

## The Development of the Necessary Competencies of High-School Students for Working in the Industrial Business Sector

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### บทคัดย่อ

วัตถุประสงค์ของการวิจัยคือ เพื่อศึกษาและพัฒนาสมรรถนะที่จำเป็นของนักเรียนมัธยมศึกษาตอนปลาย เพื่อการปฏิบัติงานด้านธุรกิจอุตสาหกรรม และเพื่อพัฒนาหลักสูตร การพัฒนาสมรรถนะของนักเรียนมัธยมศึกษาตอนปลายเพื่อการปฏิบัติงานด้านธุรกิจอุตสาหกรรม กระบวนการวิจัยประกอบไปด้วย 4 ขั้นตอน ดังนี้ คือ ขั้นที่ 1 ประเมินสมรรถนะที่จำเป็นของนักเรียนมัธยมศึกษาตอนปลายเพื่อกิจการปฏิบัติงานด้านอุตสาหกรรม ด้วยวิธี focus group และ in-depth interview กลุ่มเป้าหมายที่ศึกษาได้แก่ ศิษย์เก่าที่ปฏิบัติงานด้านธุรกิจอุตสาหกรรม นักธุรกิจและผู้เชี่ยวชาญด้านการพัฒนาทรัพยากรมนุษย์ ขั้นที่ 2 คือการพัฒนาหลักสูตรสมรรถนะ ขั้นที่ 3 คือการนำหลักสูตรไปทดลองใช้ และ ขั้นที่ 4 คือการประเมินผลการใช้หลักสูตร ประชากร คือนักเรียนมัธยมศึกษาตอนปลาย โรงเรียนเตรียมอุดมศึกษาน้อมเกล้าสมุทรปราการ กลุ่มตัวอย่างคือนักเรียนชั้นมัธยมศึกษาปีที่ 5 โปรแกรมธุรกิจอุตสาหกรรมจำนวน 30 คน เลือกแบบเฉพาะเจาะจง ผลการวิจัยพบว่า (1) สมรรถนะที่จำเป็นต่อการปฏิบัติงานได้แก่ภาษาอังกฤษ คอมพิวเตอร์ การนำเสนอ การสื่อสาร การบริการ มนุษยสัมพันธ์ ใฝ่เรียนรู้ การทำงานเป็นทีม การแก้ปัญหา การคิดวิเคราะห์ การคิดเป็นระบบ การประยุกต์ใช้ความสามารถในการเรียนรู้ ความมีวินัย ความมุ่งมั่นในการทำงาน ทักษะการควบคุมอารมณ์ ความรับผิดชอบ และภาวะผู้นำ (2) ประสิทธิภาพของหลักสูตรมีค่าเท่ากับ 87.75 / 85.94 ซึ่งสูงกว่าเกณฑ์ที่กำหนดคือ 80/80 (3). ผลของการพัฒนาสมรรถนะผู้เรียนพบว่าสมรรถนะหลังการฝึกตามหลักสูตรพัฒนาสมรรถนะสูงกว่าก่อนฝึก (4) ความพึงพอใจของผู้เรียนต่อหลักสูตรพัฒนาสมรรถนะอยู่ในระดับมากที่สุด โดยมีค่าเฉลี่ยเท่ากับ 4.48 และ (5) ผลของการนำหลักสูตรไปใช้อยู่ในระดับสูงมากที่สุด โดยมีค่าเฉลี่ยเท่ากับ 4.67

คำสำคัญ: สมรรถนะ/ธุรกิจอุตสาหกรรม/การพัฒนาหลักสูตร โดยใช้สมรรถนะเป็นฐาน

### Abstract

*The objectives of this research were to identify the necessary competencies and to devise a competency-based curriculum for developing the competencies of high school students to work in an industrial business sector. The research process involved four important sections. Section one is a needs assessment to find the necessary competencies of high school students to work in an industrial business sector, this section has four subsections with different data collection techniques. They were; subsection one, asking the needed competencies from students using a focus group, subsection two, asking the needed competencies from three selected businessmen using an in-depth interview, subsection three, asking the needed competencies from four experts in the human resource development profession using an in-depth interview and subsection four, studying the needed competencies from a literature review. The data were analyzed to validate the necessary competencies using the Affinity diagram technique. Section two was curriculum development. Section three was the curriculum implementation and section four was a curriculum revision and evaluation. The research sample was thirty high school students, chosen by a purposive sampling process, and the duration of the curriculum implementation was one semester. The research results were that: 1. The competencies of the high school students were found to be competent in English, computers, presentation, communication, being service minded, human relations, learning minded, teamwork, problem solving, analytical thinking, system thinking, adaptability, learning ability, self-discipline, attentive working, EQ, accountability and leadership. 2. The efficiency of the curriculum was 87.75/85.94. 3. The assessment of the competencies developed by high school students as the result of implementing the curriculum found that the competencies were higher than the pre-curriculum implementation. 4. The satisfaction of the students toward the curriculum was found to be at the highest level and 5. The application of the curriculum was also at the highest level.*

*Keywords: necessary competencies; competency-based curriculum;*

### Introduction

In a knowledge-based economy and society, competencies such as knowledge, skills, and attitude play a great role on an organizations' performance and competitive advantage (Adler, 2002). The requirements of knowledge, new skills, and new jobs occur all the time, and organizations need employees who have sufficient qualifications

matching their work. The industrial sectors always lack skilled workers whose qualifications match their jobs (Wongboonsin, Guest, & Prachuabmoh, 2003). Hence, the demand for advanced skills and educated workers is rapidly increasing in the industrial sectors. In addition, most organizations require knowledge and skilled workers to enhance

productivity for competitive advantage (Botkin, 1999). Chawalit (1996) who studied the potential in human resources development for industry in Thailand, Laos and Vietnam found that general education in all three countries provided within the formal education system did not meet the needs of the people. The potential for management of human resource is quite low in all three countries. The problem of general education was that there were too many people in the labor force who have only primary education so that they do not have enough knowledge or sufficient skills for changing the technology and demands of the labor market. Pomsuwan (2001) studied employee competencies that were related to work experience among members of the Thai Life Assurance Association. A case study of employees of the Thai Life Assurance Association found that the seven foundation competencies are self-competency, communication competency, diversity competency, ethics competency, cross-cultural competency, team competency and change competency that must be developed in individual workers and their managers. More importantly, Cooper & Carton (2000) reported essential competencies for meeting requirements of indicator development for competency assessment. The important competencies were ability for teamwork, intellectual leadership, vision, creativity, good human relationships, knowledge and ability in management, resolve in decision making and taking responsibility, integrity and teamwork. These studies are useful for practitio-

ners and future research. The studies indicate that competency is needed and demanded in organizations to increase work efficiency.

### **Research Objectives**

The objectives of this research were to identify the necessary competencies of high-school students and to develop a competency-based curriculum for high-school students for working in the industrial business sector.

### **Scope of Research**

The scope of this study is as follows:

1. The sample group consisted of high-school students studying in the second semester of the academic year 2006 at Triamudomsuksanomklao Samut Prakan School, Samut Prakan Province, Thailand,
2. The competencies were confined to the competencies that high school graduates need for working in the industrial sector.

### **Methodology**

The study was divided into five phases:

#### *Phase 1*

#### *Research design*

This study employed an R&D research approach. The researcher began the research process by conducting a needs assessment in order to identify the necessary competencies. The interview guided used as a tool for focus-group interviews and in-depth interviews. The interview guides were designed as an opened-ended



questionnaire for interviewing. The questionnaires for the focus group contained eight items and the questionnaires for the in-depth interview contained six items. The questionnaires were submitted to experts for validating the contents by using the Index of Consistency (IOC) by three experts. The average score of the IOC is acceptable at 0.50.

The example of the questionnaires for focus group are as follows: What is the needed knowledge that can help to work successfully in the industrial sector? What are the skills and attitudes necessary to work in the industrial sector? If there is a curriculum development for high school students to work in the industry, what knowledge, skills and attitude will be fulfilled in the curriculum? The example of the questionnaires for focus group are as follows: What are the basic competencies to work in the industrial sector for the next generation who will work in the industrial sector? How to develop the needed competencies?

## Phase 2

### Curriculum Development

Identifying the needed competencies for working in the industrial business sector, the tools used were focus group and in-depth interviews. The target groups are as follows:

The first group was collected by focus-group interviews with 30 former students who worked in eight factories after graduating from this school.

The data of the second group were collected by in-depth interviews with a management group which came from the 15 enterprises in

the industrial business sector composed of five managers from upper management, five managers from middle management, and five managers from lower management.

The third group was collected by in-depth interviews from five HRD managers in the human resource development various companies in Samut Prakan province.

The competencies from focus-group interview and in-depth interview were as follows:

*Knowledge* can be identified as accounting, management, environment, ISO, sufficiency economy, marketing, and business law,

*Skills* can be identified as English, computer skill, creative thinking, human relations, communication, learning ability, EQ, service minded, teamwork, presentation, leadership, learning minded, analytical thinking, adaptability and problem solving

*Attitude* can be identified as self-discipline, attentive working, and accountability

Then knowledge, skills and attitudes were given a description to explain each subject, skills and attitudes that are needed for working in industrial business.

*Knowledge:*

*Marketing* is understanding and explaining ways of thinking, principle, the process and procedures of marketing responsibility. The person who works in this field should be able to evaluate customer satisfaction and needs. The desired skills for marketing are service minded, presentation, and human relations.

*Accounting* is recording, classifying, summarizing, analysis and interpreting data. The knowledge of financial statements, income statements, profit and loss statements, expenses and balance sheets are required. The person who is self-disciplined and accountable is preferable in accounting.

*Management* is learning a business plan, SWOT analysis, self-management, the skills required for management are system thinking, problem solving, and the attitudes needed are self-discipline, accountability and human relations.

*Environment* is learning how to protect the environment and do projects about the environment and pollution. The skills that need are creative thinking, problem solving and communication. The attitudes desire are self-discipline and accountability.

*ISO* is to learn ISO 9000 in the data keeping system and ISO 14000 in the environment management system. The skills the students should have in this field are teamwork, management, and analytical thinking and the attitude requires is self-discipline.

*Sufficiency economy* is a subject that came from the king's philosophy. The students should be taught to know how to save and how to earn their living. The students should study the philosophy of sufficiency. The skills the students should practice are critical thinking, learning ability, adaptability and problem solving. The attitude the students should have is self-discipline.

*Business law* is learning copy right, patent, trademark, contacts for employment and labor law.

The skills required are analytical thinking, presentation, problem-solving, human relations and communication. The attitudes the students should practice are self-discipline and accountability.

#### Skills:

*English* is important for communication in industrial business such as telephoning, writing resumes, application forms, writing e-mails, and business-letters. The skills that should be practiced are communication and presentation.

*Computer* is very important in industrial sector nowadays. The students should learn power point, creating databases with Microsoft Excel, writing e-mails, and searching the Internet.

*Creative thinking* is the ability of finding new methods to improve and develop effective work, and presentation of new concepts. This is the ability to generate innovative solutions in work situations and to try different and novel ways to deal with work problems and opportunities.

*Human relations* is the ability to develop and maintain effective relationships with others in order to encourage and support communication and teamwork. This ability is to build and maintain ongoing, collaborative, work relationships with co-workers to achieve goals.

*Communication* is the ability to use both Thai and English fluently in speaking, writing, reading and listening. This is the ability to exchange information and suitable performance to the audience.

*Learning ability* is the ability of learning problems and experience in both successful and

unsuccessful work and attention of learning new things continuously.

*EQ* is the ability to control ones emotions, to compromise and be friendly.

*Service minded* is the ability of understanding the other person, paying attention, being generous and problem solving.

*Teamwork* is the ability to actively participate in working, cooperation, trusting the leader as a member of a team to move toward the completion of goals.

*Presentation* is the ability of clear explanations and description data, suitable performance to the audience, evaluation and improvement of oneself.

*Leadership* is the ability of decision making by having information, cause and reason to support the decision. The ability of attraction a person agrees with.

*Learning minded* is the ability of learning new things that will be useful for work performance in industrial sector and adaptability of learning to develop and improve work.

*Analytical thinking* is the ability of analyzing problems and understanding basic relationships between different problems. This is interpreting, linking, identifying issues, obtaining relevant information, relating and comparing data from different sources and identifying alternative solution.

*Adaptability* is the ability to maintain effectiveness when experiencing major changes in work tasks or the work environment and ability to

adjust effectively to work within new work structures, processes, requirements, or cultures.

*Problem solving* is the ability to identify problems, determine possible solutions, and actively work to resolve the issues.

Attitudes can be defined as follows;

*Self-discipline* is the ability of self-management such as time management, the priority of work and making independent decisions.

*Attentive working* is the ability to accomplish tasks and process accurately and completely. The ability to stay with a job or plan until the desired objective is achieved.

*Accountability* is the ability to be relied upon to ensure that projects within area of responsibility are completed in a timely manner. This is the ability to monitor programs and activities and take corrective action when necessary.

To meet the objectives of this research, the competencies were designed as the competency-based curriculum so as to develop the competencies needed of the high school students.



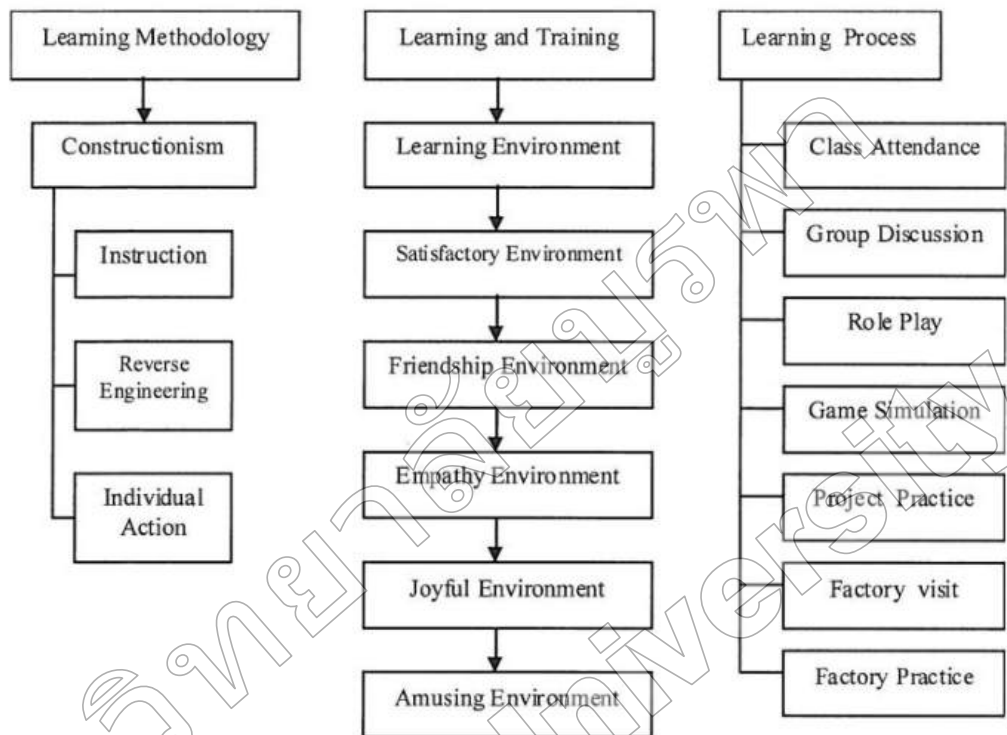


Figure1 Learning and training of Competency-based Curriculum

The developed competencies contained knowledge, skills and attitudes. The main curriculum is composed of learning process, learning methodology and learning environment. Constructionism was used as learning methodology means that the learners learned by doing. They understand what they learn and create from understanding. Thus, learning environment would attract students to practice the competencies to be practical workers in industry. Learning environment trained the competencies depending on the necessary demand of training competencies. The in-class activities are: class attendance, group discussion, presentation, role play, game simulation and project practice.

Because the class wants students to gain experience and knowledge from the industrial-business as the nature of the course, students had to do activities outside of class by visiting the factory 20 hours and practicing in the factory for 280 hours.

The competency development was trained via activities as shown in Figure 2

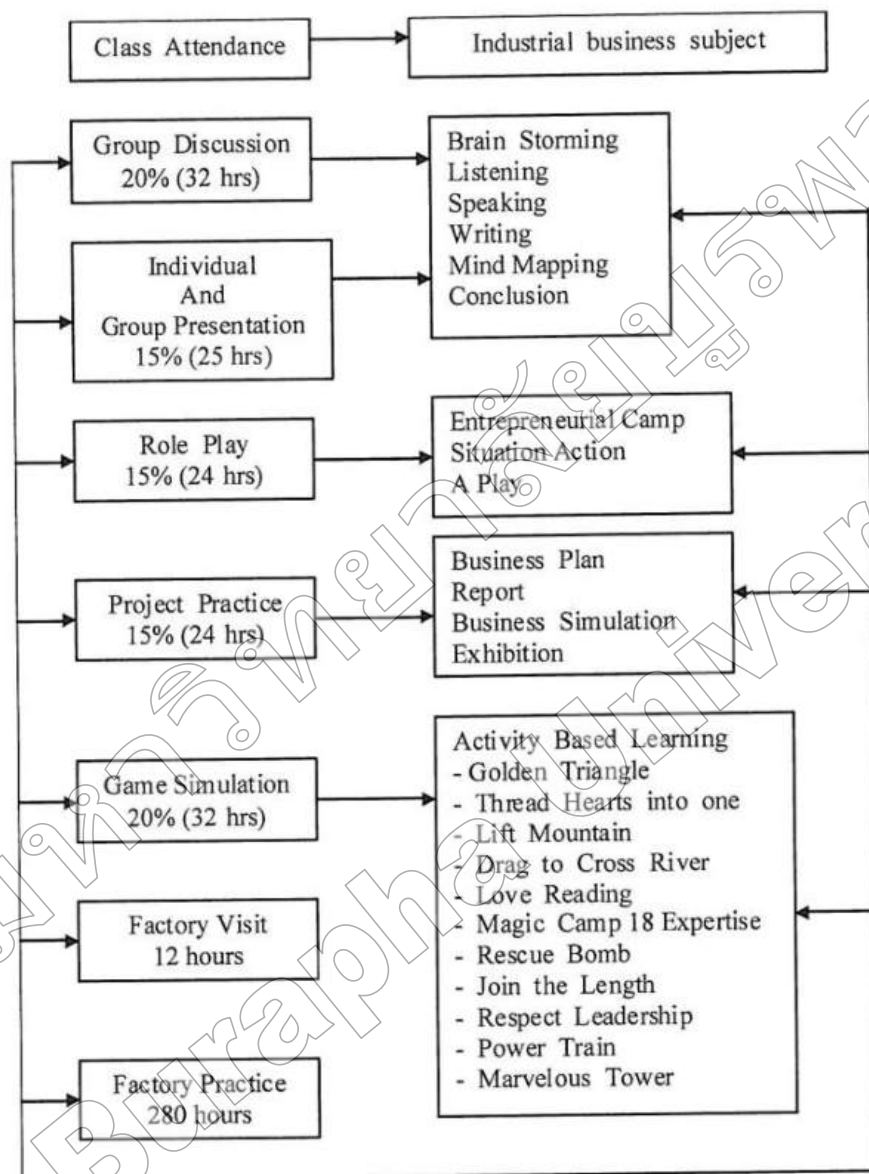


Figure 2 Competency development via activities

The curriculum was implemented with a sample group of 30 TUNS high school students who studied in the Industrial Business program for a full semester from November 1, 2006 to March 31, 2007.

There were six teachers who were trainers. The teachers were classified by their professional content. There were four units of Samut1, Samut 2, Samut3, and Samut 4 used to train the needed competencies. The competencies development



contained knowledge, skills and attitudes. The main curriculum is composed of learning process, learning methodology and learning environment. Constructionism was used as a learning methodology means that the learners learned by doing. Because Constructionism concerns three things; instruction, reversed engineering and self-practice, it related to learning environment. A learning environment would attract students to practice the competencies to be practical workers in industry such as *friendship, empathy, joyful and amusing environments*.

#### Phrase 3 Implementing

The implementing method used was Pre-experimental design which is a one-group pre-test/post test study. This design included a pretest measure followed by a treatment and a posttest for a single group.

#### Phase 4 Evaluation

The curriculum evaluation was from a comparison of the pre-test and post-test results.

#### Evaluation Instrument

The evaluation instrument were classified into four categories. The details of each category are as follows:

1. The criterion set for the evaluation of the competency-based curriculum efficiency was 80/80 or higher. ( $E_1 / E_2$ )

The competency-based curriculum was developed with four units, and checked for its content validity, consistency, and language usage by five experts. The Index of Consistency (IOC)

was calculated. The IOC value was accepted at the average of 0.50. The four units contained 28 lesson plans. They were checked for their content validity by five experts, and edited for the suitability of the language used.

2. Evaluation form on skills and attitude

The students' competencies were assessed before and after training. The instrument used was an authentic assessment formed by rubric score; the criteria had five score levels for needed competencies development before and after implementing. The evaluation form was checked for its content validity, consistency, and language usage by five experts, and calculated for its Index of Consistency (IOC). The value of statistic was accepted at 0.5.

3. The students' satisfaction towards the competency-based curriculum. The assessment of the students' satisfaction towards the competency-based curriculum was measured after learning. The evaluation form was composed of content, instruction, learning activity, learning material and evaluation. The satisfaction evaluation form was approved to find the suitability of the evaluation form by five HRD experts with the IOC method. The value of statistic was accepted at 0.5.

4. The evaluation form of the competency-based curriculum usage was evaluated and implemented. The procedure of evaluation was as follows: first, the evaluation form was made by the researcher that covered learning methodology, learning process and learning environment. Second, it was checked for its content validity,

language usage, suitability of the evaluation form and for reliability. The data was analyzed by the IOC technique. The value of statistic was accepted at 0.5.

## Results and Discussion

The results of the research can be reported as follows:

1. The evaluation of the curriculum efficiency with  $E_1/E_2$  methodology

Analyzing to find the efficiency of curriculum with  $E_1/E_2$  methodology, the criteria of the scores is not less than 80/ 80. The efficiency of the curriculum is found at 87.75 / 85.94 which is higher than the specified efficiency criteria of 80/ 80.

2. The evaluation of needed competencies development after implementing with thirty students. The data was analyzed by  $\bar{X}$ , S.D and percentage found that it is higher than the pre-test.

3. The evaluation of the satisfaction of the learners after, implementing. The data was analyzed by  $\bar{X}$  and S.D and found that it is at 4.48 at the highest level.

4. The evaluation of curriculum usage after implementing by the teachers who teach with the competency -based curriculum, the data was analyzed by  $\bar{X}$  and S.D found that it is at 4.67 at the highest level.

The research discussion was written into two parts;

### 1. Competencies

Competency is developed successfully because of good environments such as satisfaction, friendship, empathy, joyful and amusing environments. These activities motivate the learners and are interesting enough for learners to participate in the activities. The activities can make workers more practical and knowledgeable. These relate to Nordhaug (1993) that the importance of competency development is the behavior change including knowledge, skills and attitude.

The competencies were evaluated by authentic assessment which related to Meyer (1992) who referred a form of assessment to students and they were asked to perform real-world tasks that can apply the essential knowledge and skills. The teacher can evaluate real learner's behavior and competencies.

### 2. Competency-based Curriculum

The curriculum was developed to train needed competencies for the performance of high-school students in the industrial sector. The process of competency development comprises identifying the needed competencies, designing the curriculum for developing competencies, implementation and evaluation. The competency curriculum corresponded to the policy of the Ministry of Education (2006) that wishes to empower local communities to become a firm foundation for steady and sustainable national development. Learning is the most effective when it is a part of an



activity that the learner gains experiences and constructs a meaningful product (Papert, 1970). Learning process and learning environment relate to one another.

The activities to train the needed competencies are as follows: group discussion, individual and group presentation, game simulation, role-play, project practice, factory visit and factory practice. These activities interest the learners because each activity will motivate the learners to participate with activities such as expressing their ideas, brain storming, presentation, mind mapping, simulation, situation, and role play. The learners are classified into groups which help the learners have the opportunity to discuss, brain storm and exchange opinions between one another; these make the learners learn with groups of friends. In addition, each lesson plan gives situations for learners to analyze, both individually and in groups, which will motivate learning all the time. All activities are in harmony with the learning theory of Constructionism (Papert, 1970) which found that learners should create new knowledge and competency from instructions, reversed engineering and individual actions.

In terms of the competency assessment, the assessment used authentic assessment of rubric score technique of 5 score levels. This assessment corresponded with Meyer (1992) who states that a form of assessment in which students are asked to perform real-world tasks demonstrates a meaningful application of essential knowledge and skills. Stiggins (1989) found that performance assessments call upon the examinees to demonstrate spe-

cific skills and competencies, that is to apply the skills and knowledge they have mastered. So the authentic assessment is appropriate to assess competencies because competencies can be observed by behaviors and performance.

The outstanding part of this curriculum is the process of curriculum development. This curriculum was built from real needs. The researcher interviewed a target group to identify needed competencies for work performance from the grass root to the top (from the workers to the top managers). Thus, this competency curriculum occurred from real needs, and was used to develop learners to have adequate competency for career performance in real life. This harmonized with Hamstead (2001) who mentioned that learning must be in a holistic way and reflects the real world. The learners can apply what they were trained to their jobs in real life.

## Recommendations

### *Recommendation for Application*

1. This research result yielded the curriculum for needed competencies development of high school students for working performance in industrial business sector. The curriculum was evaluated by experts and implemented by a sample group. It is a model of curriculum development of other needed competencies of students in other sectors, too.

2. To make the curriculum work well every learner should participate in all learning and teaching activities.



3. In using the curriculum, the learning atmosphere should be built suitably for learning and doing activities, for example, learning materials, exhibitions, using ICT for learning and study tours.

4. The curriculum can be used for h schools which want to develop students to have needed competencies for working performance in industrial business sector or other sector.

*Recommendation for Future Research*

1. It is recommended that there should be a study to identify the most needed competency among knowledge, skill and attitude for Thai society.

2. From the data collection in the needed competency identification phase, it was suggested that the curriculum should provide students more opportunity to face and solve problems. It is recommended that there should be a development of a problem based curriculum for students.

3. There should be a study to identify the essential skills, knowledge and attitude for specific subjects such as what kind of skills are essential for the marketing profession.

4. There should be a study to identify the essential skills, knowledge and attitudes for specific profession such as what kind of skill, knowledge and attitude for the accounting profession.

5. Besides studying about competencies, student's traits should be studied as well since traits are more difficult to identify having known the competency, traits may be more readily available to study.

### References

- Adler, N.J. (2002). *International dimensions of organizational behavior*. Cincinnati: South-western.
- Botkin, J. (1999). *Smart business: How knowledge communities can revolutionize your business*. New York: Free Press.
- Brahmawong, (2001). *The efficiency of an activity package for enhancing youth consumption behavior.....basic education curriculum, 2001*. Academic department, Ministry of Education. Innovation and Technology.
- Hamstead, M.A. (2001). *Development of a holistic, participatory process model for manufacturing workforce learning with a plan for implementation and evaluation, Doctoral dissertation*, Nova Southeastern University.
- Chawalit, P. (1996). *Potential in human resource development for industry*, In Chanjarean. Curriculum development for administration training program of private vocational schools, 2002.
- Cooper & Carton, K. (2000). *Effective competency modeling and reporting*. New York, AMA Publications.
- Pomsuwan, S. (2001). *A study of individual and managerial effectiveness: A case of employees of the Thai life assurance association*, Bangkok University International College, Bangkok University, Bangkok 10110, Thailand.
- Meyer, C.A. (1992). *What's the difference between authentic and performance assessment?* Educational Leadership, 49, 39-4.
- Nordhaug, O. (1993) *Human capital in organizations: Competence, training, and learning*, New York: Oxford University.
- Papert, S. (1970). *Teaching children thinking* CAI memo no.247 and Logo mem No.2, Cambridge, MA: MIT Artificial Intelligence Laboratory.
- Ministry of education (1997). *The experience from the basic and occupational education and training programme*. Bangkok, Thailand: Ministry of education.
- Stiggins, R.J. (1989). *The design and development of Performance Assessments*. Educational Measurement: Issues and Practice, 6, 33-42.
- Wongboonsin, K., Guest, P. & Prachuabmoh V. (2003). *Demographic change and demographic divided in Thailand. International conference on the demographic. Window and healthy Aging: Socioeconomic challenges and opportunity*, Beijing, China.
- Yulaelawati, E. (2003). *National education reform in Indonesia: Milestones and Strategies for Reform* Press.

