

Chapter 2

Competency-Based Assessment of the Diploma in Phlebotomy Graduates: An Initial Evaluation

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Abstract Outcomes-based education (OBE) has been recently implemented in the Philippine educational system which is aimed toward directing the focus of education into a more learner-centered approach through a set of competencies that a student must achieve by the end of the teaching–learning process. This allows better assessment of graduates and facilitates the process leading to better outcomes. This paper is designed to determine the level of achievement of the competencies of the diploma in Phlebotomy graduates as perceived by the graduates’ themselves and as perceived by their training officers. From the initial evaluation made, the competencies expected from the graduates in terms of theoretical knowledge and technical skills (WM = 4.00), interpersonal skills (WM = 4.19), critical thinking and problem-solving skills (WM = 3.88), and the demonstration of professional and ethical behavior (WM = 4.09) were all achieved in general. Therefore, the curriculum program is said to be effective. On the other hand, the results of the responses of the graduates’ self-assessment and the assessment made by training officers were found to be significantly different when computed statistically. Further studies should be conducted to help improve the assessment process of the curriculum program.

Keywords Phlebotomy · Outcomes-based education · Competency-based assessment

2.1 Introduction

Over the years, the Philippine educational system has adapted a variety of teaching and learning methodologies to equip graduates with the right amount of knowledge, skills, and attitudes to allow them to become productive members of the society. Recently, the country made a huge step in its educational system by adapting

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outcomes-based education (OBE), which is aimed toward directing the focus of the teaching–learning process into a more learner-centered approach (Inocian & Inocian, 2016). This output- and outcomes-driven approach has been proven to facilitate the learning process and to empower students for creating a sustainable future (De Guzman, 2016). Furthermore, this approach emphasizes that the center of the learning process is the learner itself and introduces strategic educational planning that is aimed at achieving results (Hejazi, 2011) and not simply a matter of replacing “objectives” with “outcomes” (Norman, 2006).

In the year 2013, the College of Allied Medical Professions (CAMP) at Lyceum of the Philippines University (LPU)—Batangas implemented a new curriculum program wherein the students who enrolled in the Medical Laboratory Science program should undergo a two (2)-year diploma in Phlebotomy program which is a preparatory program for the said Medical Laboratory Science program. However, a student may opt to exit the program after the initial two (2) years and obtain a diploma which they can present to their prospective future employers in securing and applying for their jobs. LPU—Batangas is the only university in the whole Philippines offering this framework of ladderized program of the Medical Laboratory Science curriculum. This program is a product of a benchmarking activity conducted wherein it has been recommended that a competency-based Medical Technology (Medical Laboratory Science) using the ladder concept may be formalized in such a way that the first two years would lead to an associate degree equivalent, hence, diploma in Phlebotomy (Valdez, 2012). A list of expected outcomes based from the curriculum map should be achieved by the graduates as they finish the two (2)-year program. Furthermore, in each phase of the curriculum, these educational outcomes should be used as the framework for assessment (Harden, Crosby, & Davis, 1999). The level of achievement of these expected outcomes as perceived by the graduates and their previous training officers should be established to determine whether the current instructional design for teaching Phlebotomy is sufficient to achieve the expected outcomes of the program.

This pilot study aims to initially establish the effectiveness of the outcomes-based instructional design utilized in the Diploma in Phlebotomy program by assessing the level of achievement of the listed competencies in the curriculum map that are expected from the graduates of Diploma in Phlebotomy based from their perception or self-assessment and from the assessment of their previous training officers. Likewise, the study aims to determine the differences in the perceptions of the graduates and training officers on the level of achievement of the expected competencies to determine if there is a gap between the school instruction and the needs of the industry. Studies show that in dentistry, the different evaluations including self-assessment and external assessment which could be done through professors’ assessment may help students to improve their understanding of certain principles and improve the teaching effectiveness of education (Kirov, Kazakova, & Kirilova, 2014).

2.2 Literature Review

2.2.1 *Outcomes-Based Education*

Outcomes-based education (OBE) involves a complex combination of restructuring the curriculum, assessment, and reporting practices to emphasize the achievement of high-order learning and mastery. Thus, it is aimed at facilitating desired changes in the students, through the increase in knowledge, skill development, and/or positively influencing attitudes, values and judgment within the context (Mamat, 2014).

Aside from three of the most important determinants of quality education namely—effectiveness, efficiency, and sustainability, it is also important that the relevance of education is taken into consideration. This means that not only the needs of the students are addressed in the education process, but also the needs of the employers and in the industry, for that matter, should also be addressed. This will also provide the future graduates an educational experience that can be paralleled with the rest of the world (Commission on Higher Education, 2012). However, the full implementation of the said OBE curriculum remains to be a challenge since it offers fresh pedagogical approaches and therefore will also require shifting to output-oriented teaching and learning environment (Limon, 2016). As compared to conventional teaching methods, OBE provides higher grades in terms of academic performance especially when applied to sciences (Akir, Eng, & Malie, 2012) and English (Anh & Thanh, 2014).

In outcomes-based education, it is important that the competencies or performance indicators are well defined. This insures that the assessment made to students is coherent and consistent based on real-life criteria, providing opportunities to demonstrate proficiency in a specific competency and outcomes level, and therefore improving the quality of assessment (Boateng, Bass, Blaszak, & Farrar, 2009). Therefore, teachers applying OBE in their daily teaching should be well prepared which will allow them to provide students with appropriate and purposeful learning experiences so that they can maximize the fruits of learning (Killen, 2000).

2.2.2 *Phlebotomy*

Phlebotomy is considered as the art of drawing blood, and for many centuries, it is still considered one of the most common invasive procedures in the healthcare setting (Lavery & Ingram, 2005). However, the practice varies considerably between and among healthcare workers and may also vary among countries (Shahangian et al., 2005). These differences may include variations in blood sampling techniques, training, safety protocols and procedures, disposal system, and the availability of ample protection to healthcare workers. However, despite these differences, the phlebotomy practices must all be geared toward providing

quality care to patients by performing proper collection techniques which has an overall effect of the quality of sample being produced for laboratory testing. Therefore, it is imperative that blood collectors (phlebotomists) are well versed of the fundamentals of phlebotomy to avoid leading to inaccurate test results, leading to misdiagnosis and mistreatment of the patient (Nayal et al., 2011). Furthermore, if not performed correctly, errors resulting from phlebotomy may cause serious harm to patients be it death or a major disability. Establishing and implementing quality-control mechanisms in the process which are composed of materials and methods to promote better outcomes (Grable & Gill, 2005).

As stipulated in the writing made by Graham Ford, the fundamental principle in medical practice was greatly based on the fact that there are four body fluids or humors which are blood, phlegm, yellow bile, and black bile. It was believed that an excess of these substances results to a disease so therefore, procedures such as purging, starving, vomiting, and bloodletting (phlebotomy) are the reasonable and logical form of treatment to reverse the disease process. Even before the time of Hippocrates in 460 B.C, the art of bloodletting was already a practice. Furthermore, there were people who already specialized in this art and were known as barber surgeons during the middle ages. During the eighteenth and nineteenth centuries, the art of bloodletting became a very common practice but was declared quackery by the end of nineteenth century after an incident involving George Washington, the first US President, who died after letting nine pints of blood within 24 h (The Phlebotomy Pioneer, 2012).

According to the manual of Montgomery County Community College (2015), a phlebotomist is a member of the healthcare delivery team whose primary responsibility is collecting blood specimens from patients. These specimens are used for clinical laboratory analysis and thereby provide physicians with vital information used in making diagnoses, following progress, and treating patients. Phlebotomists are in great demand for employment in hospitals, physicians' offices or clinics, or by commercial reference laboratories. Phlebotomists must be able to collect blood competently, safely, and in a professional manner.

The art of Phlebotomy might sometimes be erroneously considered as a relatively easy task to perform, and it may bridge the gap between the patient and the laboratory. In order to attain a good grasp of the phlebotomy practice, a year of training may be necessary as this amount of training corresponds to an equivalent of close to 99% accuracy during the first attempt of blood collection. However, a phlebotomist's success is not only depicted by the number of actual performance of the procedure (Vuk, Cipek, & Jukic, 2015). With the continuous development of technology in the field of Phlebotomy, many useful devices are being developed to help in doing the process and therefore will reflect better quality of specimens collected and improve the welfare and safety of the patients. However, there is no perfect protocol that can specifically contain the right information and the right conditions in order to a phlebotomist to achieve a perfect blood draw. The efforts made in prioritizing the safety of the patients and the quality of service provided are the primary instrument which will allow the

practice of phlebotomy to serve as a link between the patients and the laboratory (Ialongo & Bernardini, 2015).

2.3 Methodology

2.3.1 Research Design

This research study utilized descriptive research design and quantitative methodology in its analysis to initially establish the level of achievement of the competencies that are expected from the graduates of Diploma in Phlebotomy based from the graduates' perception or self-assessment and from the assessment of their previous training officers during the graduates' Phlebotomy clinical practicum.

2.3.2 Respondents

The study involved 105 Diploma in Phlebotomy graduates batch 2015–2016 at Lyceum of the Philippines University. There were a total of 121 graduates for batch 2015–2016 constituting a retrieval rate of 86.78% or 105 out of 121 graduates.

2.3.3 Instrument

The study utilized the survey questionnaire method. The questionnaire was validated and approved by the dean of the program. The graduates were given a list of the expected competencies declared in the curriculum map through a survey questionnaire and were asked to rate themselves using a five-point rating scale on the level of achievement of the said competencies. Likewise, the same set of graduates was also assessed by their respective previous training officers during the graduates' Phlebotomy clinical practicum using the same list of expected competencies.

2.3.4 Statistical Analysis

The data were processed and analyzed to determine the means and were also examined to determine the differences between the responses of the graduates' self-assessment and the assessment from the training officers using independent T-test analysis.

2.4 Results and Discussion

There are four major areas to which the graduates were assessed based on the expected competencies—theoretical knowledge and technical skills, interpersonal skills, critical thinking and problem-solving skills, and the demonstration of professional and ethical behavior. All of these four (4) major areas consist of specific competencies to help both the graduates and the training officers to facilitate the overall evaluation process.

Table 2.1 shows the mean ratings of the assessment on the level of achievement of theoretical knowledge and technical skills of graduates. For the self-assessment, the graduates' ability to independently take examinations which is either written, practical, or computer was deemed highly achieved and ranked first with a weighted mean of 4.63. Likewise, the graduates' ability to safely collect, handle, and process biological specimens for testing ranked second with a weighted mean of 4.59 and therefore deemed as highly achieved. The graduates' ability to adhere to all laboratory safety rules and regulations ranked third and was also deemed as highly achieved. However, the graduates' abilities to interpret laboratory test data ranked last with a weighted mean of 3.90 and were deemed as achieved. The composite mean of 4.29 signifies that the graduates' self-assessment on their theoretical knowledge and technical skills is achieved.

From the training officers' viewpoint, the graduates' ability to independently take examinations ranked first with a weighted mean of 3.95 and was deemed as achieved. This is followed by the graduates' ability to safely collect, handle, and process biological specimens for testing with a weighted mean of 3.91. Furthermore, the graduates' ability to accurately perform laboratory testing was achieved as represented by a weighted mean of 3.80 and ranked third. On the other hand, the graduates' ability to analyze and interpret laboratory test data and their ability to carry out evaluation of new procedures and instruments ranked eighth and ninth with a weighted mean of 3.60 and 3.56, respectively, but were still both deemed as achieved. Moreover, the training officers' assessment of the graduates' theoretical knowledge and technical skills was achieved in general as indicated by a weighted mean of 3.71.

In the overall assessment of the theoretical knowledge and technical skills of the graduates, their ability to take examinations independently, their ability to safely collect, handle, and process biological specimens for testing, and their ability to adhere to all laboratory safety rules and regulations are the top three (3) competencies as indicated by the mean ratings of 4.29, 4.25, and 4.18, respectively, all of which were deemed as achieved. On the other hand, the graduates' ability to use computers and laboratory software effectively, their ability to carry out evaluation of new procedures and instruments, and their ability to analyze and interpret laboratory test data ranked the bottom three (3) with mean ratings of 3.91, 3.83, and 3.75, respectively, all of which were also deemed as achieved. Overall, the composite mean of 4.00 indicates that the level of achievement of graduates' theoretical knowledge and technical skills was achieved. However, it is noteworthy that

Table 2.1 Mean ratings of the assessment on the level of achievement of theoretical knowledge and technical skills of graduates

Competencies	Self			Training officer			Overall		
	WM	VI	R	WM	VI	R	WM	VI	R
Independently take examinations (written, practical, computer)	4.63	HA	1	3.95	A	1	4.29	A	1
Safely collect, handle, and process biological specimens for testing	4.59	HA	2	3.91	A	2	4.25	A	2
Accurately perform laboratory testing	4.29	A	4	3.80	A	4	4.04	A	4
Analyze and interpret laboratory test data	3.90	A	9	3.60	A	8	3.75	A	9
Monitor testing procedures, equipment and professional/technical competency using quality-assurance methodologies	4.25	A	6	3.61	A	7	3.93	A	6
Operate instrumentation properly and perform appropriate preventive and corrective maintenance	4.26	A	5	3.67	A	6	3.96	A	5
Adhere to all laboratory safety rules and regulations	4.50	HA	3	3.86	A	3	4.18	A	3
Use computers and laboratory software effectively	4.10	A	7.5	3.72	A	5	3.91	A	7
Carry out the evaluation of new procedures and instruments	4.10	A	7.5	3.56	A	9	3.83	A	8
Composite mean	4.29	A		3.71	A		4.00	A	

Legend 4.50–5.00 = Highly Achieved (HA); 3.50–4.49 = Achieved (A); 2.50–3.49 = Moderately achieved (MA); 1.50–2.49 = Slightly achieved; and 1.00–1.49 = Not achieved

evidence suggests that evaluating students' knowledge through practice alone may not provide an accurate assessment of their understanding and skills (Fordham, 2005).

Table 2.2 shows the mean ratings of the assessment on the level of achievement of the expected interpersonal skills of graduates. From the graduates' self-assessment, their ability to instruct patients clearly prior to specimen collection ranked first with a weighted mean of 4.57 and was deemed as highly achieved. This is followed by graduates' ability to follow verbal and written instructions with a weighted mean of 4.53 and was deemed as highly achieved. Furthermore, the graduates' ability to communicate with other professionals both verbally and in writing with a weighted mean of 4.37 ranked last and was deemed as achieved. The

Table 2.2 Mean ratings of the assessment on the level of achievement of interpersonal skills of graduates

Competencies	Self			Training officer			Overall		
	WM	VI	R	WM	VI	R	WM	VI	R
Follow verbal and written instructions	4.53	HA	2	3.96	A	1	4.25	A	1
Communicate with faculty members, fellow students, laboratory staff, and other healthcare professionals both verbally and in writing	4.37	A	3	3.84	A	2.5	4.10	A	3
Instruct patients clearly prior to specimen collection	4.57	HA	1	3.84	A	2.5	4.20	A	2
Composite mean	4.49	A		3.90	A		4.19	A	

Legend 4.50–5.00 = Highly Achieved (HA); 3.50–4.49 = Achieved (A); 2.50–3.49 = Moderately achieved (MA); 1.50–2.49 = Slightly achieved; and 1.00–1.49 = Not achieved

level of achievement of the interpersonal skills from the graduates’ own point of view is achieved in general as represented by a weighted mean of 4.49.

On the other hand, according to the training officers, the graduates’ ability to follow verbal and written instructions ranked first as represented by a weighted mean of 3.96 and was deemed as achieved. Both the graduates’ ability to communicate with other professionals and the ability to instruct patients clearly prior to specimen collection obtained a weighted mean of 3.84 and were both deemed as achieved. The composite mean of 3.90 indicates that the graduates’ interpersonal skills were achieved as perceived by the training officers.

In the summative assessment of the level of achievement of interpersonal skills of graduates, their ability to follow verbal and written instructions ranked first with a mean rating of 4.25 and was deemed as achieved. The graduates’ ability to instruct patients clearly prior to specimen collection ranked second with a mean rating of 4.20. Lastly, the graduates’ ability to communicate with other professionals ranked last with a mean rating of 4.10. Overall, the level of achievement of the interpersonal skills of graduates, as indicated by a weighted composite mean of 4.19, was achieved. Therefore, the graduates are able to communicate effectively with the hospital staff, their colleagues, and especially to their patients. Therefore, the graduates were able to recognize problems inside the laboratory and be able to solve them efficiently while applying the basic principles and techniques used in various laboratory processes.

The mean ratings of the assessment on the level of achievement of critical thinking and problem-solving skills are shown in Table 2.3. For the self-assessment, the graduates’ ability to generate and evaluate the validity of the data and assure its reliability in patient care ranked first with a weighted mean of 4.28 and deemed as achieved. This is followed by the graduates’ ability to

Table 2.3 Mean ratings of the assessment on the level of achievement of critical thinking and problem-solving skills of graduates

Competencies	Self			Training officer			Overall		
	WM	VI	R	WM	VI	R	WM	VI	R
Generate and evaluate the validity of the data and assure its reliability in patient care	4.28	A	1	3.57	A	1	3.92	A	1
Recognize errors and the ability to integrate and interpret analytical data and establish a course of action to solve problems	4.13	A	4	3.56	A	2	3.85	A	2
Recognize and identify problems then take appropriate corrective action	4.14	A	3	3.49	MA	3	3.81	A	4
Demonstrate administrative skills consistent with philosophies of quality assurance, continuous quality improvement, laboratory education, fiscal resource management, and appropriate composure under stressful conditions	4.18	A	2	3.47	MA	4	3.82	A	3
Composite mean	4.18	A		3.57	A		3.88	A	

Legend 4.50–5.00 = Highly Achieved (HA); 3.50–4.49 = Achieved (A); 2.50–3.49 = Moderately achieved (MA); 1.50–2.49 = Slightly achieved; and 1.00–1.49 = Not achieved

demonstrate administrative skills with a weighted mean of 4.18 and deemed as achieved. Moreover, the graduates’ ability to recognize errors and ability to integrate and interpret analytical data and establish a course of action to solve problems ranked last with a weighted mean of 4.13 but was still deemed as achieved. Furthermore, from their own perception, a composite mean of 4.18 indicates that the graduates’ critical thinking and problem-solving skills were achieved.

With regard to the training officers, the graduates’ ability to generate and evaluate the validity of the data and assure its reliability in patient care ranked first with a weighted mean of 3.57 and deemed as achieved. This is followed by the graduates’ ability to recognize errors and the ability to integrate and interpret analytical data and establish a course of action to solve problem as represented by a weighted mean of 3.56 and was also deemed as achieved. However, the graduates’ ability to recognize and identify problems then take appropriate corrective action and the demonstration of administrative skills were moderately achieved as represented by the means 3.49 and 3.47, respectively. A composite mean of 3.57 indicates that from the training officers’ point of view, the graduates’ critical thinking and problem-solving skills were achieved.

Overall, in terms of the level of achievement of the graduates’ critical thinking and problem-solving skills, their ability to generate and evaluate the validity of the data and assure its reliability in patient care ranked first with a weighted mean of 3.92 and was deemed as achieved. This is followed by the graduates’ ability to recognize errors and the ability to integrate and interpret analytical data and establish a course of action to solve problems with a weighted mean of 3.85 and was also deemed as achieved. The graduates’ ability to recognize and identify problems then take appropriate corrective action ranked last with a weighted mean of 3.81. The resulting composite mean of 3.88 indicates that the graduates’ ability to think critically and exhibit problem-solving skills was achieved.

Table 2.4 presents the mean ratings of the assessment on the level of achievement of the demonstration of professional and ethical behavior of graduates. The graduates’ ability to maintain confidentiality of patient’s test results ranked first with a weighted mean of 4.60 which is followed by the graduates’ ability to apply principles of educational methodology with a weighted mean of 4.50, both of which were deemed as highly achieved. Finally, the ability of the graduates to apply principles of management ranked last with a weighted mean of 4.41 and was deemed as achieved. A composite mean of 4.50 indicates that the graduates’ self-assessment on the demonstration of professional and ethical behavior was highly achieved in general.

From the training officers’ assessment, the maintenance of confidentiality of patients test results by graduates ranked first with a weighted mean of 3.78 and was deemed as achieved. This is followed by the graduates’ ability to apply principles of management and ability to apply principles of management with a weighted mean of 3.69 and 3.54, respectively, and both of which are deemed as achieved. The resulting composite mean of 3.68 indicates that the training officers’ assessment on the demonstration of professional and ethical behavior of graduates was achieved.

In the overall assessment of the graduates’ level of achievement of the demonstration of professional and ethical behavior, their ability to maintain confidentiality of patients’ test results ranked first with a weighted mean 4.19 and

Table 2.4 Mean ratings of the assessment on the level of achievement of demonstration of professional and ethical behavior of graduates

Competencies	Self			Training officer			Overall		
	WM	VI	R	WM	VI	R	WM	VI	R
Maintain confidentiality of patients test results	4.60	HA	1	3.78	A	1	4.19	A	1
Apply principles of educational methodology	4.50	HA	2	3.69	A	2	4.10	A	2
Apply principles of management	4.41	A	3	3.54	A	3	3.98	A	3
Composite mean	4.50	HA		3.68	A		4.09	A	

Legend 4.50–5.00 = Highly Achieved (HA); 3.50–4.49 = Achieved (A); 2.50–3.49 = Moderately achieved (MA); 1.50–2.49 = Slightly achieved; and 1.00–1.49 = Not achieved

deemed as achieved. The graduates’ ability to apply principles of educational methodology ranked second with a weighted mean of 4.10 and deemed as achieved. Furthermore, the graduates’ ability to apply principles of management ranked last with a weighted mean of 3.98. The overall composite mean of 4.09 corresponds to the fact that the overall demonstration of the graduates’ professional and ethical behavior was achieved.

The differences in the responses of the graduates’ self-assessment and the training officers’ assessment on the expected competencies are shown in Table 2.5. In terms of the theoretical knowledge and technical skills, interpersonal skills, critical thinking and problem-solving skills, and the demonstration of professional and ethical behavior, there was a highly significant difference (as indicated by the *p* value of 0.000 which is less than the cutoff value of 0.05) observed in the responses between the graduates’ self-assessment and the assessment made by the training officers among all the competencies.

There are many factors that can be attributed to the resulting difference in the responses. The assessment process may at least partially be dependent on the reviewer’s expertise and familiarity with an individual’s work and role expectations (Gopee, 2001). It is important that the industry are well versed of the expected competencies since competency-based education Training (CBET) aims to prepare students more effectively for real workplaces, which means that the requirements of companies and industry should be taken into account (Ayonmike, Okwelle, & Okeke, 2014).

There may be a need to do the actual assessment of the graduates after undergoing a postgraduate training program since fresh graduates maybe given the notion of not having enough working experience and the industry has reasonably higher standards than educational institutions although studies may need to be conducted to prove its truthfulness. However, the competency-based approach has stimulated beneficial changes in many postgraduate clinical training programs. Competency-based programs have a strong focus on outcomes and at the same time recognize and emphasize the relevance of the workplace with respect to both learning and assessment. (Mook, Bion, Vleuten, & Schuwirth, 2010).

In a research study conducted on Master of Public Administration (MPA) graduates, based from the initial competency data, not all students are demonstrating the needed competencies as public-service leaders as defined by the program. Therefore, while putting in mind that 100% of the competencies may not

Table 2.5 Difference in the mean ratings of the self-assessment of graduates and the assessment by training officers on the expected competencies

Competencies	F-value	<i>p</i> value	Interpretation
Theoretical knowledge and technical skills	7.837	0.000	Highly significant
Interpersonal skills	7.621	0.000	Highly significant
Critical thinking and problem-solving skills	8.009	0.000	Highly significant
Professional and ethical behavior	30.754	0.000	Highly significant

Legend Significant at *p* value <0.05

really become attainable, the initial competency data have raised concerns and excitement among the faculty members to make considerable changes in the course content in order to provide higher probability of attainment and become successful in meeting the competencies. These natural tensions serve as guide to institutionalize competency-based learning (Rivenbark & Jacobson, 2015). Likewise, these existing essential tensions between the goals of the academic institutions and the service providing sectors must be recognized and be taken into consideration in creating, developing, and updating the curricula and the assessment criteria. If not, this will make the professional competencies be deemed as both unrecognizable and meaningless (Jefferies, Chen, & Conway, 2012).

Therefore, the industry sector recognizes the need to collaborate with the educational institutions to improve the development of man power. The industries want the academe to reach out and build partnerships with them to enhance the overall teaching and learning environment. They are interested to explore other mutually beneficial partnerships through faculty immersion, designing relevant curriculum and instruction, research projects, resource sharing, and other avenues that ultimately enhance acquired knowledge and skills of students, aside from simple creating tie-ups for on-the-job training (OJT). Furthermore, industry–university interaction must be deemed a main stream activity by both partners. As in the case of the engineering profession, the fast-paced technological development entails engineering education paradigm shift that should capture the many intersections between the spheres of activity of industry and university. It is also emphasized that a structured and institutionalized relationship between the two entities is not only desirable, but is also essential for the overall success of the teaching–learning process (Roque, 2015).

2.5 Conclusions

The research aimed to determine the level of achievement of the competencies of the diploma in phlebotomy graduates as perceived by the graduates' themselves and as perceived by their training officers. From the initial evaluation made, the competencies expected from the graduates in terms of theoretical knowledge and technical skills, interpersonal skills, critical thinking and problem-solving skills, and the demonstration of professional and ethical behavior were all achieved in general. Therefore, the curriculum program was found to be effective. In a study conducted in a Medical Laboratory Science program in the Philippines, the objectives of the six-month training program embedded in the curriculum were realized to a moderate extent only (Valdez et al., 2012).

On the other hand, the results of the responses of the graduates' self-assessment and the assessment made by training officers were found to be significantly different when computed statistically. On the other hand, the results of the responses of the graduates' self-assessment and the assessment made by training officers were found to be significantly different when computed statistically. These results are attributed

to a variety of factors and may not necessarily reflect a gap in the school instruction since the competencies across all four (4) major areas were verbally interpreted as achieved based from either the students or training officers' perspective.

Further studies should be conducted which could be in the form of needs analysis and training officer's expectations from trainees to further narrow the gap between the school instructional design and the needs of the industry. Likewise, further studies should also be conducted on the literacy on assessment of training officers to determine their suitability in providing assessments to graduates and emphasize the possibility of using industrial-based assessment tools aside from typical educational tools. It may be necessary to improve assessor performance by increasing essential communication and training and develop multiple strategies for the collection and recording of competency assessment rather than "one-time" assessments.

Likewise, it is also important to develop a variety of feedback mechanisms designed to measure the level of achievement of the program competencies that may exist in various forms and may also be used in different levels of competency achievement and to greatly obtain a comprehensive evaluation of the graduates. The results from which may be analyzed to identify areas and sectors of the curriculum and instructional design that could be improved.

References

- Akir, O., Eng, T., & Malie, S. (2012). Teaching and learning enhancement through outcome-based education structure and technology e-learning support. *Procedia-Social and Behavioral Sciences.*, 62, 87–92.
- Anh, D., & Thanh, P. (2014). Competence based assessment of listening skill for ESL students. *Journal of Science: Education Research*, 30(4), 7–16.
- Ayonmike, S., Okwelle, C., & Okeke, B. (2014). Competency based education and training in technical vocational education: Implication for sustainable national security and development. *Journal of Educational Policy and Entrepreneurial Research (JEPER)*, 1(2), 290–300.
- Boateng, B., Bass, L., Blaszkak, R., & Farra, H. (2009). The development of a competency based assessment rubric to measure resident milestones. *Journal of Graduate Medical Education*, 1(1), 45–48. doi:10.4300/01.01.0008.
- De Guzman, M. (2016). Preferred student-centered strategies in teacher education: Input to outcomes-based instruction. *Asia Pacific Journal of Education, Arts and Sciences*, 3(1), 40–48.
- Fordham, A. J. (2005). Using a competency based approach in nurse education. *Nursing Standard*, 19(31), 41–48.
- Gopee, N. (2001). The role of peer assessment and peer review in nursing. *British Journal of Nursing.*, 10(2), 115–121.
- Grable, H., & Gill, G. (2005). Preventing phlebotomy errors—Potential for harming your patients. *LABMEDICINE*, 36(7), 430–433.
- Harden, R., Crosby, J., & Davis, M. (1999). AMEE Guide No. 14: Outcome-based education: Part 1D An introduction to outcome-based education. *Medical Teacher*, 21(1), p7–14.
- Hejazi, B. (2011). Outcomes-Based Education (OBE): A transformational perspective on quality and mobility in higher education. In Community College Leadership Program.
- Ialongo, C., & Bernardini, S. (2015). Phlebotomy, a bridge between laboratory and patient. *Biochemia Medica*, 26(1), 17–33.

- Inocian, R., & Inocian, B. (2016). Outcomes-based teaching for brain-based learning vis-à-vis pedagogical content knowledge. *Asia Pacific Journal of Multidisciplinary Research*, 4(2), 65–75.
- Jefferies, M., Chen, S., & Conway, J. (2012). Assessment of professional competence in a construction management problem-based learning setting. *The Australian Journal of Construction Economics and Building*, 2(1), 47–56.
- Killen, R. (2000). Outcomes-based education: Principles and possibilities. Unpublished manuscript, University of Newcastle, Faculty of Education.
- Kirov, D., Kazakova, S., & Kirilova, J. (2014). Students' self-assessment in preclinical and clinical education of prosthetic dentistry. *Journal of IMAB-Annual Proceeding (Scientific Papers)*, 20(3), 575–577. doi:[10.5272/jimab.2014203.575](https://doi.org/10.5272/jimab.2014203.575).
- Lavery, I., & Ingram, P. (2005). Blood sampling: best practice. *Nursing Standard*, 19, 55–65.
- Limon, M. (2016). Outcomes-based education integration in home economics program: an evaluative study. *Journal of Educational Issues*, 2(1). doi:[10.5296/jei.v2i1.9262](https://doi.org/10.5296/jei.v2i1.9262).
- Mamat, M., Rasul, M., & Mustapha, A. (2014). Outcome-based education implementation in Malaysian polytechnic. *International Journal of Education and Research*, 2(11), 437–450.
- Mook, W., Bion, J., Vleuten, C., & Schuurth, L. (2010). Integrating education, training and assessment: competency-based intensive care medicine training. *Netherlands Journal of Critical Care*, 15(4), 192–198.
- Nayal, et al. (2011). General procedure of phlebotomy: A review. *International Journal of Applied Biology and Pharmaceutical Technology*, 2(1), 334–341.
- Norman, P. (2006). Outcomes-Based Education: A PNG Perspective. *Contemporary PNG Studies: DWU Research Journal*, 5, 45–57.
- Rivenbark, W., & Jacobson, W. (2015). Three principles of competency-based learning: Mission, mission, mission. *Journal of Public Affairs Education*, 20(2), 181–192.
- Roque, M. (2015). Towards evolving a model of an industry-academe linkage program and service unit for the college of engineering. *Proceedings of the International Conference on Engineering Teaching and Learning Innovation* (pp. 60–67). ISSN# 2467-7507.
- Shahangian, S., et al. (2005). Results of a survey of hospital coagulation laboratories in the United States. *Archives of Pathology and Laboratory Medicine*, 129, 47–60.
- Valdez, A. (2012). Curriculum model for medical technology: Lessons from international benchmarking. *International Association of Multidisciplinary Research Journal*, 2, 292–301.
- Valdez, A., et al. (2012). The six-month internship training program for medical laboratory science education: an initial evaluation. *JPAIR Multidisciplinary Research*, 9, 271–283.
- Vuk, T., Cipek, V., & Jukic, I. (2015). Blood collection staff education in the prevention of venipuncture failures and donor adverse reactions: From inexperienced to skillful staff. *Blood Transfuse*, 13(2), 338–339.



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