# Evaluation of Pharmacy Technician Training Program

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**Abstract.** Each educational institution evaluates its own program over a period of time and uses its outcomes in order to make some decisions on its advanced development. Therefore, a well-established program evaluation methodology is essential. The medical education field has been utilizing competency-based assessment approaches for several years, and these approaches are now beginning to be adapted and implemented in pharmacy education. This time we aimed to evaluate competency-based pharmacy technician training program outcomes, its effectiveness and graduate work skills. The planning, implementation, and determination of the participants' rolesare significant in evaluating any program, or curriculum. Total of 104 graduates, 17 lecturers from School of Pharmacy at Mongolian National University of Medical Science (MNUMS) and 44 employers participated in this study. Graduates' assessment, a questionnaire with 8 subscales 77 questions was developed based on professional competency of the pharmacy technician training program. An employers assessment questionnaire with 8 subscales 20 questions was developed based on professional competency of the pharmacy technician training program; each question was rated on Likert scale of 1–5. The average score of graduates and employers for each competency was 4.06 and 3.84, separately. The difference between the mean scores of graduates and employers ranged from 0.05 to 0.38 for 8 competency units, and the employers' scores were slightly lower than the graduates'. The average work skill satisfaction scores for employers and graduates were 4.22 and 4.47, respectively; and a correlation analysis found that work skills were significantly and positively related to professional competence. The skills required in the workplace were directly related to the professional competencies, and the level of satisfaction of employers and graduates with the skills required in the workplace was similar. The high level of professional competency assessment of employers and graduates is a testament to the effectiveness of the program.

**Keywords:** Pharmacy technician · Program evaluation · Competency assessment · Workplace skills

# 1   Introduction

Each educational institution evaluates its own program over a period of time and uses its outcomes in order to make some decisions. Therefore, a well-established program evaluation methodology is essential [1]. Curriculum evaluation plays an important role in the accreditation process so that the program can be sustained, updated, expanded, discontinued, and rational decisions are made about how to implement the program [2, 3].

Curriculum planning, implementation, and participants' role determination are significant in evaluating any program [4]. The medical education field has been utilizing competency-based assessment approaches for several years [5], and these approaches are now beginning to be adapted and implemented in pharmacy education [6].

Furthermore, in order to meet the goals, objectives, standards, and requirements of the job, the specialist must own the competencies identified in the training program as well as the knowledge and skills to work with others in a team, lead, manage, effectively implement new technologies, and cope with the workload [7, 8].

Based on the evaluation results, the involvement of stakeholders is critical in future planning for program upgrades [9]. Evaluation of teachers, students, alumni, and employers directly involved in determining whether students' knowledge, skills, and attitudes meet the needs of society [10].

Employers' perceptions of graduates' competencies provide a realistic assessment of the training program's effectiveness [11].

The Employer Satisfaction Survey is the only national survey that measures how good graduates from Australian higher education institutions meet employer needs. It uses a unique methodology to link graduates' experiences to their direct supervisors' views. Furthermore, in order to meet the goals, objectives, standards, and requirements of the job, the specialist must own the competencies identified in the training program as well as the knowledge and skills to work with others in a team, lead, manage, effectively implement new technologies, and cope with the workload [7]. The Royal Pharmaceutical Society of Great Britain is currently introducing continuing professional development as a means of ensuring the competence of its members' self-assessed competence of community pharmacists [12].

Furthermore, the faculty member who develops and implements the program is vital in evaluating their graduates' competency and the program's outcomes. Based on the competency units defined by the "Pharmacy technician" training program, their corresponding elements, and performance criteria, the training program's evaluation was assessed by the graduate's self-assessment and external (employer) assessment [13]. The effectiveness and outcome of the training program as well as its relevance to the needs of society and the labor market, are determined by the employment of graduates. For example, many issues need to be clarified, such as what percentage of graduates are working in their profession, how long they have been employed since graduation, and why other graduates are not working in their profession [14].

Mongolian National University Medical Science, School of Pharmacy implemented new versions of professional competencies into their curricula in 2018 [15]. The background for conducting this study was the need to clarify whether graduates, who accomplished the competency-based program, meet the needs of employers. Consequently, it

also covered the self-evaluation of the graduates. The study hypothesized that the professional competencies and workplace skills of pharmacy technicians are graduates will be correlated. We aimed to evaluate outcomes, the effectiveness of the competency-based pharmacy technician training program, and graduates' work skills based on the program stakeholders' evaluation.

## 2  Materials and Methods

This study involved 104 graduates, 17 teachers from the School of Pharmacy at MNUMS, and 44 employers. The Graduates' competency assessment questionnaire was developed via the eight subscales, seventy-seven questions based on the professional competency of the pharmacy technician training program. Each question was rated on a Likert scale of 1–5. (1-do not agree, 2-disagree, 3-no suggestion, 4-agree, 5-completely agree). The professional competency consists of eight units: 1. Participate and support clinical pharmaceutical care; 2. Possessing the basic methods of drug quality analysis; 3. Participate in the organization of pharmaceutical activities; 4. Participate and support the rational use of drug 5. Identify plant raw materials and develop processes for medicinal plants, 6. Participate in the preparation and production of drugs, 7. Support the management of cal devices, 9. Support the implementation of the drug marketing process. We highlighted the graduates' competence satisfaction question from general six questions regarding the new curriculum insight of faculty members. The Cronbach's alpha coefficient = .983 for the competency assessment questionnaire indicates that the questions in the questionnaire and the subgroups are well-coordinated and related. The Work Skills Assessment Questionnaire consists of five subscales and 32 questions to determine graduates' basic knowledge and skills, workplace adaptation, teamwork, use of technology, and job performance. The evaluation sum scores of graduates and employers were converted to 0–100 points and the results were compared. The descriptive statistics and Cronbach's Alpha coefficient were computed using SPSS 23.0 software, including the mean, median, standard deviation, and maximum and minimum values were also calculated.

## 3  Results

Ninety-four percent of the teachers rated the competency level of the pharmacy technician program graduates as satisfactory, while 6 percent rated it as moderate (Fig. 1). However, 6 percent of the teachers rated the knowledge and skills of their graduates as moderate, 76.5 percent as generally satisfied; and 17.5 percent as very satisfied.

According to the study, 55.3 percent of graduates are working as pharmacy technicians, while 36.5 percent are continuing their studies, and 8.2 percent are working in non-professional fields or studying in other professions (Fig. 2).

The competency assessment is defined by eight sub-scales within competency units to determine the outcome of the training program, and the corresponding performance criteria have 77 indicators, and the total score of the evaluation ranges from 77 to 385. We converted the scores to 100 percent and plotted the distribution of scores as a histogram. The 104 graduates rated the above 8 competencies ranging 57.6–100 (amplitude 42.4),
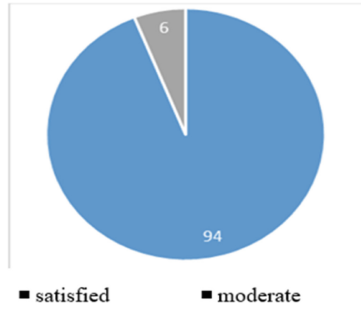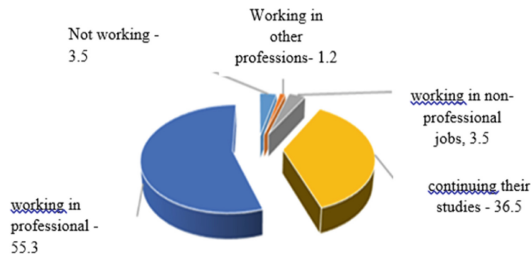
**Fig. 1.** Graduate competence level
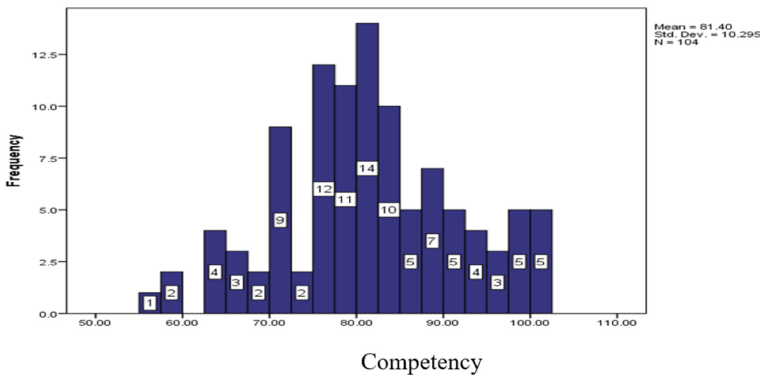


**Fig. 2.** Alumni employment



**Fig. 3.** Distribution of graduates' skills by curriculum

with an average score of 81.4, SD = 10.29, indicating a relatively high competency-based self-assessment. According to the distribution of evaluation scores, the highest frequency is between 75 and 85 (Fig. 3).

The graduates rated their professional skills and competencies on a scale of 1–5 for each of the performance-based indicators, with an average score of $\underline{xx}$ = 4.06. Summarizing the competency assessments for each indicator, the graduates' assessments

**Table 1.** Mean of the graduates' competencies assessment

| № | Competency units | Graduates | | Employers | |
|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD |
| 1 | Participate and support rational use of drug | 4.11 | 0.55 | 4.06 | 0.63 |
| 2 | Identify plant raw materials, develop and process medicinal plants | 3.88 | 0.69 | 3.77 | 0.83 |
| 3 | Participate in the preparation and production of drugs | 4.03 | 0.66 | 3.77 | 0.68 |
| 4 | Possessing the basic methods of drug quality analysis | 4.19 | 0.59 | 3.81 | 0.82 |
| 5 | Participate clinical pharmaceutical care support | 4.24 | 0.60 | 4.0 | 0.68 |
| 6 | Participate in the organization of pharmaceutical activities | 4.17 | 0.66 | 3.94 | 0.78 |
| 7 | Support the management of the medical devices | 3.90 | 0.73 | 3.84 | 0.93 |
| 8 | Support the implementation of the drug marketing process | 3.93 | 0.69 | 3.73 | 0.92 |
| Mean of the competency | | 4.06 | 0.52 | 3.84 | 0.78 |

averaged 3.88–4.24, while the employers' were $xx = 3.87$. When comparing the assessments of graduates and employers for each competency, the graduates' assessments for the competency to identify and process medicinal plants and raw materials were $xx = 3.88$, and the employers' assessment was $xx = 3.77$. The ability to support the management of hospital/medical devices was $xx = 3.90$, whereas the employer rating was $xx = 3.84$. The average rating of competency of the graduates to support the drug marketing process was $xx = 3.93$, and the employer rating was $xx = 3.73$ (Table 1). Also, the assessment of graduates' ability to possess the basic methods of drug quality analysis was $xx = 4.19$, yet the employers' assessment of graduates' ability to participate in the organization was $xx = 3.81$.

Based on the competency units defined by the "Pharmacy technician" training program, their corresponding elements and performance criteria, the program's outcomes were assessed by the graduate's self-assessment and external (employer) assessment (Table 1). The results revealed the first three competencies that graduates consider to have mastered were: Participating in and supporting clinical pharmaceutical care (4.24), Possessing the basic methods of drug quality analysis (4.19), Participating in the organization of pharmaceutical activities (4.17). On the other hand, the employers rated the following competencies as higher than other competencies: Participate in and support the rational use of the drugs (4.06), Participate in clinical pharmaceutical care support (4.0), Participate in the organization of pharmaceutical activities (3.94) (Table 1).
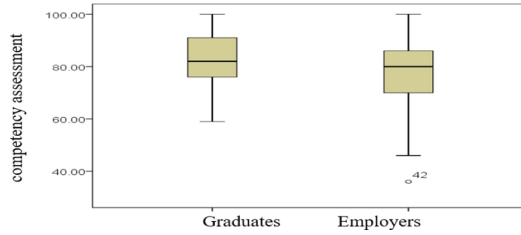
**Fig. 4.** Plotting description of the graduates and employers assessment

**Table 2.** The graduates and the employers satisfaction with the skills required in the workplace

| № | Skills | Graduates | | Employers | | Mean difference |
|---|--------|-----------|-----|-----------|-----|------|
| | | Mean | SD | Mean | SD | |
| 1 | Basic skills | 4.47 | 0.52 | 4.17 | 0.70 | 0.30 |
| 2 | Workplace adaptability | 4.46 | 0.53 | 4.16 | 0.69 | 0.30 |
| 3 | Teamwork | 4.52 | 0.55 | 4.31 | 0.66 | 0.21 |
| 4 | Usage of technologies and techniques | 4.43 | 0.58 | 4.22 | 0.73 | 0.21 |
| 5 | Workplace competency | 4.47 | 0.58 | 4.26 | 0.61 | 0.21 |
| Satisfaction results, average | | 4.47 | 0.52 | 4.22 | 0.68 | 0.25 |

The employers' evaluation was slightly lower than the self-assessment of graduates who identified the professional competencies acquired through the "pharmacy technician" program, but the evaluation indicators were generally similar (Fig. 4).

The results of a satisfaction survey among the graduates and the employers were compiled on the extent to which individual competencies and workplace adaptation, teamwork, technical and work skills, and 32 related skills were mastered. The graduates' skills are grouped into 5 categories and the evaluation scores are summarized (Table 2). The satisfaction assessment average was $\underline{xx} = 4.47$, $SD = 0.58$, and each competence comparison average fluctuated between $\underline{xx} = 4.46$, $\underline{xx} = 4.52$.

In particular, the results of the survey show that pharmacy technician graduates are satisfied with their basic personal knowledge and skills as well as their ability to adapt to the workplace, work in a team, use techniques and technologies at work.

When asked how satisfied the employers and the graduates are with their work skills, their average scores were 4.22 and revealed that the satisfaction score of 4.47 is quite reasonable.

The relationship between the professional competencies of the program graduates and the skills required in the workplace was analyzed by Pearson's correlation. The correlation analysis has shown that the skills are significantly and positively related

to the professional competencies acquired through the program. These are the highest correlation coefficients (r = .654), followed by basic skills and competencies (r = .648), ability to use technology and competencies (r = .636), and work performance (Table 3).

There is a significant correlation between professional competencies (r = .611) and workplace skills. However, the correlation between graduates' professional competence and teamwork ability (r = .541) was slightly lower. The correlation presented that the

**Table 3.** Analysis of the relationship between graduates professional competencies and the work skills

| | | Competence | Basic skills | Adaptability | Team work | Technology and technique skills | Work skill |
|---|---|---|---|---|---|---|---|
| Competency | Pearson Correlation | 1 | | | | | |
| | Sig. (2-tailed) | | | | | | |
| | N | 85 | | | | | |
| Basic skills | Pearson Correlation | .648** | 1 | | | | |
| | Sig. (2-tailed) | .000 | | | | | |
| | N | 85 | 85 | | | | |
| Workplace adaptability | Pearson Correlation | .654** | .914** | 1 | | | |
| | Sig. (2-tailed) | .000 | .000 | | | | |
| | N | 85 | 85 | 85 | | | |
| Teamwork | Pearson Correlation | .552** | .807** | .844** | 1 | | |
| | Sig. (2-tailed) | .000 | .000 | .000 | | | |
| | N | 85 | 85 | 85 | 85 | | |
| Usage of technologies and techniques | Pearson Correlation | .636** | .831** | .863** | .860** | 1 | |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | | |
| | N | 85 | 85 | 85 | 85 | 85 | |
| Workplace competency | Pearson Correlation | .611** | .815** | .861** | .931** | .906** | 1 |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | |
| | N | 85 | 85 | 85 | 85 | 85 | 85 |

**. Correlation is significant at the 0.01 level (2-tailed).

**Table 4.** Correlation between graduates professional competencies and the work skills

|  |  | Professional competency | Work skills |
|---|---|---|---|
| Professional competency | Pearson Correlation | 1 | .653** |
|  | Sig. (2-tailed) |  | .000 |
|  | N | 85 | 85 |
| Work skills | Pearson Correlation | .653** | 1 |
|  | Sig. (2-tailed) | .000 |  |
|  | N | 85 | 85 |

relationship between these factors is statistically significant (p = .000). In other words, the professional competencies of the graduates differ depending on each of these skills (Table 3).

According to the Pearson correlation, which shows the relationship between work skills and the professional competence of pharmacy technician graduates determined by the combination of the above five skills, these variables are significantly correlated (r = .653) (Table 4).

This may be due to a decrease in professional competency assessment as a result of a decrease in work skill assessment, or an increase in competency assessment as a result of an increase in work skill assessment.

## 4   Conclusion

The majority of teachers who developed the program believe that graduates' professional training is reasonable. The abilities required in the workplace were directly related to the professional competences, and the level of satisfaction with the skills required in the workplace was similar across the employers and the graduates. Both the employers' and the graduates' high self-esteem verifies the program's efficacy.

Satisfaction with the outcomes and effectiveness of the competency-based assessment and training program reflects the quality and effects of the education and training, while the training program goals and results reflect the needs of the labor market and working conditions, and it proves to be consistent in many ways.

**Authors' Contributions.**   This paper was written by Ariunaa Damdinsuren, Jargalsaikhan Otgon did the statistical calculations, Tamir Khojoo and Baigalmaa Chuluunbaatar worked as supervisors and supported the whole process.

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