Development and Validation of Standard Competencies in Architectural Drafting Technology Program

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ABSTRACT This descriptive study was conducted to develop and validate the proposed standard competencies for Architectural Drafting Technology Program of the Bachelor in Industrial Technology Curriculum of the Western Visayas College of Science and Technology. It sought to ascertain the degree of importance of each underpinning knowledge, skills, and attitude, and to determine if significant differences exist between the degrees of importance for each domain as evaluated by the academe and industry sectors. The data gathered from purposively selected 40 respondents from the academe and 20 from the industry based in the Iloilo Province were interpreted and analyzed using the Statistical Package for Social Science (SPSS). The results revealed that both sectors agreed to all the items but differed in their evaluation. The overall rating obtained had a verbal interpretation of "very highly necessary" which means that the proposed standard competencies are valid and acceptable. In addition, a significant difference in the degree of importance existed in favor of the academe. The researcher recommended for the implementation of the standard competencies in other state universities and colleges in Western Visayas.

Keywords: Architectural drafting technology, development, standard competencies, validation

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Introduction

"Education is not preparation for life;
education is life itself."

- John Dewey

Education never stops in a certain period. Learning is a continuous process for people to survive the challenges of life. Life is a race, and in order to win, one must learn to embrace change.

Major changes occurring nowadays in the society are brought about by technological developments affecting the educational system and the practices in the industry. The academe sector, like state universities and colleges (SUCs) which previously used the Competency-Based Education (CBE) and are now into Outcomes-Based Education (OBE), is also affected by these changes. The CBE approach allows student to advance based on their ability to master a skill or competency at their own pace regardless of the environment. This method is tailored to meet different learning abilities that can lead to more efficient student outcomes (Outcomes-based education, 2011). On the other hand, OBE, as defined by the Commission on Higher Education (CHED), is "an approach that focuses and organizes the educational system around what is essential for all learners to know, value, and be able to do to achieve a desired level of competence. OBE is "open to incorporating discipline-based learning areas that currently structure higher education institutions' (HEIs) curricula."

In the CHED Handbook on Typology (2012), program outcomes are the sets of competencies (related knowledge, skills, and attitudes) that all learners are expected to demonstrate. Institutional or program outcomes may also emphasize lifelong learning. For instance, HEIs could describe the attributes of their ideal graduates which they expect to see five years after graduation.

Ideally, the academe should provide the necessary and appropriate competencies needed by the students to work in the industry. These competencies should be congruent to the demands in the industry to assure that university graduates will fit in the workplace. Thus, curricula and programs offered by SUCs should be revised by developing or enhancing the competencies.

The Bachelor in Industrial Technology (BIT) curriculum of the College of Industrial Technology (CIT) of the Western Visayas College of Science and Technology (WVCST) is a flagship curriculum of the CIT. It offers various technology courses such as the Architectural Drafting Technology. The program allows students to develop their skills in making manually-prepared and computer-aided house plans, as well as in visual arts (Revised Curriculum Structure, 2012). The Program further prepares students for entrance to and advancement in the middle-level technical position in the industry between tradesmen in the workshops and the engineers or technologists (MECS Order No. 32, s. 1982). It is expected that the graduates of the academe will become middle-level technician who can work with minimal supervision because of their sufficient skills in management acquired from the professional subjects offered, such as Principles of Management, Human Resource Management, and Industrial Plant and Property Management, to mention a few. On the other hand, knowledge and technical skills must be addressed to meet the industry's demands, like the use of sophisticated rendering programs and house planning using computer-aided drafting, printing shirts using advanced technology like heat press, sublimation process, and color separation process.

In order to meet these goals of the Program, competencies must be revised through the development of standard competencies targeting the three domains of learning: knowledge (cognitive), skills (psychomotor), and

attitude (affective). In addition, acquiring better facilities, tools, and equipment should also be given attention by the Administration because they are vital factors to learning and development of an individual. If these domains do not match what the industry is doing, the students will most likely find it hard fitting in their acquired competencies.

For decades, the WVCST has been the top producer of quality graduates in the field of science and technology, specifically its CIT offering progams like Architectural Drafting Technology. This Program is considered as the feeders of the industry, locally and in abroad. With the advent of technology, like the use of AutoCAD in making house plans and drawings of similar structure, one must take a crash course in AutoCAD and other related subjects, incurring additional financial burden on his/her part before becoming competent in digital operation.

In the attempt to discuss the reasons for the existing scenario on how to match the needs of the industry with the practice in the academe, this study was conceptualized to provide an empirical basis. It primarily focused on the development and validation of standard competencies for Architectural Drafting Technology Program to determine the importance and necessity of the competency in the academe and industry.

Literature Review

Curriculum and Curricular Gaps

Curriculum is dynamic in nature. Changes, developments, and revisions are always implemented in the academe in order to meet the demands of the industry.

The Architectural Drafting Technology curriculum is one of the programs offered by SUCs in the Philippines under the Bachelor of Science in Industrial Technology

(BSIT), Bachelor of Industrial Technology (BIT), Two-Year Technical Education, and other ladderized programs. It operates under the pertinent provisions of the Republic Act (RA) No. 7722, otherwise known as the "Higher Education Act of 1994", and for the purpose of articulating the industrial technology program for global competitiveness and for the policies, standards, and guidelines for Ladderized Bachelor in Industrial Technology (BIT). Another basis of the curriculum is the Republic Act No. 7796, an Act creating the Technical Education and Skills Development Authority (TESDA), providing for its powers, structure, and for other purposes. This Act is known as the "Technical Education and Skills Development Act of 1994" or "TESDA Act of 1994." This Act should provide relevant, accessible, high quality, and efficient technical education and skills development to support the development of high quality Filipino middle-level manpower responsive to and in accordance with the Philippine development goals and priorities.

Also, Executive Order (E.O.) 358 issued by former President Gloria Macapagal Arroyo on September 15, 2004 seeks to institutionalize a Ladderized Education Career Program. TESDA and CHED are mandated to develop and implement a unified qualifications framework that establishes equivalency pathways and access ramps that allows easier transition and progression between technical-vocational education and training (TVET) and higher education (Cortez, 2006).

For the purpose of developing and validating the programs of Industrial Technology for global competitiveness, CIT adopted the rules for implementation of Republic Act (RA) No. 8272, otherwise known as the "Higher Education Modernization Act of 1997."

The policies and standards for BIT Curriculum approved by the Philippine Association of State Universities

and Colleges (PASUC) and Philippine Association of Colleges and Universities in Industrial Technology (PACUIT) served as a guide in restructuring the curriculum into a ladderized program.

Academe Expectation and Industry Needs

The Academe expects the graduates of the BIT Program to become technologists who are: (1) Technicians/ Skilled workers who can perform tasks independently without supervision and show mastery of the performance standards required of the Technician Competency Skill Test (TCST); (2) Industry supervisors and managers who can perform management functions in industrial organizations and can contribute to the Total Quality Management (TQM) of industrial organizations; and (3) Industrial consultants and technologists who can conduct research for feasibility studies to solve problems in industry and can perform higher skills required by industries. The goal of the University is to produce quality graduates. Specifically, the industrial technology programs were designed to prepare technical and/or technical management-oriented professionals for the work environment.

Technology Curriculum and Competencies

Competency can be broadly defined as the ability of a student/worker to accomplish tasks adequately, to find solutions, and to realize them in work situations. This definition fits the need for describing competencies and assessing them. It consists components that are trainable (knowledge, skills) and components that are more difficult to alter (attitudes, believes). In addition, competencies refer to a profession in an organizational context. While competency-based training is a traditional educational system, the unit of progression is time, and it is teacher-centered. In a CBT system, the unit of progression is mastery of specific

knowledge and skills and is learner-or participant-centered. Two key terms used in competency-based training are: **Skill**—A task or group of tasks performed to a specific level of competency or proficiency which often use motor functions and typically require the manipulation of instruments and equipment. Some skills, however, such as counseling, are knowledge- and attitude-based; and **Competency**—A skill performed to a specific standard under specific conditions. There appears to be a substantial support for competency-based training. Norton (1987) believes that competency-based training should be used as opposed to the "medieval concept of time-based learning." Foyster (1990) argued that using the traditional "school" model for training is inefficient. After in-depth examinations of three competency-based programs, Watson (1990) concluded that competency-based instruction has tremendous potential for training in industry. Moreover, in a 1990 study of basic skills education programs in business and industry, Delker found that successful training programs were competency-based.

This study is anchored on the Constructivist Theory by Bruner (1996), which states that learning is an active process in which learners construct new ideas or concepts based on their current/past knowledge. Meaning, instruction must be concerned with the experiences and contexts that make the student willing and able to learn (readiness); instruction must be structured so that it can be easily grasped by the student (spiral organization); and instruction should be designed to facilitate exploration and/or in the gaps (going beyond the information given). In this study, the theory was applied to the identification and development of the standard competencies needed by the drafting students in order for them to be ready, organized, and able to explore in terms of knowledge, skills, and attitude once they graduate in the program. The study focused on the standard competencies that would ensure drafting students' employability; necessary

values to improve students' work attitude; the matching and congruence of the strategies, methodology, and practices between academe and industry sectors. Furthermore, the theory guided the researcher in developing and validating the standard competencies necessary for the learning of the students taking Drafting Technology.

In order to ensure quality education, theory and practice are a must, but there is a need to regularly improve the program by internalizing the mission and vision of the College so that excellence will be achieved. This can be done by keeping abreast with the demands of the industry which are constantly made by science and technology. It is within this context that this study was conducted in order to find out the degree of importance of the proposed standard competencies in Architectural Drafting Technology Program.

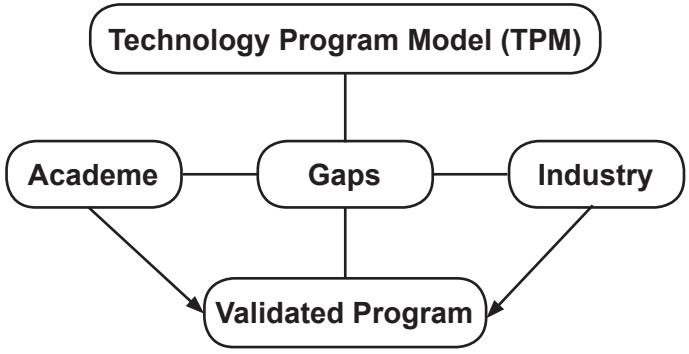

Figure 1. Framework of the study.

The framework shown in Figure 1 clearly depicts the variables involved in the development of the standard competencies in Architectural Drafting Technology. The academe will develop standard competencies, and the industry will evaluate whether the competencies fit their needs. Through this process, the gaps between the academe and the industry will be identified and addressed. The result will be the validated competencies of the Program, ready to

be used for the Bachelor in Industrial Technology major in Architectural Drafting Technology Program.

Goals and Objectives

The existence of the CIT as the mother unit of the Drawing and Drafting Technology Department which offers BIT major in Architectural Drafting Technology supports the Strategic Plan of the College to respond to the challenges and demands of the industry. One of the College's goals is to enrich and expand curricular offerings. This can be attained through the following objectives:

1. Revise curricular offerings in accordance to the needs of emerging industries; and
2. Offer new industrial technology courses/ programs.

Purpose of the Research

This is study aimed to develop and validate the Standard Competencies for the Architectural Drafting Technology Program.

Specifically, the study aimed to:

1. Develop the standard competencies in architectural drafting technology;
2. Validate the standard competencies in terms of the degree of importance of each underpinning knowledge, skills, and attitudes of the program by the academe and industry sectors;
3. Determine the significant difference in the degree of importance of each underpinning knowledge, skills, and attitude of the proposed standard competencies as evaluated by the academe and industry sectors; and
4. Provide revised standard competencies in architectural drafting technology based on

the results of the evaluation and identified differences.

Methodology

Research Design

This study used the descriptive survey method which is suitable for studies which aim to describe the nature of a situation as it exists at the time of the study and explore the causes of particular phenomena. Hualde (2007, 4) stressed that this kind of research describes prevalent situations both qualitatively and those not directly experienced by the investigator.

Participants of the Study

Through purposive sampling, 60 respondents from Western Visayas were identified: 40 from the academe sector composed of instructors/professors of Architectural Drafting Technology from SUCs; and 20 from the industry sector.

The Instrument

The data gathering instrument used is a checklist designed by the researcher. It was used for the validation of the standard competencies in Architectural Drafting Technology Program. Part 1 of the checklist is on the profile of the respondents, and Part 2 is on the competencies of the different subjects offered in the said program, from first to fourth year. The instrument also contains open-ended questions which seek to gain additional information on the program in order to further enhance the competencies.

Data Collection

Pre-Development Phase

This study employed the collaboration and participatory methods in developing and validating the proposed standard competencies.The development of the instrument started with the review of the existing curricular structure offered by the said program. Legal issues were taken into consideration like MECS Order No. 38, s. 1982, "Minimum Standards for Diploma in Industrial and Engineering Technician, Bachelor of Industrial Technology and Teachers Training Curricula for Trade Technician Institute."Also, policies and standards for BIT Curriculum approved by PASUC and PACUIT which served as a guide in the restructuring of the curriculum into a ladderized program were looked into. In addition, the Education Qualification Framework for teaching Industrial Technology Program, TVET Programs, and TESDA Competency-Based Curriculum/ Training Regulations for Technical Drafting NC II were used. In making the standard competencies more appealing, competencies of the 2005 Construction Technologies of Maine University of the USA Drafting Technology Program of Redwoods was utilized. Then, the list of the standard competencies was identified based on the required learning outcome for the entire duration of education and training for Architectural Drafting Technology Program from first year to fourth year. The identification of the competencies was based on Bloom's Taxonomy of Learning Domains (Anderson, 2001) in order to promote higher forms of thinking in education, such as analyzing and evaluating concepts, processes, procedures, and principles, rather than just remembering facts (rote learning). It is most often used when designing educational, training, and learning processes in the cognitive (knowledge), psychomotor (skills), and affective (attitude) domains. Each subject was

then categorized into three domains: the underpinning knowledge, skills, and attitude. Each domain is composed of at least 10 items which were arranged in chronological order according to simple and complex principles and methods of teaching.

Development Phase

In the present study, the construct validity operationally determined the appropriate underpinning knowledge, skills, and attitude for a particular major subject with a certain level. Since the standard competencies were identified to be sufficient on the subjects, then they were categorized according to year level; thus, the first year subjects were categorized as level 1, the second year subjects as level 2, the third year subjects as level 3, and fourth year subjects as level 4. Every item on the proposed standard competencies was classified and aligned to each subject title and course description bearing in mind the proposed qualification framework developed for leveling of qualification on equivalency of training under the College. The next step on validation was expert validation. The content of the proposed standard competencies were subjected to criticism and suggestions in the institutional level. The draft lists of the identified standard competencies were subjected to evaluation by the curriculum experts who formulated and identified the list of specific competencies for a specific subject and course description. The final draft of the proposed standard competencies for each subject area and level was then subjected to another expert validation to validate the face and content of the instrument. Five (5) experts were requested to evaluate the items as to the appropriateness of the instrument to the study. The validation process resulted in 100 percent agreement, with some items revised and modified as suggested by the jurors due to ambiguity and redundancy. After the validation, the reliability test was then processed

to ensure that the validated competencies could pass the test for reliability. Using the SPSS, the reliability of the items was tested using the Cronbach's **α** Alpha Test. Based on the results, all of the items listed for all subject areas and levels passed the alpha level having the following results: In level 1, specifically all first year subjects, knowledge (α =.9101); skills (α=.8847); attitude (α=.9202). In level 2, knowledge (α=.9043); skills (α=.8225); and attitude (α=.8495). In level 3, knowledge (α=.9818); skills (α= .9864); attitude (α=.9902). In level 4, knowledge (α=.9554); skills (α=.9040); attitude (α=.9587). The Cronbach test is commonly used as a measure of the internal consistency or reliability of a psychometric test score for a sample of examinees. This article assigns the use of α to psychology, yet the Cronbach's alpha statistic is widely used in other disciplines, e.g. social sciences, business studies and nursing (Cronbach's alpha, 2010). The first draft of the instrument underwent discussion and deliberation by the committee and faculty of the Drawing and Drafting Technology. The discussion and deliberation resulted in further review and enhancement of the content of the competency. The consolidated feedbacks were used as inputs in coming up with the semi-final draft. The proposed competencies were then presented to the College of Industrial Technology and the Faculty of the Drawing and Drafting Technology for approval, and additional inputs were given. Inputs generated were used to come up with the developed but not yet validated proposed competencies.

Post-Development Phase

The respondents from the academe were five instructors/professors from Carlos Hilado Memorial State College, five instructors/professors from Aklan State University, seven instructors/professors from Capiz State University, two instructors/professors from University of Antique, six from West Visayas State University, two from

Don Jose Sustiguer Memorial National State College, four from Southern Iloilo Polytechnic College, two from Purificacion Dolar Memorial College, and seven from Western Visayas College of Science and Technology-Main Campus. At the time of the study, these instructors/professors were actively teaching drafting technology subjects. From the industry sector, there were 20 entrepreneurs, administrators, department heads, supervisors, and draftsmen from the City and the Province of Iloilo and Negros Occidental. After establishing the validity and reliability of the research instrument, permission to conduct the study was secured from each office of the SUCs, and owners or managers of each industry.The researcher personally distributed and administered the instrument to the identified respondents. In some cases, a representative of each sector was tapped to facilitate the distribution and administration of the questionnaires. The researcher distributed the 60 sets of instruments and had difficulty in retrieving the data because the respondents were busy attending to their jobs and businesses. Validating the instruments would mean extra time; reading a 26-paged instrument with more than 750 items would be another burden for them. Not all of the instruments were retrieved, so 20 sets of instruments were additionally distributed to the respondents. Because of the persistence of the researcher in reminding them, the filled out instruments were retrieved in summer time. The respondents were given ample time to accomplish the instruments. All the 60 sets of instrument were successfully retrieved from the academe and industry sectors by delivery services, by facilitators of each sector, and by personal retrieval. The gathered data were then tallied, processed, and interpreted.

Results and Discussion

Developed Architectural Drafting Technology Program

Architectural Drafting Technology Program

The Architectural Drafting Technology Program or Architectural Drafting or Drafting, also called mechanical drawing, is the process of representing topography, engineering works, buildings, and pieces of machinery by means of conventionalized drawings called mechanical or engineering drawings. The techniques of drafting are an important part of all types of engineering and manufacturing and are also used in such diverse fields as architecture and geology (Encarta, 2009).

The fundamental purpose of a mechanical drawing is to convey the exact shape and dimensions of an object. An ordinary perspective drawing gives no information about hidden details of the object and is not drawn to scale. The technique of conventional drafting is to use two or more projections to represent solid objects. These projections are views or plans of the object and are not complete in them, but when taken together they represent every dimension and detail of the object.

Today, computers manipulate most drafting work. Mechanical drawings done on a computer are easier to manipulate than those done on paper. Also, computers make the design and production processes more efficient. For example, if the specifications of a small part of a larger machine are changed on a computer, the computer can calculate how the change affects the rest of the machine even before the machine is actually built.

Drafting Technology offers students the opportunity to learn skills required by today's high tech engineering, architecture, and manufacturing industries.

It prepares students to meet the design and drafting needs of engineering, architectural, and manufacturing firms(College of Redwood, 2009).

Table 1 presents the list of competencies and subjects offered in the Architectural Drafting Technology Program.

Table 1. Lists of Competencies and Subjects

Competencies	Subjects
(1) Identify general safety in accordance with government regulations and health standard; (2) Identify practices that contribute to a healthy environment; (3) Utilize universal signs and symbols that apply to given workplace situation; (4) Practice safety in the workplace; (5) Practice proper waste disposal; and (6) Practice First AID.	DT 1 Occupational Safety and Health Practices
(1) Define terms, symbols and notationsmaster those activities; (2) Introduce different kinds of drawing instruments; (3) Demonstrate the manual operation of the different tools and instruments; (4) Use the different drawing tools and instrument in making projects; (5) Practice making projects using those tools and instruments; (6) Create masterpiece using various media; and (7) Apply SAFETY in the workplace.	DT 2 Graphics 1
(1) Introduce the fundamentals and techniques of freehand drawing using drawing media; (2) Familiarized the elements and principles of Art (3) Explain the techniques of freehand drawing using drawing media like Pencil, Charcoal, Pastel, Pen and Ink; (4) Demonstrate the techniques of freehand drawing using drawing media like Pencil, Charcoal, Pastel, Pen and Ink; (5) Perform and practice using imagination, with a model, using diff. Drawing Media; (6) Create masterpiece using drawing media; and (7) Apply SAFETY in the workplace.	DT 3 Visual Techniques 1
(1) Introduce the history of architecture; (2) Familiarize the elements and principles of architecture; (3) Explain the parts of the house and areas. (4) Design a house (5) Perform and practice (using imagination, with a model, using diff. Drawing Media); (6) Create dream house using drawing media; and (7) Apply SAFETY in the workplace.	DT 4 Architectural Design 1
(1) Familiarize perspective drawing Properly care for drafting equipment, materials and drawings; (2) Prepare perspective drawings in one, two and three vanishing point; (3) Draw perspective of one storey house; (4) Respect time and property of other by having his/her own tools and instruments; (5) Create masterpiece using various media; and (6) Apply SAFETY in the workplace.	DT5 Graphics 2
(1) Expand/further develop manually prepared architectural designs through series of outdoor sketching rendering; (2) Further enhance basic skills in rendering using various media such as, pen and ink, colored pencil, water color and acrylic paints; (3) Learn how to use various drawing materials such as, water color paper, boards, canvass, tracing papers and other drawing related materials. Summarize necessary information to produce quality visual compositions; (4) Produce masterpieces of human figure, other models and action figures; and (5) Respect time property of other by having his/her own tools and instruments.	DT 6 Visual Techniques 2

(1) Identify and appropriately use architectural symbols used in a set of working drawings; (2) Demonstrate efficient techniques for layout and development of a drawing; (3) Identify the types of elevations and sections used in architectural drawings; (4) Use proper architectural dimensioning and labeling techniques; and (5) Make a scaled model house as per plan.	DT 7 Architectural Design 2
(1) Identify structural aspects of house planning; (2) Classify different types of column foundation and recommended soil foundation; (3) Draw the different types and of columns and beams; (4) Draw truss, roof framing and other details fastening and construction; and (5) Show self-reliance when working independently in structural planning.	DT 8 Structural Drafting and Building Technology
(1) Make an architectural design of a one-storey residence compose of a floor plan, elevations, sections, and schedule of doors and windows; and (2) Providing complete dimensions and notes following the standard set-up and templates.	DT 9 Introduction to CADD
(1) Introduce the principles of elementary surveying in relation to Architectural Drafting; (2) Discuss the trigonometric formulas in relation to surveying; (3) Explain the theory of probability and most probable value; (4) Familiarize procedures and equipment in tape and offset surveying; (5) Apply formula in problem solving on linear measurement; (6) Perform differential leveling; (7) Introduce the Engineers transit and theodolite; and (8) Perform computation of areas enclosed by straight lines	DT 10 Elementary Surveying and Plotting
(1) Identify different shapes of figures; (2) Compute Area and volume of plane figures; (3) Solve the required number of building materials as per plan; (4) Familiarize with principle in writing specification; and (5) Prepare program of works.	DT 11 Cost Analysis and Estimates
(1) Define elements of perspective; (2) Explain principles of interior design; (3) Draw architectural Entourage; and (4) Draw an interior Perspective.	DT 12 Architectural Rendering Techniques
(1) Identify different activities involved in the commercial arts; (2) Master those activities; (3) Master the step-by-step processes of each activity; (4) Create projects of each activity with quality and mastery and (5) Apply SAFETY in the workplace.	DT13 Graphic Arts
(1) Make an architectural design of a two-storey residence with a 3D model rendered base in the floor plan, elevations, sections, and schedule of doors and windows; and (2) Providing complete dimensions and notes following the standard set-up and templates.	DT 14 Advanced CADD
(1) Familiarize with the theory of forces and stress as applied to structure; (2) Apply the concepts and knowledge acquired in structural design in actual working drawings; (3) Explain the problems met in designing structural aspect of the house; (4) Identify design loads regulated by National Building Code. Interpret the analysis and design of the structure; and (5) Produce complete structural design of working drawing.	DT 15 Advanced Structural Design
(1) Familiarize the latest trends in building construction; (2) Identify construction tools and equipment; (3) Make program of works in accordance to building requirements; (4) Organize important documents needed for building construction and operation; (5) Exhibits logical system and operations in making program of works; and (6) Analyze critical works and make change order, extra work and price escalation.	DT 16 Construction and Operation Technology

(1) Design a commercial building based on the required standards; (2) Produce a complete set of plans for commercial building composed of architectural plans, structural plans, electrical plans and sanitary plans; and (3) Providing complete dimensions and technical notes following the standard set-up and templates.	DT 17 CADD Project
(1) Internalize the basic fundamental principles and theories of electrical and plumbing; (2) Explain Philippine Electrical Code (PEC) and Sanitary and plumbing code; (3) Exhibits logical analysis of Electrical lay out; (4) Identify the different tools, materials and equipment of electrical and plumbing; (5) Analyze the specification of electrical and plumbing; and (6) Draw complete set of electrical and plumbing plan.	DT 18 Architectural Utilities (Electrical and Plumbing)
(1) Identify different methods and techniques in making prototypes. Identify solutions in making developments; (2) Master the processes and methods; (3) Create package container of a product; (4) Create filler and paper tray; and (5) Apply SAFETY in the workplace.	DT 19 Architectural Surface Development and Prototypes
(1) Describe the fundamental principles governing the design, purpose and application of the different types of non-conventional systems of construction and the advantages of using such systems; (2) Identify the principles of public safety through building laws and codes; (3) Prepare specifications and contract documents, building standards, laws and regulation; (4) Applies the essentials of specification writing in identifying, recommending and using the appropriate type of materials for a situation and condition; and (5) Enhance knowledge in actual setting of industry.	DT 21 Philippine Building Laws and Specifications
(1) Exhibits awareness in the content of the Philippines Bidding articles. Identify different articles applied in building; (2) Show courtesy when asking documents from offices; (3) Demonstrate practices that contribute to the excellence and quality output; (4) Exhibit critical thinking in bidding procedures; (5) Demonstrate practices that contribute to the excellence and quality output; and (6) Exhibit critical thinking in bidding procedures.	DT 22 Philippine Bidding Laws
(1) Identify different methods and techniques in making prototypes; (2) Identify solutions in making developments; (3) Master the processes and methods; (4) Create package container of a product; (5) Create filler and paper tray; and (6) Apply SAFETY in the workplace.	DT 23 Industrial Designing
It requires students to report and perform assigned tasks for the whole semester in an identified industry.	DT 24 Supervised Industrial Training 1
It requires students to attend and perform jobs that could further hone their knowledge, skills, and attitude towards work for the whole semester in an identified industry.	DT 25 Supervised Industrial Training 2

Table 1 shows the list of competencies of each subject offered in the Architectural Drafting Technology Program. These competencies are required in each subject in order for the student to acquire the necessary knowledge, skills, and attitude to graduate in the said program. In DT 1, the competencies focus on the safety practice involved in the

workplace. DT 2 introduces the different drawing instruments, their functions, and how to take good care of them. DT 3 introduces the techniques of using different drawing medium while DT 4 discusses the history of architecture related to house planning. DT 5 teaches the students to make pictorial drawings using isometric, oblique, and perspective. DT 6 provides a venue for the students to develop their freehand sketching skills by making outdoor drawings. DT 7 identifies the architectural symbols and process of house planning. DT 8 provides structural details of columns, walls, and footings. DT 9 conveys manual design of one-storey into AutoCAD works. DT 10 discusses fundamentals things about surveying and plotting. DT 11 is on solving areas, volumes, and estimates of materials and labor cost of the structure. DT 12 translates the elements of perspective, entourage, interior and exterior perspective as applied in house planning. DT 13 involves making of commercial arts, such as t-shirt printing, signage, cards and other art works. DT 14 is about making architectural design using 3D rendering in AutoCAD. DT 15 involves structural designing and knowledge in loads and stress of the structural members as prescribed by the National Building Code of the Philippines. DT 16 emphasizes the latest trend in building construction, construction tool and mechanisms, and make program of works in accordance with building requirements. DT 17 is about preparations of the complete set of plans needed prior to construction as required by the building officials done in AutoCAD. DT 18 explains electrical and specifications specified in the Electrical Code of the Philippines and plumbing plans, diagrams stipulated in the plumbing code. DT 19 introduces students to making surface developments and prototypes in making a product such as packaging and scale models. DT 21 familiarizes the students to the Philippine Building Laws and Specifications. DT 22 identifies different documents needed for bidding and other requirements specified in the Philippine Bidding Laws.

DT 23 is about designing and creating products that can be sold in the market. Lastly, DT 24 and 25 give opportunity to students to work in the industry for a year to experience actual work in the real workplace. It should be mentioned that, originally, 25 subjects were offered by the Program, but because of changes in the curriculum, DT 24 was deleted and incorporated in other subjects to give students ample time to comply with their requirements.

Academe and Industry Evaluation

Table 2 presents the summary of evaluation of the standard competencies for each subject offered under the Bachelor in Industrial Technology Major in Architectural Drafting Technology Program as evaluated by the academe and industry sectors.

Table 2. Summary of evaluation of the standard competencies for each subject under the Bachelor in Industrial Technology major in Architectural Drafting Technology Program

No.	Subject Code	Subject Title	Academe		Industry		Overall	
			Mean	Description	Mean	Description	Mean	Description
1	DT 1	Occupational Safety and Health Practices	4.27	VHN	3.98	VN	4.17	VN
2	DT 2	Graphics 1	4.53	VHN	4.11	VN	4.39	VHN
3	DT 3	Visual Techniques 1	4.36	VHN	3.96	VN	4.23	VHN
4	DT 4	Architectural Design 1	4.40	VHN	4.20	VN	4.33	VHN
5	DT 5	Graphics 2	4.39	VHN	3.98	VN	4.25	VHN
6	DT 6	Visual Techniques 2	4.20	VN	3.88	VN	4.09	VN
7	DT 7	Architectural Design 2	4.49	VHN	4.09	VN	4.35	VHN
8	DT 8	Structural Drafting and Building Technology	4.48	VHN	4.20	VN	4.39	VHN
9	DT 9	Introduction to CADD	4.54	VHN	4.29	VHN	4.46	VHN
10	DT 10	Elementary Surveying and Plot	4.23	VHN	3.97	VN	4.14	VN
11	DT 11	Cost Analysis and Estimates	4.50	VHN	4.05	VN	4.35	VHN
12	DT 12	Architectural Rendering Techniques	4.28	VHN	3.92	VN	4.16	VN
13	DT 13	Graphic Arts	4.08	VN	3.94	VN	4.03	VN
14	DT 14	Advanced CADD	4.47	VHN	4.01	VN	4.31	VHN
15	DT 15	Fundamentals of Structural Design	4.44	VHN	4.00	VN	4.29	VHN
16	DT 16	Construction and Operation Technology	4.39	VHN	4.00	VN	4.25	VHN

17	DT 17	CADD Project	4.33	VHN	4.00	VN	4.19	VN
18	DT 18	Architectural Utilities (Electrical and Plumbing)	4.42	VHN	4.00	VN	4.21	VHN
19	DT 19	Surface Development and Prototypes	4.30	VHN	4.00	VN	4.05	VN
21	DT 21	Philippine Building Laws and Specifications	4.40	VHN	4.00	VN	4.28	VHN
22	DT 22	Philippine Bidding Laws	4.25	VHN	3.84	VN	4.11	VN
23	DT 23	Industrial Designing	4.27	VHN	3.91	VN	4.15	VN
24	OJT 2	Supervised Industrial Training 1	4.45	VHN	3.89	VN	4.27	VHN
25	OJT 3	Supervised Industrial Training 2	4.52	VHN	4.02	VN	4.35	VHN
		OVERALL MEAN	4.38	VHN	4.01	VN	4.24	VHN

Legend: VN – Very Necessary; VHN – Very Highly Necessary

As shown in Table 2, the following are the subjects which were rated by the academe and industry sectors as "very highly necessary": Graphics 1 with an overall mean of 4.39, Visual Techniques 1 with an overall mean of 4.23, Architectural Design 1 with an overall mean of 4.33, and Graphics 2 with an overall mean of 4.25. These were followed by Architectural Design 2 with an overall mean of 4.35, Structural Drafting and Building Technology with an overall mean of 4.39, Introduction to CADD with an overall mean of 4.46, Cost Analysis and Estimates with an overall mean of 4.35, Advanced CADD with an overall mean of 4.31, Advanced Structural Design with an overall mean of 4.29, and Construction and Operation Technology with an overall mean of 4.25. Then Architectural Utilities (Electrical and Plumbing) with an overall mean of 4.21, Philippine Building Laws and Specifications with an overall mean of 4.28, Supervised Industrial Training 2 with an overall mean of 4.27, and lastly, Supervised Industrial Training 3 followed.

For the subjects rated by the academe and industry sector as "very necessary", they are the following: Occupational Safety and Health Practices with an overall mean of 41.7, Visual Techniques 2 with an overall mean of 4.09, Elementary Surveying and Plotting with an overall mean of 4.14, Architectural Rendering with an overall

mean of 4.16, Graphic Arts with an overall mean of 4.03, CADD project with an overall mean of 4.19, and Surface Development and Prototypes with an overall mean of 4.05. These were followed by Philippine Bidding Laws with an overall mean of 4.11,and lastly, Industrial Designing with an overall mean of 4.15. These show that subjects rated by the academe as "very necessary" were new to them.

Introduction to CADD subject as considered by the academe and industry sectors as a "very highly necessary" subject among the other subjects, with an overall mean of 4.46. The academe sector gave a higher mean compared to the industry sector. Additionally, Graphic Arts subject was evaluated only as "highly necessary" by both sectors, with the overall mean of 4.03, with the academe giving a higher mean. Furthermore, the overall mean of the 25 subjects, as rated by both sectors, was 4.24, interpreted as "very highly necessary."

As Elambre (1994) pointed out, the level of OJT performance of the technician education student was very satisfactory. He stressed further that the technician curriculum was more relevant to the emerging needs of the industries and that most teachers were continuously visiting industries in the service area of the college through a teacher-industry attachment program.

In the study of Haro (2006), using new methods in estimates of materials and labor involved in house planning gave the respondents an overall perception that his developed program on estimates using web would enrich their skills in estimates as one of the major activities in house planning. Acquiring new skill coming from new learning materials would make their work easier and faster.

The findings of this study conform to that of the study of Calambro (1993) which found out that Drafting

Technology provides students adequate training with more exposure to actual jobs, enhancing students' skills in making outputs as those done in the industry.

This study also supports Diergos' (2005) study in which knowledge in the operation of AutoCAD (greater extent of utilization of basic and advance CADD commands and options, organizing information with layers, and developing plans, elevations, and details are done) gave the students greater avenues of opportunities to engage in more complex activities on building construction.

Also, this study is in agreement with Valenciana (2007) who stated that contents, competencies, values, and strategies stipulated in every subject should be offered or implemented in order to ensure quality training among the architectural drafting students.

Table 3 presents the summary of items when grouped by categories of the proposed standard competencies of the Architectural Drafting Technology Program as evaluated by the two sectors.

Table 3. Summary of items when grouped by categories.

Competency	Combined Mean	Desc.	Sector	Mean	Desc.	Mean Diff.	P-value
Knowledge	4.22	VHN	Academe	4.34	VHN	0.37	*0.00
			Industry	3.97	VN		
Skills	4.24	VHN	Academe	4.38	VHN	0.43	*0.00
			Industry	3.95	VN		
Attitude	4.27	VHN	Academe	4.41	VHN	0.41	*0.00
			Industry	4.00	VN		

**significant @ .05*

Among the three domains of learning, attitude obtained the highest combined mean of 4.27, followed by skills with the combined mean of 4.24, and knowledge with combined mean of 4.22. They were "very highly necessary"

(VHN) as evaluated by both sectors. In the mean difference, skills got the highest difference of .43, followed by the attitude of .41, and knowledge of .37. The academe sector found the three competencies significantly VHN, while the industry evaluated them "very necessary" (VN). The t-test revealed that a significant difference exists between the ratings given by the academe and the industry sectors (p=<.05). This means that the proposed standard competencies can be used in the instruction inside the shop rooms because they address the gaps between the practice in the academe and in the industry. The use of AutoCAD software as part of the competencies is a must as what the industry recommended in their evaluation. They also suggested that attitude is very vital in the learning of the students. Further, they added that proper working attitude is a key in hiring technicians, aside from skills and knowledge that they acquired in the Architectural Drafting Technology Program. Digital and manual method of making house plans and similar structure must be balanced and must inculcate the value of manual labor because if technology fails, they can still work.

Manalang (1997) stressed that vocation/technical education is a shared responsibility of educational institutions and the industry. Robles (1998) also espoused that desirable work habits and attitude should be developed in order to fare well in the industry.

In Patricio's (1981) study, teachers' opinion regarding the appropriateness of the instrument yielded an agreement ration of exiting percents and above for every item, indicating the suitability of the instrument to the abilities, age, socio-economic, and curriculum backgrounds of the students. The researcher stressed that the instrument should be administered to a bigger number of students in Western Visayas so that norms can be set up.

Conclusions and Recommendations

The degree of importance of the proposed standard competencies for the Bachelor of Industrial Technology Major in Architectural Drafting Technology as to knowledge, skills, and attitude was very highly necessary as rated by the academe and industrial sectors. The two sectors, however, differed in their ratings of the subjects, in favor of the academe. All items stipulated in the proposed competencies from knowledge, skills, and attitudes were important. This simply means that the revisions of each item should be done to meet the demands of the industry because the curriculum is dynamic in nature, specifically in the use of equipment found in the industry. The facilities acquired by the institution are far compared to the ones used in the industry. With these findings, acquiring the needed facilities and equipment must be a priority in the Annual Procurement Plan (APP) of the School.

Recently, the curriculum underwent revisions, from competency-based into outcomes-based. It must be geared towards the realization of competencies needed by the industry, and the time allotted for every topic in each subject should be based on the approved course outline/course syllabus or course guide. Further enhancements and revisions of the competencies must be done. As stated in the CHED Handbook on Typology, competencies must be outcomes-based rather than competency-based.

The revised competencies should be used in teaching the subjects offered under the Bachelor in Industrial Technology Major in Architectural Drafting Technology Program of state universities and colleges. Furthermore, the development of the modules and workbooks in the Architectural Drafting Technology Program is encouraged.

In addition, instructors/professors of Drafting must undergo training and seminars to update their knowledge and upgrade their skills, especially in the AutoCAD, for efficiency and effectiveness of the teaching-learning process in the Architectural Drafting Technology Program. In addition, they must also develop a more positive attitude towards teaching the subjects and their significance to the industry and career of the students. Students should be given opportunities to acquire competencies based on industry standards applicable to local, national, and international workplace. Moreover, students should be encouraged to have their own drafting tools and instruments in order to perform well in the subjects. They should also be encouraged to participate in co-curricular and extra-curricular activities of the College to develop their personality, social values, and upgrade their morale. Lastly, the School Administration should support the Architectural Drafting Technology Program by providing enough facilities to include license and genuine computer hardware and software. Moreover, the School should allocate budget for the procurement of plotter used in printing working drawings in the drafting technology so that students and instructors/ professor will be acquainted with the latest trends in building designs and technology.

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