Physics Studies and Generic Attributes

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Abstract

The purpose of this study is to investigate and understand the perception of physics undergraduates, lecturers and employers on the learning of Universiti Teknologi Malaysia (UTM) graduate's generic attributes through physics studies. A total of 104 physics undergraduates and 27 physics lecturers participated in the questionnaire survey while three employers participated in semi-structured interview. Mann-Whitney U test and Wilcoxon Signed Ranks test with significant level of p=0.05 were used to evaluate the data collected from the questionnaires. Interview data were recorded and summarized to identify key categories and features. The results indicated a development gap among undergraduates, lecturers and employers.

Keywords: Generic attributes, physics education;

1. Introduction

Achieving zero unemployment is the dream of every country, but unfortunately, it is not a problem that can be easily solved. Nevertheless, Malaysia is blessed enough to be a country with its unemployment rate below five percent (Abdullah, 2009). However, it is undeniable that there are still people who find difficulties in getting themselves employed. According to the tracer study conducted by the Ministry of Higher Education (MOHE), the percentage of unemployment graduates had yet to reach below 20 % from year 2006 to 2008 from the total number of graduates including diploma, first degree and post graduates. Also, surprisingly, graduates from the science field contributed to the highest percentage among other fields of study in unemployment (Abu Bakar et al., 2009).

The National Higher Education Action Plan 2007-2010 had indicated that the unemployment phenomenon is not new in many countries among fresh graduates. The mismatches between market requirements and graduates quality are one of the factors that contribute to the unemployment phenomena (Atkins, 1999; PSPTN, 2007). Thus, our tertiary educational institutions had been urged and pressurised to be reinvented so that they can produce more employable graduates. Graduates are expected to enhance not only their theoretical knowledge but also a mixture of knowledge, generic skills and attitude that may contribute to their success in the society (Hoddinott & Young, 2001; Fabbris, 2007).

The market now demands graduates that possess not only adequate theoretical knowledge, but more generic skills. The labour market today needs workers who are able to communicate effectively in both written and oral aspects; solve problems; think creatively and critically; willing to work; willing to contribute and share the success in a team; and are able to embark on lifelong learning activities to improve their knowledge, skills and competence. As if these are not enough, the current market also demands workers that are able to recognize business opportunities and then utilize their knowledge and skills to develop the opportunities brilliantly, responsibly and ethnically. As a result, the universities had been urged to make more explicit efforts to develop the 'key', 'core', 'transferable', 'soft', 'employable' and/or 'generic' skills (Gurvinder & Sharan, 2008). Hence, in order to improve the

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employability aspects required amongst graduates, MOHE has identified seven generic skills that should be possessed by all graduates, namely communication skill; critical thinking and problem solving skills; team working skill; lifelong learning and information literacy skills; entrepreneurship skill; professional ethics and morality skills; and leadership skill (Abdullah, 2009). Employability, in this sense, is defined as a set of achievements, understandings and personal attributes that make individuals more likely to gain employment and be successful in their chosen occupations (Knight & Yorke, 2003).

1.1. The generic skills and Malaysia higher education

After realizing that the higher education institutions play a vital role in forming capable human capital for the market place, MOHE had taken the responsibilities not only in providing educational opportunities to capable citizens, but also ensuring that every graduate has the desired employability skills. As indicated in the National Higher Education Action Plan (PSPTN) 2007 – 2011, the future economic, social and spiritual well being of our nation depends critically on the success of our human capital. The development of quality human capital had been emphasised especially in the knowledge, skills, intellectual fields such as science, technology and entrepreneurship (PSPTN, 2007).

In order to achieve this goal, MOHE had the Generic Student Attributes (GSA) module implemented in higher education institutes throughout the country. As mentioned by the Higher Education Ministry secretary-general, Datuk Dr Zulkefli Hassan, MOHE places great focus and expectation in undergraduates' generic skills development after realizing that academic excellence alone is no longer sufficient in pursuing human capital success (PMO, 2010). Besides that, the Deputy Higher Education Minister, Datuk Saiffudin Abdullah, also commended on the newly launch Soft Skills Scale (My3S) certificate by MOHE. He said that the certificate will benefit the students in ensuring that they are excellent in academic as well as in the development of generic skills. It will help both students and employers to acquire and access the concerned generic skills respectively. (NST, 2010).

Hence, by successfully achieving the targeted 75 % employment rate among fresh graduates after six month of graduation in the National Higher Education Action Plan 2007 – 2011, the second phase of the National Higher Education Action Plan 2011 – 2015 has identified further action plan to increase the employability among fresh graduates. These include making sure that 85 % of the students are able to achieve the minimum score (6.5) in the My3S instrument (PSPTN, 2011).

In line with the higher education action plan, Universiti Teknologi Malaysia (UTM) has identified certain desirable graduate attributes and their respective generic skills that should be developed in all undergraduates:

1) Communication skill - Communication skill incorporates the ability to communicate effectively in Malaysia's major languages, Bahasa Melayu and English, across a range of contexts and audiences.
2) Critical thinking and problem solving skills - The ability to think critically, logically, creatively and analytically.
3) Team working skill - The ability to work with other people from different background to achieve a common goal.
4) Information management and lifelong learning skills - The ability to continue learning independently in the acquisition of new knowledge and skills.
5) Entrepreneurship skill - The ability to analyze situations and recognize opportunities to use one's knowledge and skills for business opportunities.
6) Leadership skill and pro-activeness - Possess knowledge on basic leadership principles and able to apply the traits of leadership in one's interaction with others.
7) Ethics and integrity - The ability to apply high ethical standards in professional practice and social interactions.

1.2. The generic skills and physics studies

According to Ball (2008), although the unemployment rate for physics graduates in UK is falling, it still leaves the physics graduates more likely to be out of work six months after graduation than other major science subjects. They are also more likely to remain unemployed than graduates from several arts subjects popularly believed to have fewer employment options. The percentage of physics graduates unemployed from the American Institute of Physics (AIP) also indicated a typically two to seven percent from the year 1995 to 2004 (Tesfaye & Mulvey, 2007).

As a science subject, physics is developed from the desire to study about the physical environment (Cutnell & Johnson, 1998). The law of physics and the theory of physics have contributed so much in a variety of phenomena. It helps to explain questions like how aeroplane flies and why a ship weighed a thousand tonne does not sink in the sea? Physics is also used to predict how the nature will behave based on experiments. However, many see the process of learning physics as the toughest challenge to students because they need to know the facts, remember complex formulas and solve tedious algorithms concerning physics problems to understand physics (Elby, 1999). We cannot deny that a good academic result is important in the modern world to increase the possibilities of getting a good job right after graduation. However, the abilities, skills and work performance of the graduate will soon overshadow the importance of academic results after the graduate starts working. Graduates will then be judged largely on their abilities in handling a task, applying the academic knowledge on job and of course, their generic skills acquired from many years of education.

Learning physics challenges students in many ways, for example students need to be able to search and identify key resources; to think critically and analytically; and to solve the problems given effectively (Sands, 2004). These cognitive skills provide graduates with a set of technical skills including laboratory skills, mathematic skills and computer skills that can be used in their future careers (Ivie & Stowe, 2002).

Although physics studies are expected to prepare graduates with a variety of generic skills, research respondents suggested that typical physics programs are not sufficiently structured in encouraging interpersonal skills development (Roman, 2000). Besides that, the study carried out by Wiata (2006) reflected that graduates are not aware of the generic skills that lecturer may have been attempting to develop in them. Graduates tend to value and develop problem solving skills and critical thinking skills mostly due to the nature of physics studies where these skills are an integral part to the nature of physics studies and are taught explicitly (Thomas & Jones, 2007). In addition, respondents ranked ethical and social issue skills as the least developed skills (Sharma, et al., 2008).

On the other hand, it has been reported that universities have sought to address generic skills development through a range of actions and curriculum specifications (Atlay, 2006). However, the finding from 13 academic staff indicated that ethics issues are less relevant to the science course. Although they considered it as important, only a few issues regarding academic honesty were being discussed with students (Leeuwen, Lamberts, Newitt, & Errington, 2007). Jones (2009) identified four reasons that generic skills are still implicit in the teaching environment:

a) There is tension between content and skill, and the priority is given to technical competence.
b) There are practical difficulties such as large classes and time constraints.
c) The academic-wised resistance to practice the generic skills that are often perceived as not being an integral part to the discipline.
d) The resistance on the part of students to uncertainty and ambiguity.

As mention by Hager and Holland (2006), there is an increasing requirement of a diverse range of generic skills on workers nowadays. A study that was conducted on employers' view of the importance of generic skills had summarized that employers want employees who are able and willing to pick up new skills quickly (Coll, Zegwaard, & Hodges, 2002). Interpersonal skills, literacy, communication skill, numeracy and enthusiastic are the most important generic skills in the view of employers (Martin et al., 2008; Sharma et al., 2008) (Sharma, et al., 2008).

2. The Study

Although research showed that physics studies are able to equip graduates with multiple generic skills, different parties place emphasis on different matters. For example, graduates only care about problem solving and critical thinking skills, lecturers are worried with skill-embedding issue when they come across ethical issues, and employers often appreciate communication skill more. In order to have a better understanding on the generic skills learned by undergraduates, embedded by lecturers and needed by employers, this study sought to address:

i) The perception of physics undergraduates, lecturers and employers on the development level of generic skills through physics studies.

ii)The perception of physics undergraduates, lecturers and employers on the priority ranking of generic skills.

2.1. Research methodology

The research was a cross-sectional descriptive research which described the perception of the respondents regarding the generic attributes developed through physics studies. Also, this research was conducted to understand the actual workplace phenomenon where physics graduates are tested on their abilities. The sampling design consisted of the physics undergraduates (104 people), physics lecturers (27 people) from the Faculty of Science, UTM, and the employers (3 people). A total number of 41 first year, 39 second year and 24 third year undergraduates were selected. The sampling design adopted in this study was purposive samplings where the physics undergraduates and physics lecturers represented the context of this study while the employers were convenient samples. The purpose of selecting the samples was to develop a deeper understanding with respect to the phenomena (learning of generic attributes through physics studies) being studied.

In this study, the samples' perceptions on the UTM generic attributes were the main finding component. According to Hager (2006), performance is describable, observable, measureable and assessable but generic attributes are not discrete entities. We cannot recognize them readily when we see them and they are inaccessible as their competence judgment involves reference. Thus, questionnaires and semi-structured interview were used in this educational research to collect data about the phenomena that are not directly observable (Gall et al., 2007).

2.2. Questionnaire

The questionnaire survey was developed to assess the respondents' perceptions on the learning of graduate's generic attributes through the industrial physics program. Self-administered techniques were employed in administering the questionnaire, where the researcher was on site to distribute and to collect the completed forms. According to Best and Kahn (1986), self-administered questionnaire will give the researcher an opportunity to establish rapport and explain the purpose of the study and the meaning of the test item that may not be clear. Should circumstances required, the researcher may even administer with the help from the lecturers in the Faculty of Science as a better return can be obtained when the original request is sent to the administrative head rather than directly to the respondent where there is an implied feeling of obligation (Best & Kahn, 1986).

The questionnaire was divided into two sections where section one was about the respondents' perception on the development level of generic skills through physics studies. Semantic differential scale was adopted in which the respondent would use a seven point scale between two extreme choices to indicate their perception with 1 indicating the least developed and 7 indicating the most developed. Both lecturers and undergraduates answered the same items with mirror questions. The lecturers rated on their embedding level of generic attributes while the undergraduates rated on their development level of generic attributes through physics studies. Section two was a grid format question where respondents would indicate the importance level of each of the seven generic attributes from most important – 1 to least important – 7. The indication score could only be used once. This section was included in both undergraduates and lecturers questionnaires.

The questionnaire used was validated by two content experts and pilot study was carried out where the respondents were the undergraduates undertaking physics education. A total of 33 questionnaires were collected for the pilot study. Subsequently, the calculated Cronbach's Alpha value for the questionnaire was 0.964 which was above the benchmark of 0.75 (Hinton et al., 2004) and thus was reliable for further analysis.

2.3. Interview

Employee was identified as the key informants among the three aspects in this study because they possessed special perceptions on the needs of generic attribute held by physics graduates in their workplace. The interview questions were adopted from Sharma et al. (2008) and suitable items to this study were selected. The interviews were recorded, summarized and coded. The data were analyzed by comparing the responses for each question both individually and across all interviewees to identify key categories and features.

After the initial construction of interview question, pilot testing of interview was conducted. During the pilot interview, problems relating to communication, evidence of inadequate motivation on the part of respondent, suggested the need to rephrase questions. Besides that, evaluation regarding the methods of recording interview data during the pilot interview was also used to determine whether adequate information was being recorded. Checking of interview questions wording was also conducted as the same question should not be interpreted differently by different respondents to increase the validity of the interview.

3. Results and Discussion

The data collected from the first section of questionnaire were used to evaluate the development level of generic skills. SPSS (Statistical Package for Social Science) software was used to compute the Mann-Whitney U result. Since the scale used was a semantic scale or ordinal scales, the magnitude of mean and medium was not well defined. Thus, Mann-Whitney U test for ordinal data was used to evaluate the hypotheses with significant level of $p = 0.05$. The null hypotheses were accepted if the development level scores for the identical generic attributes had no significant difference between undergraduates and lecturers and vice versa. From here, it helped to answer what are the perception of undergraduates and lecturers on the development level of generic skills through physics studies. Did undergraduates develop the generic attributes as embedded by the lecturers or not? To determine the perception of undergraduates and lecturers on the priority ranking of generic attributes, the data collected from section two of the questionnaire were analyzed. Two analysis methods were adopted. Firstly, the descriptive statistic, where the frequency percentage ranking score of each generic attributes was tabulated in a frequency distribution table to identify the majority ranking scores. Secondly, the SPSS Wilcoxon signed rank test at $p = 0.05$ significance level, which evaluated the ranking scores of each generic attributes to identify the actual priority rank of the generic attributes.

3.1. Generic skills development level

In this section, sample comparison between undergraduates and lecturers was made. SPSS Mann-Whitney U test was conducted with significant level, $p=0.05$ to evaluate the difference in development level for communication skill (CS); critical thinking and problem solving skills (CTPS); team working skill (TW); lifelong learning and information management skills (LL); entrepreneurship skill (ES); leadership skill (LS); and ethic and integrity skills (ET) among undergraduates and lecturers. On the other hand, 27 responses from lecturers were collected. Mann-Whitney U test was used to evaluate the different perceptions across the undergraduates and lecturers.

Mean rank indicates the mean ranking result of each group while asymptotic significance (Asymp. Sig. 2 tailed) indicates the value of significant, p. It was expected that if there were no significant differences between the groups, the mean rank should be roughly equal across the two groups.

Table 1 shows the Mann-Whitney U test results which clearly depicts that there was a significant difference between lecturers and undergraduates' perceptions on the development level of communication skill (CS); team working skill (TW); lifelong learning and information management skills (LL); leadership skill (LS); and ethic and integrity skills (ET). Lecturers suggested a higher level of development in these attributes compared to undergraduates. This implied that undergraduates did not develop the generic attributes as much as the lecturers had expected except for critical thinking and problem solving skills (CTPS) and entrepreneurship skill (ES).

Table 1: Mann-Whitney test results on generic skills development level.

Statistic Comparison (Undergraduates versus Lecturers)						
Generic Attributes	No of Participant		Mean Rank		Mann-Whitney U	Asymp. Sig (2-tailed)
	Undergraduates	Lecturers	Undergraduates	Lecturers		
CS	104	27	405.35	665.66	29736.50	0.000*
CTPS	104	27	322.54	349.02	32262.00	0.131
TW	104	27	174.14	285.04	5505.00	0.000*
LL	104	27	174.29	284.46	5551.50	0.000*
ES	104	27	67.18	61.44	1281.00	0.466
LS	104	27	115.47	193.26	2281.00	0.000*
ET	104	27	183.75	248.02	8503.50	0.000*
*significant at p<0.05						

Nevertheless, according to the interview with employers, physics graduates' generic skills are just as good as any other employees. For example, they showed critical thinking and problem solving skills in translating customer requirement into ideas and implementation of ideas, product inspection, failure analysis and trouble-shooting. They also demonstrated communication skill during conversation, meeting, discussion, and so on.

The employers suggested that lifelong learning and information management skills should be developed more in physics study. This is because it is important for the employees to perform continuous learning as graduates can only gain basic knowledge from university or school. According to employers, the level of development for team working skill is low and the same applies to their ability to listen, respond and present orally. Thus, physics graduates need to possess lifelong learning and information management skills to help them perform better.

The results obtained revealed that there are significant differences on the level of generic attributes embedded by lecturers and developed by undergraduates except for critical thinking and problem solving skills (CTPS) and entrepreneurship skill (ES). Undergraduates do not rate their development level of generic attributes as equal to the level of generic attributes embedded by lecturers. A teacher will not be able to achieve the desired ends without a clear blueprint or outline (Lesley et al., 2002). Thus, learning outcome should be introduced to undergraduates at the beginning of the teaching alongside the expected learning outcome of generic attributes. It is believed that undergraduates are not aware of the learning of generic attributes and this generated low self rating of generic attributes development among undergraduates.

On the other hand, the development level of critical thinking and problem solving skills (CTPS) and entrepreneurship skill (ES) showed no significant difference among undergraduates and lecturers. This implied that undergraduates had learnt critical thinking and problem solving skills (CTPS) and entrepreneurship skill (ES) as much as embedded by lecturers. This circumstance was collaborated with the perception gained from employers through semi-structure interview. Employers agreed that physics graduates had shown critical thinking and problem solving skills (CTPS) in most of their daily works. Similar results were obtained from past researchers where critical thinking and problem solving skills (CTPS) were learnt or valued most by physics graduates.

In spite of that, employers revealed that there is a lack of entrepreneurship skill (ES) among physics graduates, as they sometimes neglected business opportunities. Physics graduates do not show equal concern on product quality as well as product cost. Ironically, the costs are the major concern in a business. Hence, our results showed a mismatch perception among undergraduates, lecturers and employers. Although undergraduates perceived that they had developed the entrepreneurship skill (ES) as embedded by lecturers, employers did not value the skill as expected.

3.2. Priority ranking of generic attributes

Table 2is a generic attributes priority ranking frequency percentage distribution table from 104 undergraduates. 37.5 % of the undergraduates ranked the communication skill (CS) as their first priority. This is followed by critical thinking and problem solving skills (CTPS); team working skill (TW); lifelong learning and information management skill (LL); entrepreneurship skill (ES); leadership skill (LS); and last but not least, the ethic and integrity skills (ET).

Table 2: Generic attributes ranking based on frequency percentage (undergraduates).

Matrix table : Generic Attribute and Priority Ranking (undergraduates)							
Rank	CS%	CTPS%	TW%	LL%	ES%	LS%	ET%
1	37.5	25.0	12.5	6.7	2.9	6.7	8.7
2	19.2	37.5	18.3	6.7	4.8	7.7	5.8
3	11.5	16.3	38.5	14.4	13.5	2.9	2.9
4	7.7	5.8	13.5	43.3	15.4	11.5	2.9
5	1.9	5.8	8.7	14.4	39.4	15.4	14.4
6	10.6	5.8	2.9	9.6	11.5	38.5	21.2
7	11.5	3.8	5.8	4.8	12.5	17.3	44.2

The priority ranking of lecturers is as shown in Table 3. For communication skill (CS), 44.4 % of the lecturers ranked it as their first priority while majority of them (51.9 %) ranked critical thinking and problem solving skills (CTPS) as the second priority. This is followed by team working skill (TW); lifelong learning and information management skills (LL); entrepreneurship skill (ES); leadership skill (LL); and ethic and integrity skills (ET). Majority of the lecturers or 40.7 % of them ranked entrepreneurship skill (ES) as the least prioritized skill as none of them ranked it in the top three.

Table 3: Generic attributes ranking based on frequency percentage (Lecturers).

Matrix table : Generic Attribute and Priority Ranking (lecturers)							
Rank	CS%	CTPS%	TW%	LL%	ES%	LS%	ET%
1	37.0	48.1	3.7	3.7	0.0	0.0	7.4
2	44.4	51.9	0.0	3.7	0.0	0.0	0.0
3	18.5	0.0	55.6	7.4	0.0	3.7	14.8
4	0.0	0.0	25.9	33.3	7.4	22.2	11.1

5	0.0	0.0	11.1	25.9	25.9	33.3	3.7
6	0.0	0.0	3.7	18.5	25.9	29.6	22.2
7	0.0	0.0	0.0	7.4	40.7	11.1	40.7

Although the frequency percentage distribution tables reflected the distribution of scores, it did not provide information about the significant difference regarding the ranking of priority for each generic attributes. Thus, Wilcoxon signed-ranks test with significant level p=0.05 was used to evaluate the difference between two generic attributes scores (Frederick & Larry, 2004).

The priority ranking comparison of generic attributes among 104 undergraduates and 27 lecturers is as exhibited in Table 4. The results showed that the ranking position for communication skill (CS) was not significantly different from critical thinking and problem solving skills (CTPS). Thus, both skills were ranked as the first priorities by undergraduates. The ranking is significantly followed by team working skill (TW); lifelong learning and information management skills (LL); entrepreneurship skill (ES); leadership skill (LS); and lastly the ethic and integrity skills (ET).

Similar to the undergraduates' perception, the priority ranking difference between communication skill (CS) and critical thinking and problem solving skills (CTPS) among lecturers was not significant with p>0.05. Both undergraduates and lecturers ranked communication skill (CS) and critical and problem solving skills (CTPS) as their first priorities. However, for lecturers, both leadership skill (LS) and ethic and integrity skills (ET) were ranked as the least prioritized, which was different from undergraduates where leadership skill (LS) was ranked higher than ethic and integrity skills (ET).

Table 4: Generic attributes ranking based on Wilcoxon signed ranks test.

Generic Attributes	Comparison	Undergraduates		Lecturers	
		Wilcoxon, Z	Asymp. Sig (2-tailed)	Wilcoxon, Z	Asymp. Sig (2-tailed)
CS	CS – CTPS	-1.529	0.126	-1.461	0.144
CTPS	CTPS – TW	-2.679	0.007*	-4.488	0.000*
TW	TW – LL	-3.849	0.000*	-2.726	0.006*
LL	LL – ES	-2.985	0.003*	-3.674	0.000*
ES	ES – LS	-2.014	0.044*	-2.145	0.032*
LS	LS – ET	-2.283	0.022*	-0.590	0.556
ET	-	-	-		
*significant at p<0.05					

The ranking of generic attributes is supported by employers. They think that the main function of an employee is actually to solve problems, thus critical thinking and problem solving skills should be the first priority. On the other hand, employers believe that the company rules and regulations will help in preventing ethic and integrity problem, hence ethic and integrity skill should be the least prioritized. At the same time, entrepreneurship skill was also the least prioritized as employers pointed out that every company has their own marketing or business department to identify and work for business opportunity. Thus, it should not be a concern for physics graduates to possess entrepreneurship skill.

Obviously, from the results obtained, lecturers and undergraduates equally ranked communication skill (CS) and critical thinking and problem solving skills (CTPS) as the highest priorities. This is due to the fact that they need to communicate daily. Most of the time, employers need to communicate either verbally or in written to present and to reach common agreement with colleagues, customers and suppliers at workplace. Because of this, communication skill (CS) is important so that physics graduates are able to present their idea clearly and effectively, to negotiate; and to communicate to people with different culture. On the contrary, entrepreneurship skill (ES); leadership skill (LS); and ethic and integrity skills (ET) were ranked as low priorities.

Since employers perceived that a good employee is an employee who can solve problem and think critically to transform ideas into design and action, critical thinking and problem solving skills (CTPS) were ranked high by employers as well as lecturers and undergraduates. Lecturers gave high ranking for critical thinking and problem solving skills (CTPS) because the nature of the discipline (Physics) is relevant to the skills. Undergraduates might have ranked it highly due to their daily needs in thinking critically and solving problems regarding their studies.

On the other hand, ethic and integrity skills (ET) were ranked as the lowest priority among undergraduates, lecturers and employers. This suggested that they might not have encountered much reverse effect due to the lack in ethic and integrity skills (ET). Moreover, the rules and regulation as well as plagiarism prevention technology have alternatively contributed in preventing concerning issues. Since the learning of physics is mainly on discovering nature phenomenon and less on product creation and innovation, undergraduates and lecturers showed low concern on the importance of entrepreneurship skill (ES). Also, employers ranked entrepreneurship skill (ES) low because they believe that the marketing and business professionals will help the company in solving business problems.

4. Conclusion

This study was set out to investigate the perception of physics undergraduates, physics lecturers and employers on the learning of generic attributes through physics studies. Questionnaires and semi-structured interview were used to gather information from samples. The research questions were answered through the analysis of the development level of generic attributes and the priority ranking of generic attributes through physics studies.

Knight and Yorke (2003) stated that modular study program in higher education gives an advantage to students to have flexibility in choosing the modules. However, from the perspective of acquiring generic skills, modular study program faces problems in accommodating slow learning environment. Slow learning refers to the kind of learning that requires more time than in a single modular study program. The development of problem solving skill, critical thinking skill, and other interpersonal skills are some of the slow learning processes that are most likely to take place (Claxton, 1998).

At the same time, there are also some problems with the assessment of employability. Some curriculum designs have inadvertently proved inimical to formative assessment and consequentially to student learning. Most universities aspire to enable students to develop key skills or graduate attributes, but they have not necessarily developed a curriculum encompassing assessment strategies which explicitly reflect these attributes (Stafeni, 2009). These skills and attributes are often difficult to assess and require students themselves to reflect on and assess their own strengths and weaknesses, with formative feedback being given at strategic times to enable students to improve or to further develop. Thus, there is a need to review curricula in order to ensure that there is sufficient opportunity in them for effective formative assessment. There is also a need to accommodate slow learning in the assessment. Documentation is also needed in order to acknowledge students' achievement to putative employers in an appropriate manner (Knight & Yorke, 2003).

In order for a lecturer to carry out effective teaching, it would be necessary for lecturers to undertake pedagogical training because expertise on physics knowledge may not promise their expertise on teaching and learning. Thus, it is advised that appropriate assessment criteria and tools should be introduced and undergraduates should be aware of the assessment of generic attributes to achieve the goals of assessment.Since employers emphasize more on the lifelong learning and information management skills, undergraduates should equip themselves with these skills before entering workplace and should fully utilize the industrial training opportunity to understand and develop the generic attributes needed in workplace. Lastly, continuous communication between employers and academic institutions is necessary. This will help lecturers and graduates to perform continuous improvement towards the market demand. It is proposed that the working sector should provide industrial training for undergraduates to promote continuous feedback on the generic attributes needed and possessed by undergraduates. By understanding the employers' needs on the generic attributes, lecturers can play a more effective role in embedding the desired attributes into curriculum. This will help graduates to improve their employability based on the employers' needs and consequently, increases the employment rate among physics graduates.

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