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### **DEVELOPING AN ASSESSMENT INSTRUMENT FOR INFORMATION TECHNOLOGY PRACTICUM PROGRAM FROM UNIVERSITY'S PERSPECTIVE**

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### **ABSTRACT**

Focusing on having accurate assessment during Information Technology Practicum, this article focuses on improving the assessment instrument, particularly from the university's perspective. The works are motivated by the bad feedbacks from the industry regarding Practicum performance and assessment. Based on its suitability, a combination of Design Science Research methodology and Action Research are adapted to conduct this study. The improved design focuses on student learning needs and policy by integrating Practicum elements, university's expectations, and transferable skills expected to be delivered. Emphasis is given on integrating important elements in achieving Practicum learning outcomes. To ensure its readiness for real implementation, the improved instrument has been evaluated involving Practicum stakeholders for three academic semesters. The improved design is believed to measure Practicum

performance accurately in preparing IT graduates to face the industry, as stated in IR 4.0.

**Keywords:** assessment instrument, IT assessment, Practicum assessment, Industrial training.

## INTRODUCTION

Practicum or internship is intended as a course of study to train university students in practical aspect to create crucial learning ties between theory and practice (Forlin & Gibson, 1997), found to be useful in the evaluation of student's capability and the program revision process (Verney et al., 2009), and useful in helping interns to understand theories learned in class and improved their learning and comprehension of issues pertinent to their specific fields of study (Bukaliya, 2012). The practicum or internship programme also benefits everyone involved and helps to enhance university-community ties (Simons et al., 2012). In the field of study, students can work and use the knowledge and skills that have been theoretically learned. It is an essential component for undergraduate programs to the extent that certain programs have set Practicum as a necessary prerequisite to attain bachelor degree requirements. Practicum plays a significant role for Information Technology (IT) in ensuring that graduates are knowledgeable and ready to work with rapid technology changes in the demanding industry. IT Practicum aims to introduce students to actual working conditions requiring IT practice, improve students' knowledge by introducing them to industrial processes, and provide students with opportunities to learn and execute real tasks in a more demanding environment. Students will be assessed on their soft skills during practicum while applying their theoretical and practical knowledge.

Practicum can be seen as the most significant element and an indication of the effectiveness of the program. The Practicum for IT-related programs in Malaysia is designed for the final year of the programs, either in the fifth semester or the final semester. Students were prepared with enough fundamental knowledge and theories at this point for them to face the industry. It is in line with one of the core business strategic goals of the Institution of Higher Learning (IHL) included in the roll-out of the 10th and 11th Malaysia Plan developed by the Prime Minister's Office of Economic Planning Unit. Graduate

employability has become a national agenda for the higher education industry based on the strategy mentioned above to enhance students' achievement. There is a significant relationship between students' performance and employability; successful students who meet the industry's standards will have higher chances of getting a job. This goal can be measured by evaluating the performance of the Practicum.

Early works on accessing Practicum performance has been conducted for IT programs of School of Computing, Universiti Utara Malaysia involving Bachelor of IT (BIT) and Bachelor of Science in IT (BSc IT). This study was conducted for two semesters. In the initial state, the point of analysis in the study was the students' overall performance, expected skills and lacking skills as perceived by the employers. Early analysis of assessment is depicted in Table 1.

**Table 1**

*Early Analysis of Practicum for BIT and BSc IT*

Overall performance	Expected skills	Lacking skills
Adaptive	Creative	Poor in response
Fast learner	Proactive	Lack of confidence, too shy
Good discipline	Cooperative	Presentation & Communication skill
Hardworking	Independent	English proficiency
Not well prepared for work	Good communication skill	Problem-solving skills, critical thinking
Able to plan	Logical thinking, reasoning	Physical appearance
Good leadership quality	Require more exposure to the latest technology	Individual/independent programming skill
Excellent in documentation	Sharp observation	Structural database design, table normality
Strong will	Technical skills: Java script, HTML, CSS3, C#, .NET	Programming skill; VB, ASP, PHP
Able to decide in a critical situation		Practical programming in Java, C#, .NET

Overall analysis shows bad feedbacks from the industry on the lacking skills. They think students lack many skills, both technical and soft skills. They also concluded that BIT and BSc IT students are not well prepared to work. Despite the feedbacks from industries, the most crucial issue is the outcome. Students' final grade for Practicum does not reflect the real quality of the students. For example, students who scored 'A' received bad overall comments from industry's and university's supervisors and vice versa. The existing instruments are not outcome-based (OBE) compliant. It cannot measure the performance accurately. Constructs on technical aspects are too little that have been included in the existing tools. For example, the capability of practicum students in developing IT systems is only measured by asking two questions. Too many constructs on measuring their soft skills and many more drawbacks have been identified.

Early analysis shows there are rooms for improvement to be made. It derives some questions; what is wrong with our Practicum approach? Any drawbacks of the instruments for Practicum assessment? Good Practicum instruments are crucial in ensuring the accuracy of the assessment and how well students can face the industry, as stated in IR 4.0. Thus, reliable and valid instruments should be used in assessing students' performance during practicum or internship (Canney & Bielefeldt, 2016; Koonce et al., 2014; Kelly, 2014; Verney et al., 2009; ). The focus should be given to integrating important elements in achieving Practicum learning outcomes. The elements are Practicum stakeholders, processes, supervision, assessment (instrument, percentage), industry expectations, university expectations, and performance. Many researchers claimed that it is complicated and multi-dimensional to establish the Practicum model. Different scholars have proposed that various elements should be included in the model and must be consistent with the context of work-integrated learning. Forlin and Gibson (1997) proposed that Practicum should be a university-industry joint project. Their experience in developing a Bachelor of Education Practicum Model has emphasized the participation of all stakeholders throughout the process, especially when the evaluation part is included.

In developing and implementing a practicum model for the teaching industry, Tomaš, Farrelly, & Haslam (2008) concentrated on interaction. They recommended an approach to improve engagement through the provision of the Practicum abroad. Ridzuan et al. (2005)

focused on the Practicum model evaluation and identified six elements to be included: employer report, visiting tutors report, student weekly log and summary report, language skills assessment, and oral report. In terms of length, researchers proposed that each model be applied over a while to note shifts in expectations after the initial implementation period. To assess each model's perceived advantages and challenges, the study will ideally provide access to the views of stakeholders; educators, faculty advisers, and site supervisors. Cantalini-Williams (2014) spent at least three years designing and testing three teacher education practice models; Peer Mentorship Practicum, Model of Alternative Service-Learning Practicum, and Model of International Practicum. The advantages, challenges, and implementation consequences of the three models and the guidelines for model development progress were addressed. To facilitate comparisons and evaluations of common benefits and challenges, important aspects offer more importance to clear methodologies across the studies.

Due to the limitations of the current assessment method, an enhanced assessment tool or rubric is required. A rubric is commonly used in postsecondary education to help during the evaluation process. However, many questions remain about their quality and effectiveness (Philip, William, & Thomas, 2019). A better version of the rubric instrument is needed in assessing the real situation and indicator of Practicum performance. This research proposes developing the Practicum assessment instrument responsive to student learning needs and policy by integrating Practicum elements, university's expectations, and industry's expectations. The proposed assessment instrument will be implemented for several cycles in a real environment of Practicum. Cycles of refinement involving feedback from all stockholders will be employed. Detailed steps are explained in the methodology section.

## **METHODOLOGY**

A combination of Design Science Research methodology (Preffers et al., 2007) and Action Research is adapted to design the research methodology for this study. Action research is chosen based on its suitability involving implementation cycles in a real Practicum situation for evaluation purposes. Research methodology is divided into five main phases; awareness of problems, suggestions of the

solution, re-design of PRAK02 instrument, implementation, and evaluation, as illustrated in Figure 1.

**Figure 1**

*Research Methodology*



**Phase 1: Awareness of the problem**

In this stage, a combination of a literature review, a series of interviews and an early review performed during Practicum Review workshops highlights the various weaknesses of the existing instrument. To define the loophole and rooms for improvement, current evaluation methods and approaches to the implementation of Practicum from 2011 to 2016 are extensively studied. To understand the problems of the current evaluation instruments, content review and interviews with domain experts were also conducted. Among the experienced Practicum supervisors (supervisors from UUM supervisors), Practicum coordinators, and Practicum committee are domain experts with more than 10 years of experience in handling Practicum issues. Industry feedback is used as the essential guide to the problem with the current implementation.

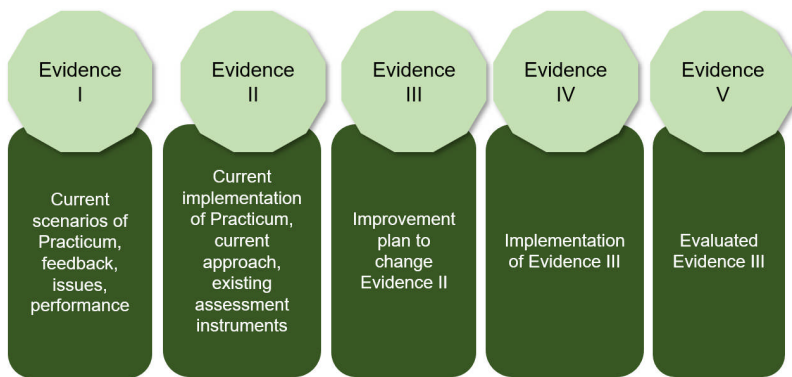
**Phase 2: Suggestion of solution**

In this phase, solutions for improving the assessment tools are carefully planned, based on the problem found in Phase 1. The solution of suggestion is focused on the integration and mapping of Program

Learning Outcomes (PLOs), Course Learning Outcomes (CLOs) and the Malaysian Qualification Framework (MQF) as defined in the PNGK Bersepadu (iCGPA) portion, Panduan Pentaksiran Hasil Pembelajaran (KPT, 2016). For action research, five pieces of evidence have been created, as shown in Figure 2.

**Figure 2**

*Evidences Produced in the Study*



Evidence I (current scenarios of Practicum, feedback, issues, performance), Evidence II (current implementation of Practicum, current approach, existing assessment instruments), Evidence III (improvement plan to change Evidence II), Evidence IV (implementation of Evidence III), and Evidence V (evaluated Evidence III).

### **Phase 3: Redesign of PRAK02 instrument**

Practicum or Internship course is different from other courses in IT program in terms of delivery method (Ali & Smith, 2015). Lih-bin (2019) indicated that internship programs could effectively equip students with both technical skills and soft skills that are necessary. Bitran et al. (2010) suggested in their related works that four main factors to be included in designing the assessment instruments are patient-centred teaching, teaching skills, assessment skills and learning climate.

Because of the differences in delivery methods and format, also skills, it needs special assessment criteria. Furthermore, the previous

assessment instrument did not specifically focus on the ordinary skills that students need to achieve. Therefore, a new version of the evaluation instrument to assess the student has been designed. It should be based on the Course Learning Outcomes (CLO) for STIX3912 Practicum course syllabus to start designing the instrument. The CLOs are illustrated in Figure 2.

**Figure 3**

*Course Learning Outcomes (CLO) for STIX3912 Practicum*



Based on the identified suggestions and evidence created in Phase 2, Practicum assessment instruments are carefully redesigned. Focus is given on the contributing elements in achieving the learning outcomes; stakeholders, assessment criteria, percentage and weightage of each element, industry's expectations, university's expectations, and performance (result-based).

#### **Phase 4: Implementation**

Implementation and refining of Evidence III (assessment tool) were carried out in three phases involving three Practicum sessions in three academic semesters. The first implementation stage was in semester A172. The first version of Proof III, consisting of the improvement plan and the early version of the appraisal model, would be used during the first stage. The findings are evaluated based on relevant



performance and input from supervisors (university supervisors) for the first implementation cycle.

The assessment tools are updated and further improved based on the outcome of the implementation in the first cycle. The refined evaluation tool was then has been implemented for a second implementation cycle affecting the A181 semester. Finally, the same procedures for the A182 semester are repeated, as seen in Figure 1.

### **Phase 5: Evaluation**

The assessment instruments and the students' results are evaluated in this phase involving both validation and verification. Instruments, overall performance, and some samples of the answered forms are reviewed by the experts (as described in Phase 3) for three (3) cycles. Focus is given on the content of the instruments, learning outcomes, language proficiency and format. Refinements are made for each cycle of the review.

Early version of the improved instruments has been evaluated by the domain experts focusing on the content. Among domain experts involved are Practicum Coordinator, Practicum Committee, Practicum Supervisors from UUM with at least ten years of experience with Practicum. Evaluations are conducted for several cycles. Their feedbacks are used to refine the instruments before it can be implemented in the next phase. Feedbacks from each respondent, area of expertise and years of experience are depicted in Table 2.

**Table 2**

#### *Feedbacks from Respondents*

Expert	Area of expertise	Year of experiences	Feedbacks
E1	Teleworking, ICT policy and social impact, E-government	26	Agree with the content, accuracy, and format of the instrument
E2	Academician, gender and technology	20	Agree with the content, accuracy, and format of the instrument

(continued)

Expert	Area of expertise	Year of experiences	Feedbacks
E3	Academician, Intelligent System Knowledge discovery, Content Management System	16	Agree with the content, accuracy, and format of the instrument. Improved the method of marks calculation
E4	Academician, computational linguistics	11	Strongly Agree with the content, accuracy, and format of the instrument.
E5	Academician, Data Warehousing, Database Design, System Analysis and Design	13	Strongly Agree with the content, accuracy, and format of the instrument.  Section A (Practical demo): the sub-attributes are difficult to apply for networking projects.  Section B : Individual Assessment (Social skill and responsibility & Values, Attitude & Professionalism): these elements are difficult to access by the lecturer as the practicum student is not performing tasks directly under the lecturer's observation, which is more suitable to access by company's supervisor.

## FINDINGS

Next, the syllabus has also stated a few transferable skills that need to be achieved by students. The skills are Knowledge, practical, social skills & responsibilities, values, attitudes & professionalism, problem-solving, communication skills, and lifelong learning. Hence, the instrument has been divided into three (3) sections, and in each section, the relevant skills have been set based on the transferable skills stated in the syllabus, as depicted in Table 3.

**Table 3**

*Transferable Skills to be Achieved by Students*

Section A	A: Verbal Communication	10%
Project Presentation (20%)	B: Practical - Project demo	10%
Section B	C: Knowledge	3%
Individual Assessment (20%)	D: Problem solving	10%
	E: Social Skill & Responsibility	2%
	F: Values, Attitudes & Professionalism	3%
	G: Lifelong Learning	2%
Section C	H: Proposal	4%
Project Assessment (20%)	I: Report draft	4%
	J: Final report	10%
	K: Log book	2%

Then, the skills are mapped to MQF elements and the CLOs with the percentage of marks given, as depicted in Table 4.

**Table 4**

*Transferable Skills Mapped to MQF Elements and the CLOs*

Assessment methods	Percentage	MQF	CLO1	CLO2	CLO3	CLO4
<b>Assignment 2: UUM's Supervisor (60%)</b>						
<b>Project presentation</b>	20					
a. Verbal communication		5			10	
b. Practical		2	10			
<b>Individual assessment</b>	20					
a. Knowledge		1				3
b. Problem solving		6	10			
c. Social skill		3				2
d. Values, attitude & professionalism		4				3
e. Lifelong learning		7				2
<b>Project assessment (written communication)</b>	20	5				
a. Proposal				4		
b. Report draft				4		
c. Final report				10		
d. Log-book				2		
<b>Total mark</b>	<b>60</b>					

There major components of an assessment are designed to achieve skills associated with seven MQFs. Communication, Leadership and Teamwork Skills (MQF 5) and Practical skills (MQF 2) are mapped to measure student's performance through their project presentation. Compared to the existing instrument, which only covered assessment on personal characteristics and logbook for individual assessment, the coverage of the improved instrument is broader and more organized. Students are assessed through five components (knowledge, problem-solving capability, social skills, values, attitudes, and practical skills. This will be used to measure student's capability in achieving MQF 1 (Knowledge), MQF 3 (Social Skills and Responsibilities), MQF 4 (Values, Attitudes and Professionalism), MQF 6 (Problem Solving and Scientific Skills), and MQF 7 (Information Management and Lifelong Learning Skills).

Communication, Leadership and Teamwork Skills (MQF 5) are measured by assessing Practicum written components, which are their proposal, report draft, final report, and logbook. However, items for measuring report drafts are revised to be more practical.

Next, rubrics for each section were designed and the sub-attributes have been adapted from iCGPA handbook as depicted in Table 5 to 15. There are three sections: Section A for project presentation, Section B for Individual assessment and Section C for project assessment. Likert scale 0 – 4 (poor-excellent) is used to measure the components.

### **Section A: Project Presentation (20%)**

Section A focuses on verbal communication (through project presentation evaluation) and student's practical skill through project demonstration as shown in Table 5. Project presentation evaluation consists of nine sub-attributes namely; purpose of presentation, content, clear delivery of ideas, confident delivery of ideas, effective & articulate delivery of ideas, adapt delivery to audience level, voice & pronunciation, eye contact, and understanding respond to questions.

**Table 5**  
*Assessment of Verbal Communication Skill in Section A*

Sub-attributes	0 Poor	1 Weak	2 Fair	3 Good	4 Excellent
<b>Verbal Communication (10%)</b>					
<b>Purpose of presentation</b>	Incomprehensible	Vague	Moderately clear	Clear	Very clear
<b>Content</b>	No grasp of subject matter	Lack of understanding of subject matter	Understand some of the subject matter	Understand most of the subject matter	Fully understand the subject matter
<b>Clear delivery of ideas</b>	Not able to deliver ideas clearly and require major improvements	Able to deliver ideas and require further improvements	Able to deliver some ideas and require minor improvements	Able to deliver ideas fairly clearly	Able to deliver various ideas with great clarity
<b>Confident delivery of ideas</b>	Not able to deliver ideas confidently	Able to deliver ideas with limited confidence and require further improvements.	Able to deliver ideas with some confidence but still require minor improvements	Able to deliver ideas fairly confidently	Able to deliver ideas confidently
<b>Effective &amp; articulate delivery of ideas</b>	Not able to deliver ideas	Able to deliver ideas	Able to deliver ideas with limited effect and require further improvements	Able to deliver ideas fairly effectively and require minor improvements	Able to deliver ideas effectively and articulately
<b>Adapt delivery to audience level</b>	Not able to deliver appropriately to the audience level	Able to deliver ideas with limited appropriateness to the target audience and require further improvements.	Able to deliver ideas appropriately to the target audience	Able to deliver ideas appropriately to the target audience well	Able to fully deliver ideas appropriately very well
<b>Voice &amp; pronunciation</b>	Mumbles, reading	Mumbles at certain places, most of the audience has difficulty in hearing the presentation	Voice is sometimes low, pronounce some words correctly. Some of the audience can hear the presentation	Voice is clear, pronounced words correctly. Most of the audience can hear the presentation	Voice is very clear. Pronounce words correctly. Audience can hear the presentation
<b>Eye contact</b>	No eye contact. Reading notes.	Occasional use of eye contact. Frequently reading notes	Moderate use of eye contact. Still reads notes	Maintains eye contact most of the time. Occasionally refers to notes	Maintain eye contact with audience, do not refer to notes nor having notes at hand
<b>Understand and respond to questions</b>	Not able to understand and respond to any question	Partly understand the questions but not able to accurately answer the questions	Able to understand and briefly answer questions	able to respond to questions reasonably well	Able to fully understand and respond to questions satisfactorily with explanations and appropriate examples

**Table 6**

*Assessment of Practical Skill in Section A*

Sub-attributes Practical - Project demo (10%)	0 Poor	1 Weak	2 Fair	3 Good	4 Excellent
<b>Functionality</b>	Project is not functional	Less than half of the project is functional	More than half of the project is functional	Project is functional but some parts can be improved	Project is perfectly functional
<b>Functional Specification</b>	Design does not include any of the mandatory requirements	Design includes very few mandatory requirements	Design includes only some mandatory requirements	Design includes most of the mandatory requirements	Design includes all mandatory requirements and suitable non-requirements
<b>System interaction</b>	Hard to figure out how to even get started	Hard to use	Can be used after some repetitive effort to learn	Easy to use after one or twice repetitive effort to learn	Intuitive, easy to use without any training
<b>Aesthetic</b>	There is no clear theme presented; the size, color, and placement of each element did not work together	There are themes but not consistent	Themes and interface elements (size, color, and placement) need to be learned	Themes and interface elements (size, color, and placement) that should work together needs further improvement	Themes and interface elements (size, color, and placement) work together, creating a clear path to understanding the interface
	The interfaces fail to enable users to understand how things will work as it is not consistent (no affordance)	The interface enables users to guess how things will work where the interface design presents a lot of inconsistencies (slight affordance but only one or two objects)	The interface enables users to understand how things will work, but users need help to use it as the consistency of the design needs more improvement (some affordance)	The interface enables users to better understand how things will work, but the consistency in design can be further improved	The interface enables users to easily understand how things will work, increasing their efficiency by presenting consistent design. (full affordance)
	Too crowded and no appearance of a layout being designed.	Complicated layout arrangement with unnecessary features/elements.	Some layout are inflow, some are not	Simple layout but not up to professional look and feel	Simple layout but neat and professional.
<b>Beneficial to organization</b>	Project is not beneficial	Less than half of the project is beneficial	More than half of the project is beneficial	Project is beneficial but some parts can be improved	Project is beneficial to organization
<b>Ready for implementation</b>	Project is not ready to be implemented	Less than half of the project is ready to be implemented	More than half of the project is ready to be implemented	Project is ready to be implemented but some modules can be improved	Project is ready to be implemented

While assessing practical skills (through project demo), six sub-attributes are included; functionality, functional specification, system interaction, aesthetic, beneficial to organization and ready for implementation as shown in Table 6.

The second component is individual assessment which is covered in Section B. Each student is expected to gain five skills during Practicum. The skills are knowledge, problem-solving, social skill, values, attitude & professionalism and lifelong learning. Table 7, 8, 9, 10 and 11 depicted sub-attributes used to assess individual skills.

## Section B: Individual Assessment (20%)

Sub-attributes for knowledge are understanding organization governance, Knowledge of key business principles and practices, and ability to apply knowledge into practices. While for problem solving skill, sub-attributes are problem identification, analysis, application, and decision making.

**Table 7**

### *Sub-Attributes to Assess Knowledge Skill*

Sub-attributes	0 Poor	1 Weak	2 Fair	3 Good	4 Excellent
<b>Knowledge (3%)</b>					
<b>Understanding of organization governance</b>	Poor understanding of the organization governance	Limited understanding of the organization governance	Fair understanding of the organization governance	Good understanding of the organization governance	Excellent understanding of the organization governance and can explain off hands
<b>Knowledge of key business principles and practices</b>	Do not understand the important information from a business point of view	Poor understanding what is Important from a business point of view	Often need guidance in understanding what is important from a business point of view	Good understanding of the important information from a business point of view and able to use it to solve relevant problems	Excellent understanding of the important information; able to use it to solve relevant problems and identify new business opportunities
<b>Ability to apply knowledge into practices</b>	Do not demonstrate skills in applying knowledge to practical problems	Demonstrates minimal skills in applying knowledge to practical problems	Demonstrates moderate skills in applying knowledge to practical problems	Demonstrates reasonable skills in applying knowledge to practical problems	Demonstrates excellent skills in applying knowledge to practical problems

**Table 8**

*Sub-Attributes to Assess Problem Solving Skill*

<b>Problem solving (10%)</b>					
<b>Problem Identification</b>	Not able to explain a problem, even with assistance	Able to partially explain a problem with maximum assistance	Able to explain a problem with minimum assistance	Independently able to explain a problem without assistance	Able to explain problem clearly and accurately
<b>Analysis</b>	Not able to organize and analyze gathered requirements and fails to define the factors that contribute to the problem/issue or explain the root of the problem	Finds difficulty in organizing and analyzing gathered requirements and finds difficulty in explaining the factors that neither contribute to the problem/issue nor explains the root of the problem	Able to organize and analyze gathered requirements, but does not clearly describe the factors that contribute to the problem/issue or clearly explain the root of the problem	Able to organize and analyze gathered requirements, describe <b>some</b> factors that contribute to the problem/issue or explain the possible roots of the problem	Able to organize and analyze gathered requirements, clearly describe the factors that contribute to the problem/issue or explain the root of the problem
<b>Application</b>	Not able to apply any new idea or knowledge to a given problem	Barely able to apply new idea	Limited ability to apply new idea or knowledge	Able to apply new idea or knowledge to a given problem with assistance from lecturer or student.	Able to apply new idea or knowledge to a given problem independently
<b>Decision Making</b>	Not able to make decisions based on comparison and contrast between information, ideas and solutions even with assistance	Able to make <b>some</b> decisions based on comparison and contrast between information, ideas and available solution with maximum assistance	Able to make decisions based on comparison and contrast between information, ideas and available solutions with some help	Able to make decisions based on comparison and contrast between information, ideas and available solutions	Able to make effective and excellent decisions based on comparison and contrast between information, identify problems and available solutions

Self-expression, interaction with others and etiquette are sub-attributes for social skill and responsibility skill. Values, attitudes, and professionalism are assessed on appearance, Proactive & Volunteerism, Work Ethics, and attendance to workshop provided before their internship period, as depicted in Tables 9 and 10 respectively.



**Table 9**

*Sub-Attributes to Assess Social Skill and Responsibility*

<b>Social Skill &amp; Responsibility (2%)</b>					
<b>Self-expression</b>	Not confident in doing a task	Limited self-confidence in doing a task	Sometimes demonstrate self-confidence	Frequently demonstrate self-confidence	Always display self-confidence
	Too self centred	Self centred	Sometimes accept other people's perception of self	Frequently accept other people's perception of self	Always accept other people's perception of self with an open heart
	Not aware of self ability and potential	Able to realize the self ability and potential when raised by others	Sometimes accept and give praise and feedback	Frequently accept and give praise and feedback	Always accept and give praise and constructive, rational feedback
<b>Interaction with others</b>	No interest to participate in conversations	Less interest to participate in conversations	Take part in conversations when initiated by others	Take the initiative to start a conversation	Start, maintain and end a conversation in a friendly manner
	No eye contact	Inappropriate eye contact	Less eye contact	Reserved eye contact	Maintain good/ appropriate eye contact
<b>Etiquette</b>	Need guidance to be ethical when carrying out responsibilities to the society	Lack of ethics when carrying out responsibilities to the society	Ethical when carrying out responsibilities to the society, but sometimes put self interest first	Frequently ethical when carrying out responsibilities to the society	Always ethical and promote being ethical when carrying out responsibilities to the society

**Table 10**

*Sub-Attributes to Assess Values, Attitudes and Professionalism*

<b>Values, Attitudes &amp; Professionalism (3%)</b>					
<b>Appearance</b>	Show appearance, not appropriate to situations or wear improper attire at all times	Show appearance, less appropriate to situations or wear improper attire most of the time	Show appearance, appropriate to situations and wear proper attire in general	Show appearance, appropriate to situations and most of the time wear proper attire	<b>Always</b> show appearance, appropriate to situations and wear proper attire at all times
<b>Proactive &amp; Volunteerism</b>	Demonstrate no interest to offer him/herself when offered to perform a certain task	Demonstrate less interest to offer him/herself when offered to perform a certain task	Agree to offer him/herself when offered to perform a certain task (reactive)	Offer him / herself voluntarily to perform a certain task	Offer him/herself voluntarily to perform certain task and demonstrate ability to lead a task

(continued)

Values, Attitudes & Professionalism (3%)					
<b>Work Ethics</b>	Practice inappropriate working culture such as bad behaviour, not punctual as well as not being efficient, not productive and unethical at work in almost all situations	Sometime shows appropriate working culture such as inconsistent behaviour, less punctual as well as being less efficient, productive and ethical at work in many situations	Practice good working culture such as good moral, timeliness as well as being efficient, productive and ethical at work in general	Practice good working culture such as good moral, timeliness as well as being efficient, productive and ethical at work in most situations	Always practice excellent working culture such as good moral, timeliness as well as being efficient, productive and ethical at work in all situations
<b>Attendance to workshop I</b>	Absent				Attended
<b>Attendance to workshop II</b>	Absent				Attended

The last skill in section B is Lifelong learning. Student will be assessed on self- learning, interest, initiative and effort. The sub-attributes to assess the skills are depicted in Table 11.

**Table 11**

*Sub-Attributes to Assess Lifelong Learning Skill*

Lifelong Learning (2%)					
<b>Self Learning</b>	Not able to self learn	Limited ability to self learn	Sufficient ability to self learn	In general, able to self learn	Good ability to self learn
<b>Interest</b>	Show no interest in exploring issues for a given task	Show limited interest in exploring issues for a given task	Demonstrate some interest in exploring issues for a given task	Demonstrate sufficient interest for exploring issues for a given task	Readily interested in exploring issues for a given task
<b>Initiative</b>	No initiative to complete a task	Demonstrate limited initiative in completing a task	Demonstrate moderate initiative in completing a task	Demonstrate good initiative in completing a task	Demonstrate excellent initiative in completing a task
<b>Effort</b>	No effort to complete task	Minimal effort to complete task	Sufficient effort to complete task	Good effort to complete task	Excellent effort to complete task

**Section C: Project Assessment (20%)**

The last section of this instrument is Section C designed to assess students' written communication skills. There are four documents to be submitted or prepared by students; proposal, draft report, final report and logbook during their six months of Practicum. Their written skill will be assessed based on the sub-attributes for each document. For

example, table 12 depicted six sub-attributes used to assess project proposal.

**Table 12**

*Sub-Attributes to Assess the roposal*

Sub-attributes	0 Poor	1 Weak	2 Fair	3 Good	4 Excellent
<b>Proposal (4%)</b>					
<b>Project Title</b>	Incomprehensible	Vague and not relevant	Moderately clear and relatively irrelevant	Clear but lack relevance	Very clear and relevant to the field of IT and organization's need
<b>Problem Statement, Significance of the Study</b>	Problem is vaguely stated. No justification between purpose and problem/opportunity. The project is <b>not</b> significant	Problem is too broad. Lack of justification between purpose and problem/opportunity. The project is <b>not</b> significant	Problem is stated. Justification between purpose and problem/opportunity is not clear. The project <b>lack</b> significance	Problem are stated and justified but one or more are not stated clearly and concisely. The project is significant but are not highlighted clearly	Problem is stated and justified very clearly. The project is highly significant
<b>Objectives</b>	Objectives are not clearly stated	Objectives are not aligned with stated problem	Objectives are stated but there is lack of coherence to the stated problem	Objectives are stated but one or more are not stated in a clear and concise manner	Manageable numbers of objectives that is clear and aligned with the stated problem
<b>Scope</b>	Not relevant and do not fulfill Practicum requirements	Too small/ broad and do not fulfill the Practicum requirements	Manageable scope but not viable for Practicum requirements	Fulfill Practicum requirements but need some improvement	Manageable, viable, relevant scope and fulfill Practicum requirements
<b>Methodology</b>	Not written	Methods for collecting and analyzing requirements are minimally discussed also do not aligned with objectives	Methods for collecting and analyzing requirements are minimally discussed but aligned with the objectives	Methods for collecting and analyzing requirements are adequately discussed relative to the research objectives	Methods for collecting and analyzing requirements are thoroughly discussed relative to the objectives
<b>Feasibility study</b>	Not feasible	Unclear	Moderately feasible	Reasonable	Feasible

Six sub-attributes to assess project proposal are project title, objectives, scope, methodology and feasibility study. On the other hand, report draft only assessed on three sub-attributes: completeness of the content, report structure and mechanics or format used in the draft. These sub-attributes are depicted in Table 13.

**Table 13**

*Sub-Attributes to Assess Report Draft*

Report draft (4%)					
Completeness	Incomplete	Incomplete but the important component is there	Complete but require minor improvements	Complete but not well written	Complete and well written
Structure	Not able to write ideas coherently	Able to write ideas with limited coherence and require major improvements	Able to write ideas fairly coherently but require minor improvements	Able to write ideas coherently, yet can be improved	Able to write ideas with excellent coherence
Mechanics/ format	Poorly formatted Does not follow any guidelines	Formatted but require further improvements Reflects minimal knowledge of APA/IEEE guidelines Reflects minimal knowledge of APA/IEEE guidelines	Formatted with minor improvements Reflects incomplete knowledge of APA/IEEE guidelines	Adequately formatted Uses APA/IEEE guidelines with minor violations to cite sources	Well formatted Uses APA/IEEE guidelines accurately and consistently to cite sources

The final report is the core document that needs to be prepared by the student. Seven sub-attributes have been set to be assessed; (i) Establishing the project context (ii) Appropriate methodology in carrying out the project (iii) Discussion, conclusion, implication and recommendation (iv) report organization and structure (v) graphics (charts, tables, graphs) (vi) mechanics (punctuations, grammar, spelling) (vii) references. These sub-attributes are depicted in Table 14.

**Table 14**

*Sub-Attributes to Assess Final Report*

Final report (10%)					
Establishing the project context	Problem is vaguely stated while objectives are not stated	Problem is too broad. Objectives are not aligned with stated problem	Problem is stated but there is lack of coherence between purpose, problem/opportunity and objectives	Problem and objectives are stated but one or more are not stated in a clear and concise manner	Problem is stated very clearly. Manageable numbers of objectives that is clear and aligned with the stated problem

(continued)

Final report (10%)					
<b>Appropriate methodology in carrying out the project</b>	Methods for collecting and analyzing requirements to support project objectives are not discussed	Methods for collecting and analyzing requirements are wrongly discussed relative to the project objectives	Methods for collecting and analyzing requirements are minimally discussed relative to the project objectives	Methods for collecting and analyzing requirements are adequately discussed relative to the project objectives	Methods for collecting and analyzing requirements are thoroughly discussed relative to the project objectives
<b>Discussion, conclusion, implication &amp; recommendation</b>	Discussion and conclusions are not presented limitation and recommendation are not presented	Discussion and conclusions are unclear Limitation and recommendation are unclear	Discussion and conclusions are presented but less clear, irrelevant to objectives Limitation and recommendation are presented but less clear	Discussion, conclusions, limitation and recommendation are moderately presented	Effective discussion and conclusions Limitation and recommendation are clearly presented
<b>Report organization and structure</b>	The organization is problematic or nonexistent	The organization is unclear or ineffective	The organization is not clear or does not follow the required report structure	The organization is clear but containing minor problems	Well organized
<b>Graphics (charts, tables, graphs)</b>	Diagrams and illustrations are not used to clarify the content	Diagrams and illustrations are neither neat nor entirely accurate and they don't add much to the content	Diagrams and illustrations are somewhat accurate though do not add understanding to the content	Diagrams and illustrations are accurate	All diagrams and illustrations are neat, accurate and add understanding to the content
<b>Mechanics (punctuations, grammar, spelling)</b>	Poorly formatted	Formatted but require major improvements	Formatted with minor improvements	Adequately formatted	Well formatted
<b>References</b>	Does not follow any guidelines	Reflects minimal knowledge of APA/IEEE guidelines	Reflects incomplete knowledge of APA/IEEE guidelines	Uses APA/IEEE guidelines with minor violations to cite sources	Uses APA/IEEE guidelines accurately and consistently to cite sources

The last component to be assessed in this section is student's Logbook. Again, only one sub-attribute is used to assess in terms of its completeness. It is to ensure that students record their daily activities at work during the Practicum period. These sub-attributes are depicted in Table 15.

**Table 15**

*Sub-Attributes to Assess Logbook*

Logbook (2%)					
<b>Completeness</b>	Incomplete	Less than half are complete	More than half are complete	Complete but not detailed	Complete and reasonably detailed to the level of Practicum report

## **CONCLUSION**

The improved version of the university's evaluation instrument is described and addressed by concentrating on achieving and evaluating CLOs and the necessary skills as specified by MQFs. It has been successfully implemented for three academic sessions in a real environment. The drawbacks of the early implementation of the Practicum assessment have been resolved using the proposed instruments.

The improved instrument is anticipated to measure the performance of Practicum accurately and can be used to evaluate further several other aspects that demonstrate the performance of Practicum in preparing IT experts to face the industry as indicated in IR 4.0. To ensure continuous improvement of the instrument, future works could be considered in re-evaluating the instrument after three to five years of its implementation.

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