Academe-Industry Partnership: Basis for Enhanced Learning Guide in the New Science General Education Course

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Abstract - *This study explores the academe-industry partnership of Cebu Technological University Bachelor of Science in Hospitality Management and Bachelor of Science in Industrial Technology major in Food Preparation and Services courses, SY 2014-2015 to improve the quality of course offering. It takes on the feedback received from supervisors of 50 different hotels and restaurants of Cebu province, as well as the self-rating of 185 OJTs of the two courses as regard to OJTs' level of functional and science-based core competencies. This descriptive research utilizes Likert-type research-made survey questionnaire which was previously tested for validity and reliability. The findings revealed that industry supervisors evaluated the trainees as Competent in core competencies (Bartending, Bread and pastry products, Cookery, Customer services, Front office services, food and beverages) as well as functional skills (Problem solving, Leadership, Communication, Independent work, Creativity, Negotiation, Teamwork, Time management and Initiative). However, they found the students need of strengthening their problem solving and communication skills. The researchers therefore developed an enhanced learning guide for the New Science GE course to address the gaps based on the industry feedback.*

Keywords: *Science, Functional, Core Competencies, Academe-Industry Partnership, Descriptive research, State university, Cebu, Philippines*

INTRODUCTION

Globalization greatly challenges the Philippine educational system to align with the current demands for global competencies. Essentially, the functional competencies which are demonstrated across disciplines have been the concerns of most industry executives. As studied by Gropello di [3] the functional competencies such as problem solving; leadership; communication; independent work; creativity; negotiation; teamwork; time management; andInitiative were ascertained in this study. The need for highly skilled workers has become an international struggle that has been recognized as the role of science and technology manpower in the economic development [1]. For the past years,studies on job-skills mismatch revealed the apparent existence of the gap between the skills possessed by the graduates and the skills demanded by the global market [2]-[5].

The Philippine Department of Labor and Employment [6] also made known its exerted initiative in addressing the skills-mismatch through the effort of Project Jobs fit: THE DOLE 2020 Vision. In 2013, DOLE identified two major challenges that the Philippine labor market is facing in the next ten years (2013-2014): (1) the persistence of high unemployment rate and (2) the lingering problem of job-and-skill mismatch. It also has articulated critical concerns to develop the human resources in: (1) analytical and communication proficiencies of the students and their corresponding IT skills; and (2) the honing of the managerial skills of college graduates.

Gropello di [3] through the Human Development Department East Asia and Pacific Region published the Philippine Skills report which identified the "functional" or "generic skills that Philippine workers need to be equipped with to be employable and support the firms' competitiveness and productivity. Moreover, skills are broadly clustered into three main categories: (1) Academic skills: associated with

subject areas (Math, Literacy, English) andgenerally measured through standardized scores; (2) Generic skills: broader set of skills transferable across jobs generallyincluding thinking (critical and creative thinking, problem solving), behavioral(typically communication, organization, teamwork, and leadership skills) and computingskills.(3) Job-specific (or technical) skills associated with one's profession, which are generally a mix of specific knowledge and skills to perform jobs.

Moreover, along with the actual survey conducted to managers and directors, right personnel for production, administrative and sales staff, the most important key core skills based on rank are identified as problem solving, leadership, communication, independent work, creativity, negotiation, team work, literacy, time management, initiative, Math, writing, language, and computer skills which are manifested across occupations[3]. Furthermore, the same study revealed that problem solving is the most notable skill that needs to be contained within the curriculum of Food and Natural Resources at the University of Missouri, Columbia [7].

However, missing in the literature are the studies on how academic institutions addressed this job-skills mismatch. This prompts the researchers to conduct a study to address this gap of knowledge and competencies and broaden the literature on strategies to bridge the gap between industry skills requirements and curricular offerings of higher educational institutions.[The OJT program of the institution enhances the acquisition of learning skills and knowledge of the students which are beneficial for future employment which contributes to the full participation in country's economic mobility. Furthermore, this study is designed to help students improve academic competence and develop employability skills specifically to science related course offerings of the institution.

This study is anchored on the philosophy of Outcome-Based Education. "OBE proposes for higher levels of achievement from restructuring the system around desirable students' outcomes which highlights the knowledge on how it is applied in real life setting rather than concentrating simply on abstract bits of information" [8]. On the other hand, the Philippine Commission on Higher Education (CHED) on its mandate that "CHED is committed to develop competency-based learning standards that comply with existing international standards (i.e. Outcome-based education) to achieve quality and enable an effective integration of the intellectual discipline, ethos and values associated with liberal education [9]. This means that characterizing educational outcomes, it must be in the nature of actions and specific performances that express the context of knowledge, idea, and information. [The learning guide heightens and substantiates the course design intended to enhance the students' competencies specifically on problem solving as apparently indicated from the research results. Enframing learning activities that reflect the real world of science and technology in society in interwoven along with the active participation of students in the classroom meaningfully enrich students' competencies. Furthermore, the learning guide incorporates the fundamentals, characteristics, historical outlook, current issues of science, technology and society and how the advances of science and technology affect human society including political, economic, ethical, social and cultural.

This study specifically focuses on the assessment of On-the-Job Trainees' level of competencies for both functional and core competencies as assessed by industry supervisors and OJTs themselves. The assessments conducted limits to OJTs enrolled in science related courses from a State University. The competencies possessed by the respondents may also differ from other OJTs in other State Universities which is beyond the scope of this study.

OBJECTIVES OF THE STUDY

This study ascertains the Cebu Technological University-Main Campus (CTU-MC) OJT's level of competencies as assessed in the academe and in the industry as well as the underlying implication to science education. Specifically, this study determines the following: (1) OJT's level of competencies as rated by the supervisors and by the students themselves in the following functional competencies: as to :problem solving; leadership; communication; independent work; creativity; negotiation; teamwork; time management; Initiative; (2) OJT's level of core competencies along with : bartending bread and pastry products; cookery; customer services; front office services; and food and beverages.

METHODS

The study utilized the descriptive research design using researcher-made Likert-type survey

questionnaire which was tested for validity and reliability in the course of pilot testing in Cebu Technological University-Danao Campus (CTU-Danao). The content validity of the research instrument was established by a panel of experts from selected panel committee members and industry supervisors during the pilot testing. A Cronbach's statistic technique utilizing the Statistical Package for Social Science (SPSS) software was used to test for reliability. A Cronbach alpha of 0.98 was found from the pilot test signifying that the research instrument was reliable with high degree of internal consistency.

The research respondents of this study were the OJTs for SY 2014-2015 of the two science related course offerings of CTU- Main such as the Bachelor of Science in Hospitality Management (BSHM) and Bachelor of Science in Industrial Technology Major in Food Preparations and Services (BSIT). Likewise, the corresponding immediate supervisors of the On-the-Job Trainees (OJT) in the hotels or resorts where they were deployed served also as the respondents. Table 1 shows the summary of the respondents included in the study.

Table 1. Sampling Data

Respondents		Total Population	Target Sample Size	No. of Respondents	Retrieval Rate
OJTs	BSMH	180	100	89	89.00 %
	BSIT	39	35	32	91.43 %
Supervisors		62	50	48	90.00 %
Total		**281**	**185**	**169**	**91.35 %**

This study observes the ethical considerations that were needed for the conduct of this research through keeping confidentiality and anonymity of the details of the respondents, and seeking consent from the concerned administrators and personnel. The study went through the following steps: First, the researcher made a request letter for the conduct of study addressed to the Cebu Technological University President for approval. Then the pilot testing of the researcher-made questionnaire which was administered in Cebu Technological University - Danao Campus to determine its reliability and validity, and feedback for fine-tuning before administering for the proper study. Then, selection of the OJT respondents was determined from the official list of enrolled Bachelor of Science in Hospitality Management OJTs released by the Office of Student Assistance Office (SAO). Seventy (70) OJTs from 90 OJTs officially enrolled in Cebu Technological University (CTU)-Danao Campus were requested to rate the research-made questionnaire. Likewise, 15 questionnaires were handed personally to the 15 identified immediate supervisors out from 23 hotel companies.

With the good results of the pilot testing, she then finalized the instrument of the research. The gathering of research data were conducted in the Cebu Technological University (CTU)-Main Campus from the responses of Bachelor of Science in Hospitality Management and Bachelor of Science in Industrial Technology major in Food Preparations and Preparations OJTs. One hundred twenty-one (121) OJT respondents were given the questionnaires out of total population of 219. Likewise, 48 identified company OJT's immediate supervisor were given with the questionnaires for the competency rating. After all the data were gathered, these were analyzed and interpreted using Statistical Package for Social Sciences (SPSS) software and Microsoft Excel Statistical Pack.

Based on the result of this study the educational initiative in the form of enhanced learning guide for science, technology and society was formulated intended for the improvement of BSHM and BSIT-Food Preparation and Services students' competencies using the Outcome-Based Education (OBE) from the CMO 46 framework.

RESULTS AND DISCUSSION

On-the-Job Trainees' (OJT'S) Level of Functional Skills

OJT's functional skills include: problem solving, leadership, communication, independent work, creativity, negotiation, teamwork, time management, and initiative. The Table 2 shows the summary of OJTs functional competencies as rated by OJT themselves and by supervisors. It includes the average mean per competency, standard deviation values, and the overall mean with the corresponding level of competency.

The Table reveals the ratings made by supervisors for OJT's level of competency for the nine functional skills are lower compared to OJT's self-rating. This implies that the OJT's actual range of knowledge and competencies developed as perceived by the supervisors are not as high as those of the OJT's perceptions of themselves.

Table 2. Summary of OJTs' Functional Competencies

Functional Competencies	Student-Trainees Mean	Student-Trainees Level of Competency	Student-Trainees SD	Supervisor Mean	Supervisor Level of Competency	Supervisor SD
Problem Solving	4.13	Highly Competent	0.73	3.37	Competent	0.68
Leadership	4.25	Very Highly Competent	0.66	3.49	Highly Competent	0.85
Communication	4.22	Very Highly Competent	0.65	3.46	Highly Competent	0.75
Independent Work	4.30	Very Highly Competent	0.65	3.78	Highly Competent	0.76
Creativity	4.30	Very Highly Competent	0.68	3.45	Highly Competent	0.76
Negotiating	4.18	Highly Competent	0.69	3.49	Highly Competent	0.71
Teamwork	4.36	Very Highly Competent	0.63	3.86	Highly Competent	0.77
Time Management	4.25	Very Highly Competent	0.64	3.62	Highly Competent	0.77
Initiative	4.35	Very Highly Competent	0.59	3.75	Highly Competent	0.74
Overall	**4.26**	**Very Highly Competent**		**3.58**	**Highly Competent**	

This result agrees with the study conducted by Donina [10] to tourism and hospitality management graduates' employability skills as rated by both employers and graduates themselves in which employer's rating is lower than graduate's self-rating. This trend according to the study might be explained by the graduates' insufficient work experience which did not enable them thoroughly evaluate their skill level. It could also be traced to an individual's unconscious biases of himself/herself.

On the competencies with at least Highly Competent rating, the Table depicts the following skills, namely initiative, independent work, leadership, time management, communication, and negotiating. These ratings can be attributed to the fact made by supervisor's remarks on OJT's strong points which are most often mentioned in the instruments that OJTs are willing to help and cooperate, able to get along with others, can work with less supervision, motivated and self-driven workers. These observations do not affirm with the claims made by Handel [2], Gropello di[3] OECD [4], and ILO [5] that graduates most often do not possess the needed skills required by present labor market.

As to the least functional competency level, problem solving shows the least mean value from both OJTs' and supervisors' rating. This could be possibly due to lack of proper approach on how to solve problems in the workplace. In addition, problem solving skills was the only functional skills appeared as weak points as assessed by the supervisor.

Comparably, in the study of Robinson revealed that problem solving skill is seen as the most needed skill among the graduates of Foods in University of Missouri, Columbia [7]. It can be construed that OJTs probably were not subjected to problem solving proper exposure in their studies. According to Dehaan, problem solving skill can be enriched through explicit creativity instruction in science classes[11]. Hence, the OJTs were probably not exposed to a good and creative instruction experience in their science classes.

On-the-Job Trainees' Level of Core Competencies (TESDA NC II)

OJTs' core competencies include: bartending, bread and pastry products, cookery, customer service, front office service, food and beverages. However, the basic and common competencies are integrated and interwoven among the core competencies. Moreover, taking into account the interconnection of the core competencies to science education, three of the unit competencies across all basic and common competencies are considered as part of the implications of the core competency levels of OJTs. These are the following; practicing occupational and safety procedures, observing workplace hygiene procedures, and performing workplace and safety practices [12].

Table 3 summarizes the OJTs' level of core competencies as rated by both respondents. It also includes the average mean values, standard deviations and corresponding level of competency.

On the other hand, the core competency with lowest mean value is bartending as rated by both respondents. This can be attributed to the lack of exposures of OJT in such area. According to selected supervisors asked, most often supervisor assigned regular employees to the said area. Moreover, supervisor's observation that OJT's knowledge and skills in wine mixing need more enhancements might as well validate the lower rating made by supervisor.

Table 3.Summary of OJTs' Core Competencies

Core Competencies	OJT			Supervisor		
	Mean	SD	Level of Competency	Mean	SD	Level of Competency
Bartending	3.68	1.00	Highly Competent	3.10	0.82	Competent
Bread and Pastry Products	3.95	0.86	Highly Competent	3.39	0.88	Competent
Cookery	4.27	0.76	Very Highly Competent	3.49	0.93	Highly Competent
Customer Services	4.17	0.85	Highly Competent	3.50	0.84	Highly Competent
Front Office Services	3.72	1.09	Highly Competent	3.22	1.03	Competent
Food and Beverages	4.48	0.71	Very Highly Competent	3.78	0.79	Highly Competent
Overall	**4.05**		**Highly Competent**	**3.41**		**Highly Competent**

However, the result shows that the overall rating of supervisor on OJTs' core competencies is Highly Competent which reveals contrary to the report of ILO that the competencies required for the new jobs are not possessed by the graduates [5].

This study finds that the descriptive levels of OJTs' functional competencies as assessed by supervisors are lower compared to OJT's self-ratings. The lower ratings are probably due to the need of more retention of knowledge and skills from educational training [13]. Among the functional competencies rated, problem solving skill has the least rating with a Competent level, which might be due to OJT's less tendency on handling work challenges and problems systematically as pointed out by supervisors. Moreover, the lack of students' engagement in difficult process of transforming abstract established knowledge content into content for making action in science courses might as well substantiate the OJT's motivation on more retention of problem solving skills. In addition, the study also reveals some of the supervisor's specific observations the necessary to lead exemplary level of knowledge in manipulating tools and equipment in workplace especially in food sanitation and cleaning operation for leadership skills. Furthermore, the supervisors highlighted also the OJT's articulation in expressing themselves creatively in a variety of ways.

On the other hand, the general rating for OJT's core competencies is Highly Competent as rated by both respondents. However, with regards to bartending, bread and pastry products, and front office services, the OJT's level of competencies are only Competent as rated by supervisors and Highly Competent as rated by OJT themselves. This Competent rating might possibly due to OJT's need for improvement in wine making, bread baking, and familiarization on finance records as to which OJTs got the lowest mean for the indicator on conducting night audit as these were revealed in the research instruments as OJT's weak points.

Instructional Initiatives for STS Course Offering

The changing realities spurred by globalization underscore the shift in contemporary international education discourse to lifelong learning, and from education as transmission of expert knowledge to education as building learner competencies-including learning to learn [9]. This CHED memorandum order mandates on using the Outcome-Based Education for Higher Education Institutions. Thus, it is from the this context that this instructional initiative through a learning guide for Science, Technology, and Society (STS) offered as General Education for the BSHM and BSIT-Food Preparation and Services programs in Cebu Technological University- Main Campus (CTU-MC) is constructed using the principle of OBE.

The course outcomes of this STS course design are anchored based on University's VMGO, Institutional outcomes, program outcomes which are translated and reflected course outcomes. The course description and topic outline stem from the directive of CMO No. 20 series of 2013. The course topic outline includes a review of the history of science and technology globally which is grounded on an understanding of the basic science concepts that examine the science and technology developments throughout human society: politically, economically, socially including culturally [15]. Apart from these, the course also focuses on current issues to choose from namely: Food Security, the Environment and Natural Resource Management, Biotechnology including Genetic Engineering, Medical Ethics, Health Policy, Neurobiology, Revolution of ICT, Intellectual Property Rights over Patents and Discoveries from Bioprospecting, Weapons of Mass Destruction, and Impact Assessment of Technology, which arise from the applications of science and

technology and how such applications relate to ethical and political decision in both the public and private sectors and their effects on society and life in general[14].

Furthermore, the study guide will be used by both science professors and students of BSHM and BSIT-Food Preparation and Services in their STS classes. It heightens and substantiates the course design intended to enhance the students' competencies specifically on problem solving as apparently indicated from the research results.

Classroom learning activities play a significant effect in students' development of competencies. Both theories of Constructivism and Learning by Doing of Jean Piaget and John Dewey believe that "students are active learners who construct knowledge for themselves" [15]. Thus, choosing learning activities in the classroom that utilize active participation of students enrich students' competencies. In using the study guide, each chapter is presented in the following manner; chapter title, overview of the chapter, learning outcomes, guide questions, concept map, reading resources, learning activities which signify the result of the study on functional skills that the students need to further enhance, and the assessments relating to the outcomes of the specific topics.

CONCLUSION AND RECOMMENDATIONS

The claimed job-skills mismatch as the authors cited in the literature was not in the level of competency of OJTs. Based on the findings of the study where OJTs were found to be weak in problem solving skills, the researchers have developed an enhanced Science Learning initiative.

There may be more possibilities of future research from this dissertation. If this research were to be spread out to longitudinal study, the following are recommended: Based on this study's approach, a correlational study between faculty and student's assessment on their functional competencies would also be conducted to strengthen the evaluation of students' skills and knowledge. Given that the result of this study provides the basis for the functional skills as determinants of the core competencies in science related courses, approaches that will be used in the science classroom would be outcomes based learning. While the globalization consistently demands for global competent graduates, it would be necessary for the educational institution to provide a syllabus of internship to their partner industries that informs the employer about the aims, tasks and expected learning outcomes of the OJTs. The approach used in this study would also be significant to other courses offering in a higher education institution for a thorough assessment of students' functional competencies assessment for an effective learning intervention.

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