Development and Validation of Questionnaire on Students’ Perception On Effectiveness Of Industrial Attachment

Running title: Effective Industrial Training Questionnaire

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Declaration of interest

The authors wish to declare that there are no conflicts of interest.
Development and Validation of Questionnaire on Students’ Perception on Effectiveness of Bachelor of Pharmacy Industrial Training

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ABSTRACT

Introduction: Educational programs in institutes of higher learning nowadays integrate industrial attachment to give initial exposure to students of the working life. The empirical nature of the attachment gives differential impact to students especially when they are placed in various companies and institutions. This study reports the validation of a questionnaire to measure the student’s perception of effectiveness of industrial attachment and the results of survey on pharmacy undergraduate students. Methods: This survey involved 112 respondents and the criterion is based on the 5-score Likert scale. Pilot study was done for face validity and exploratory factor analysis for construct validity. Results and Discussion: The data were grouped into two domains with Cronbach's Alpha value of >0.8 that indicate that the questionnaire has good internal consistency and high reliability. Investigation reveal that there was significant difference in self-perception before and after industrial attachment on their Attitude & Skills ($p < 0.001$) and also Benefit ($p < 0.001$). Results show that support from superiors and peers in conducive working environment affect the effectiveness of industrial attachment as it was observed that from the respondents, 107 (96%) feel that during training they receive support from their superiors and peers while 103 (92%) said that during training they were surrounded by conducive working environment. As for the factors that impact the effectiveness, majority agreed that longer duration of training (67% agreed), superiors support (76% agreed), peers support (75% agreed) and more exposure to the industry’s expectations (88% agreed) would improve their experience. Conclusion: These findings suggest that industrial attachment has positive impact on the student’s learning as there is a general
increasing trend in both domains. In conclusion, this questionnaire can be used as a reliable and validated instrument to study student's perception of effectiveness of industrial attachment.

**Keywords:** Education, Pharmacy, Questionnaire Design

**What this paper adds:** Industrial training is for exposing students to the realities of the working world. This paper presents a tool for determining the student’s perception on industrial training and could be used by educators and policy makers to measure the effectiveness of the training program.

**INTRODUCTION**
Tertiary education has been the subject of scrutiny for many years as it is the central point whereby skilled workers and professionals are trained for the job market. However nurturing students who are competent and ready to be absorbed into their roles is challenging, particularly for healthcare sectors such as pharmacy. Pharmacy is a dynamic field that offers recruitment in areas such as retail pharmacy, hospital pharmacy, regulatory affairs and industrial pharmacy. In order to cater for the different sectors of the field, academic institutions need to prepare students who are holistic and competent in all fields of pharmacy. The constant feedback from employers is that although students are knowledgeable, they lack practical skills hence they become less useful to industry. Realizing this deficiency, many institutions have developed industrial attachment, a form of learning by participation, to address the issue [1].

Industrial attachment is a program which aims to provide supervised practical training within specified timeframe [2]. The main goal is to expose pharmacy students to the real work life situations in various practice settings within a health system [3]. Institutes of higher learning (IHLs) organize and promote the placement of students in private enterprises and other organizations to foster work experience so that students will attain the necessary skills to supplement their theoretical training.
The fast pace of the world we live in today necessitate the fast and comprehensive learning of knowledge and skills. Therefore, it is important to maximise the potential for learning by understanding how we learn and how best could this be applied in institutes of higher learning (IHLs). Learning can be explained using metaphors that consist of learning by acquisition, learning by participation or a merge between the two. Industrial attachment is a form of learning by participation [4,5].

Learning by participation is based on social construct that enable teaching to be done as an ongoing process that occur through activities performed in the context of work and through interactions with people already in the particular line of work [5]. In this model, students are trained on-the-job and is moulded as part of the community via the communities themselves. On the other hand, learning by acquisition is when the individual constructs meaning into the knowledge gained that in turn can be combined, rearranged, owned and exhibited [4]. This is often exercised by educators through formal didactic teaching sessions that is measured at the end of the learning session through examinations. The combination of both learning perspectives is seen as most effective in producing graduates who are ready for their roles when entering the job market. In view of this educational programs nowadays have moved away from total didactic lecture to integration of various learning methods to maximise the competencies of graduates of the program which include student-centred team learning, problem-based learning, practicals, objective structured clinical examination (OSCE) and also industrial attachment.

Cyberjaya University College of Medical Sciences (CUCMS) is one of the IHL in Malaysia that offers courses related to the health sciences that includes pharmacy. The Bachelor of Pharmacy (Honours) programme at CUCMS is a four-year course that prepares students in becoming well-groomed, well-mannered pharmacists, knowledgeable in all aspects related to drugs, medicine and pharmaceutical care as well as being innovative in their related
field. All students who are registered for a Bachelor of Pharmacy (Hons) in CUCMS are required to undergo industrial attachment for a period of minimum 4 weeks. Attachment is at pharmaceutical company in areas of production, research and development, regulatory, marketing and logistics. Grade will be based on supervisor’s evaluation, reports that will be written by students themselves, students’ logbook and also attendance and performance during viva session [6].

Pharmaceutical industrial attachment has been implemented as part of the CUCMS Bachelor of Pharmacy program since its inception, but no study has been done so far to prove its effectiveness as perceived by students and alumni. Thus, the purpose of this study is to develop and validate an instrument for measuring the student’s perception on effectiveness of industrial attachment and to utilize the questionnaire to understand the perception of CUCMS Bachelor of Pharmacy students toward the implementation of industrial attachment.

MATERIALS AND METHODS

Development of the Questionnaire

The instrument is designed into three main sections:

a. Social demographic data specifically regarding level of education and gender.

b. Type of industry went for training, company size and total duration of training.

c. Perception on effectiveness of industrial attachment before and after attachment, further subdivided into 7 sections that include personal attitude, work attitude, communication, knowledge, practical skills, benefit of industrial attachment and factors affecting effectiveness of industrial attachment.

The scores for the instrument are using the 5-point scale (1 = strongly disagree to 5=strongly agree) for questions. English was the language used in the questionnaire. The time taken to answer the questions is 15 minutes and discussions between the respondents during the survey
were not allowed to prevent bias. Students and alumni were asked to rate “how close the statement is for them” using a scale of 1 to 5 which indicates “strong disagree, disagree, neutral, agree and strongly agree”. Individuals’ scores on each scale could range from 1 to 5; the higher the score, the greater the perception is towards effectiveness of attachment.

**Validation of the Questionnaire**

Content validity test is done where expert group discussed on the questionnaire. Face validity test was done with 15 students and alumni to obtain necessary input regarding the suitability and completeness of the questionnaire. Informed consent was obtained from all subjects.

**Participants and data collection**

Data collection for validation of the questionnaire was performed in April 2013 to August 2013. Informed consent was obtained from all subjects. The inclusion criteria for this study are all students and alumni of CUCMS (batch year 2005 until batch year 2011) who have completed their industrial attachment, excluding the respondents involved in pilot study. Considering the small number of students who have completed their industrial attachment during the time of study (178 students), all were included as respondents. The self-administered questionnaire was distributed to the respondents via online or hand-delivered by researcher.

**Data analysis**

Data were analysed using IBM SPSS. Descriptive statistics were calculated for participant demographic information. Factor analysis was done to define constructs (factors) and related items. Internal consistency reliability was assessed using Cronbach’s alpha coefficient with preferred value between 0.7 and 0.9.

**RESULTS**

**Questionnaire**

Number of items in questionnaire was reduced

**Demographics of respondents**
Of the 178 questionnaires given out, 112 were returned (62% response rate). The intermediate response was mainly due to the online survey to the alumni group as the emails are from the faculty’s archive which may become obsolete by the time this study is undertaken. Respondent demographics and details of industry attachment are shown in Table 1. Referring to Table 1, the type of industry for “Others” indicate attachment at sites such as regulatory, marketing or logistics. Whereas the definition of the company size is small for companies with less than 50 workers, medium for companies with 50 to 249 workers and large for companies with 250 or more workers [7].

**Exploratory factor analysis (EFA)**

The question list for EFA initially included 53 items. Factor analysis was then performed on the data with initially Eigenvalue > 1 that yields 15 components. KMO and Bartlett’s test showed that the data is suitable for factor analysis as it was statistically significant (p < 0.001).

Further EFA was performed on the data and factor loadings of < 0.3 was suppressed and yields 5 components. To further refine the domains, some questions were reassigned different domains and those with low factor loadings p < 0.001 were omitted. This results in two domains namely attitude & ability (Component 1) and benefit (Component 2). Final question list for each domain is listed in Table 2.

**Reliability test**

Reliability test were performed on domain attitude & ability (17 items) by measuring their Cronbach’s Alpha value (0.89). For domain benefit (4 items), the Cronbach’s Alpha value was 0.80.

**Data analysis**

The perception of CUCMS pharmacy students on industrial attachment before and after the training is reported using descriptive statistics and summarized in Table 3. The factors that
would affect the effectiveness of industrial attachment were also investigated and the findings are summarized in Table 4. An open-ended question was posed to the respondents through Question 3 with the option to state other reasons that may contribute to the effectiveness of industrial attachment. The responses included more opportunities in industry for student training, a copy of SOP or summary for reference or notes, assignment of mini project was very helpful, and to be given more hand-on experience during attachment.

**DISCUSSION**

One of the key issues related to graduates not being able to meet the job market requirements is the lack of job skills, competence and lack of experience among the graduates. Today’s competitive business environment places demands on graduates that cannot often be provided within the academia. There are genuine needs to establish industry-university partnerships, meaning that business and education must cooperate to create more real world opportunities for students for practice. University graduates need training and exposure to develop their psychomotor skills, behavioural skills and cognitive skill. Industrial attachment is for skills and development while education is for life; training involves learning by doings (learning by participation), while education is learning by acquiring knowledge and thinking (learning by acquisition). Ultimately, development involves both perspectives of learning in order to shape our graduates into the best they can be.

It has been proved that graduates that have undergone industrial attachments have better chance of job employability due to work exposure and experience gained [8]. However, the effectiveness of the inclusion of industrial attachment in the education program for pharmacy courses in Malaysia has yet to be explored, particularly in the part of the student themselves. Particularly because pharmacy as a dynamic field offers opportunity in various practise settings, it is impossible during this time to provide experiential training in all the pharmacy
practise setting due to time constraint. Therefore, many educational providers often integrate industrial attachment in their courses to give initial exposure to students of the work-life experience although some may argue that a short period of minimum 1 month may not be providing enough for the students. Pharmacy students have been undergoing the attachment while completing their degrees, but the effectiveness is still inconclusive and the instrument to measure this is lacking. Therefore, this questionnaire is developed to be used for the betterment of pharmacy education.

Factor analysis was used in this study to determine the constructs or domains within the developing measure. This approach contributes to establishing construct validity. The item and factor analysis stages of the questionnaire development process may then be used to establish if such items are indeed representative of the expected subscale or factor [9]. Factor analysis involves an examination of the interrelationship among these variables. The correlation between items of the same attributes is to be higher than between the correlation between items of different attributes [10].

Initially there are 52 questions in this questionnaire. Based on the results of factor analysis, items that did not meet the requirement were omitted. From 52 questions, the questions were reduced to 21 questions. Face validity and reliability analysis were performed thus proving the validity of this questionnaire. Both of the domains having Cronbach’s Alpha value of > 0.8 indicate that the questionnaire has good internal consistency thus reflecting it is reliable.

An initial survey on CUCMS students revealed that the mean of perception on attitude & skills before industrial attachment (M = 3.49) showed that the respondents agreed that they have the attitude and skills needed prior to industrial attachment and this value increased significantly after (M= 3.82, \( p < 0.001 \)). This reflects favourably toward the current curriculum offered as it prepares the students’ mind set to be confident and ready for the
challenges during attachment. Faculty of Pharmacy, CUCMS has been dedicated and creative to deliver the best education to train future pharmacists that are holistic and competent. This is the reason why the program is structured to have a good mix of learning by acquisition (lectures, written assignments, projects) and learning by participation (industrial attachment, primary care attachments). The increased score after industrial attachment proves the positive impact of the inclusion of the attachment in the curriculum and that the learning by participation is valued by the students as it focuses on the experience rather than results or examinations.

The mean of perception on benefit before industrial attachment (M = 3.70) showed that the respondents recognized that the session will be of benefit to them. This value increased significantly after the attachment (M = 4.31, p = < 0.001) which suggested that the perceived benefit they expected prior to attachment was surpassed when they experienced and gained positively from the process. The respondents agree that industrial attachment gives benefit to them in terms of increasing the prospects, the qualifications and guidelines for their future career [11].

Results from this study also show that support from superiors and peers while surrounded by conducive working environment affect the effectiveness of the program. Out of 112 respondents, 107 (96%) respondents feel that during training they receive support from their superiors and peers while 103 (92%) respondents said that during training they are surrounded by a conducive working environment. It is important to note that while the faculty provides time for the attachment, the training itself is often not under the regulation of the faculty. The companies often devise the training themselves while abiding by the guidelines given by the faculty. Therefore, this feedback reflects positively on the industry as the good support they give to students to equip students with industry exposure would assist in moulding job-ready graduates.
An investigation of the factors revealed that majority of the respondents agreed that longer duration of training (67% agreed), superiors support (76% agreed), peers support (75% agreed) and more exposure to the industry’s expectations (88% agreed) would improve the effectiveness of the industrial attachment. Students need to be wary of the expectations from the industry and navigate their own learning. As a form of learning by participation, nature of the industrial attachment is empirical and unstructured because the training must flow along with the company’s daily activities. As most of the students (43.8%) were attached in small companies (less than 50 employees), it may be hard to set a side resources specifically for training of students. Therefore, some companies often resort to giving assignments to the students for independent learning. Whereas students who were placed in large companies (42%) also needed to be familiar with the industry’s expectation in order to be more prepared to undergo their training. The minimum period of attachment is one month, therefore the students had to maximise the opportunity of being in the industry in order to reap maximum benefits from the experience.

The open-ended question for factors that would improve effectiveness of industrial attachment solicited responses that include providing more opportunities in industry for student training, provision of references and guidelines and to be given more hand-on experience during attachment. The issue of more opportunities for attachment in pharmaceutical companies would only be realized if more companies open up their doors for university-industry partnerships in providing the best education and skills for the graduates. It is indeed a loop because the feeder of the workers is from universities, but the universities need to be able to design courses that have content that are relevant and useful to the industry. An effective partnership would bridge this issue and ultimately produce quality graduates.

CONCLUSION
As a conclusion, the validated questionnaire could be used for measuring the students’ perception on effectiveness of industrial attachment. Results from the instrument can aid educational providers in improving the structure and process of industrial attachment in order to maximise the benefit to students. It is undeniable that industrial attachment plays an important role in preparing quality future professionals. It is an important strategy to expose students to real work life situation and to equip them with the necessary skills so that they would be competent and ready to enter the job market upon graduation.

REFERENCES


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