creative thinking skills. This area incorporates problem solving and addresses the creativity that should be encouraged in approaching problems.

Thailand has a history of creativity, which can be seen throughout the country in the beautiful temples and various crafts, for example. An attendee mentioned that the trend towards imitation has occurred despite the fact that the Thai "are good at creativity and are spirited in this way." One attendee stated that if Thailand is to become a worldwide leader in high quality, fashionable textiles, there needs to be a move from imitation to innovation which could be brought about through encouraging the development of creative thinking.

Teamwork and leadership were considered to be skills that were hand-in-hand. However, teamwork was stressed more as it was considered to include leadership as a subset. It was said to be a very important for Thai workers to have. One attendee also mentioned that if teamwork skills were developed in students, then leadership would arise as a result of teamwork ability. Many attendees agreed that leadership must always be practiced in situations requiring teamwork and would arise naturally as teamwork is fostered. Feedback suggests that therefore the focus should be more on teamwork than leadership ability.

Business was a topic that entailed a debate. There was some disagreement as to the necessity of including it as part of the curriculum. One attendee agreed with the other areas of concern,

but thought that business should be replaced with technology improvement, since business was not part of the philosophy of PTC. He felt that business should be an elective course.

On the contrary, some other attendees thought that business was a critical skill that all students should learn, concentrating especially on marketing (business mathematics). If students learned the basics of business, they would understand the concepts of quality control, cost, waste, efficiency, profit, etc. better, and as a result increase company production capability. It would also give them the opportunity to move up in position as well as start their own entrepreneurial endeavors. The final consensus was that business was an important skill that students needed to have at least basic knowledge of for the workplace.

At the end of the workshop discussion, we had the opportunity to ask the attendees what one skill area they felt is the most important for students to develop for entry into the textile industry. The most mentioned skill was English language. A majority of those present said that this was something that was essential that students learn well. The current reform at PTC addresses these underlying concerns very well, but our suggested additions appeared to be welcomed as feasible ways to further enhance the current move towards teaching English effectively. Other areas that were mentioned include: textile processes, problem solving, creativity, and student qualities.

4.4.2 Other Important Issues

While all the workshop participants generally agreed with our suggestions for enhancement of the curriculum at PTC to address the areas of concern, many of them brought up other issues of interest and overall thoughts. We value their expertise and therefore include their insights into our report. The following are remaining general ideas and concerns expressed by the workshop attendees regarding curricular reform at PTC.

- Students should receive more factory training, which could be made feasible if, for example, a tax break was provided for companies facilitating such an endeavor.
- In order to improve human resource development in Thailand, students in schools (such as PTC) should be highly encouraged to further their studies by attending a community college.
- PTC should consider recruiting fine arts students (possibly 25% of enrollment) and starting a design program at the school. Students would study both art and textiles. Design was considered by the workshop attendees to be critical for helping turn Thailand into the hub of the worldwide fashion industry.
- PTC should allow and encourage alumni to come back to the school and retrain and help current students with new technology and/or other workplace practices.

- PTC should develop a new basic engineering (electrical and mechanical) course to teach students the basics in this field. Factory participants at the workshop highly recommended this idea as a means for upgrading the skills level of workers in the factories.
- PTC should stress development of the following in their students:
  - Loyalty to the organization (factory).
  - Some knowledge into lower, middle, and upper stream textile processes (nothing should be completely new to the students, some exposure to all aspects of the field is necessary).
- PTC should give students more knowledge of the textile production line

4.4.3 Conclusions from Workshop

A combination of the different viewpoints stated about our ideas for curricular enhancement suggestion at PTC as well as overall feedback gained gave us some new insights into how preparation of students for entry and success in the textile industry workplace can be pursued. Some general comments will be given that portray our understanding of the feedback gathered.

Using our notes from the workshop as well as interview responses and survey results, we gauged the level of discussion and concern that was displayed for the various concern areas that we presented. This allowed us to qualitatively prioritize the order of the areas of concern. We came up with the following order:

1. English language
2. Problem solving
3. Business and mathematics
4. Teamwork
5. Leadership

The initial concern areas that we determined using stakeholder data yielded six areas. However, even though mathematics was not discussed during the workshop, we came to the conclusion that combining business and mathematics would be rational as the area of mathematics stressed by workshop attendees were marketing and other business related areas. These could be either integrated into current mathematics classes or into new business classes if they were implemented.

Another possible adjustment to our list of concerns is that of replacing problem solving with creative thinking. This arose out of an attendee who expressed the need for students to think creatively, in addition to the fact that problem solving can be a subset of creative thinking.

In conclusion, ideas and recommendations that arose during the course of the workshop discussion were of great interest to us. Many of the comments and suggestions made by those present could prove to be beneficial to both the Photharam School and the Thai textile industry. The feedback was integrated with our initial recommendations to come up with our final recommendations for curricular development at PTC.

5 Recommendations

In this chapter we present our recommendations on how to enhance the curriculum at the Photharam Technical College (PTC). These recommendations are the culmination of our research and incorporate feedback received from the workshop. They are organized into five areas: English language, problem solving, business and mathematics, teamwork, and leadership. We will also report other important ideas that were put forth by the workshop attendees, but are not related to our main areas of focus. The suggestions presented are intended to facilitate student transition for school to work, maximize options for students, and ensure success once in the workforce.

5.1 English Language

Of the areas that we identified for curricular enhancement, English language was the most emphasized in workshop discussion. At PTC, the English language program has recently undergone vast reform. Instruction has been restructured to incorporate both visual and audio aids that help the students learn to read and hear English. We believe that these reforms are helping to enhance the English language program at PTC.

However, we concluded that there still is a need for improvement, as students are given very little opportunity to practice speaking English and appeared very reluctant to communicate with us at any level. Proficiency in written and spoken English can facilitate work in higher managerial positions and be the catalyst in operating a successful business in the global society. For students to have access to improved job opportunities, we recommend that students be required to speak English more often, as well as continue to improve upon reading and writing skills.

To this effect, we have developed a module of supplements to the current English curriculum. Certain aspects of the module incorporate English into other classes, since English is currently a required field of study for all students. Other suggestions deal with areas outside of the class setting, which also help in developing communication and social skills, in addition to English. **We recommend that the Photharam Technical College:**

- Develop a system which rewards any spoken English
- Start an English language tour of the school for foreigners to see the process behind the development of fabric (opportunities for school to sell products as well). Students would lead tours.
- Invite or hire fluent English speakers to the school who could:
  - Give talks or lectures to students about the importance of knowing the language
  - Teach or assist in some classes in the following areas: reading, writing, pronunciation, and word recognition

- Develop a new English course which is more intensive and advanced (student entrance is based on grades and teacher recommendations)
- Focus more attention on textile marketing and business language
- Place more emphasis on students learning textile based vocabulary (technical terms) for manual reading, interactions with technicians, and using specialized computer software. This is for the different textile disciplines and courses available at the school. (e.g. Weaving, Knitting, Dying, etc.)
- Coordinate practice interviews and writing resumes in English

Feedback from the workshop suggested that these recommendations have the most promise for improving student's English language skills.

5.2 Problem Solving

As technology advances and businesses globalize their markets, it is necessary for workers to become more open minded and creative in order to provide new ideas and have the capability to deal with more and more complex problems that may arise in the workplace. To achieve results in these areas, problem-solving skills must be enhanced during the educational careers of future textile workers. This aspect of a pupil's education does not only necessarily involve solving problems solely with machinery, but also to be capable of improving on an existing process or design method. It can also be related to solving social or communication problems, such as those that might arise in a group environment. In order to better prepare vocational school students to face such challenges **we recommended that PTC:**

- Develop student brainstorming techniques
- Use case studies to show methods of looking at things from different perspectives and considering alternative ways of approaching and solving problems (Puzzle-solving)
- Face students with difficult or complicated tasks with no set methodology or single "right" answer

Basically these techniques are aimed at helping students realize that there are always other ways of accomplishing a particular goal or solving a certain problem. More complicated challenges require several problem solving techniques, which are very valuable in any work or school environment. We are encouraging mind-stimulating exercises that can be employed by the teaching staff to further develop problem solving skills. Arousing the curiosity and creativity in students through tricky or indirect problems could help them to think more independently and follow different thought patterns or processes instead of always relying one certain method or techniques. The basic principle behind developing better problem solving skills is to expand the

mindset and views of the students and help them break out of narrow or "one-dimensional" thinking patterns.

5.3 Business & Mathematics

Workshop feedback confirmed the underlying importance of business and mathematics. Increased knowledge in these particular areas of study is another way in which employees can reach higher levels of employment, possibly in the marketing or financial sector of a company. A student who possesses both technical as well as business skills can be very successful by incorporating the two in pursuit of entrepreneurial endeavors. Also, as technology slowly replaces the jobs of more and more people, knowing a different aspect of the industry can help with job security.

Mathematics is a key component of successful business practice. The ability to effectively market products and understand the concepts of monetary balancing and profit is essential for any business practice. Mathematics is an essential part of a core business education, and a way to develop problem solving ability, an area of concern for our project. Discussion at the workshop suggested that the areas of business and marketing were thought important. **The following recommendations are aimed at ensuring that PTC supply students with these very important skills.**

- Teach time management skills. Tell students how long completion of a certain process takes in the factories, and make then strive to achieve that time.
- Stress or expand business aspect of SME program (Allow students to have more control over business and financial processes)
- Stress organization and planning for the future
- Initiate projects in which students get experience on all levels of business by including such activities as:
  - Students think of an item that they want to produce
  - Students investigate the market and determine whether their product would be profitable to develop
  - Students develop design specifications and create product while working with a set budget and having complete control over finances and resource allocation
  - Student take part in selling or distributing item(s) that were produced

5.4 Teamwork

Teamwork is another skill which our research indicated may need improvement in PTC graduates. Based on feedback gained from our stakeholders, as well as the workshop participants who encouraged us to focus on teamwork for possible enhancement opportunities, we have recommended several ways for additional exercises and methods to be included into the

curriculum to enhance the capabilities of students in this particular area. **Specifically, we recommend the PTC:**

- Expand the SME (Small and medium enterprise) program at the school. Set up a shop to sell products made at the school. Set up students teams to make different product, and encourage quality and quantity competitions.
- Host prominent school alumni to give talks and specific examples of teamwork they have been involved with in the workplace. Encourage them to focus on describing benefits of skills such as:
    - Team dynamics
    - Group problem solving
    - Idea sharing
    - Efficiency (Multi-tasking)
- Encourage peer review. Allow students to correct the work of each other. This is a means for them to interact, communicate, and learn from one another.
- Group competitions in classroom activities. Examples are best dialogue in English, having the most creative dye design, or finishing a particular weaving pattern the fastest.
- Develop a means to award quality work and good team effort. Examples might be letting the team with the best Tie-dye design team keep the products they made.

These suggestions are just a few of the many ways that teamwork can be emphasized more in the Photharam curriculum. The addition of any group related work will help to develop these skills in students, which will be very beneficial to them in their future endeavors.

5.5 Leadership

As the textile industry moves towards a more value added labor system, current and future employees with good leadership skills are highly sought after. More complicated problems involving technology and human resources are bound to occur as rapid progress continues to sweep through the industry. Methods of preparing workers for such challenges can begin to be while they are still in school, which leads to our following recommendations for improvements in this area. Although leadership is a very important skill for all students to be proficient in, we do not stress it as much as it is essentially a subset of teamwork. If students learn to effectively work in teams, individual leadership abilities will eventually grow out of these practices. **Accordingly, we recommend that PTC:**

- Encourage students to present completed projects or reports in front of teachers and peers (presentations), which develops:
    - Public speaking

- Organization of material
- Presentation of material

- Invite experts to give talks on ways of developing better leadership skills or send interested students to seminars that deal with leadership development
- Provide peer leadership opportunities for older and academically advanced students, which includes creating such programs as:
  - Peer tutor program (tutor younger students)
  - Peer advisor program (advise younger students in general educational areas, such as what elective classes are good to take, what classes would help them the most in their major, etc.)
  - Peer mentor program (help or advise students on issues outside of the classroom setting)
- Stress ethics and morals by using case studies and examples of great religious, cultural, and ethical business leaders.
- Invite prominent alumni to give talks on what skills made it possible for them to move up in position in the factory.

Having more emphasis on or incorporating these ideas into the curriculum should help enhance and develop the leadership skills of future graduates, which could translate into better job positioning, hire wages, or quicker promotions within the textile industry.

The Photharam Technical College (PTC) is an established institution and one of the very few schools in Thailand providing an education for students entering the textile industry, which is a major revenue producer for the Thai economy. Based on observations and data gathered on PTC, we can confidently report that innovative reforms have already begun to be implemented at the school. The director and faculty realize that vocational education is faced with a great challenge, keeping up with a rapidly modernizing industry. The administration of the school showed great interest and resolve in helping us with our study, so that further enhancements could be made to the curriculum to keep pace with new technology prevalent and skill levels needed in the Thai textile factories. Based on all of the information we gathered, as well as all possible reform possibilities presented, we are very hopeful that our study will be beneficial to PTC. While our focus was strictly on PTC, the recommendations are meant to be feasible and applicable to other Thai vocational schools, so that students are better prepared and have more opportunities for advancements in the workplace, as well as the capability to contribute to future prosperity in Thailand.

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Appendices

Appendix A – Photharam Technical College Curriculum

Curriculum for Certificate in Vocational Education – Photharam Technical College

NOTE: In the *Credit* column, the number in parenthesis gives the classroom hours per week, while the number outside of the parenthesis is the number of credits given for class completion. When an * appears in the parenthesis, this indicates that students can choose between training or project time.

Number	*Name of Subject*	*Code*	*Objective*	*Credit*
1	Computer for Profession	2001-0002	1. To understand: a. The principles of Information Technology (IT) for profession b. The usage of programs in the office including internet and e-mail use 2. To use computers and IT systems: a. In the profession b. For Installing Equipment c. For Making documents, schedules, and presentations d. For Searching for data and sending e-mail e. For the internet 3. To have: a. Morality and responsibility in using computers with IT b. Habits in working systematically, patiently, carefully, and safely	2(3)
2	Materials in Industry	2800-1002	1. To understand the basic principles in classifying the kind, the type, and the standard in using materials 2. To select materials suitably and to maintain them correctly 3. To realize the value of materials and to use them efficiently	2(2)

Number	*Name of Subject*	*Code*	*Objective*	*Credit*
3	Basic Mechanics	2800-1004	1. To understand the usage and maintenance of tools and basic mechanics 2. To use and maintain tools and basic mechanics 3. To be able to work properly 4. To apply safety, neatness, and problem solving to work 5. To have morality and responsibility (see no. 1.3)	3(7)
4	Fiber Materials (only threads and yarns)	2800-1007	1. To understand the principles in classifying the kind and quality of fibers 2. To compare the physical and chemical qualities of fibers 3. To select and use the kind of fiber appropriately 4. To have good habits in working, timeliness, and care	2(2)
5	Local Textile Weaving (only traditional)	2801-2101	1. To understand the principles, background, and methods of local textile weaving 2. To select, assemble, and adjust the parts and equipment of local textile machines 3. To weave local textiles according to the processes of local textile weaving 4. To apply knowledge and skill in local textile weaving with textile work 5. To have responsibility, order, love, and a good attitude towards local textile weaving work	3(7)
6	Basic Technical Drawing (for clothing)	2800-1001	1. To understand the principles of technical drawing, the usage of equipment, and the devices of drawing 2. To read and draw basic patterns of projected and perspective pictures 3. To have good habits in working, order, cleanliness, timeliness, and responsibility	2(4)
7	Principles of Fabrics	2800-1008	1. To understand the principles of classifying the kind of fabric which is used to make clothes and textiles 2. To classify the quality, use, and application of any kind of fabric 3. To select and use fabric suitably according to type of work [?] 4. To understand the principles, methods for decoration, and maintenance of fabric 5. (same as no. 6.3)	2(2)

Number	*Name of Subject*	*Code*	*Objective*	*Credit*
8	Spinning	2801-2107	1. To understand the basic principles and evolution of spinning of natural fibers 2. To understand the principles of producing a cotton thread using a machine 3. To classify all the machine stages in the spinning process 4. To have good habits in working, responsibility, timeliness, and neatness	2(2)
9	Preparation for Weaving	2801-2102	1. To understand the principles of how a machine works in the process of weaving preparation 2. To understand the stages of work and calculate how much material to use 3. To be able to prepare and use the equipment and weaving machines 4. (same as no. 8.4)	3(7)
10	Basic Dyeing	2801-2111	1. To understand the principles of dyeing and the preparation of materials for dyeing 2. To compare the qualities of color used in the dyeing process with colors such as: direct colors, reactive colors, and wet colors 3. To prepare the materials for dyeing with direct colors, reactive colors, and wet colors 4. To have responsibility, order, creative thinking, and a good attitude to occupation	2(4)
11	Maintenance of Textile Machinery	2801-2114	1. To understand the principles, strategy, and safety in maintenance (both maintenance and repair) 2. To be able to: a. Plan, prepare documents, materials, equipment, and spare parts b. Maintain and repair, including verification and testing of the machine 3. To realize environmental effects and nature conservation 4. To have responsibility, order, love of work, and a good attitude to occupation	2(2)

Number	*Name of Subject*	*Code*	*Objective*	*Credit*
12	Weaving by Machine I	2801-2103	1. To understand the principles of weaving and safety involved when weaving by machine 2. To understand the processes, the function of parts and equipment, and the relationships between the main mechanism(s) and sub-mechanism(s) of a machine 3. To be able to weave using a weaving machine 4. To have order and care while weaving	3(7)
13	Textile Machine Disassembly and Reassembly	2801-2113	1. To realize the safety involved in separating and building a textile machine 2. To understand the processes of a textile machine, the structure of parts, and the system(s) of textile machines 3. To understand the principles of the methods of repair and maintenance of textile machines 4. To be able to plan the repair, maintenance, separation, and building, including adjustment of textile machines 5. To realize environmental effects and nature conservation 6. To have responsibility in environmental aspects, order, love of work, and a good attitude towards work	3(5)
14	Basic Textile Printing Theory	2114-0004	1. To know the history of textile printing 2. To know and understand the processes of printing textiles: a. Block model b. Stencil model c. Screen model	1(1)
15	Basic Textile Printing Practicum	2114-0005	1. To have the skill to: a. Make a model - Block - Stencil - Screen b. Use the equipment/materials in printing c. Draw patterns d. Use color e. Know the process after printing	2(6)

Number	*Name of Subject*	*Code*	*Objective*	*Credit*
16	Welding	2100-0013	1. To understand the principles and processes of gas and electric welding 2. To weld safely and correctly according to the principles of sanitation 3. To use and adjust the tools and equipment use in welding 4. To be able to weld using gas and electricity 5. To have order, neatness, careful habits, and realize safety	2(4)
17	Industrial Business	2100-0022	MISSING OBJECTIVE	2(2)
18	Weaving by Machine II	2801-2104	1. To understand: a. The principles of weaving b. Safety while weaving 2. To understand the processes and function of the parts and equipment of the machines 3. To maintain and adjust the machines according to the companies standards 4. To be able to weave using a machine 5. To have order and careful habits while working	3(7)
19	Pattern Design	2801-2108	1. To understand the principles, methods of basic pattern design, and methods of pattern drawing on paper 2. To design patterns 3. To have neat and careful habits	2(4)
20	Knitting	2801-2106	1. To understand the principles, history, and background of knitting machines 2. To understand the processes, maintenance, and adjustment of the mechanisms and parts of knitting machines 3. To maintain and adjust the mechanisms and parts of knitting machines 4. To knit using a machine 5. To have responsibility, habit of order, and a love or working	3(7)
21	Weaving by Machine III	2801-21058	1. To understand the processes of weaving machines 2. To maintain and adjust the system of a machine 3. To be able to verify fabric quality and fix flawed fabric 4. To be able to calculate productivity and efficiency, and improve the quality of weaving 5. To have responsibility, habit or order, and a love of working	3(7)

Number	*Name of Subject*	*Code*	*Objective*	*Credit*
22	Knit Textile Pattern Design	2801-2109	1. To understand the principles of designing knitted textiles 2. To classify and prepare materials 3. To design knit textile patterns 4. To have responsibility, habit of order, and a love or working	2(4)
23	Textile Testing	2800-1009	1. To understand the principles, methods of textile testing, and know the influence of temperature or humidity affecting the textile materials 2. To select and use tools and equipment for testing 3. To test textile materials according to the qualifications of the thread 4. To have responsibility, timeliness, and careful habits	3(5)
24	Basic Machine Shop	2800-1006	1. To understand: a. The principles of processing b. Calculation necessary for using basic mechanical tools 2. To be able to drill, cut, turn, and plane by using basic mechanical tools 3. To have responsibility , neatness, order, timeliness, and safe habits	2(4)
25	Carpet and non-Woven Textile	2113-2009	1. To know and understand: a. A kind and type of carpet and/or non-woven textile [?] b. The process of production	1(1)
26	Textile Quality Control (QC)	2801-2112	1. To understand the principles, methods, objectives, and background of controlling the quality of textiles 2. To plan production 3. To select the method(s) of controlling textile quality 4. To have responsibility and think creatively	2(2)
27	Hands-on Training (any discipline)	280X-5001	1. To have experience to work 2. To be able to use knowledge and skills for applying and solving problems in real life 3. To have responsibility and a good attitude towards work	4(*)

Number	*Name of Subject*	*Code*	*Objective*	*Credit*
28	Project (oriented towards skilled-labor)	280X-5002	1. To be able to apply knowledge and skills to create your own work (innovation) 2. To think creatively and develop your work 3. To be able to plan, practice, solve problems, evaluate, report, and present the report 4. To have responsibility, ethic, and a good attitude towards work	4(*)
29	Professional Project (business oriented)	280X-5003	1. To apply knowledge and skills for creating and distributing work to make money for business (such as SMEs) 2. To think creatively and develop your work for money making 3. To be able to plan, practice, solve problems, evaluate your work, and practice in real life accounting, profit making, and capital production 4. To have responsibility, ethic, and a good attitude towards work	4(*)

Curriculum for Diploma in Vocational Education – Photharam Technical College

NOTE: In the *Credit* column, the number in parenthesis gives the classroom hours per week, while the number outside of the parenthesis is the number of credits given for class completion. When an * appears in the parenthesis, this indicates that students can choose between training or project time.

Number	*Name of Subject*	*Code*	*Objective*	*Credit*
1	Fiber Sciences	3113-1001	1. To know and understand the raw materials which produce textile fiber 2. To know the elements of raw materials and qualities (physical and chemical) of fiber 3. To know: a. The relationship between the molecular structure of various fibers b. The parts of a polymer substance which are used to produce fibers 4. To be able to apply and use fibers correctly	3(3)

Number	*Name of Subject*	*Code*	*Objective*	*Credit*
2	Safety and Pollution Control	3100-0151	1. To know and understand the principles of environmental organization and organization of safety in the industry 2. To know the legislation, and methods of pollution control and pollution elimination used in the industry	2(2)
3	Mechanical Sciences I	3100-0101	1. To know the principles of mechanical engineering: momentum, balance, etc. 2. To be able to solve formulas correctly using principles of engineering	3(3)
4	Machine Parts	3100-0111	1. To know and understand the parts of a machine: wedge, clutch, bolt, cogwheel, cog, etc. 2. To be able to calculate machine parts	3(3)
5	Computer Usage	3100-0121	1. To know and understand: a. The use of computer programs b. How to write basic programs in BASIC, C, and PASCAL	3(2)
6	Electrical Engineering I	3104-5001	1. To know and understand electrical systems and electrical circuits in industrial work 2. To select proper electronic equipment to install circuits, and repair and maintain the electronic equipment	2(4)
7	Weaving Preparation Theory	3113-2001	1. To know and understand: a. The methods of winding b. The systems of winding machines c. The process of winding preparation	2(2)
8	Weaving Practicum	3113-2002	1. To be able to practice in weaving: winding, pulling threads, pouring powder, mixing powder, etc.	1(3)
9	Spinning Theory I	3113-2101	1. To know and understand: a. The production of every kind of thread b. The machine processes c. The meaning of technical terms	3(3)
10	Industrial Management	3100-0152	1. To know and understand the basics of industrial management: finance, marketing, purchasing, human resource development, accounting, etc. 2. To know how to plan a factory 3. To know safe management and quality control (QC)	2(2)

Number	*Name of Subject*	*Code*	*Objective*	*Credit*
11	Industrial Economics	3100-0153	1. To understand: a. The relationship between economics and industry b. Understand economic affects on industry 2. To know and understand: a. Policy about industrial development b. Investment in the industry c. The problems of industrial economics	2(2)
12	Training	3104-2901	1. Students must train (not less than 350 hours) in a company that is suitable for their vocation 2. Training will make students: a. Apply their knowledge, skills, and experience in work b. Realize real life work, have a good attitude towards work, have responsibility, and have ethics	4(*)
13	Knitting Theory	3113-2011	1. To know: a. The methods of how to modify a decorative design b. The equipment that is used to make a pattern c. The processes of knitting equipment	1(1)
14	Knitting Practicum	3113-2012	1. To be able to practice: a. Modifying patterns b. Making patterns	2(4)
15	Weaving Theory	3113-2003	1. To know and understand the processes of 3 types of weaving machines	2(2)
16	Weaving Practicum I	3113-2006	1. To be able to practice their skills and use weaving machines	2(6)
17	Spinning Theory II	3113-2103	1. To be able to plan the production of thread and solve problems that happened in production 2. To understand the process of producing new thread	3(3)
18	Electronic Technology	3105-5001	1. To understand the characteristics and the processes of electrical equipment and basic electric circuits 2. To study the equipment that is used in general electrical work and be able to apply this knowledge to work	2(4)

Number	*Name of Subject*	*Code*	*Objective*	*Credit*
19	Newmatrix and Hydrolic I [?]	3100-0107	1. To know and understand the basic principles of the Newmatrix system and the Hydrolic system 2. To be able to calculate and design basic circuits	3(5)
20	Weaving Theory II	3113-2005	1. To know and understand the processes of these types of weaving machines: a. Shuttleless b. Waterjet c. Airjet d. Gripper e. Rapier 2. To know and understand the principles of verifying and classifying types of fabric 3. To be able to calculate the products and the machine efficiency	2(2)
21	Weaving Practicum II	3113-2006	1. To have skills in using weaving machines of every kind 2. To be able to verify and classify types of fabric	2(6)
22	Design and Analysis Theory for Woven Fabrics	3113-2007	1. To know and understand the structure, characteristics, and kind of woven fabric 2. To know how to design a weaving pattern	2(2)
23	Design and Analysis Practicum for Woven Fabrics	3113-2008	1. To have skills in designing patterns 2. To have skills in calculating the width and density of fabrics	1(3)
24	Design and Analysis Theory for Knit Fabrics	3113-2009	1. To know and understand: a. The categories of knit fabric design b. The principles of knit fabric design: threads and the calculation of - Fabric weight - Fabric width - Length of thread to knit	1(1)

Number	*Name of Subject*	*Code*	*Objective*	*Credit*
25	Design and Analysis Practicum for Knit Fabrics	3113-2010	1. To be able to: a. Design patterns and graphic designs b. Calculate: - The quantity of thread needed - The number of threads	1(3)
26	Physical Textile Testing Theory	3113-2013	1. The know and understand the methods of testing the quality of textiles 2. To study the physical qualities of fiber, thread, and fabric 3. To know the chemical substances used for testing the quality of textiles	1(1)
27	Physical Textile Testing Practicum	3113-2014	1. To be able to test the physical quality of thread, fiber, and fabric 2. To be able to analyze and report the results of testing 3. To be able to use the testing tools correctly	2(4)
28	Quality Control (QC) of Textiles	3113-2105	1. To apply the statistics for the QC of textiles a. Statistics → How to: - Randomize the target group - Collect data for analyzing 2. To know the systems of QC in the textile industry	3(3)

Appendix B – Interview Questions and Questionnaires

Employer Interview Questions

1. What specific part(s) of the textile industry does your factory deal with? What does it produce?
2. How often do you upgrade the textile machinery in your facilities?
3. Do you think that in the future, textiles in Thailand would be more successful and profitable if skilled labor is prevalent at the factories?
4. Is your company internationally or nationally based?
5. How many employees do you currently have working at this particular facility?
6. Of your workforce, approximately how many do you think are graduates of the Photharam Polytechnic College?
7. Are you familiar with the Photharam School's current textile-based curriculum?
8. What do you particularly like or feel are strengths of the Photharam School's curriculum?
9. From your experiences, what are some noticeable weaknesses of the Photharam School's curriculum?
10. Are Photharam School graduates stronger than other employees in any particular areas?
11. Do Photharam School graduates adapt to their work environment and changes well?
12. If so, do they advance in their careers quicker then other employees?
13. What strengths do you look for when promoting employees?
14. Is the English language necessary for promotion to a manager level position or other higher level positions?
15. In your opinion, what are the skills that the Photharam School curriculum should emphasize the most?
16. Do you feel that there is a "gap" between the skills that you desire in employees and those that are present?
17. If you believe there is a "gap," what is needed to fill the "gap?"
18. What skills do you feel are particularly important for employees to know in the future? (please describe why)

Employer Questionnaire

Objective: This questionnaire is intended to help us gather feedback on the current Photharam Polytechnic College curriculum. This information will help us analyze the curriculum in our effort to make suggestions for curricular improvement. Please take a moment to provide your input.

Please answer the following questions.

1. What is your gender? (please circle)
   Male Female
2. What range is your age in? (please circle)
   (20-25) (26-30) (31-35) (36-40) (41-45) (46-50) (51-55) (56-60) (above 60)
3. What is the highest level of education you have achieved? (please circle)

Secondary school Associates Degree Bachelor's Degree Masters Degree PhD

4. What is your current position?

Please rate your agreement or disagreement with the following statements based on the following scale:
1— strongly disagree 2— disagree 3— uncertain 4— agree 5— strongly agree

5. Workers who graduated from Photharam Polytechnic College know the following skills WELL.

Thai Language	1	2	3	4	5
Textile Processes	1	2	3	4	5
Machine Operation & Maintenance	1	2	3	4	5
Safety	1	2	3	4	5
Ethics	1	2	3	4	5
Social Interaction	1	2	3	4	5
Cross-cultural	1	2	3	4	5
Teamwork	1	2	3	4	5
Business	1	2	3	4	5
Leadership	1	2	3	4	5
Problem Solving	1	2	3	4	5
English Language	1	2	3	4	5
Computer Knowledge	1	2	3	4	5
Mathematics	1	2	3	4	5

Based on future industrial needs, please rate the importance of the following skills according to the scale:
1— not important 2— somewhat important 3— important 4— very important 5— extremely important

6. Please rate these in relation to the other skills listed.

Thai Language	1	2	3	4	5
Textile Processes	1	2	3	4	5
Machine Operation & Maintenance	1	2	3	4	5
Safety	1	2	3	4	5
Ethics	1	2	3	4	5
Social Interaction	1	2	3	4	5
Cross-cultural	1	2	3	4	5
Teamwork	1	2	3	4	5
Business	1	2	3	4	5
Leadership	1	2	3	4	5
Problem Solving	1	2	3	4	5
English Language	1	2	3	4	5
Computer Knowledge	1	2	3	4	5
Mathematics	1	2	3	4	5

7. Do you have any suggestions for improving the curriculum at the Photharam School?

Alumni Interview Questions

1. For how long have you been working at your current location?
2. What is the current position you hold at your workplace?
3. Have you moved up in position while at this factory?
4. If not, do you feel that you have received the education necessary to move up in position?
5. Did your Photharam School education and training adequately prepare you to enter the labor force upon graduation?
6. How enthusiastic are you about advancement in your job?
7. Did the education given at the Photharam School encourage you to strive for success?
8. Are language skills necessary for job advancement at your factory?
9. How well developed are your English language skills and do you feel that improved English language skills would help you at your job?
10. How often are you expected to use, or are given the chance to use skills such as: teamwork, leadership, problem solving, computer knowledge, social interaction, cross-cultural, etc.?
11. What areas of the Photharam School curriculum have been particularly helpful for your job?
12. Are there any skills (as listed on the questionnaire) that you have never used at your job?
13. What areas of the Photharam School curriculum could be improved so that future graduates are better prepared to enter the labor force?

Alumni Questionnaire

Objective: This questionnaire is intended to help us gather feedback on the current Photharam Polytechnic College curriculum. This information will help us analyze the curriculum in our effort to make suggestions for curricular improvement. Please take a moment to provide your input.

Please answer the following questions.

1. What year did you graduate from Photharam Polytechnic College?

2. What was your major area of study while at Photharam Polytechnic College?

3. What program did you graduate from? (please circle)
   Certificate Diploma Dual Diploma

Please rate the importance of the following based on this scale:
1— not important 2— somewhat important 3— important 4— very important 5— extremely important

4. Which of the following areas are most important for your career in the textile industry?

Thai Language	1	2	3	4	5
Textile Processes	1	2	3	4	5
Machine Operation & Maintenance	1	2	3	4	5
Safety	1	2	3	4	5
Ethics	1	2	3	4	5
Social Interaction	1	2	3	4	5
Cross-cultural	1	2	3	4	5
Teamwork	1	2	3	4	5
Business	1	2	3	4	5
Leadership	1	2	3	4	5
Problem Solving	1	2	3	4	5
English Language	1	2	3	4	5
Computer Knowledge	1	2	3	4	5
Mathematics	1	2	3	4	5

Please rate your answer to the following question based on this scale:
1=no preparation 2= mediocre prep. 3= good prep. 4=very good prep. 5= excellent preparation

5. How well did your education at Photharam prepare you in the following areas?

Thai Language	1	2	3	4	5
Textile Processes	1	2	3	4	5
Machine Operation & Maintenance	1	2	3	4	5
Safety	1	2	3	4	5
Ethics	1	2	3	4	5
Social Interaction	1	2	3	4	5
Cross-cultural	1	2	3	4	5
Teamwork	1	2	3	4	5
Business Skills	1	2	3	4	5
Leadership	1	2	3	4	5
Problem Solving Skills	1	2	3	4	5
English Language	1	2	3	4	5
Computer Knowledge	1	2	3	4	5
Mathematics	1	2	3	4	5

6. How does the textile equipment at Photharam Polytechnic College compare with that used in your factory or at other factories in the area? (please circle)

Much worse Worse Identical Better Much better

7. Do you have any suggestions for improving the curriculum at the Photharam School?

Faculty Interview Questions

1. What classes are you currently teaching?
2. In addition to preparing for classes, do you actively work on improving the curriculum?
3. To what extent do you offer assistance to students outside of the classroom?
4. To what extent do the students have an understanding of the textile industry beyond their specific area of study?
5. To what extent does the current Photharam curriculum focus on cultural, language, and problem-solving skills?
6. To what extent do you think the school is keeping pace with changes in educational standards and technological advances in textile machinery?
7. In your opinion, what are the strengths and weaknesses of the current curriculum?
8. To what extent does the curriculum prepare students to enter the textile industry after graduation?
9. Can you suggest any improvements to the current curriculum that would improve future employment opportunities for the graduates?
10. Is further cooperation with local factories necessary for the students' future in the textile industry?
11. What are your means for evaluating students?
    a. Class participation
    b. Homework
    c. Exams
    d. Hands on proficiency
    e. Other (please explain)
12. Are students eager to participate and learn in your classes?
13. Does the current curriculum encourage the development of creative thinking and problem solving skills?
14. Does the Photharam School's curriculum provide sufficient time in the laboratory to learn practical and technical skills?
15. Do you have freedom to explore methods of education in your classes? If so, how do you approach course reform and to what extent?

Faculty Questionnaire

Objective: This questionnaire is intended to help us gather feedback on the current Photharam Polytechnic College curriculum. This information will help us analyze the curriculum in our effort to make suggestions for curricular improvement. Please take a moment to provide your input.

Please answer the following questions.

1. How many years have you taught at Photharam Polytechnic College?

   _____ years

2. How many years of teaching experience do you have, including experience at Photharam Polytechnic College?

   _____years

Please circle your answer to the following questions.

3. What range is your age in?

   (20-25) (26-30) (31-35) (36-40) (41-45) (46-50) (51-55) (56-60) (above 60)

4. What is the highest level of education you have achieved?

   Associates Degree Bachelors Degree Masters Degree PhD

Please rate your agreement or disagreement with the following statements based on the following scale:

1— strongly disagree 2— disagree 3— uncertain 4— agree 5— strongly agree

5. Is the school keeping pace with advancements in textile technology.

   1 2 3 4 5

6. Cooperation with local factories is important for Photharam students' careers.

   1 2 3 4 5

7. The current core curriculum prepares the students well for entry into the workforce upon graduation.

   1 2 3 4 5

8. The current professional curriculum prepares the students well for entry into the workforce upon graduation.

   1 2 3 4 5

9. The current elective curriculum prepares the students well for entry into the workforce upon graduation.

   1 2 3 4 5

10. Students are learning the following skills WELL.

Thai Language	1	2	3	4	5
Textile Processes	1	2	3	4	5
Machine Operation & Maintenance	1	2	3	4	5
Safety	1	2	3	4	5
Ethics	1	2	3	4	5
Social Interaction	1	2	3	4	5
Cross-cultural	1	2	3	4	5
Teamwork	1	2	3	4	5
Business	1	2	3	4	5
Leadership	1	2	3	4	5
Problem Solving	1	2	3	4	5
English Language	1	2	3	4	5
Computer Knowledge	1	2	3	4	5
Mathematics	1	2	3	4	5

Based on future industrial needs, please rate the importance of the following skills according to the following scale:

1— not important 2— somewhat important 3— important 4— very important 5— extremely important

11. Please rate these in relation to the other skills listed.

Thai Language	1	2	3	4	5
Textile Processes	1	2	3	4	5
Machine Operation & Maintenance	1	2	3	4	5
Safety	1	2	3	4	5
Ethics	1	2	3	4	5
Social Interaction	1	2	3	4	5
Cross-cultural	1	2	3	4	5
Teamwork	1	2	3	4	5
Business	1	2	3	4	5
Leadership	1	2	3	4	5
Problem Solving	1	2	3	4	5
English Language	1	2	3	4	5
Computer Knowledge	1	2	3	4	5
Mathematics	1	2	3	4	5

12. Do you have any suggestions for improving the curriculum at the Photharam School?

Student Questionnaire

Objective: This questionnaire is intended to help us gather feedback on the current Photharam Polytechnic College curriculum. This information will help us analyze the curriculum in our effort to make suggestions for curricular improvement. Please take a moment to provide your input.

Please circle your response for the following questions.

1. What gender are you?

   Male Female

2. What is your major study area?

Textile Technology Chemical Textile Garment Manufacture

3. Which program are you in?

   Certificate Program— 3rd year Diploma Program— 2nd year

4. What range does your GPA lie in?

0.0-0.5 0.6-1.0 1.1-1.5 1.6-2.0 2.1-2.5 2.6-3.0 3.1-3.5 3.6-4.0

Please rate your agreement or disagreement with the following statements based on the following scale:

1— strongly disagree 2— disagree 3— uncertain 4— agree 5— strongly agree

5. Structured group activities are a large part of class instruction.

   1 2 3 4 5

6. You have substantial knowledge of other cultures.

   1 2 3 4 5

7. You are learning the following skills WELL.

Thai Language	1	2	3	4	5
Textile Processes	1	2	3	4	5
Machine Operation & Maintenance	1	2	3	4	5
Safety	1	2	3	4	5
Ethics	1	2	3	4	5
Social Interaction	1	2	3	4	5
Cross-cultural	1	2	3	4	5
Teamwork	1	2	3	4	5
Business	1	2	3	4	5
Leadership	1	2	3	4	5

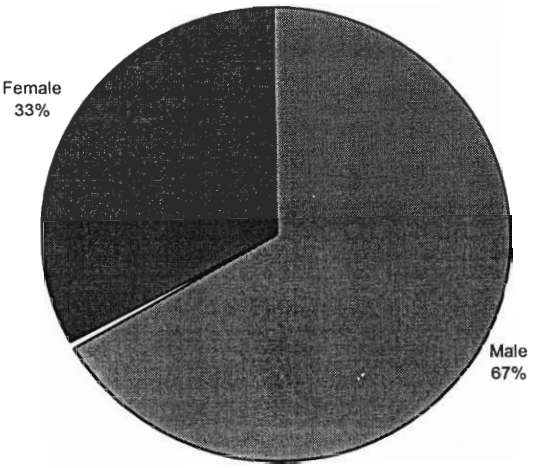
Problem Solving	1	2	3	4	5
English Language	1	2	3	4	5
Computer Knowledge	1	2	3	4	5
Mathematics	1	2	3	4	5

12. Do you have any suggestions for improving the curriculum at the Photharam School?

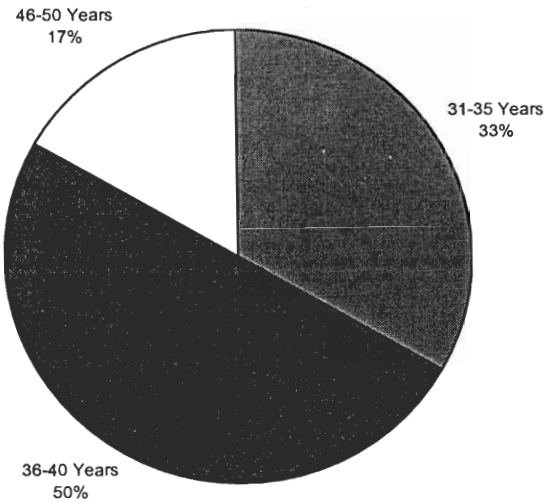
Appendix C – Questionnaire Statistics

Employer Statistics

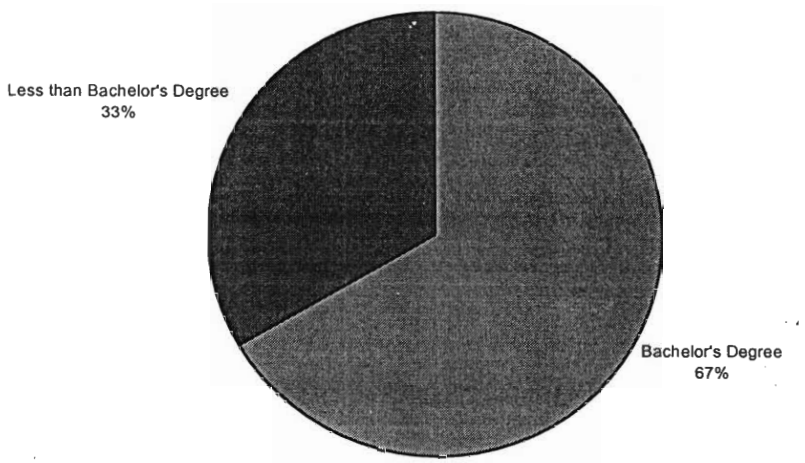
Gender of Employer Respondants
(6 surveys received)



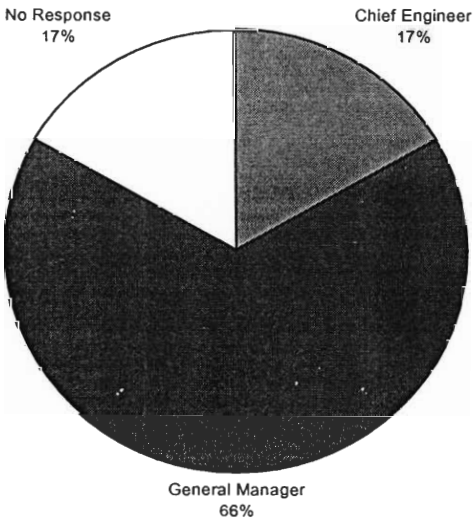
Age of Respondants
(6 surveys received)



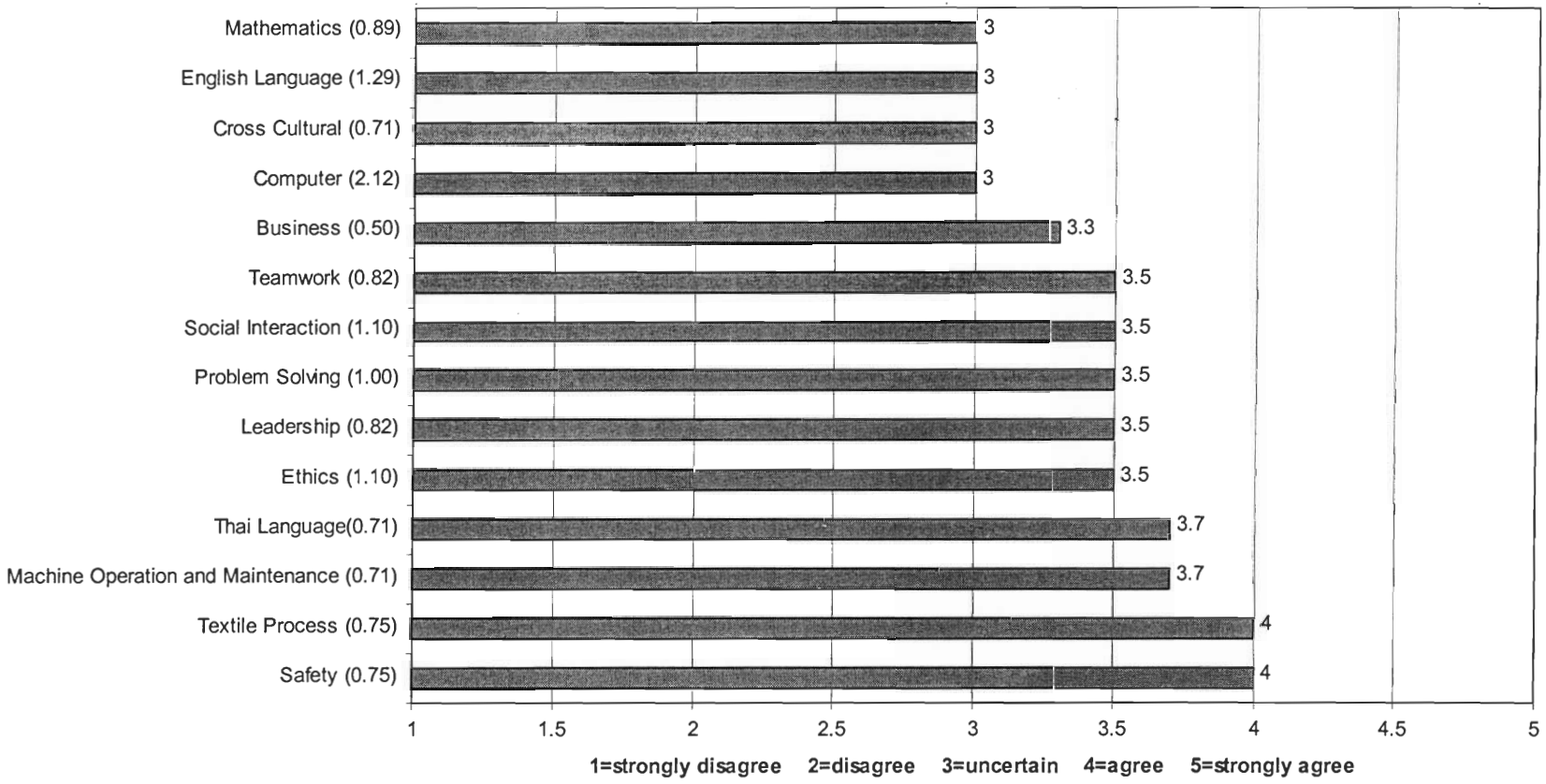
Education Level of Respondants
(6 surveys received)



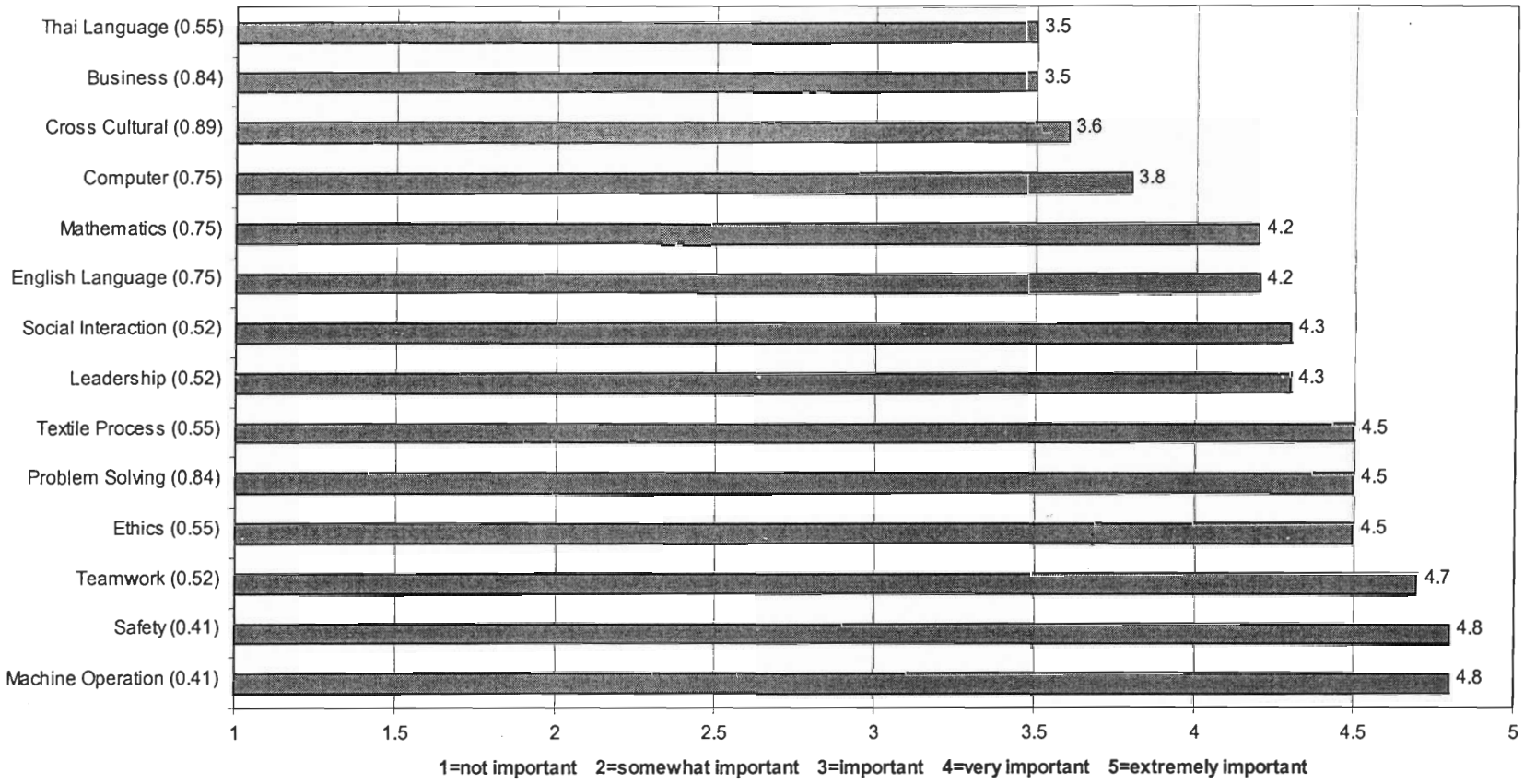
Current Position of Respondants
(6 surveys received)



Mean of Employer Agreeance to the statement: "Workers who graduated from Photharam Polytechnic College know the following subject well" (Std. Deviation in parenthesis, N = 6)

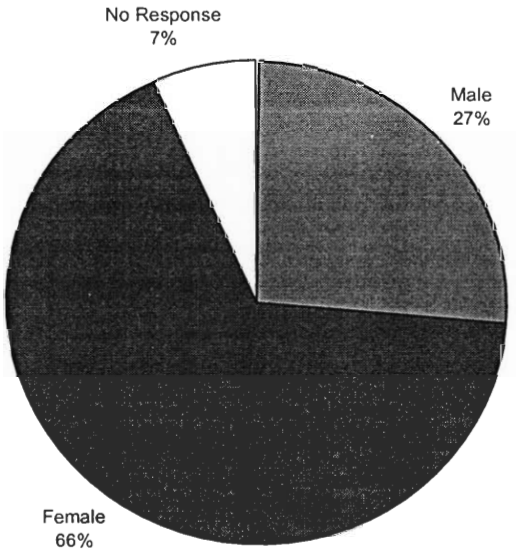


Mean of employer response to the statement: "Based on future industrial needs, please rate the importance of the following skills"(Std. Deviation in parenthesis, N = 6)

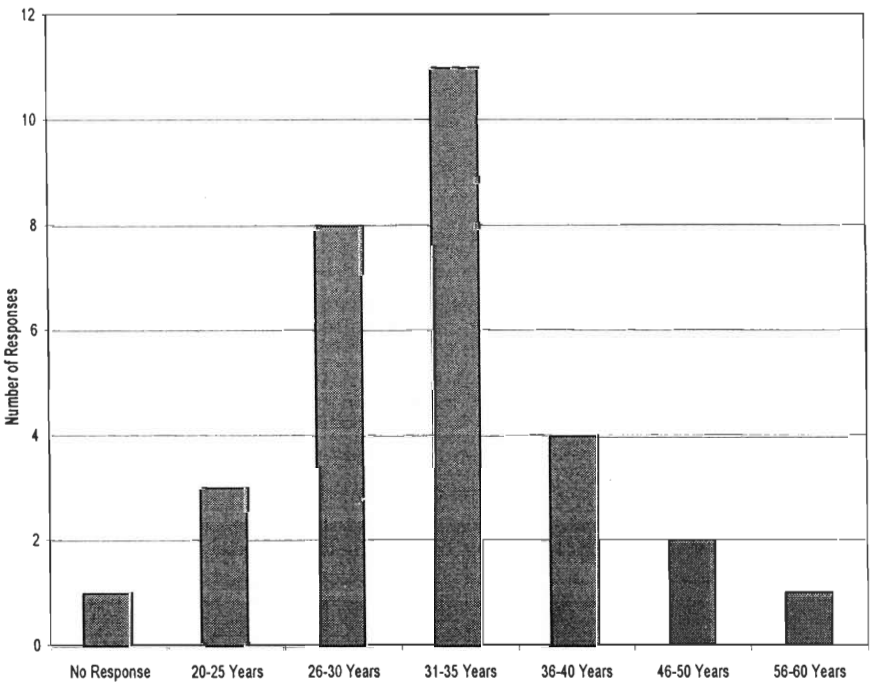


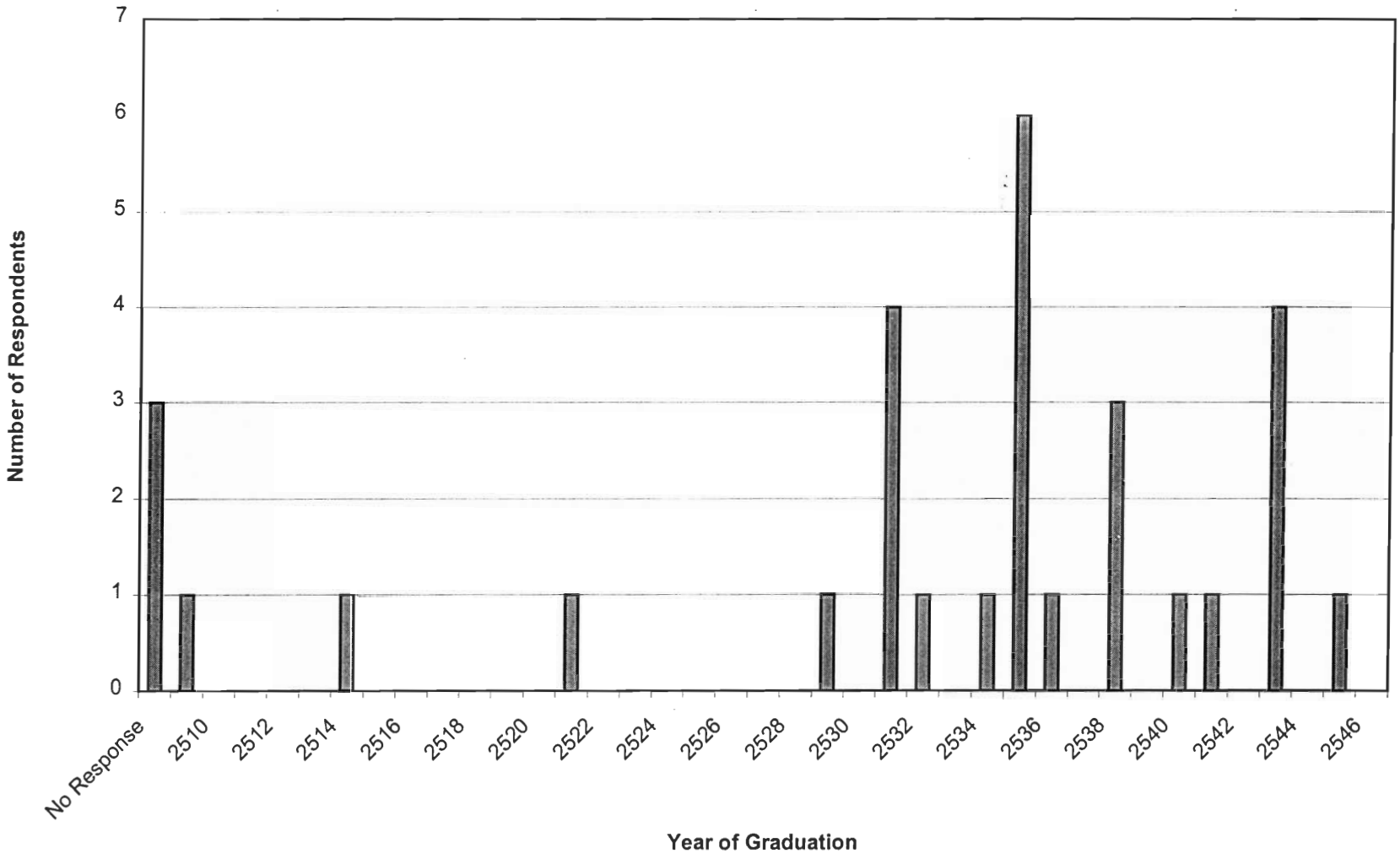
Alumni Statistics

Gender of Alumni Respondents
(30 surveys received)

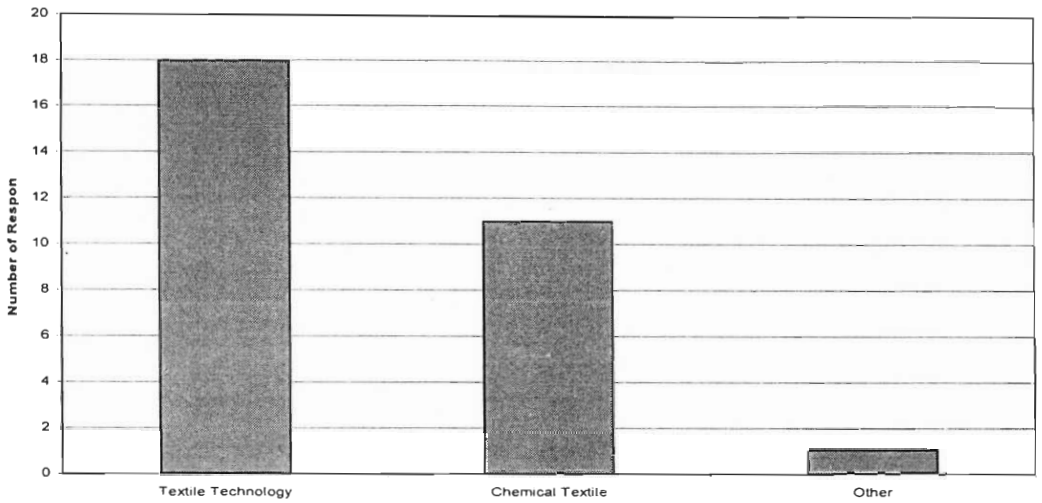


Age of Alumni Respondents
(30 surveys received)

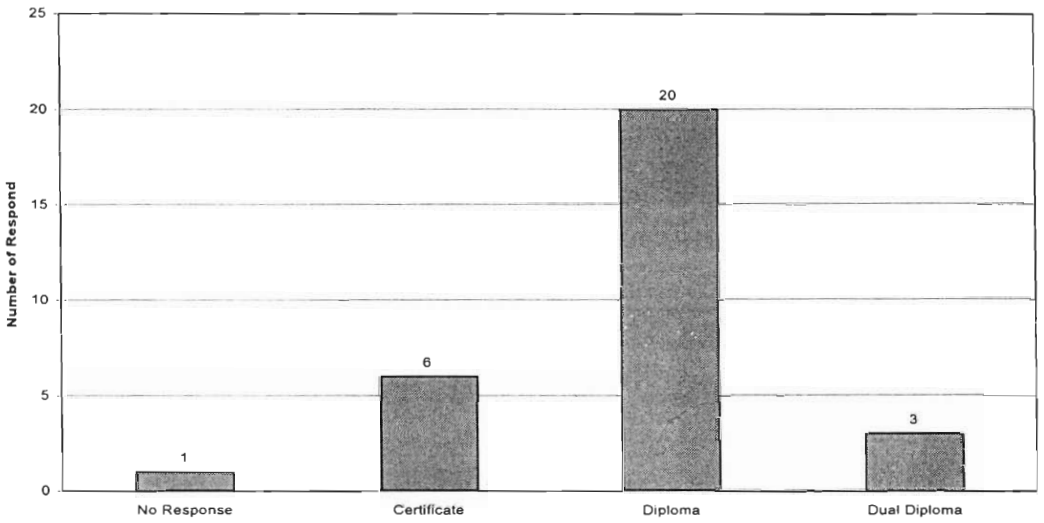



Alumni Year of Graduation from Photharam Technical College
Number of Respondents
0
1
2
3
4
5
6
7
No Response
2510
2512
2514
2516
2518
2520
2522
2524
2526
2528
2530
2532
2534
2536
2538
2540
2542
2544
2546
Year of Graduation

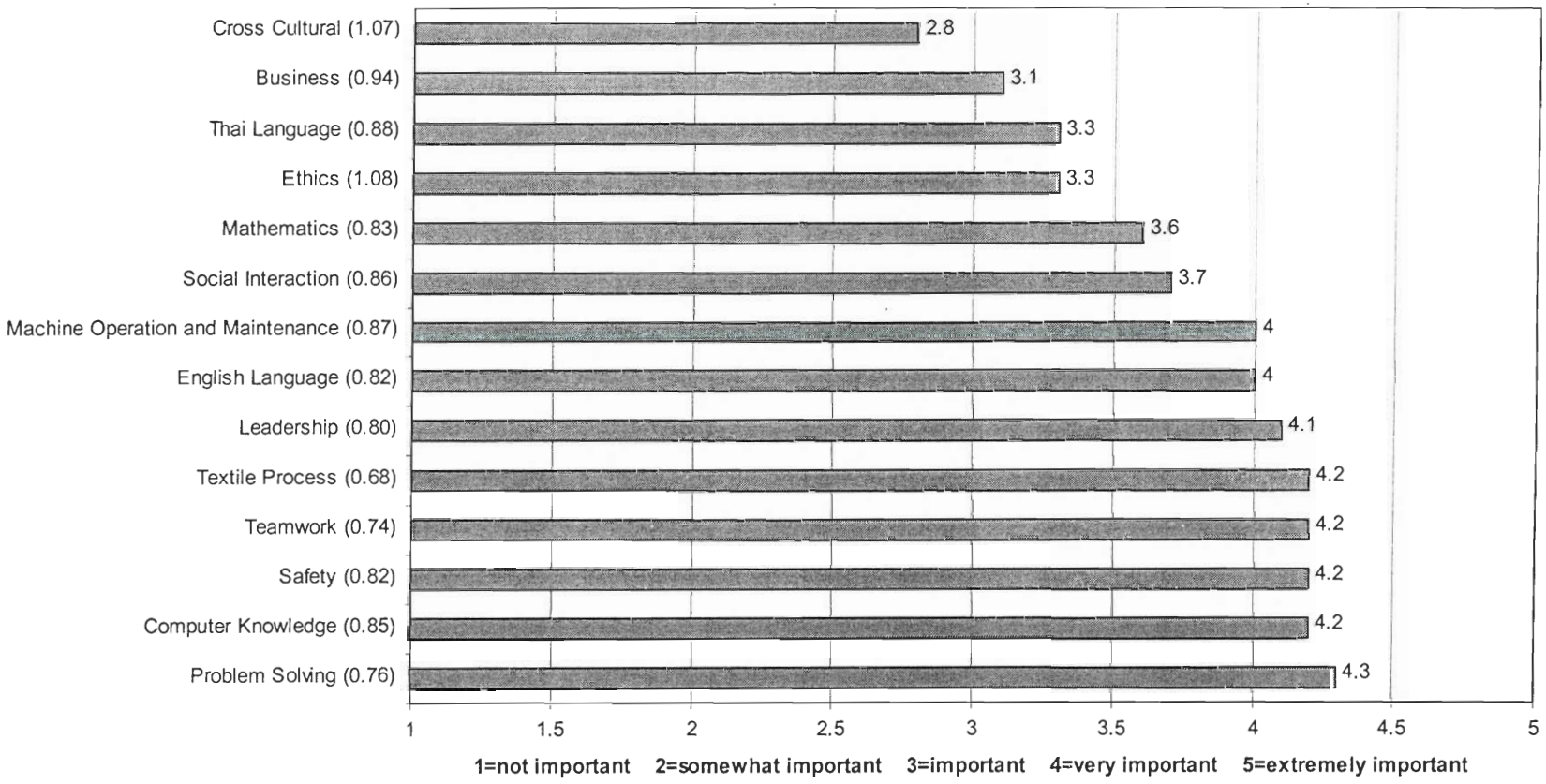
Alumni Major Area of Study



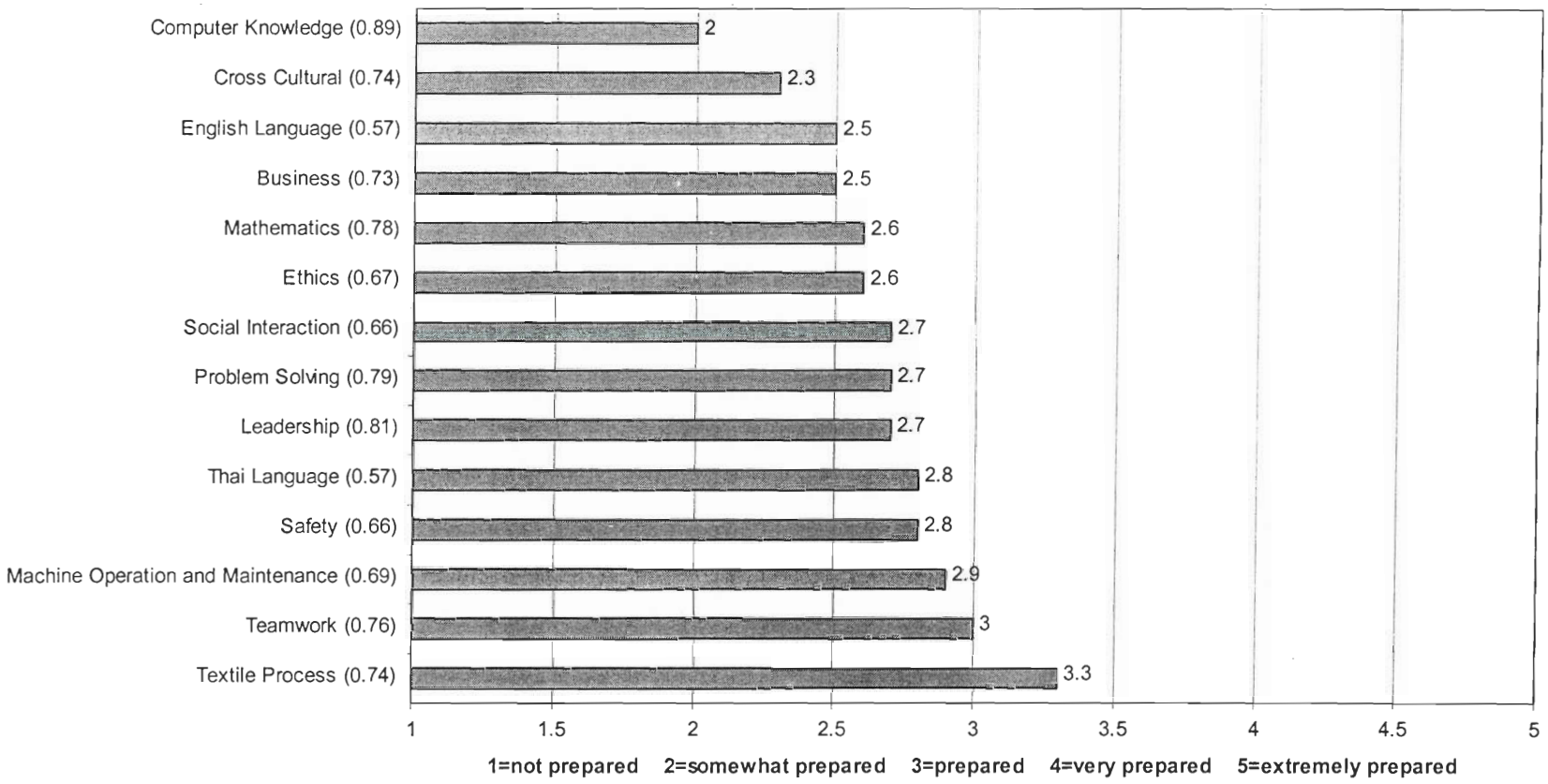
Vocational Program Completed by Alumni



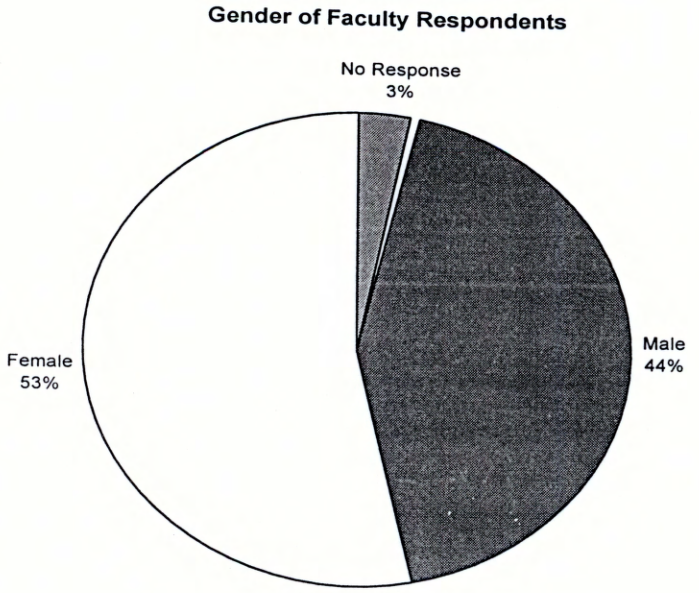
Mean of alumni response to the question: "Which of the following areas are most important for your career in the textile industry?" (Std. Deviation in parenthesis, N = 30)

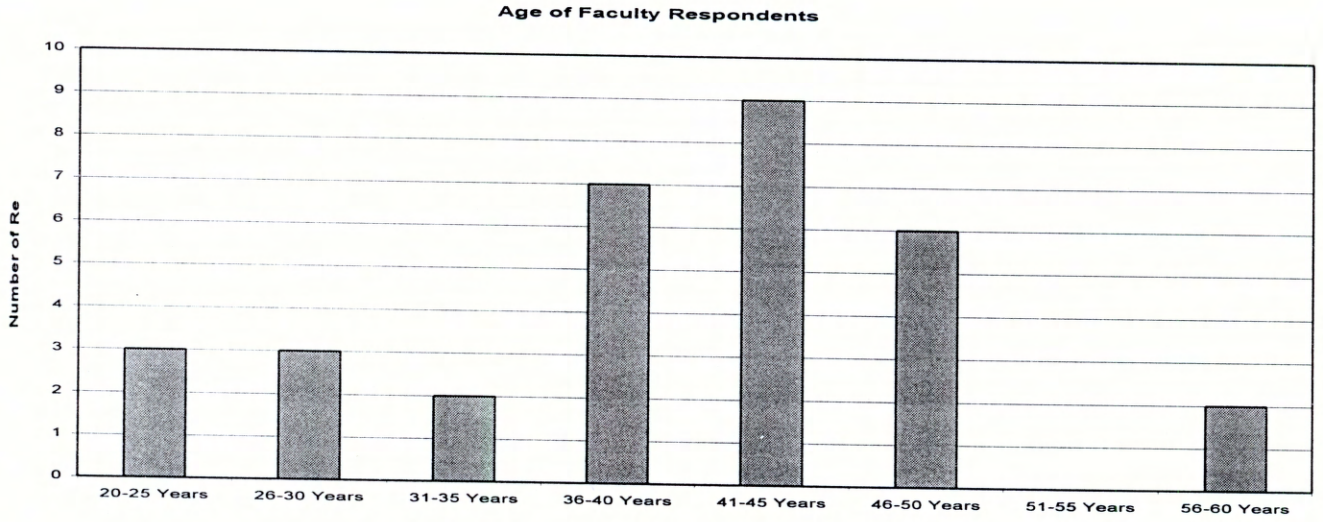


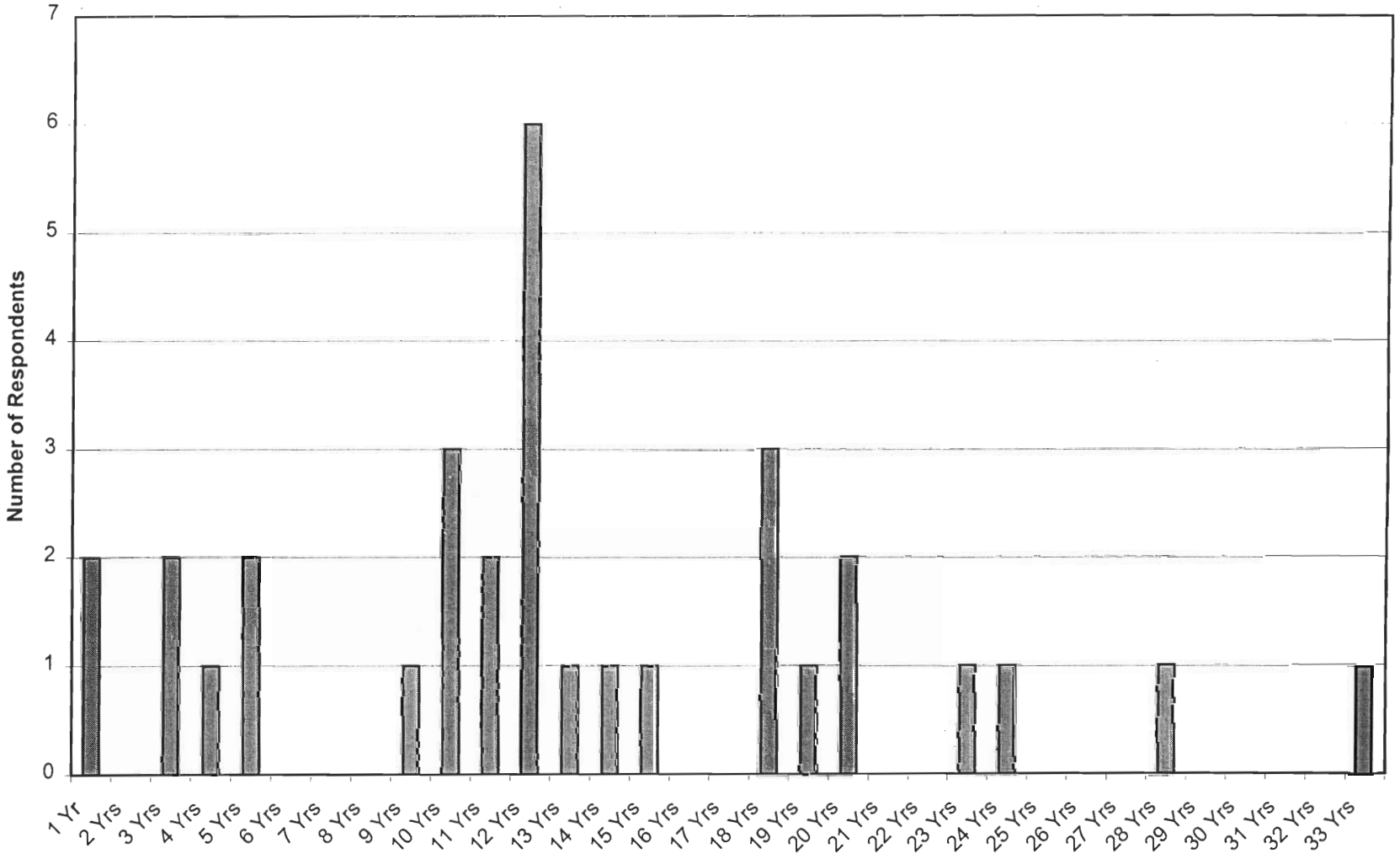
Mean of alumni response to the question: "How well did your education at Photharam prepare you in the following areas?" (Std. Deviation in parenthesis N = 30)

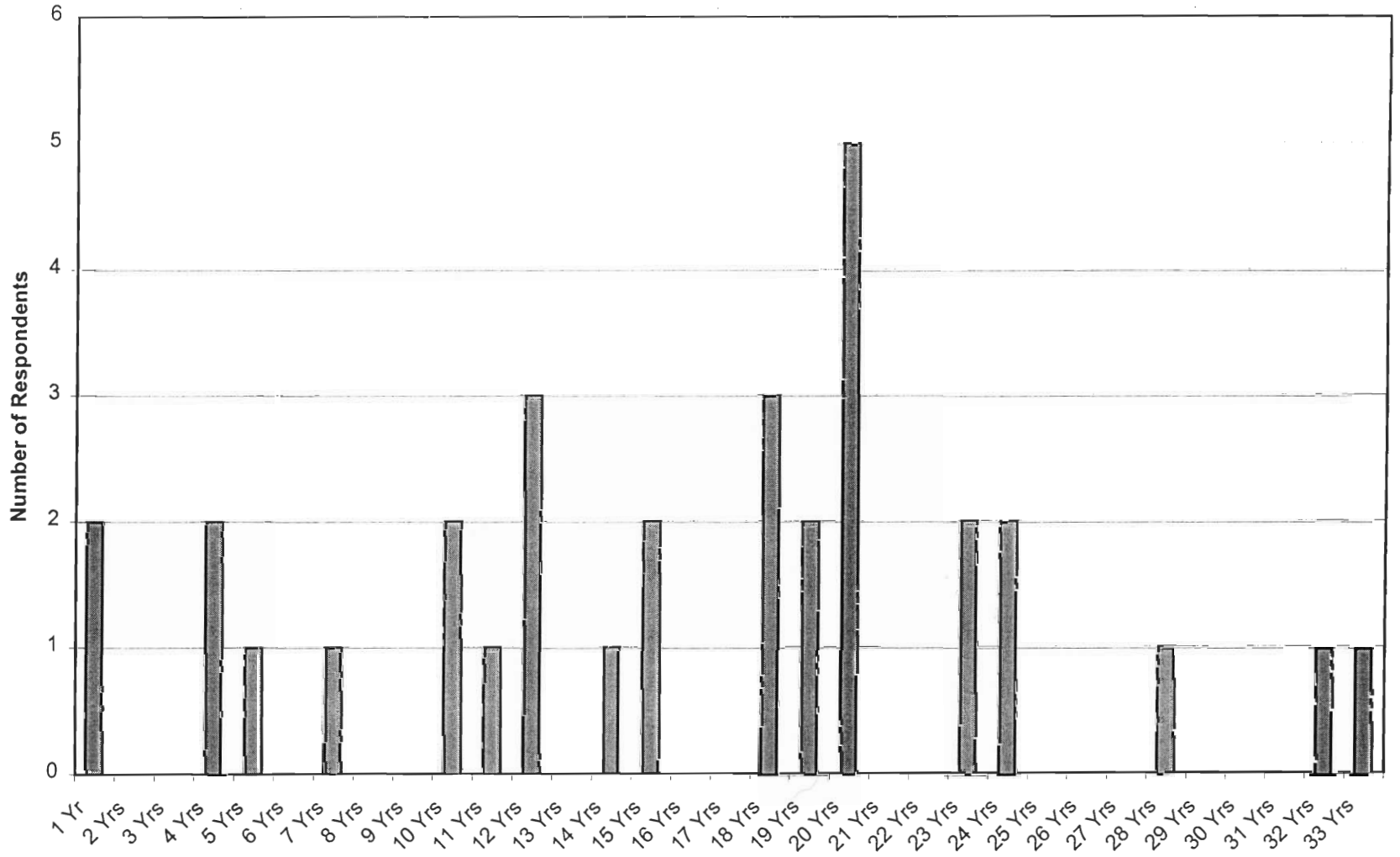


Faculty Statistics

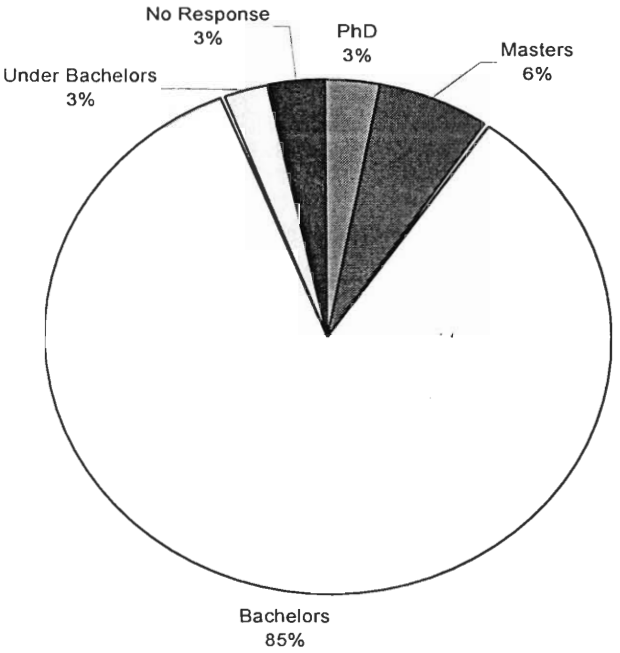




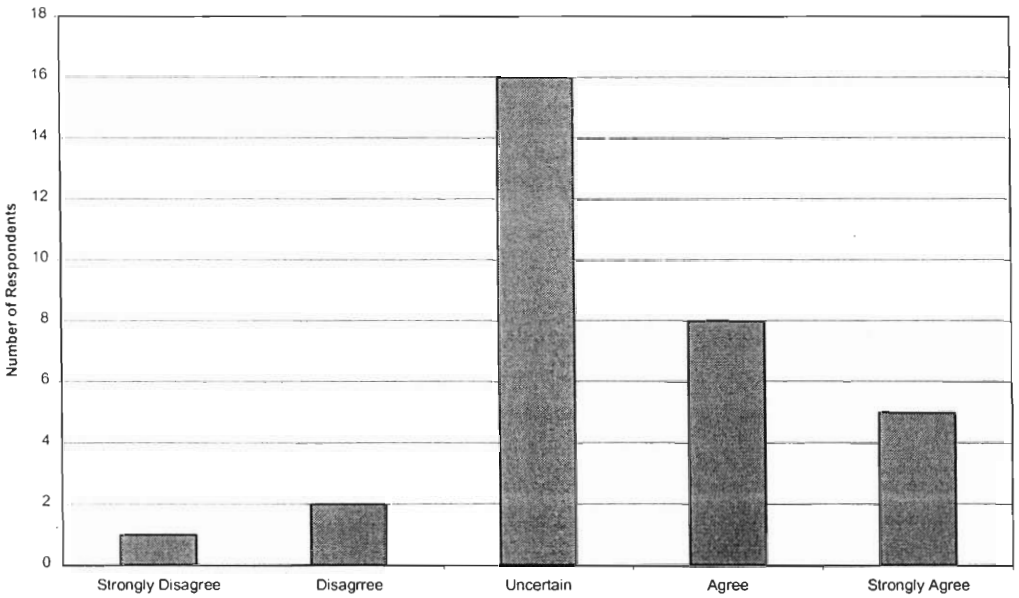

Number of Years Teaching at Photharam Technical School
Number of Respondents
0
1
2
3
4
5
6
7
1 Yr
2 Yrs
3 Yrs
4 Yrs
5 Yrs
6 Yrs
7 Yrs
8 Yrs
9 Yrs
10 Yrs
11 Yrs
12 Yrs
13 Yrs
14 Yrs
15 Yrs
16 Yrs
17 Yrs
18 Yrs
19 Yrs
20 Yrs
21 Yrs
22 Yrs
23 Yrs
24 Yrs
25 Yrs
26 Yrs
27 Yrs
28 Yrs
29 Yrs
30 Yrs
31 Yrs
32 Yrs
33 Yrs


Number of Years Total Teaching Experience
Number of Respondents
0
1
2
3
4
5
6
1 Yr
2 Yrs
3 Yrs
4 Yrs
5 Yrs
6 Yrs
7 Yrs
8 Yrs
9 Yrs
10 Yrs
11 Yrs
12 Yrs
13 Yrs
14 Yrs
15 Yrs
16 Yrs
17 Yrs
18 Yrs
19 Yrs
20 Yrs
21 Yrs
22 Yrs
23 Yrs
24 Yrs
25 Yrs
26 Yrs
27 Yrs
28 Yrs
29 Yrs
30 Yrs
31 Yrs
32 Yrs
33 Yrs

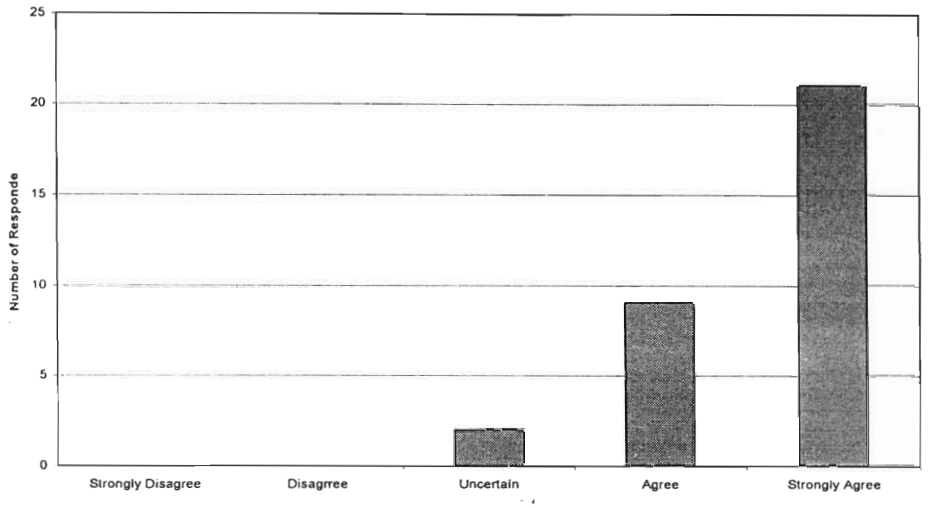
Educational Level of Faculty Respondents



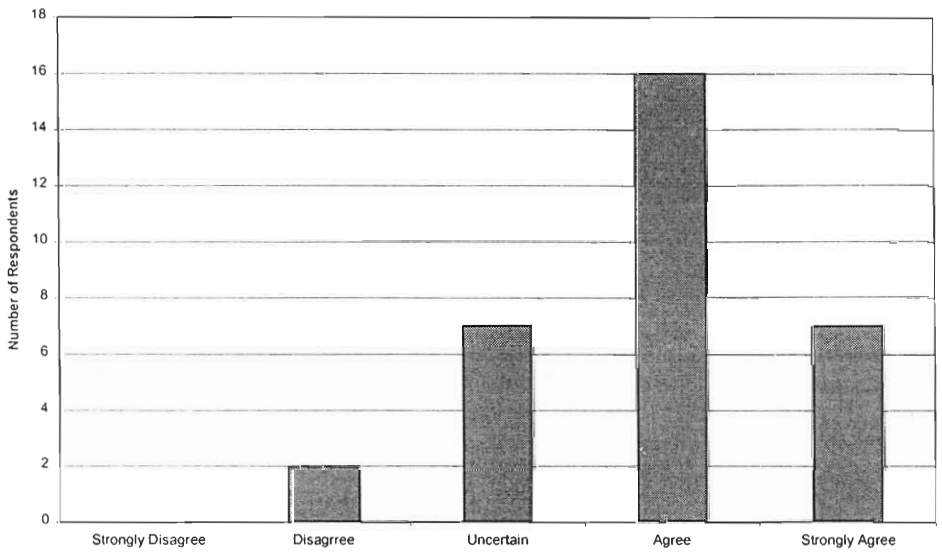
Faculty Agreement with "School keeps pace with industrial advancements"

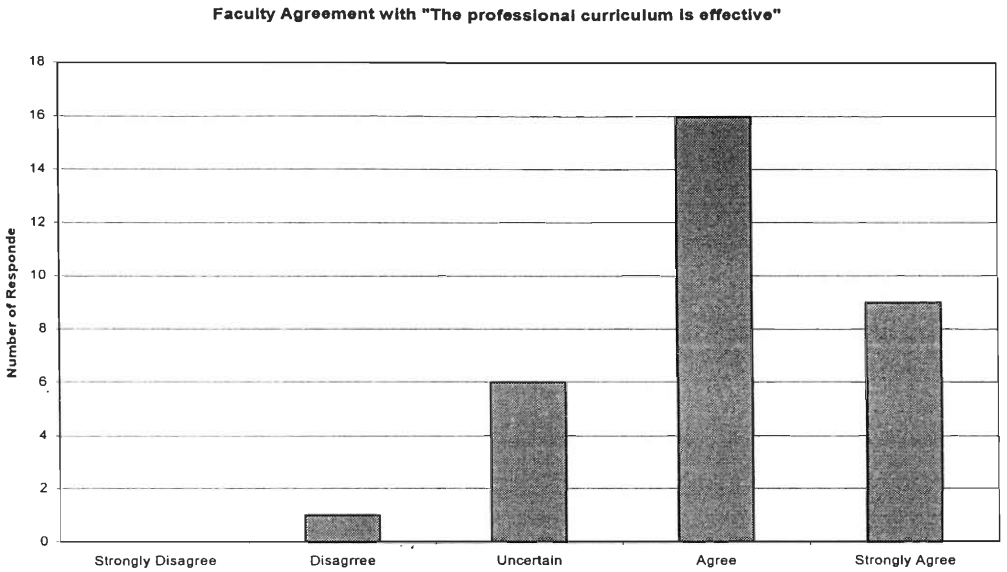


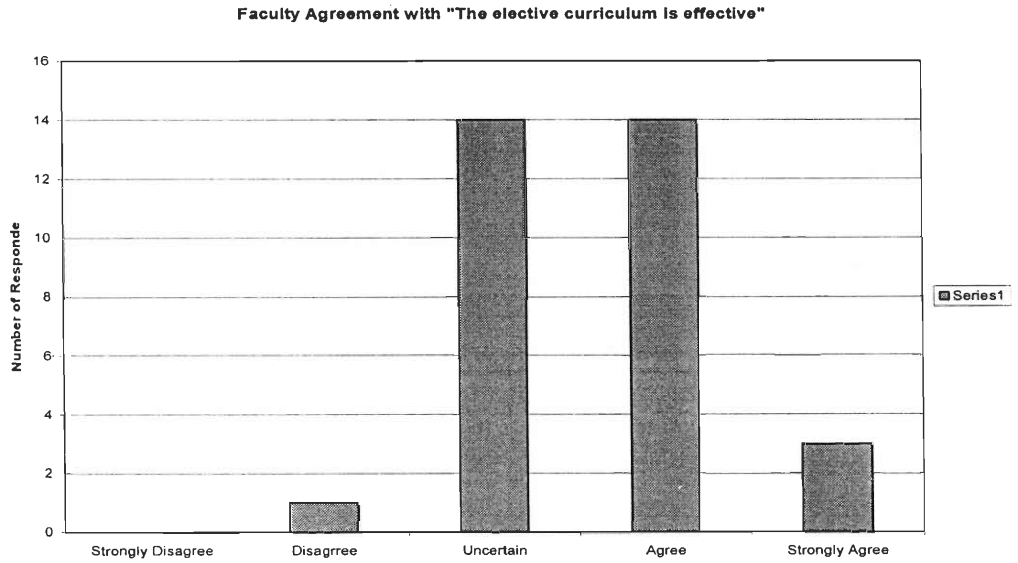
Faculty Agreement with "School should cooperate with local factories"



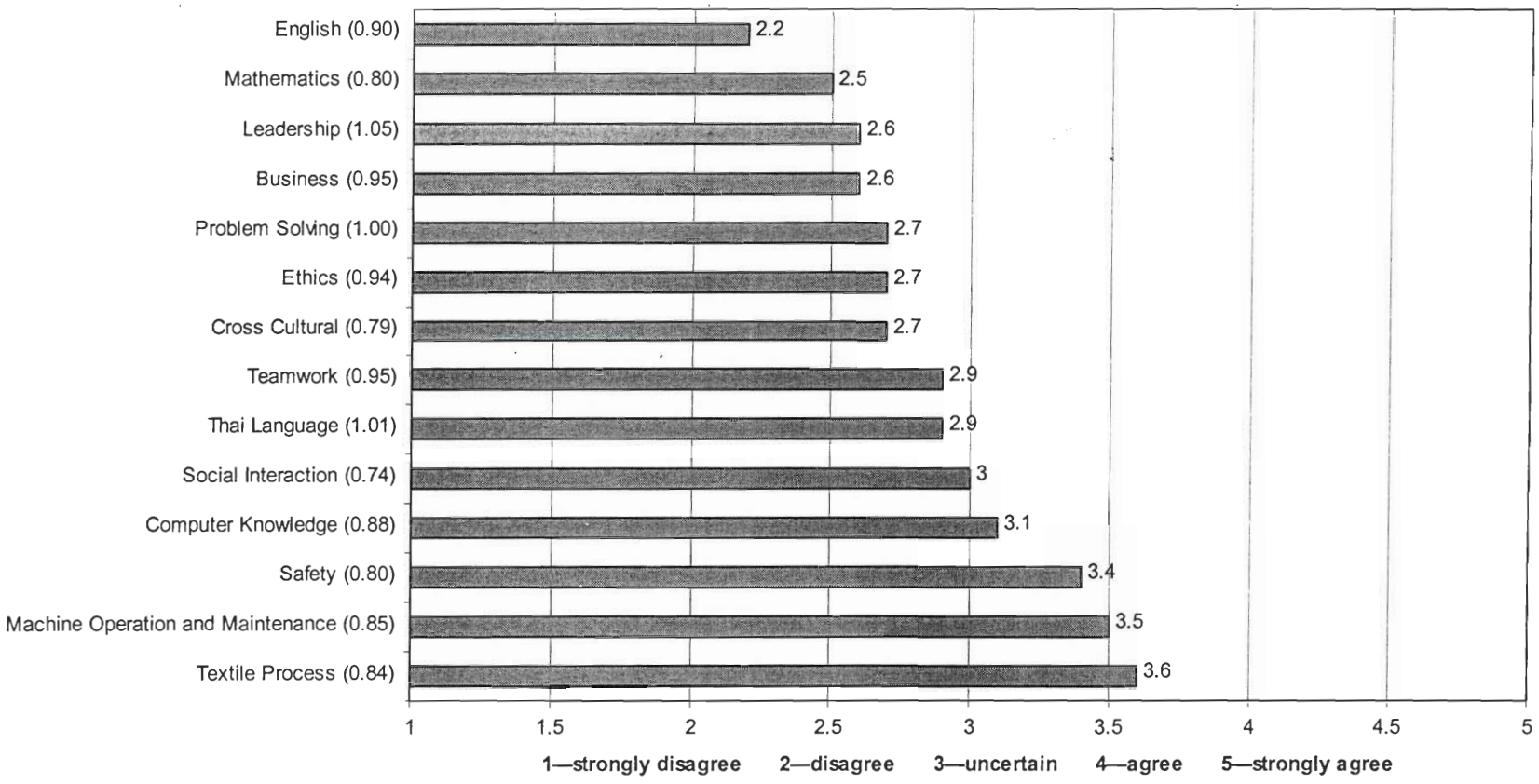
Faculty Agreement with "The core curriculum is effective"



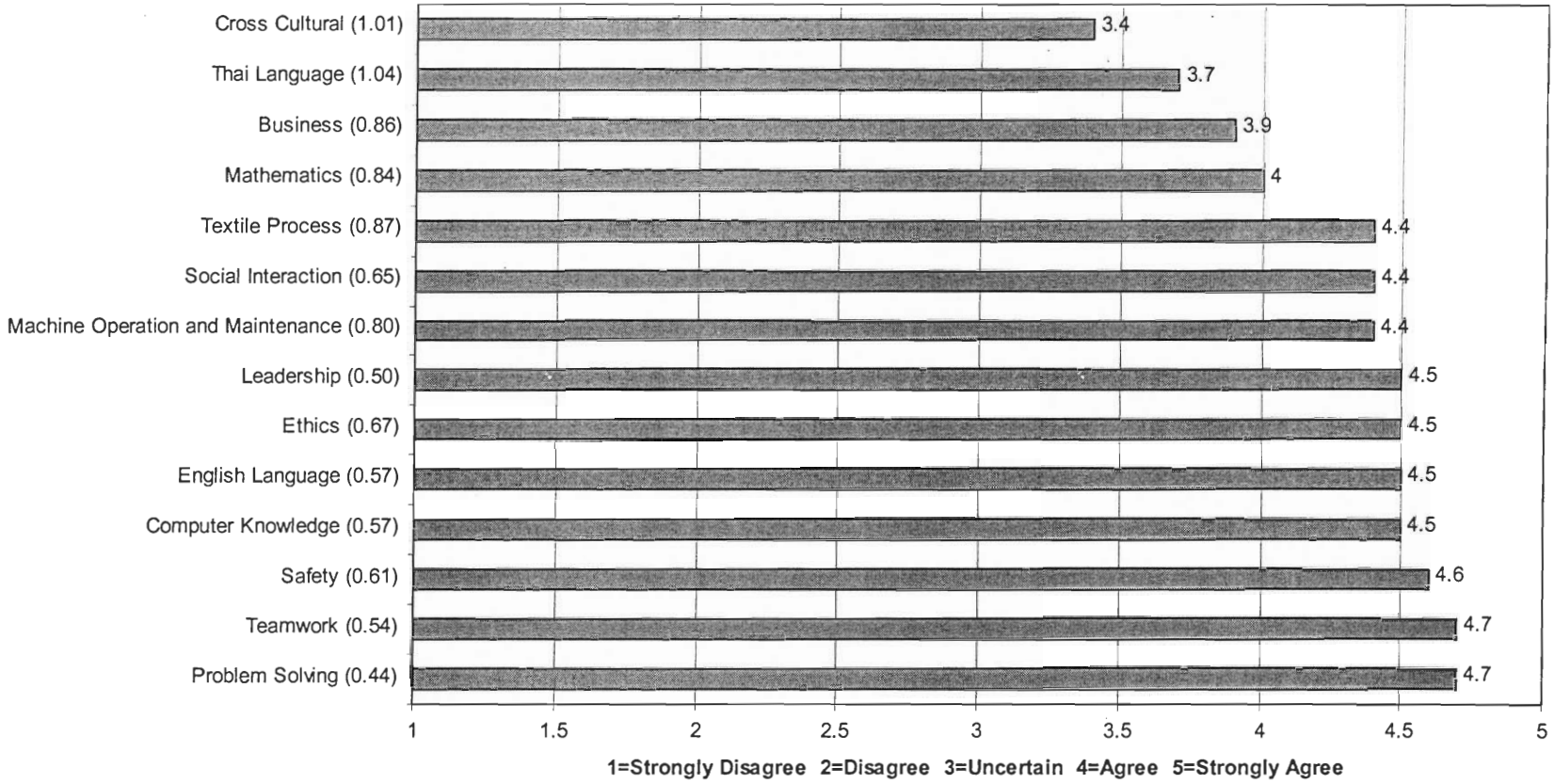

Faculty Agreement with "The professional curriculum is effective"
Number of Responde
18
16
14
12
10
8
6
4
2
0
Strongly Disagree
Disagrree
Uncertain
Agree
Strongly Agree


Faculty Agreement with "The elective curriculum is effective"
Number of Responde
16
14
12
10
8
6
4
2
0
Strongly Disagree
Disagrree
Uncertain
Agree
Strongly Agree
Series1

Mean Faculty Response to "Students are learning the following skills well"
(Std. Deviation in parenthesis, N = 32)

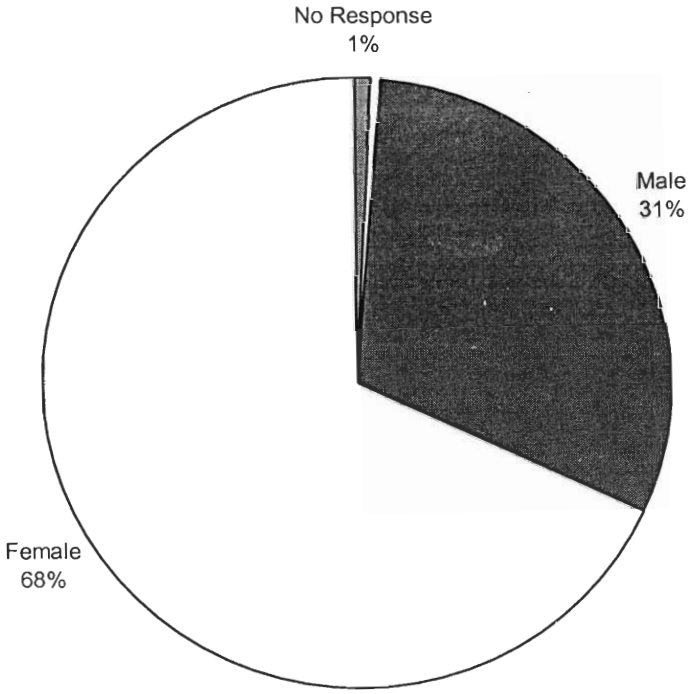


Mean faculty agreeance to the statement: "The following skills are very important for success in the textile industry" (Std. Deviations in parenthesis, N = 32)

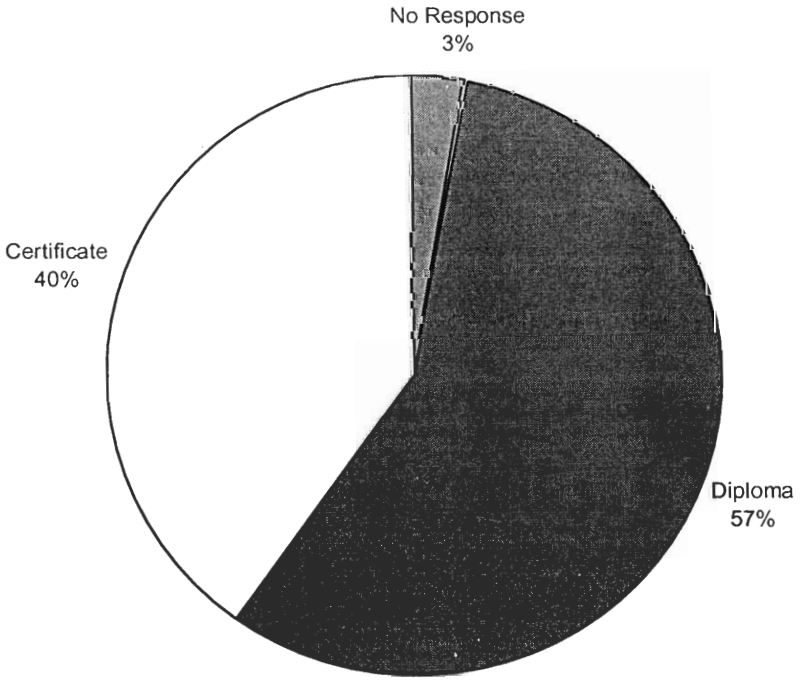


Student Statistics

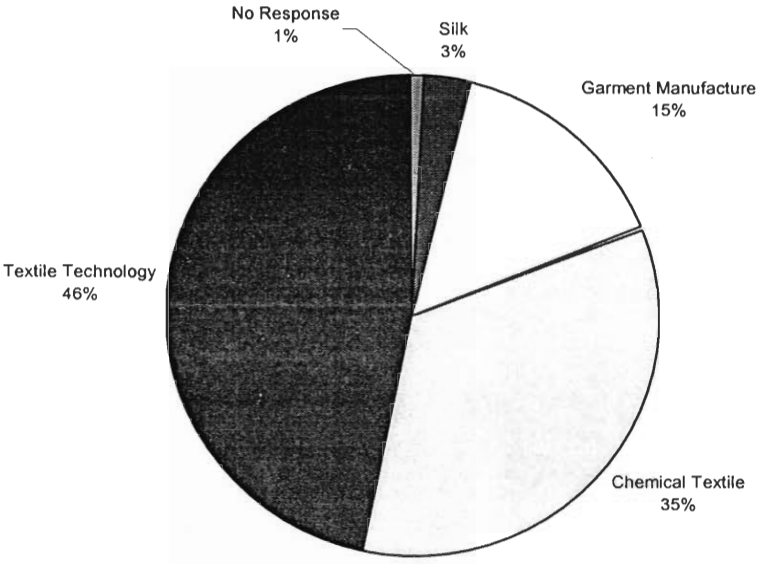
Gender of Student Respondents



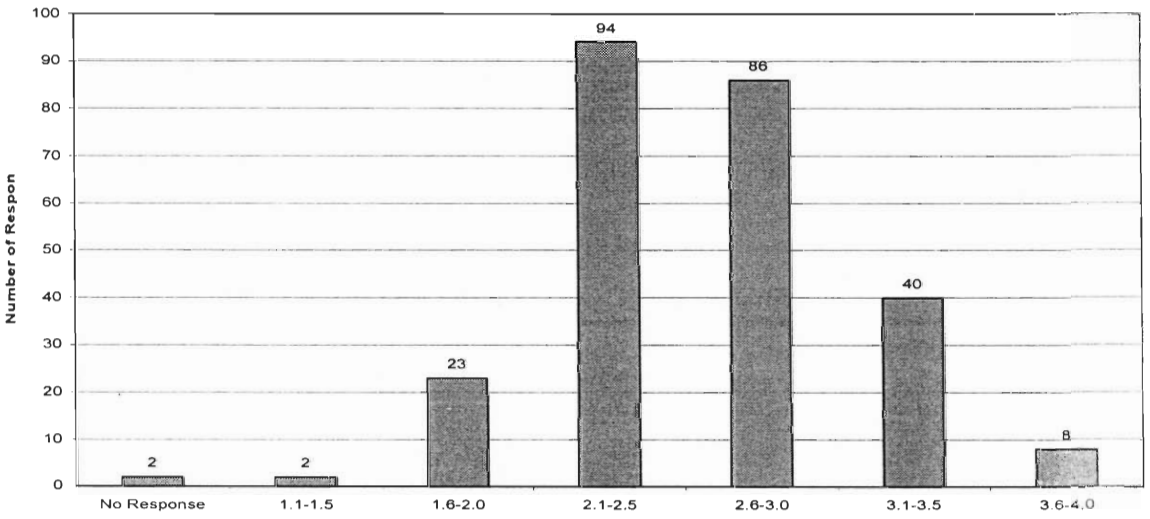
Education Program of Respondents

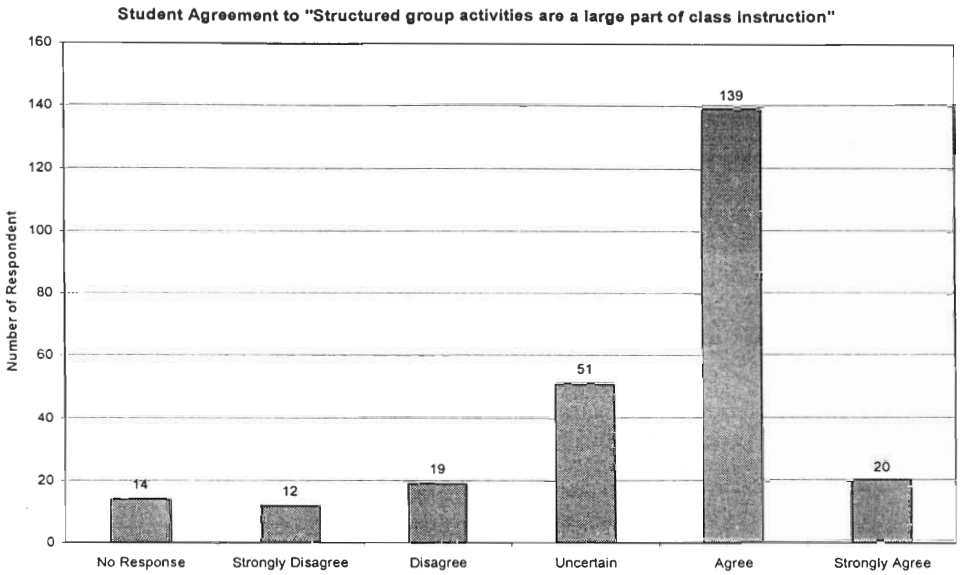


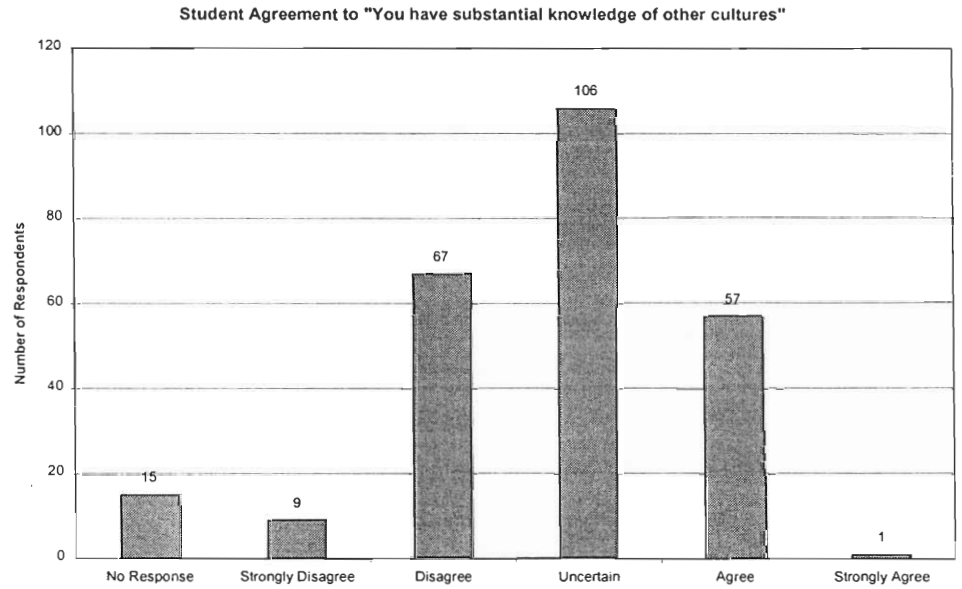
Major Concentration of Student Respondents



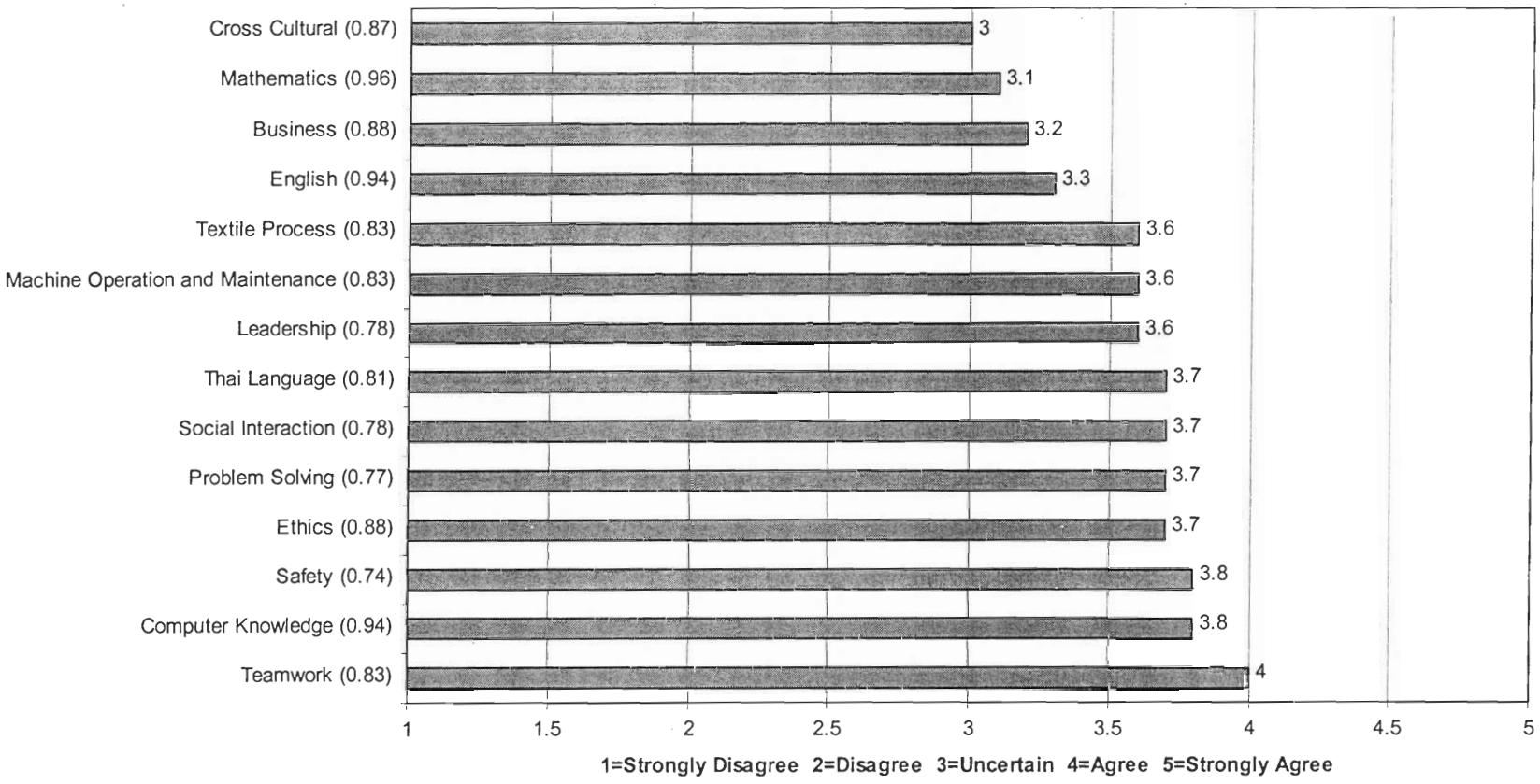
GPA of Student Respondents




Student Agreement to "Structured group activities are a large part of class instruction"
Number of Respondent
160
140
120
100
80
60
40
20
0
14
12
19
51
139
20
No Response
Strongly Disagree
Disagree
Uncertain
Agree
Strongly Agree


Student Agreement to "You have substantial knowledge of other cultures"
Number of Respondents
120
100
80
60
40
20
0
15
9
67
106
57
1
No Response
Strongly Disagree
Disagree
Uncertain
Agree
Strongly Agree

Mean of Student Agreement with "I am learning the following subjects well"
(Std. Deviation in parenthesis, N = 253)



Appendix D – Detailed Employer, Alumni, and Faculty Interview Transactions

The following summaries represent detailed transactions of interviews with textile industry employers and Photharam Technical College alumni in different fields of textile production. In our summaries, we have omitted any comments made by employers that clearly did not survive the translation to English.[48]

Employer Interviews

Employer Interview #1

This interview was conducted at the Kangwal Textile Co., LTD, where we talked with the owner. This company is a spinning and weaving firm that produces both synthetic (polyester, rayon, etc) and cotton fabrics and yarns. It is located very close to Photharam Technical College (PTC) and has 2100 employees, approximately 70 of which are from the college. The factory is locally based and owned by Thai. The questions asked of the owner followed those laid out in appendix B. The following is a summary of the answers that the owner supplied to our questions.

The owner of this factory had both positive and negative feedback on graduates of Photharam Technical College. He felt that employees from Photharam were relatively good at adjusting to the workplace, as a result of the experience in the workplace that they gain before graduating. This experience resulted in better practical textile skills. They were noted as having good knowledge of textiles. On the other hand, it was noted that graduates of Bangkok Polytechnic were stronger in theory than graduates of PTC. When PTC students came to the factory to train, they did not have enough background in textile theory. English was also mentioned as a weakness of PTC graduates. The owner stressed the importance of English, especially with the current focus on Information Technology (IT), as machines have become more computerized.[49] The ability to read the operation manuals of the machines, which are primarily written in English, is critical. For the above, it should be noted that only Photharam Technical College and Bangkok Polytechnic were compared.

In our interview, we received some feedback on the owner's thoughts of how the curriculum at PTC could be strengthened. He mentioned how software and multimedia could help students learn the processes of machine operation and problem solving ability. Another area that was mentioned was the need for a focus on English ability, as opposed to Japanese or Chinese. Overall, the feedback from this stakeholder stressed the need for immediate entry into the workforce without the need for extensive training to take place in the factory following graduation.

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[48] We only omitted statements that did not make any sense in their context. We were able to have most things clarified, however we were not always able to.

[49] In reply to this comment, the PTC faculty member that was accompanying us (a chemical textile teacher) noted that PTC provides English courses during the summer.

Employer Interview #2

This interview was conducted at the Sri Thong Textile Factory, where we were received by the owner. This was a smaller company relative to others we have visited, employing 165 workers. Most of these are locals, and there was only one Photharam College graduate. The textile machinery at the factory was upgraded based on need as well as budget so we could not discern a particular timetable for technology upgrades. The owner was generally pleased with students she had been in contact with form Photharam. She mentioned that they possessed good work ethic, they paid attention, and endured more than other workers. Promotion opportunities were depended on what department you worked for. However, longevity at the company was a big factor in determining who moved up in position. The owner said that English was not necessary for obtaining a job, however this could be helpful in certain areas. With English students can work in the textile marketing area or in chemical sales.

When asked what she would suggest that Photharam focus on, in order to better prepare its students for the workplace, our interviewee said the following:

A better job must be done for students to have better problem solving skills, leadership ability, work ethic, as well as technical preparation in order to easily adapt to the work place.

Employer Interview #3

This interview was conducted at RTD Textile Industry Co. Ltd., where we were received by the local manager, who acted as public relations representative and did some recruiting and hiring in the local Ratchaburi area. The company focused primarily in silk fabrics, but they also specialized in dyeing and finishing. The interview was precluded by a tour of the factory, which was extremely helpful in showing us what the different textile processes are. Some background information was requested and we found out that machinery at the factory can be updated up to 6 month intervals usually driven by the market demand. Currently 535 workers were employed at the factory, and almost all of them were locals, something which our interviewee stressed.

After the background information was received, we started asking about the Photharam curriculum. He was somewhat familiar with the school and was therefore able to answer most of our questions fully. There was a distinct tone to this interview, as the manager specifically mentioned social skills as the main area for improvement for the students. He was not at all concerned with their textile knowledge, due to Photharam students knowing more in that field than most others due to their school having the only strictly textile based curriculum. Also, once the graduates were hired they would receive training specific to what was required from them at RTD Textile. The manager's main concerns were with the communication, leadership, creative thinking, and problem solving skills. He pointed out that graduates did not want to take any initiative in the work place, and that specific instructions were given to them on every type of job. He wanted to hire people that would be good workers in a team environment, had vision, and will to move upwards in the company. Other specific concerns were graduates desire to work and their lack of responsibility. He also mentioned that the teachers at the school are not prepared enough to teach student leadership, social, and thinking skills. Other information gathered focused on

the need for foreign languages, especially English. While proficiency in this area was not needed for a floor manager position, in the marketing sector and higher level management it was absolutely necessary. Our interviewee once again stresses the need for Photharam graduates to be better communicators, thinkers, and to be able to take leadership roles in their workplace.

Employer Interview #4

Our next interview was conducted at the Mun Ying Co. Ltd., where we were greeted by Vichit Cheevaprawatdamrong who held the position of Deputy Managing Director. He informed us that the factory specialized in fabrics coating, as well as the production of nylon and polyester packs and golf-bags. The factory exported 80% of their products while the rest was for local consumption. European countries were their main customers while Mr. Vichit pointed out that Chinese companies were their main competitors due to chap labor. He classified their market standing as middle stream, meaning that they serve costumers interested in mid level quality of products.

Once again sue to the proximity of the school to the factory, we were able to get answers to specific questions on the Photharam curriculum. The graduates adapt quickly to machinery upgrades, and they are better prepared for the weaving industry. However, they lacked knowledge in the dying and garments sector. Mr. Vichit said that what is most important for Photharam to focus on for the future is a deep understanding of the theory behind the structure of fabrics and the finishing of all materials. He mentioned that there is a big gap between what student should and what they now about the structure of fabrics. The most important factors for hiring a vocational school graduate were enthusiasm, motivation, and school record (grades). The English language was not necessary for obtaining a job, however it could be the catalyst for job promotion. English was taught at the factory because of the workers need to be able to understand the machine manuals. Mr. Vichit ended the interview by recommending that the Photharam School upgrade their English, reading, writing, and speaking skills.

Employer Interview #5

This interview took place at the Jiam Patana Knitting Company, where we spoke to the textile manager. The factory was involved in production of cotton and CVC (55%cotton and 45% polyester) products. The company was highly labor intensive and currently employed 200 workers in their textile sector. However, due to high demand they currently needed 100 more employers, which they could not obtain due to the hard labor involved with working in their factories.

The managers main concerns with schools like Photharam were, adaptability of students to the workplace and their industry training. He said that graduates from the school have better textile knowledge from others, but training is provided at the factory to all new employees anyway. He thought that lack of hard work, and discipline were two major weaknesses of vocational school graduates. He suggested that students should be more exposed to textile training before they obtain their jobs. Promotion was based on work ethic and attitude, as well as by longevity in the company.

Employer Interview #6

While at the Photharam School for an observational visit, we had the opportunity to interview Puchong Temcharoen a textile factory manager who was at the school on a recruiting visit. His company employed 2400 workers in three separate factories. He identified several strength and weaknesses of Photharam graduates. He stressed that the textile curriculum was proficient and that students from the school were generally very knowledgeable of what was required in their particular line of work in the factory. He recommended that improvements be made in the following areas: teamwork, responsibility, computer, and social skills. With an eye towards the future he believed that life-long learning and adaptability to workplace changes.

When asked what he was looking for and what questions he was asking the students in the interviews, he told us that textile education is never discussed. Instead he focused on the students character and speaking ability. He tried to spot the ones with good character, the ones that would work well with others and be motivated in the workplace.

Mr. Puchong stressed that English is very necessary in his company. Problems arose with machine operators due to their inability to understand English commands and manuals. He thought that the school should better prepare students for such challenges which they are bound to encounter in the work place.

Alumni Interviews

Alumni Interview #1

A group of eight alumni were interviewed in a round-the-table setting where questions, shown in appendix B, were asked. This interview session took place at the Kangwal Textile Co., LTD located near PTC. The alumni were all experienced workers (15-20 years) holding high level positions, such as manager at the company. The following is a summary of the responses that were given by these eight alumni.

Holding high level positions, the alumni knew what was most needed in the workers. They suggested several areas that need to be stressed in the curriculum of PTC. Echoing the concerns of the owner, the alumni felt that there needed to be more focus on the process of solving problems at both the certificate and diploma level. They though that having alumni visit PTC to teach would be beneficial, as the alumni have direct knowledge of how processes are applied in the workplace, for example. Knowing the processes of spinning and weaving were deemed critical, as this factory produced fabric and yarn. However, students would not benefit by learning only theory with no application. The idea of having students take field trips to factories so that they can see the real-world applications of theory learned in the classroom would help the students correlate theory with reality. Other than knowledge of processes, knowing how to maintain electronics and having a basic understanding of machinery were brought up. The alumni also thought information technology (IT) to be important as most every machine has a computer. They shared the owners concerns for graduates to be ready to work immediately following graduation without requiring on-site training.

In the interview session with the alumni, which overlapped with that held with the owner, some other interesting points were brought up. The issue of worker responsibility was one of these. There seemed to be concern over the lack of responsibility in the younger worker, for example the tendency for younger workers to leave the workplace before the workday was over. They said that they can't expect the younger generation to be responsible and work efficiently.[50] The alumni said that there are courses at the factory though which the workers can train to work in teams and learn to be leaders. They also teach the use of computers and e-mail each year.

Alumni Interview #2

This interview of an alumnus of PTC took place at Sri Thong Textile, a firm which pretreated and printed fabric. She was the only worker at the factory that was an alumnus of PTC and held the title of head of the department of quality control. She had actually started her work at this company as a head of pretreatment, as she stated that circumstances had allowed for this. Over the 7 years that she had been working there, she had changed titles and gained more responsibility. The highest degree that she had was a vocational diploma. She said that the basic academic knowledge that she learned was sufficient, but that problem solving and planing she had had to learn herself.

She gave us insight into what areas were important to hold a job and also to be a head of a department. The worker must have intentions to work, concentrate, have devotion, be able to solve as well as avoid problems, increase productivity, control quality, and have endurance. To be a head of a department requires, in addition to these skills, strong social skills, the ability to deal with people, and good management skills. However, these skills are meaningless if the person does not have enthusiasm, dignity, and pride towards their work.

There was no disappointment with the education which the alumnus had received at PTC, even stating that it had very much had given her an advantage in the workplace. It was clear that English was considered important, but the factory did not have evening language classes at the time of this interview session. She felt that teamwork, leadership, problem solving, and social skills were important for the workplace, but that computers[51] and cross-cultural skills were not important.

Areas where this alumni thought the curriculum of PTC could be improved are as follows: public/human relations, leadership, governing, organizational management (getting the right job to the right person), planning, increasing productivity, problem solving methods, problem avoidance, work safety with machines and chemicals, and quality assessment. These are all areas that seemed important to her job, and would therefore be deemed important for workers to have by her.

We followed our alumni questions by asking some employer questions, since the interviewee was a higher up in the company. The most significant of these was when asked her whether graduates from PTC were stronger than other workers, to which she noted that PTC graduates work hard and strive

[50] In observation that followed the Interview session, we noted that the workers seemed to be working hard. However, this was not an extensive observational session, but simply walk-by observation.
[51] In the context of this factory, this is understandable, as the machinery did not appear to be highly computerized.

more than others, having a good work ethic.[52] She noted that workers at this factory were predominantly local persons.

Alumni Interview #3

At the Mun Ying Factory we were able to conduct a group interview with 7 Photharam School alumni currently working for that company. All of the interviewees had finished the graduate program at the school. Workplace experience ranged from one to eleven years. The most recent graduate was still just regular staff, whereas the rest had started out in that position but had since moved up regularly. Worker evaluations at the factory occurred monthly. All of the alumni agreed that workplace enthusiasm is essential for promotion. Taking charge of work and projects shows initiative and resolve therefore it helped in improving position at the company. They agreed that English language skills were not good coming out of Photharam and that they would have been very helpful at the factory. There was also agreement that supervisory and leadership skills needed attention and improvement while students were still in school. Those involved with planning deduced that for that particular process there was a large gap between what is taught at the schools and what actually occurs in the factories. Textile theory and practice at the school, they though were sufficient and helpful. For the future they recommended that the school improve its English and Computer programs so that students have a better transition to work, and that they can be ale to advance. The alumni agreed that something had to be done to improve the quality of the machinery at the school, as they are not up to par with what is currently being used in the factories.

Alumni Interview #4

While at the Jiam Patana Knitting Company we were ale to interview two Photharam graduates. This was a very labor intensive environment, and both students mentioned that they were there primarily due to it being close to their parents houses. Both interviewees felt that strengths of the Photharam School had been the textile area which provided them with superior knowledge compared to the rest of the employees. Due to them simply being involved with one particular process, and Jiam Patana company promoting based on years of experience, they could not provide us with much input as to what skills they felt were necessary for success in the textile world. They were satisfied with the education they had gotten at Photharam, mentioning that you can get more out of it based on the effort that you put in.

Faculty Interviews

Faculty Interview #1

We interviewed 7 faculty of PTC. These members of the "teaching staff" were all from the textile department. A majority of the input was provided by faculty teaching chemical textile and textile technology. The interview was conducted in a group interview format where questions were asked systematically from a pre-written list (see appendix ??) and extra questions asked when further knowledge

[52] We assume that she had worked with PTC graduates in the past, being the only alumni working at the factory at the time of the interview.

on a topic was desired. Many of the teachers present at this session were members of the committee that develops the curriculum at PTC.

Of the questions asked, one of them probed the extent to which the school updates their curriculum to meet changing demands locally and in industry. What we found was that the committee develops the curriculum a minimum of once every 5 years, although intermediate curricular reform can be instigated if there is a sudden need for it. Instances where curricular change is necessary include changes in technology. The task of the committee is to produce a draft of an updated curriculum. It also came to our attention during this visit that PTC had just recently undergone vast curricular reform to adjust, in part to the need for improved general education. It should be noted here that students enrolled at PTC prior to the new curriculum would complete their education following the old curriculum.

We learned that the new director, Dr. Kamol, initiated the current reform that PTC has been undergoing. He has stressed that there be a large focus on the English language. It appears that the English teachers do not necessarily want to speak English. This has resulted in innovative methods for teaching, which include having students watch videos and listen to audio recordings while filling out English language worksheets. In addition, the new curriculum requires students to study English every semester, which was not necessary previously. In general, under the current curriculum, the students have lots of freedom to complete coursework whenever they please. It was also praised for helping creativity and problem solving skills. The teachers noted that the director supports problem solving. However, classes in major areas, such as in the textile disciplines, were still scheduled, although they had an open, hands on environment with minimal lecture time.

When asked whether students requested extra help from teachers outside of the classroom, we were told that they always come to see them after a problem is assigned. We realized that this is partly a result of the new curriculum, which centers around having the faculty supervise students in their work instead of simply lecturing. This requires students to have constant direct contact with the faculty. They said that some students will try to solve assigned problems alone and only ask the teachers for help if the have trouble. The teachers with whom we talked to seemed to agree that a majority of students utilize the Internet and library for the purposes of research. However, although the faculty thought it good for students to take the time to learn on their own, they were unsure as to whether all the students were capable of this.

In research, students work individually, but for practice and training, they work in groups, which are assigned by the teachers. We were told that in the previous curriculum, theory and practice were divided, each being allotted 2 hours in the course of a class. In the new curriculum, theory and practice were combined into a 6 hour session, where the teacher decided the division of time between theory and practice based on the requirements of the curriculum. However, the teachers interviewed thought that the school needed people from the factories to come to PTC to train students. Employers currently help develop the curriculum and make suggestions and recommendations that would help students prepare for the workplace.

Students at PTC are required to complete 400 hours of training or project time, which is done over a 2 month period. This is in an attempt to prepare them for the workforce. The students are given the choice to complete a project on campus or travel off campus to train at a factory. In either case, they must complete all classes in theory before beginning training. We found out that a problem that the school had before this was implemented recently was that students would not return to complete their theory and simply continue working. If a project is chosen, the student must find a faculty advisor for their project. Training or project time must be completed in both certificate and diploma programs (see Appendix A– the curriculum).

Another interesting topic that was brought up was the availability of students to complete project for factories. These projects were completed on campus but consisted of actual work that the students had financial control over and received money for the completed product. The faculty we talked to really liked this, as they though it gave students the opportunity to explore the way that business is run. They also noted that students really enjoy this as it gives them a feeling of control and that they are supporting themselves through delivering product.

Despite these measures to allow student's control over what they do, they still have the problem of not being independent enough in thought. This was a major issue during the interview. An example to show the lack of independence of students is how they are nearly guaranteed work upon graduation, but often do not except it as it would require them to move away from home and their friends. Students could also pursue further education if they desired[53] but decline for similar reasons as previous cited.

The following suggestions were made by the faculty interviewed on what areas students are lacking and where they needed to develop more. Despite the recent modification of English classes, the teachers felt that students were not good enough at English, having no English communication skills. English is especially important, they noted, because technology (e.g. operation manuals) is in English. The students were said to be good at following direction, but needed to develop their individual thinking skills. They were said to not be able to plan by themselves. In addition, students needed more ethics, responsibility, and morals. Some students were said to join departments without wanting to, because their parents were forcing them into it, or because they thought PTC graduates would get a job easier. The faculty wished students were enrolled because of their own desire to be there.

The following are some interesting points that the faculty interviewed brought to our attention:

1. Some teachers in the garment department join the industry for 2 months to gain industry experience to bring back to school.
2. The teachers are free to set up the curriculum but must follow the local ideas and technological needs.

[53] A quota allows them to easily enter higher institutions, although they must pay for the tuition themselves.

3. Evaluation in textile classes involves observation for practice and tests given on a topic by topic basis, including tests on work done in lab.
4. Other universities send students to PTC because of its strength in textiles.
5. The curriculum is good, but also depends on the teachers and whether they know their own abilities. Teachers need to expand, seek help, and give more opportunities to students (e.g. by asking specialists to teach classes in areas where they are not as comfortable).
6. The curriculum is not the issue but more the limited budget that the school has, resulting in the technology not being up-to-date, etc.
7. The limited budget that the government allots PTC makes it critical that they work with local factories. They already have the technology and will help.

Appendix E – Workshop Agenda

The Role of Academic Institutions in Upgrading Working Skills and Competency of Thai Labor in the Textile Industry

Saturday, 22 February 2003 at Golden City Hotel, Ratchaburi

This workshop is being held to obtain feedback on our ideas for vocational curricular improvement and hopefully to obtain new ideas. Our research has been focused around Photharam Technical College and its recent reform efforts. Photharam Technical College is a textile-based college located near many textile factories. We sought to determine the effectiveness of the Photharam curriculum by analyzing the perceptions of four stakeholders: local employers, alumni, faculty, and students. Through comparisons of these different viewpoints along with research of successful curricular reforms in other countries, we were able to uncover areas where the vocational curriculum in Thailand might be enhanced.

Our research was conducted because the need for improved human resource development in the textile industry has become evident. The Thai economic crises of 1997, resulting in Thailand's loss of status in the world textile market due to increased labor wages, has created the need for a more technologically advanced industry. As technology advances, students entering the market must be prepared for more mentally demanding jobs. Our hope is that our suggestions for curricular reform in Thailand will help lift the current economy to a more value-added state through the enhancement of human resources.

11.30-12.00	**Registration**
12.00-13.00	**Lunch**
13.00-13.15	**Opening Remark** Project Director: Patcharawalai Wongboonsin
13.15-14.45	**Project Presentation:** Chris Cichetti Leon Metreaud Kathryn Rivard Henri Sino

Presentation Outline

- Introduction – Henri Sino
- Importance of the Textile Industry and Education Reform – Kathryn Rivard
- Challenges Facing Vocational Education through Industry Reform – Leon Metreaud & Henri Sino
- Research Methodology – Chris Cichetti & Henri Sino
- Analysis of Data from Photharam Stakeholders and Curriculum – Leon Metreaud & Kathryn Rivard
- Suggestions of Possible Solution – Chris Cichetti

14.45-15.00	**Coffee Break**
15.00-16.30	**Brain Storming** Moderator: Prof. Kua Wongboonsin, Ph.D.

16.30 **Closing Remarks**

Topics to be discussed:

- Student initiative and workplace enthusiasm
- Independent thought and learning processes
- Broad-based knowledge development
- Incentives for continuing education and job placement
- Keeping with modern technology at vocational schools
- Leadership and social skills development
- English language development
- Computer and internet knowledge
- Theory vs. practice
- Overall feasibility of reforms

We are requesting your attendance at this workshop so that our research will benefit from your insight and expertise.

It is our hope that this event will produce many new ideas for the enhancement of Thai education.