Teaching and learning management strategy for a basic medical science course

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Abstract

Basic medical science courses were delivered with accompanying white papers or curriculum documents in an effort to increase students' motivation and responsibility towards independent learning. The supporting curriculum documents included students learning time and contact hours based on the forty notional hours. Students were provided with information on educational objectives, content, teaching strategies and instructional assessment, and the equivalence of each teaching and learning activity in terms of contact and student learning time hours. The equivalent hours of teaching and learning activity served as a guide to ensure instructors are not overloading their students. This strategy serves to better equip the students in their learning management in order to develop good independent learning habits and lifelong learning.

Keywords

Student-centred learning, notional hours, contact hours, student learning time, learning guide, independent learning, basic medical science

1.0 INTRODUCTION

The United Kingdom University system of using notional hours to calculate academic load has been adopted in Malaysia in an effort to shift from teacher-centred to learner-centred and outcome-based education. The adoption was initiated with enactment of the Malaysian Qualifications Agency (MQA) Act 2007 by the Malaysian Parliament (Malaysian Qualifications Agency, 2007; Malaysian Qualifications Framework, 2011; The Scottish Credit and Qualifications Framework Partnership, 2010). This strategy is targeted to better equip university students to manage and be responsible of their own learning, and in order to develop good independent learning habits and lifelong learning (Finsterwald, Wagner, Schober, L□ftenegger & Spiel, 2013). Besides that Malaysia, which is a fast developing nation, is putting more emphasis on outcome-based education

in order to achieve the status of a fully developed nation by 2020 (Lee, 1999; Mohd Ghazali *et al*., 2008; Vicziany & Puteh 2004).

Malaysia Qualifications Agency (MQA) is the statutory agency under the Ministry of Higher Education (MoHE), responsible for approving academic programmes and for carrying out accreditation processes. Accreditation practice controls the quality of programmes run by private institutions of higher learning in Malaysia. Private universities have to submit programme proposals in the form of curriculum documents which are given approval once criteria set by the MQA have been met. It is in the approved documents that the teaching and learning activities are outlined as guidance for institutions to run academic programmes. From here onwards the institution has to translate the course curriculum into actual teaching and learning activities based on the academic load set in the original MQA approved curriculum documents. The academic load refers to teaching and learning activities given a quantitative measure in terms of hour equivalence (MQA, 2007).

In this system of teaching and learning, which is still very much teacher-centred, instructors not only have to develop and implement learning materials from the MQA approved document, but become facilitators of learning to their students, which is quite similar to the lifelong learning approaches to acquire certain competencies (Ananiadou & Claro, 2009). Adoption, implementation and sustainability are important steps in ensuring the educational tools or strategies are embraced by the instructors effectively (Durlak & DuPre, 2008).

A regular undergraduate class would meet based on the number of hours per week stated as the credit hour over a 14-week semester, equivalent to roughly the numbers of hours of contact with the instructor teaching the course. In addition to these 'contact time' hours (CT), 'student learning time' hours (SLT) are added to make up to, but not exceeding, the total contact and independent learning hours of a 40-hour notional multiplied by the credit hour (MQF, 2011; SQCF, 2010).

For example a 3 credit hour class which meets 3 times 1 hour per week, or 1 times 3 hours weekly, would have a total of CT hours plus SLT hours of 3 times 40 equals 120 hours. The notional hours 40-hour was used as a the basis to calculate the total student learning time which include the CT, and time taken to prepare for lectures or tutorials and other tasks before, during and after delivery of a lesson (Malaysia University of Science and Technology, 2012; SQCF, 2010).

Along with these two determinants (CT and SLT), assignments and examinations were also assigned fixed equivalent hours. The SLT for an assignment would be a rough estimation for a student to complete the given task. It could be anything from half an hour to a maximum of 3 hours depending on the course instructor. Since there is no contact for the assignment (task is given in advance or through electronic communications), the CT hour is set at zero.

Each teaching and learning contact activity to the student learning time (CT: SLT) is given a fixed ratio as in Table 1 for calculation of total notional hours per credit hour of a university course (MQF, 2011). Teaching and learning activities may include but are not limited to lectures, tutorials,

laboratory practical, student-centred learning (SCL), problem-based learning (PBL) and field trips (MQA, 2007).

2.0 TEACHING AND LEARNING MANAGEMENT TOOLS

The faculty development programme undertakes the task of providing the training of instructors to implement the teaching and learning strategies. The faculty generally received training from the MQA itself. Preparation includes writing of the course synopsis and schedule and the daily learning guides adopted from the main MQA approved curriculum document (Table 2). The course schedule and learning guides are the most important tools in ensuring students understand what is expected of them at the beginning of the academic session or at each lesson, respectively.

The course synopsis includes basic information such as the assignments types, reading pages to the main textbook, attendance requirement and the general learning outcomes expected to be achieved by the students (Table 3). The course schedule is basically the timetable but with more details on the teaching and learning strategies, and given equivalent hours in terms of CT and SLT (Table 4).

The learning guides written for every lesson in contact with the instructor would include the delivery method and the required skills for learning as deem appropriate for learners (Table 5). Inclusive in this section would be any skills highly recommended for incorporation into educational strategies (Ananiadou & Claro, 2009). Guidelines (Figure 1) for preparation of student-centred learning (SCL) modules were given during the first class meet, and students are expected to follow the guidelines as closely as possible.

These curriculum documents were kept in teaching files for inspection during an internal auditing, and by the MQA officials from MoHE for accreditation purposes. Documents served as an indicator of the course instructor having implemented the teaching modules and is called the 'teaching file'. Other documents would also be included from time to time in the teaching file as the semester progresses, ending finally with final results and answer scripts from 5-top, 5-middle and 5-bottom performers. The rest of the answer scripts are archived in safety vault for a period of ten years before being destroyed.

2.1 Course instructors

Course instructors were given training during a workshop, conducted several weeks before a new semester begins, to create the additional supporting curriculum documents for the course. In the case of the course having more than one instructor, a course coordinator would be appointed to monitor the running of the course throughout the whole semester.

During the workshop, instructors were trained to write out the course synopsis, course schedule and learning guides. If a particular course is taught by several instructors, the documents were written to include all activities and method of delivery according to each instructor's preference.

A typical training schedule conducted at faculty level is as illustrated in the flow chart in figure 2, and for writing the supporting curriculum documents as in table 3, 4 and 5.

2.2 The Course Synopsis and Course Schedule

The course synopsis and schedule showed all teaching and learning activities that have been planned for the academic session (table 3 and 4). In Malaysia, a typical undergraduate degree programme meets for 14 weeks per semester (there are two semesters per academic year), with a one week break in between usually after the seventh week.

A basic undergraduate course such as Pathology with two credit hours would have a total of 80 hours, inclusive of all teaching and learning activities planned by the instructor. The course schedule was generally prepared using the Word Excel Spreadsheet or Word Document, and distributed to students as hard- or softcopy or sometimes both.

The calculation of hours spent is a rough estimation of how the instructor would conduct the course. Students were given clear instructions on the course requirements, enhancing their learning capabilities and lessening dependence on the instructor to remind students of datelines. Students are expected to be able to learn more effectively when the teaching and learning activities are spelt out clearly, especially in an outcome-based educational system.

2.3 The learning guide

Along with the course schedule, a learning guide was also prepared and distributed to students for every contact and non-contact meetings. Learning guide for each lesson was provided so student is always guided when doing independent learning. A typical learning guide consists of abstract, learning resources, background knowledge, important terms or keywords, the content or learning in-class activity, summarisation task and finally an evaluation (table 5).

The abstract would tell briefly the scope of topics to be covered during the contact session with the instructor. The learning resources are usually the main and supplementary textbooks along with websites recommended by the instructor. The background knowledge indicates the pre-requisite for the particular topic of discussion, and could include previous courses that were required of the students. The terms or keywords section lists out the main terminologies used in the topic, and students are expected to be able to define some of the terms during exams.

The learning objectives are the most important part of the learning guide because this is what the students are expected to learn during the lesson. The learning objective is written according to the Bloom's taxonomy or the revised version (Bloom, 1956; Razmjoo & Kazempourfard, 2012), and may require that students use previously learned skill in lower level course (for example doing the 6-point disease analysis which consists of aetiology, epidemiology, prognosis, complications and sequelae, and signs and symptoms learned the previous semester in Pathology 1). The content or learning activity would be the type of teaching strategy and learning activity planned for the day according to the schedule set by the course instructor. A good learning objective which is specific,

measurable, achievable, relevant and written for a specific time of learning should provide good guidance to students when doing independent work.

The summary is usually a task that students have to complete and can be submitted as a written assignment in the form of a summative evaluation. Generally students are asked to draw a mind map or an organisational chart, or write a brief summary on a sub-topic of the lesson. The main aim for this mini task is to ensure students get a generalised idea of the topic. Lastly is the evaluation, which could be anything from multiple choice to structured questions, "fill in the blanks", "True/False statements" or clinical case comprehension exercise. The evaluation is an assignment that checks on the achievement of the learning objectives by students. Assignments were marked and returned back to students promptly so students were able to gauge their competencies in the subject matter taught for the particular lesson. The instructor may give assignments based on all learning objectives targeted for the day, or may integrate all of learning objectives in one single assignment.

3.0 CONCLUSIONS

It was noted that not all academics were willing to adopt the newly devised teaching and learning management (TLM) strategy. Willingness to adopt certain teaching strategies definitely goes hand in hand with the teacher's belief and values especially when technology is involved (Kim, Kim, Lee, Spector & DeMeester, 2013; Nespor, 1987; Ng, Nicholas & Williams, 2010). Support from higher university officials also plays a vital role in ensuring success of adoption and implementation of TLM strategy. University officials should monitor TLM implementation process by setting it as a key performance indicator in key result areas of effective teaching.

Efficacy of the TLM strategy can be investigated to provide statistical research data when comparing students' attitudes and achievement towards a course taught by academics which adopted the strategy, to those that did not. Studies have shown that high quality teacher professional development could produce more favourable student achievement (Borko, Jacobs & Koellner, 2010). A rough survey conducted on a group of students showed general favourable responses towards academics who have adopted the TLM strategy in managing their courses.

Further studies on the efficacy of the TLM strategy developed and adopted should provide more information on its significance in increasing students' achievement in an outcome-based education. Once its efficacy has been proven, implementation and monitoring of the TLM strategy would be easier and more readily adopted by the academics.

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Table 1 Ratio of contact to student learning time (CT:SLT) in terms of hour equivalence	
Type of teaching and learning activities	Ratio of hour equivalence (CT:SLT)
Lecture	1:1
Student seminar/ Problem-based learning	2:2
Tutorial	1:1.5
Student-centred learning	2:3
Laboratory practical	3 or 2:1
Field trips	*n*:1 (n = unlimited)
Assignment	0:*n* (n = unlimited)
Midterm test (pro-rate)	1:2
Final examination (pro-rate)	3:10
Key CT: Contact hour; SLT: Student Learning Time	

Table 2 MQA approved curriculum document for Pathology 2		
1.	**Name of Course/Module**	Pathology 2
2.	**Course Code**	[Code given and registered in the Academic Affairs Department of the institution which handles student registration]
3.	**Name(s) of academic staff**	[Name of teaching instructor proposed but may not be the actual person teaching]
4.	**Rationale for the inclusion of the course/module in the programme**	The purpose of teaching Pathology 2 is to provide students with the understanding of common systemic disease manifestations; for diagnosis, prognosis, prevention and general management of diseases. This course enables students to correlate the clinical symptoms of diseases and its relationship on the basis of the underlying pathology.
5.	**Semester and Year offered**	Semester 4 Year 2

<table>
<tr><td rowspan="3">6.</td><td>Total Student Learning Time (SLT)</td><td colspan="4">Face to Face</td><td>Total Guided and Independent Learning</td></tr>
<tr><td rowspan="2">L = Lecture
T = Tutorial
P = Practical
O = Others</td><td>L</td><td>T</td><td>P</td><td>O</td><td></td></tr>
<tr><td>28</td><td>10</td><td>0</td><td>Self directed learning
= 30 hours

Test/Quizzes/Exam
= 12 hours</td><td>80 hours</td></tr>
<tr><td>7.</td><td>Credit Value</td><td colspan="5">2 [2 x 40 = 80 notional hours]</td></tr>
<tr><td>8.</td><td>Prerequisite (if any)</td><td colspan="5">Pathology 1</td></tr>
<tr><td>9.</td><td>Learning Outcomes</td><td colspan="5">At the end of this module, the student will be able to:
[the macro learning outcomes are listed here]

Example: To explain the pathophysiological changes in different systemic diseases</td></tr>
<tr><td>10.</td><td>Transferable Skills: Skills and how they are developed and assessed, Project and Practical experience and Internship</td><td colspan="5">Students who undergo this course are expected to demonstrate the ability to: [the transferable skills are listed here]
Example: To distinguish pathological lesions from normal tissue.</td></tr>
<tr><td>11.</td><td>Teaching - learning and assessment strategy</td><td colspan="5">This course provides the following approaches:

[List of general teaching and learning activities proposed here]
Example: Lectures, Tutorials/ SCL, PBL, Assignments, Test/Quiz, Examination]</td></tr>
<tr><td>12.</td><td>Synopsis</td><td colspan="5">Pathology 2 is the study of pathophysiological changes in different systems of the human body (systemic pathology), mechanisms of their disturbance, the morphological and clinical manifestations.</td></tr>
<tr><td>13.</td><td>Mode of Delivery Lecture, Tutorial, Workshop, Seminar</td><td colspan="5">Lectures, tutorial/SCTL, group presentations, group discussions, etc</td></tr>
</table>

<table>
<tr><td>14.</td><td>Assessment Methods and Types</td><td colspan="8">Types of Assessment
Continuous - 60 %
Final - 40 %
Assessment Methods
Final Examination (Theory) - 40%
Test/Quiz - 20 %
Assignments - 40 %</td></tr>
<tr><td>15.</td><td>Mapping of the course / module to the Programme Aims</td><td colspan="8">This course is expected to contribute to the body of knowledge which students will carry with them into a research career. This should be a “working” body of knowledge which the student can apply, in a problem solving manner, to understanding mechanisms of disease manifestations.</td></tr>
<tr><td rowspan="3">16.</td><td rowspan="3">Mapping of the course / module to the Programme Learning Outcomes</td><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td></tr>
<tr><td>✓</td><td>✓</td><td></td><td></td><td></td><td>✓</td><td>✓</td><td></td></tr>
<tr><td colspan="8">Key
PO1: Knowledge
PO2: Practical Skills
PO3: Social Skills and responsibilities
PO4: Ethics, professionalism and humanities
PO5: Communication, leadership and team skills
PO6: Scientific methods, critical thinking and problem solving skills
PO7: Lifelong learning and information management
PO8: Entrepreneurship and managerial skills</td></tr>
<tr><td rowspan="5">17.</td><td rowspan="5">Content outline of the course /module and the SLT per topic</td><td colspan="5" rowspan="2">Course Content</td><td colspan="4">SLT (hours)
[an estimation of academic load]</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>O</td></tr>
<tr><td colspan="5">(Title of topic 1 & sub-topics)</td><td>4</td><td></td><td></td><td>4</td></tr>
<tr><td colspan="5">(Title of topic 2 & sub-topics)</td><td>4</td><td></td><td></td><td>4</td></tr>
<tr><td colspan="5">(Title of topic 3 & sub-topics)</td><td>4</td><td></td><td></td><td>4</td></tr>
<tr><td colspan="5">(Title of topic 4 & sub-topics)</td><td>4</td><td>5</td><td></td><td>4</td></tr>
</table>

		(Title of topic 5 & sub-topics)	4			4
		(Title of topic 6 & sub-topics)	4			5
		(Title of topic 7 & sub-topics)	4	5		5
		Total	**28**	**10**	**0**	**30**
		Key:L = Lecture; T = Tutorial; P = Practical; O = Others				
18	**Main references supporting the course**	[The proposed list of textbooks as main and supplement texts of latest 5 year publications]				
	Additional references supporting the course	[Additional learning materials in the form of journals or worksheets are listed here]				
19	**Other additional information**	This is a curriculum for basic medical science course in homeopathy medical science.				

Table 3 Course synopsis for students	
Name of Course	*Pathology 2*
Semester/Level	*Semester II of 2012/2013 Undergraduate Second Year*
Credit Unit	*2.0 credit hours*
Total Hours	*80.0 (based on the 40 notional hours)*
Prerequisites	*Student must have taken General Pathology and Microbiology*
Course Description	*Pathology 2 is the study of pathophysiological changes in different systems of the human body (systemic pathology), mechanisms of their disturbance and the morphological and clinical manifestations. The 6-point disease analytical skills learned in Pathology 1 will be widely applied for studying the systemic diseases of bodily organs.*
Course Learning Outcomes/ Objectives	At the end of the module, students should be able to: [The learning outcomes as in the MQA approved curriculum document]
Course Logistics	*Wednesdays 11.00 to 1.0pm on the classroom on 3rd Floor*
Teaching/Delivery Methods	*Lectures, Student-centred learning & Clinical case studies.*
Learning Materials:	[The main textbook can be decided by the academic who shall be teaching and need not follow the actual texts listed in the MQA approved document. However the books should be of recent publications generally within the last five years] 1. *Underwood, J.C.E. and Cross, S.S. (2009). General and Systematic Pathology 5th Edition, Churchill, Livingstone Elsevier. 857pp. QZ 4G328. (Main textbook)* 2. *Kumar, Abbas, Fausto. (2005) Robbins & Cotran Pathologic Basis of Disease 7th Edition. (supplement textbook)*
Assessment Criteria	*Continuous: Assignments, mini projects, midterm test (60%)* *Final: MCQ, SAQ and essay (40%)*

Attendance	[Attendance rules and regulations are as listed in the Student Handbook published by the Student Affairs Department of the University. The listed ones in this section would be additional according to the course which is inclusive of the total contacts with the instructor]. Example: *Barred from sitting for the Final Exam if attendance less than 80% (**not more than 4**) unexcused absences throughout the whole block.*
Course Content and reading pages of main textbook	[Listed content as in the MQA approved curriculum document along with reading pages taken from the main textbook]

NO.	**COURSEWORK (Assessment: Continuous – 60%; Final – 40%)** [The percentage breakdown ratio of continuous assessment and final, in this case 60:40 must follow the MQA approved curriculum document]	**Percentage towards grading**
1	*Assignments (8 at 2%)- Continuous Assessment*	*20*
2	*Clinical case/Mini projects (2 @10%) - Continuous Assessment*	*20*
3	*Mid-term (1 @ 20%) - Continuous Assessment*	*20*
4	*Final Exam (2 hrs) – Final Assessment*	*40*

Table 4 The Course Schedule academic load in hour equivalence						
Wk	**Date**	**Time**	**Topics**	**Mode of delivery**	**Contact (hrs)**	**SLT (hrs)**
1	**9-Jan**	**11-1**	*Topic 1*	*L*	*2*	*2*
			Assignment 1	*A*	*0*	*1*
2	**16-Jan**	**11-1**	*Topic 2*	*L*	*2*	*2*
			Assignment 2	*A*	*0*	*1*
3	**23-Jan**	**11-1**	*Topic 3*	*L*	*2*	*2*
			Assignment 3	*A*	*0*	*1*
4	**30-Jan**	**11-1**	*Topic 4*	*L*	*2*	*2*
			Assignment 4	*A*	*0*	*1*
5	**6-Feb**	**11-1**	*Topic 5*	*L*	*2*	*2*
			Assignment 5	*A*	*0*	*1*
	11 - 15 Feb		***MID-SEMESTER BREAK***			
6	**20-Feb**	**11-1**	*Tutorial 1*	*T*	*2*	*3*
7	**27-Feb**	**11-1**	*Midterm Exam*		*2*	*4*
8	**6-Mar**	**11-1**	*Kidney & Urinary Tract Diseases*	*L*	*2*	*2*
			Assignment 6	*A*	*0*	*1*
9	**13-Mar**	**11-1**	*Male & Female genital Diseases*	*L*	*2*	*2*
			Assignment 7	*A*	*0*	*1*
10	**20-Mar**	**11-1**	*Skin diseases*	*L*	*2*	*2*
			Assignment 8	*A*	*0*	*1*
11	**27-Mar**	**11-1**	*Bone Diseases*	*SCL**	*2*	*3*
12	**3-Apr**	**11-1**	*Endocrinal Diseases*	*SCL*	*2*	*3*
13	**10-Apr**	**11-1**	*Clinical and chemical pathology*	*SCL*	*2*	*3*
14	**17-Apr**	**11-1**	*Tutorial 2*	*T*	*2*	*3*
STUDY BREAK (ONE WEEK)						
EXAM WK 1 & 2					*2*	*7*
TOTAL					*30 hrs*	*50 hrs*
GRAND TOTAL					*80 hours*	

Key: L = Lecture; SCTL = Student-centred learning; A = Assignment; T = Tutorial
* Guidelines for preparation provided to students at beginning of course (see sample figure 1)

Table 5 Learning Guide	
Topic 1 – Gastrointestinal diseases – Lecture (2-hr)	
1	**Abstract** [A brief outline of the lecture sub-topics] *Sample: This lesson will touch on the disease characteristics, factors and cause of diseases – inborn or acquired and whether it is genetic or environmental of origin. Examples of aetiological agents and pathogenesis of selected diseases of the gastrointestinal tract.*
2	**Learning Resources** [Main text or supplementary readings required for this lesson] 1. *Alimentary System in General and Systematic Pathology 5th Edition, C.E Underwood & S.S Cross, Churchill Livingstone Elsevier, Chapter 15, 356-401.* 2. *Turner, J.R. The Gastrointestinal Tract in Kumar et al: Robbins and Cotran Pathologic Basis of Disease 8E, Chapter 17.*
3	**Background Knowledge** [Previously learned knowledge associated with this lesson] *Anatomy, Physiology, Pathology 1, Microbiology*
4	**Terms/Keywords** [Important definitions that students should focus on] *Chronic gastritis, Crohn's disease, Coeliac disease, Dyspepsia, Giardiasis, In ammatory bowel disease, Irritable bowel syndrome, Jaundice, malabsoprtion*
5	**Learning Objectives** [The outcome of learning process from this lesson. The instructor provided a list of about four to five learning objectives, appropriate for the topic for a stated time interval of delivery, which in this case is two hours] *At the end of this lesson students should be able to:* *LO1: Describe the anatomy associated with common pathological conditions of the GIT*
6	**Content/Learning activity** [The actual lesson activity] *Part A: Lecture on Gastrointestinal diseases (1hr 20 minutes)* *Part B: Discussion session (20 minutes*)
7	**Summary** [The assignment to check on student's overall understanding of the lesson] *Write an A4 size mind map to show non-infectious GIT diseases and the aetiology.*

8	**Evaluation** [The assignment to check whether students have been able to acquire the learning objectives listed in section number five above] *Clinical case: Giardiasis (please submit in handwritten format during next lesson)* *A 33-year-old man presented with complaints loss of weight following bouts of yellowish diarrhoea which started about three years ago, along with pruritic anus which became worse after eating porridge oats. He has developed intolerance to milk. Faecal sample tested positive for Giardia lamblia. Patient given three doses of 200mg metronidazole for five days. The pain is gone but faeces still runny and turn yellowish when he ate porridge oats or white bread.* *1) Why did the patient's symptoms worsened after eating the porridge oats?* *2) Explain mechanism of how patient acquires intolerance to milk, and subsequently the diarrhoea and pruritic anus in this case.* *3) Explain the pathogenesis of infection and the pathophysiology of malabsorption in this case. (You may draw the life cycle of infection etc to help with the explanation)* *4) Explain the reason for patient still having the symptoms even after being treated.* *5) How should this patient be managed successfully?*

The SCL modules will be posted on the learning management system (LMS) portal or given as soft copy through electronic mailing system to the students one week before the scheduled class meet. The format for SCL module is similar to the learning guide for lecture.

HOW TO PREPARE FOR THE SCL LESSONS?

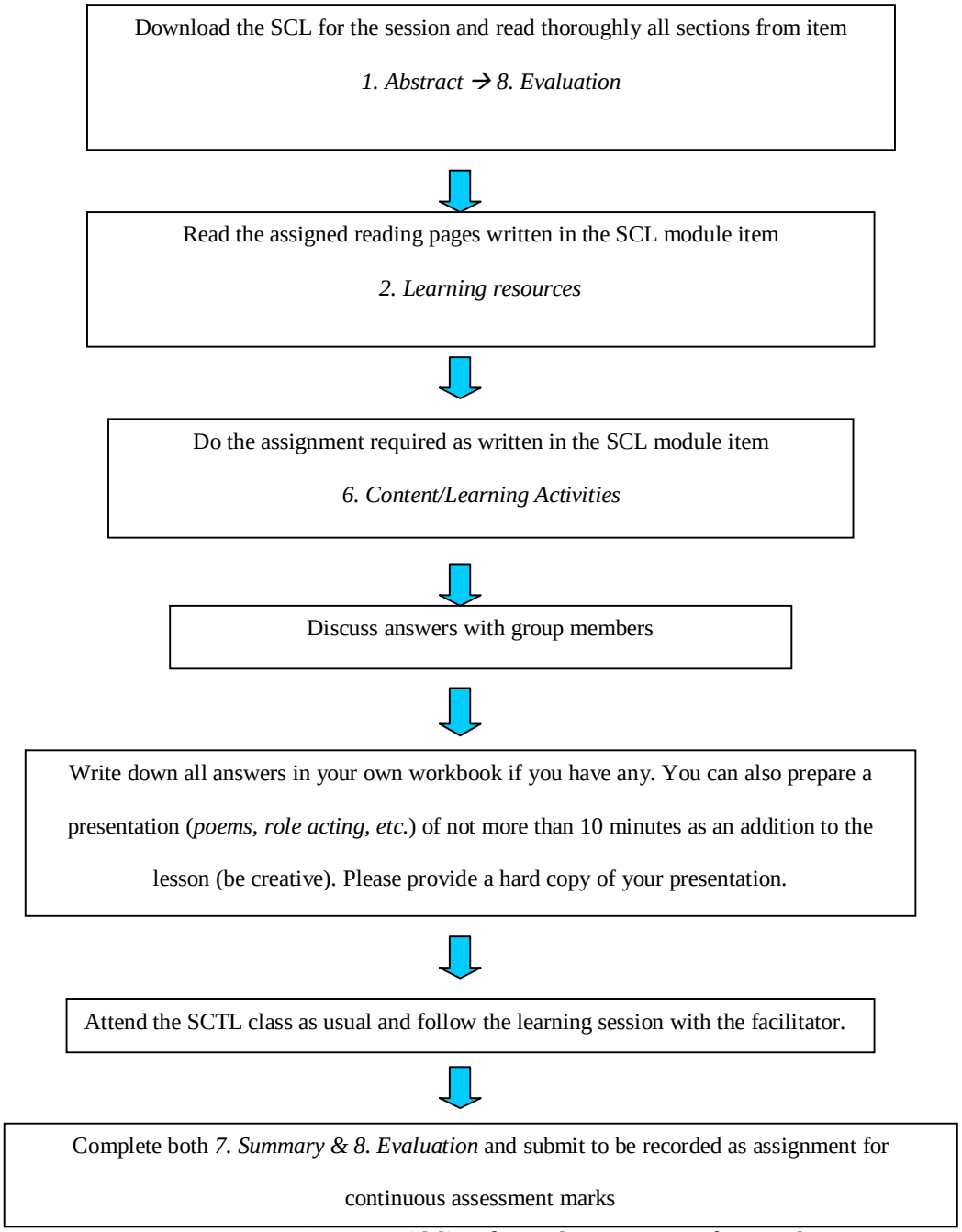

Figure 1 Guidelines for student to prepare for SCL lessons

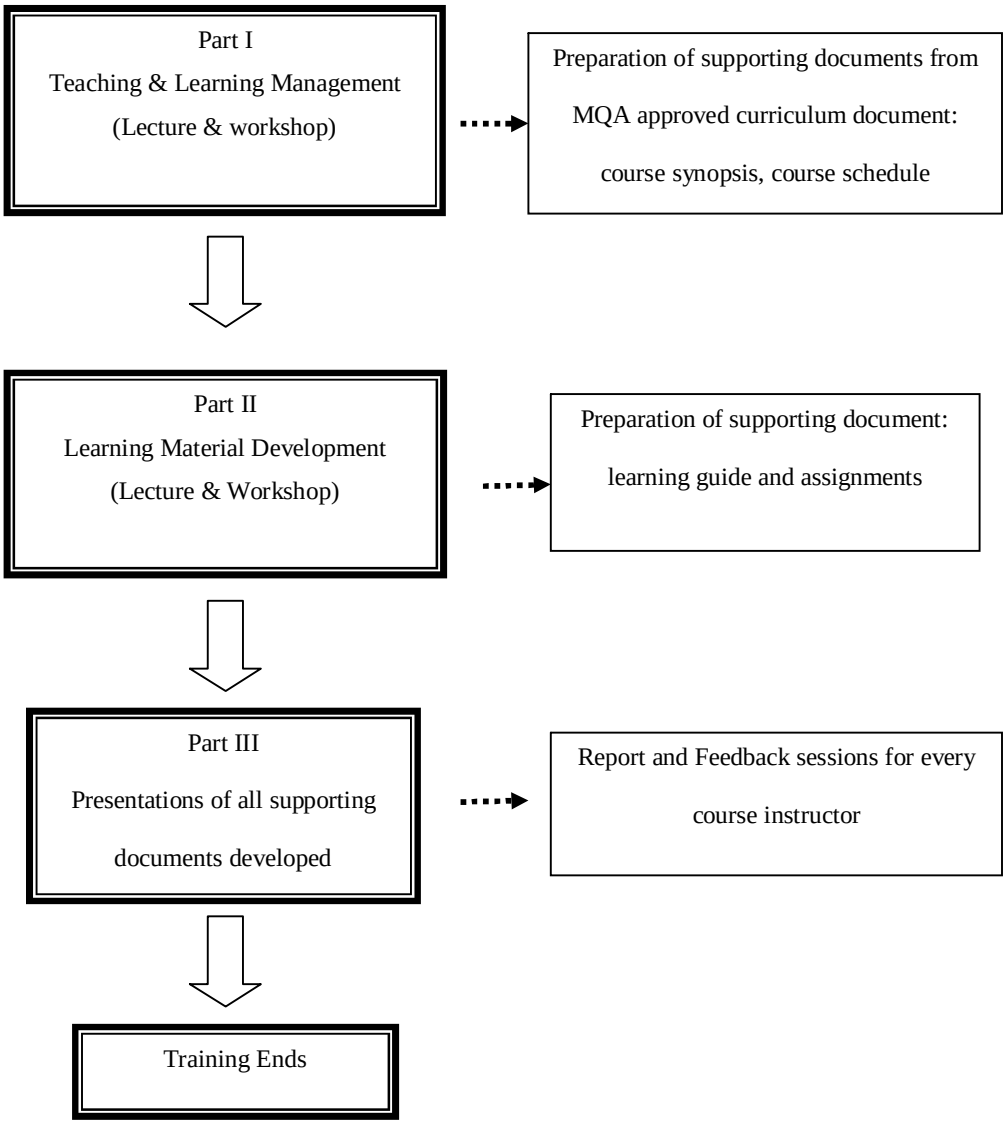

Figure 2 Teaching and learning management training