

Enhanced Civil Engineering Curriculum Towards Employability

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Abstract

This study covers the effectiveness towards employability of the enhanced civil engineering curriculum implemented in 2005 at Samar State University. The low employment of the civil engineering graduates was revealed in the graduate tracer study on (1998-2003). The curriculum content focused more on the basic subjects and less time in professional civil engineering courses and industry immersion (on the job training). Hence, the civil engineering curriculum was revised and enhanced with more emphasis on professional courses and industry immersion of 972 hours. It used a descriptive research design where questionnaire was the major instrument with graduates of 2009-2012 and their employers as respondents. The results of the study revealed that 89.23% of the graduates were employed in civil engineering related works in less than two years after graduation. In terms of civil engineering competency and skills, the graduates have a satisfactory level in professional courses while poor in communication and scientific skills. The enhanced civil engineering curriculum is effective towards employability. However, communication courses must be added in the next revision of the curriculum.

Keywords: civil engineering, curriculum development, employability, enhancement civil engineering curriculum

I. INTRODUCTION

The knowledge has driven economy and globalization and results to a rapid change in the world's workforce both in the local and international marketplace. It is the concern of companies of individuals with strong knowledge, skills and competencies in order to meet the demands of the world's fast moving economy. The graduates who possess these qualifications can easily get a job after graduation.

The academic institutions have a major role to play in the development of knowledge, skills, and competencies

among young students. They have to come up a curriculum that will match the need of the industry in the local and international level. Pellegrino (2006) reported that there is a need to change the educational processes of teaching, learning, and assessment in universities in order to produce graduates with strong capabilities and competencies.

The Civil Engineering (CE) curricular program of the College of Engineering of Samar State University was established in 1983 with its first batch of graduates in 1988. It has been awarded as Center

of Development (COD) Level II by the Commission on Higher Education (CHED) in 1999-2003. In 2004, a graduate tracer study was conducted for the civil engineering graduates of 1999-2003. It found out that the graduates had low employment rate after two years from graduation and possessed low level of professional civil engineering skills, specifically on structural analysis, planning and designing.

The results of the graduate tracer study in 2004 served as the basis for the evaluation of the existing curriculum for 1998-2003. It found out that the curriculum contained very low industry immersion and not design directed project based courses (Gomba&Babalcon, 2004). Moreover, the course in the civil engineering curriculum were outdated and based only on the minimum requirements provided in the CHED standards (CHED, 2004). Hence, the civil engineering curriculum was revised, and enhanced focusing more on longer industry immersion, and the professional civil engineering courses were design directed based projects.

In this context, this paper was conceptualized to assess the effectiveness of the enhanced civil engineering curriculum towards employability with

four (4) batches of graduates (2009-2012) as respondents. The result of the study served as the basis on the revision and implementation of the 2014 revised civil engineering curriculum.

The study aimed to assess the effectiveness of the enhanced civil engineering curriculum towards employability of the graduates of 2009-2012. Specifically, it determined the employment period of the graduates right after graduation and after the passing of the licensure examination; and evaluated the civil engineering competencies and skills of the graduates.

CONCEPTUAL FRAMEWORK

Figure 1 shows the conceptual framework for the curriculum development. The enhanced civil engineering curriculum of the College of Engineering, Samar State University implemented in 2005 was developed based on the Lernfelder (Fischer, 2007) or learning arenas concept utilized in Germany for vocational education. In this concept, the learning situations have to be related to work activities in a particular area of expertise (occupation). It is also supplemented by the design-directed curriculum (Xiong and Xiaohua, 2007)

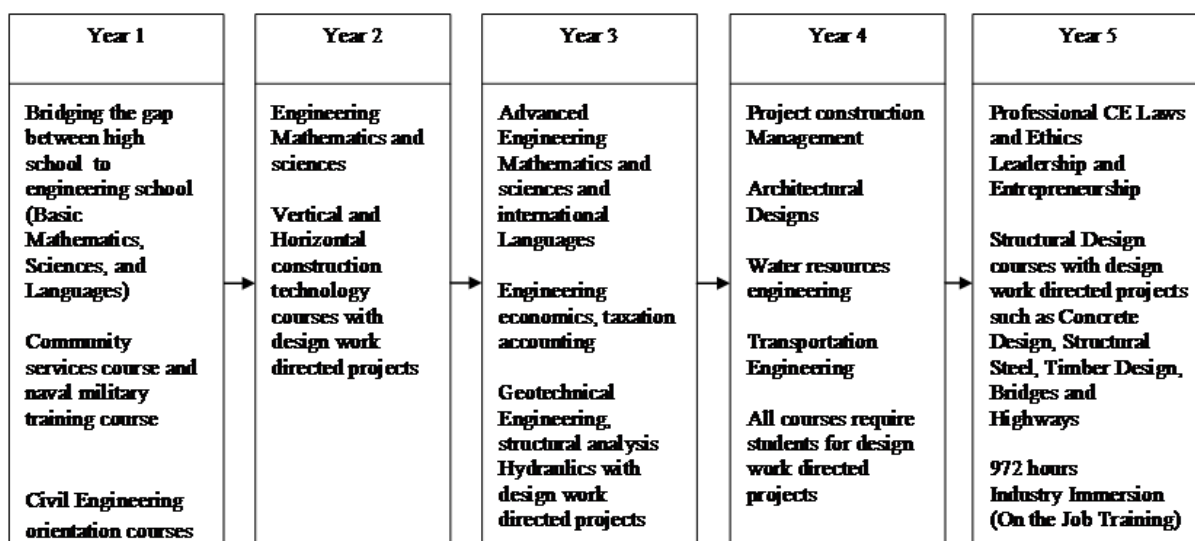


Figure 1. Framework of the Enhanced Civil Engineering Curriculum Development

wherein the curriculum utilized design projects, a tool that is integrated with the courses. The entire curriculum development was also guided by the CHED civil engineering curriculum standards and the minimum requirements of the Philippine Professional Regulation Commission-Board of Civil Engineers (PRC BCE) (PRC, 2004).

It utilized Lernfelderor learning arenas concept on the analysis of the curriculum content and forms of work.

Activity and competence was used as an empirical bases for curriculum development. The faculty of the College of Engineering, alumni, external assessors, representative from the industry, and students determined the transformation gaps between the empirical analysis of work and the standards/normative curriculum development.

The design directed curriculum concept served as a basis in bringing students in a design environment through a project-based task. It means that professional civil engineering courses require students to come realistic projects. In this aspect, students learned engineering, science, technology, and non-engineering knowledge areas. They were allowed to work as a design/project team geared towards communication, project management, leadership and other skills(MegaMohd et.al, 2004).

The CHED and PRC BCE standards served as bases in the assignment of course and teaching credit units including learning areas. The major areas of work (occupation) for civil engineering are: structural engineering; construction engineering and management; geotechnical and geo-environmental engineering; water resources engineering; and transportation engineering.

The enhanced civil engineering

curriculum implemented in 2005 aimed towards employability of the graduates. Specifically, it was developed to produce graduates with sufficient knowledge in different areas in civil engineering and possessed the needed skills for work in the industry at international level.

Participants of Curriculum Development

The stakeholders participated in the enhanced civil engineering curriculum development. The stakeholders were five alumni representatives; three from the industry; two from the Department of Public Works and Highway Samar District Office; and three key officials of Samar State University.

Measurement of Success for Curriculum Development

The success indicators were determined for the enhanced civil engineering curriculum development along three objectives towards employability, namely: work in the industry; competencies and skills; and employment in multi-national companies in the international marketplace. The measurement indicators are shown in Table 1.

II. METHODOLOGY

This evaluation of the curriculum was through a descriptive research design wherein all civil engineering graduates of 2009-2012 were considered as respondents including their current employers. Table 2 shows the number of respondents(graduates and their employers). The study utilized a questionnaire with the support of documentary analysis from the respondents. The questionnaire contained the profile of the respondents; first employment; nature of the first employment 3-6 months after passing the board examination; employer's feedback

Table 1.
Objectives and Indicators

Objectives	Success indicator
Civil engineering graduates work in the industry	60% of the graduates who are board passers will find jobs in civil engineering based industry. These are construction, academe, consultancy, developers, sales three to six (3-6) months after passing of the licensure examination 50% of the graduates who are not board passers still find jobs in civil engineering based industry.
Competencies and skills needed by the industry	Level of skills based on the feedback of the employers and alumni. Skills include communication, leadership and interpersonal, technical skills(Computer skills for planning, design, and analysis)
Civil engineering graduates work in advanced design and innovation in multinational companies at international level	50% of the graduates will find jobs at international level two years after graduation. The skills and professional competencies of the graduates are strong and at par with the international standards. However, the work measured should be advanced design, planning, and project management and research works.

Table 2.
Number of graduates and employers as respondents

Year	Number of Graduates	Licensed CE	Number of Respondents	
			Graduates	Employer
2009	20	12	20	10
2010	17	11	17	9
2011	12	11	12	8
2012	16	14	16	6
Total			65	33

relative to the level of competency and skills of the respondents using number scale of 1-5 wherein 5 is excellent and 1 is poor. The analytical framework used in the assessment was mean and percentages.

III. RESULTS AND DISCUSSION

The result of the study focused towards employability of the graduates after graduation and after passing the civil engineering licensure examination. The competencies and skills of the graduates were evaluated by their current employer.

A. Employment Profile

Table 3 presents the employment profile of the graduate-respondents

after graduation and passing the civil engineering licensure examination.

The civil engineering graduates of batch 2009-2012 were all employed after graduation at about 61.54% in civil engineering related work and 38.46% in non-civil engineering work area. None of the graduates was working while taking the licensure examination. About 57.78% of the graduates were employed in civil engineering area in less than 3 months after passing the licensure examinations.

It implied that there is a high employment rate of graduates in this enhanced civil engineering curriculum implemented in 2005.

The employment of the graduates was in various government and private organizations. About 10.76% of the graduates were employed in international construction firms/industries and 24.61% were in national companies. About 89.23% of the graduates were employed in civil engineering works and only 10.76%, were employed in non-civil engineering works. The civil engineering graduates of the enhanced civil engineering curriculum implemented in 2005 were accepted in international, national and local

Table 3.
Employment of the Graduates

Period to obtain the first job	Area of employment			
	CE		Non –CE	
	f	%	f	%
1. After Graduation				
Less than six months	5	7.69	9	13.85
One year after	12	18.46	5	27.08
Less than 2-years	13	20	10	15.38
More than two years	10	15.38	-	
Total	40	61.54	25	38.46
2. After Passing the Licensure Examination				
Working				
Less than three months	26	57.78	3	6.67
Within 3-6 months	10	22.22	-	
More than six months	6	13.33	-	
Total	42	93.33	3	6.66

Table 4
Type and Location of Employer of the Graduates

Description of Employer		Number of Employed/Nature of work			
		CE works		Non–CE work	
Type	Location	f	%	f	%
Government agencies (DPWH, NIA, DENR)	National	8	12.31		
	Local	9	13.84	3	4.62
Construction Firms/Industry	International	7	10.76		
	National	16	24.61	2	3.08
	Local	11	16.92	2	3.08
Consultancy Firms/ Industry	International	2	3.08		
	National				
	Local				
Academe	Private	3	4.62		
	SUCs				
Other organizations/ agencies	International	2	3.08		
	National				
	Local				
Total		58	89.23	7	10.76

employment organizations.

B. Competencies and Skills

The competencies and skills of the civil engineering were defined from the civil engineers professional practice of the Philippines (PICE, 2001). The communication is a major skill of civil

engineers, which means the ability of the graduate to communicate oral and in written form. Leadership and group dynamics are another skill. Computer technology skills which means the ability to use computer to engineering application of the civil engineer. The professional civil engineering skills are the ability of the graduate to design and plan in different

Table 5
Competencies and Skills Rating of the Graduates

Competencies and Skills Level	% Respondents by Level					Mean (AR)*	
	5	4	3	2	1		
1. Communication skills			45	30	24	2.21	NI
2. Leadership and group dynamics		24	61	15		3.09	S
3. Computer Technology skills (AutoCAD drafting and drawing, Engineering applications)	21	70	9			4.12	VS
4. Professional civil engineering							
Structural engineering design	6	21	39	36		2.9)	S
Geotechnical engineering	6	9	39	9	39	2.81	S
Water resources engineering	18	37	24	21		3.51	VS
Project planning and Management	6	15	61	24		3.21	S
Transportation engineering	21	21	33	24		3.39	S
5. Scientific and innovations							
Engineering R&D	6	21	9	36	24	2.39	NI
Knowledge generations (Product development)	3	20	12	31	30	2.32	NI

fields such as structural, geotechnical, water and water resources, project planning and management, transportation engineering, computer based designing, planning, and analysis.

The graduates of the enhanced civil engineering curriculum were rated "very satisfactory" by their employers on computer technology applications. Along professional civil engineering, the graduates were rated "satisfactory" except in water resources engineering, wherein the employers rated "very satisfactory".

Along communication skills and engineering research and development (R&D), the graduates were rated "needs improvement" by the employers. It implied that the civil engineering graduates need more courses along communication and research skills.

Table 5 shows the competencies and skills of the graduates of the enhanced civil engineering curriculum.

IV. CONCLUSIONS AND RECOMMENDATIONS

The enhanced civil engineering curriculum of College of Engineering of Samar State University was effective towards employability of graduates. The competencies and skills required of a civil engineering graduate were met satisfactorily except on communication skills.

For future curriculum revisions, it is recommended to add more courses on communication skills development of the civil engineering students. It is further recommended that courses on research and scientific innovation must be included in the curriculum in order to develop the skills of the students on knowledge-based resources generation which is the major requirements in most companies and industries abroad.

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