Development and evaluation of study guide template for an integrated cardiovascular module

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Abstract
The undergraduate medical curriculum in the King Abdulaziz University in Jeddah, Saudi Arabia, was reformed in 2002. It is integrated, organized in courses and modules, and has an increasing proportion of problem-based and self-directed learning. The new curriculum has presented the faculty and students with specific challenges. Accustomed to a traditional teacher-centred approach, and because the language of instruction is English, students needed much more support and encouragement in taking advantages of independent learning than their western counterparts would require. A well-designed study guide may be more effective student learning tool in the new integrated curriculum. This article describes to simplify and modern approach to the production of study guides. The approach is based on the development and the use of a study guide template. The guide is evaluated by second year medical students at King Abdulaziz University. The study guide is highly appreciated by student evaluations and 'study guide template' that includes a well-designed layout is a useful aid for medical teachers who have had no experience in producing a study guide. The template allows medical teachers to invest their time in the production of the content rather than in the layout and format of the guide.

Background
The undergraduate curriculum of medical school in King Abdulaziz University, like many medical schools in the Kingdom of Saudi Arabia, was in the traditional mode that has been in existence for more than 30 years. It was teacher-centred, discipline-based, information gathering and hospital based with no options or electives modules. The learning depends mainly on information gathering where the teacher is the main source of information. The main part of the curriculum consists of lectures, tutorials, practical classes with a limited number of problem-based sessions. The students reduce what is to be learned to the status of unconnected facts to be memorized. The learning task is to reproduce the subject matter in the final exam. Generally, students see learning as something done to them by the teacher.

In 2002, curriculum planners decided to implement a new undergraduate medical curriculum which is integrated and organized in blocks of integrated system-based modules. The aim of the reform is to introduce more independent learning and problem-based learning (PBL). Students need guidance and assistance with the new approach and study guides have an important role to play.

The study guide can be seen as a tutor sitting on the students' shoulder, available 24 h a day to advise the students what they should be doing at any stage in their study (Harden et al. 1999). It is quite different from a textbook or a book of readings; these are intended to communicate information. While the study guide may also communicate information, its primary purpose is to communicate teaching. For this reason, it is sometimes referred to as 'a tutorial in text' (Kember 1991). Students are likely to make good use of a well-designed guide but may not look at those which are not attractive and poorly prepared (Holsgrove et al. 1998).

There are several publications about the design of the study guide (Ireland 1979; Shahabudin 1987; Fisher, 1996; Moore & Michael G, 1997; Holsgrove et al. 1998; Harden et al. 1999). However, the design and development of a good study guide is very time consuming and requires a wide range of skills which include medical education, instructional designing, layout, desktop publishing and experience in the subject itself. The study guide is very different from a textbook and it is unlikely that the medical teacher will have the necessary expertise to produce efficiently, an effective study guide without support. Therefore, a 'study guide template' may be the best support for a busy medical teacher (Harden & Crosby 2000).

This article concludes that 'the production of a study guide using a template for an integrated system based cardiovascular module and students' and teachers perceptions on using the study guide'.

Design of the 'study guide template'
Study guide is usually presented in printed format. Electronic study guides have many advantages compared to the...
print format. However, designing an electronic study guide is
time consuming and needs team work, which includes media
and web designer. Therefore, depending on the situation, the
print format may be more practical and user friendly for all
students including those with no computer skills.

The study guide template can be described under the
following nine headings.

The cover of the study guide
The cover of the study guide may be as important as the
content. The cover gives the first impression about the
contents of the guide. The cover page is printed in colour to
ensure that high quality is maintained. As shown in Figure 1,
the cover has the following features: the name of the
University, the name and the logo of the medical school, an
illustration of the topic, e.g. heart, ECG strip and the name of
the module.

List of contents of the study guide
The study guide has the following contents:

- **The outcome**
  It shows the outcomes of the Medical Undergraduate
  Curriculum.
- **Teachers**
  Module teacher’s contacts, etc.
- **Phase 2**
  It shows the students where they are.
- **Introduction**
  About the Cardiovascular System Module.
- **Aims**
  This title explains the aims of this module.
- **Revision**
  Before start the cardiovascular module, we recommend that
  the students to revise some of the subjects related to this
  module.
- **Objectives**
  In this content has by the end of this module students
  should be able to.
- **Transferable skills**
  In this content has by the end of this module, students will
demonstrate the ability to.
- **Assessment**
  The assessment is designed to give you feedback to help
  you to identify areas for improvement. It includes a mixture
  of multiple-choice questions, short answer-questions,
  extended matching questions, problems-solving exercises
  and independent learning activities in all subjects.
- **Timetables**
- **Icons**
- **Topic outlines**
  - Lectures
  - Practical
  - Self-directed learning (SDL)
  - PBL

The table of contents helps students to see clearly what
topics are contained in the study guide. It shows the structure
of the study guide and allows the students to find major topics
with ease.

**Icons**
Icons are used to help the students find their way round the
study guide. It helps ‘the effect of breaking up the reading
pattern and can prevent students lapsing into a reading mode
that results in their skimming over the activities and indepen-
dent learning which are important component of this study
guide’. Eight types of graphic icons were used in the study
guide of cardiovascular module Figure 2.

Considering the packaging and portability of the
study guide
The guide is developed as a loose A4 format and presented in
a ring folder to help students to add additional pages. This may
encourage the students to carry the study guide with them
through out the course.

**Topic outlines**
One of the main components of the study guide is ‘topic
outlines’. The topic’s section is subdivided according to
the scheduled teaching sessions. Students will find that the
arrangement of the guide goes hand in hand with the
scheduled teaching time table. A specific format has been
developed for each teaching approaches such as lectures,
practical, SDL and PBL.

**Format of the lecture’s guide**
The guide for each lecture consists of two pages (Figures 3
and 4). In the first page, the title of the lecture, the department
and the name of the lecturer are identified. Then, the
objectives are stated with a meaningful icon. A summary of

**Figure 1.** The cover page of the study guide in cardiovas-
cular system.
the lecture is provided to help the student to have a quick overview of the topic, before the beginning of the lecture. The important concept of the lecture is mentioned under the icon ‘don’t forget’. In the second page, the learning resources are illustrated. These not only include suggested textbooks but other resources which might be of special interest to students, particularly those whose learning preferences are other than through the written word. These include CD-ROMs and selected useful websites, both of which are accessible from inside and outside the college campus. Regarding the textbook, the page number is indicated for each reference.

The last section in the guide to lectures presents a self-assessment exercise whereby students can evaluate their improvement as the course progresses. This is a useful tool because it can help students to identify areas where they are apprehensive or might run into difficulties. Identification of such areas enables the student to raise these issues with their tutor next time. The self-assessment is a short essay about the topic followed by a true and false statement. Sometimes a reference to more self-assessment is indicated.

A two-column layout is used for the guide to lectures. A specific space (one column in each page) is included for student notes. This space allows the student to write in the study guide and build their own notes. This is an important component because it can also help the student to carry the study guide with them most of the time. The format of the lecture’s guide is consistent and identical for all lectures. The consistency of the format makes the guide user friendly for students as well as tutors.

**Format of the practical guide**

For each practical session, there is a practical manual which is usually provided by the appropriate department. The practical manual gives detailed information about the practical session. However, a general practical guide may help students at a

![Figure 2](image_url). The different icons which can be used in the study guide.
glance to prepare themselves before they go to the laboratory and read the detailed practical manual. This information at a glance can activate the learner’s prerequisite knowledge and be used as an advance organizer. In the study guide, one page has been dedicated for each practical session (Figure 5). In this page, the title, location (department) and the tutor are stated on the top of the page. A summary of the practical session is also provided to give the students an overview of the practical session. The objectives are stated clearly with an appropriate graphic icon. The reading list, which includes the practical guide booklet and other references, are also stated to help the students to move to more independent learning. The practical guide is enriched by the use of diagrams or illustrations. Illustrations were used to help the students visualize certain important issues in the practical sessions. For example in the ECG recording practical (Figure 5), an ECG strip has been illustrated to help the students better achieve the objectives of the practical session. The emphasis on the use of illustration in the practical guide is more educational than aesthetic.

Format of the SDL (independent learning)

Figure 6 demonstrates the format of ‘self-directed learning’ guide. The guide provides students with the title of a topic and its objective as guidelines. Students are directed to learn independently about the topic. The learning resources are precisely stated for each topic. Four topics are identified for independent learning in the cardiovascular modules as following:

- Histology of blood vessels and relate structure to function in the circulation.

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<table>
<thead>
<tr>
<th>Lecture (14): The Electrical activity of the heart and the ECG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department: Physiology Department</td>
</tr>
<tr>
<td>Lecturer …………………………………</td>
</tr>
<tr>
<td>Learning Objectives:</td>
</tr>
<tr>
<td>At the end of this lecture you should be able to</td>
</tr>
<tr>
<td>1) Describe the Cardiac conducting system (sinus node, atria, AV-node, bundle of His, Purkinje system and the ventricular myocardium).</td>
</tr>
<tr>
<td>2) Describe the role played by the ion channels and the gap junctions in the conducting system.</td>
</tr>
<tr>
<td>3) Describe the mechanism of pace-making.</td>
</tr>
<tr>
<td>4) Know the role of the annulus fibrosis and that of the AV node?.</td>
</tr>
<tr>
<td>5) Describe a normal ECG and relate its morphology to cardiac events.</td>
</tr>
<tr>
<td>Content of the lecture:</td>
</tr>
<tr>
<td>The heart beat originates in the specialised conduction system and spreads via this system to all the parts of the myocardium. The structures that make up the conduction system are the Sino-atrial node (SA node), the internodal pathway, the ventricular node (AV node), the bundle of His and its branches and the Purkinje system. The SA node normally discharges most rapidly, depolarization spreading from it to the other regions before they discharge spontaneously. The SA node is therefore the normal cardiac pacemaker, its rate of discharge determining the rate at which the SA the heart beats. Because the body fluids are good conductors fluctuations in action potentials of myocardial fibres can be recorded extracellularly. The record of these fluctuations during the cardiac cycle is the electrocardiogram (ECG).</td>
</tr>
<tr>
<td>The various parts of the conduction system and, under abnormal conditions, parts of the myocardium are capable of spontaneous discharge.</td>
</tr>
</tbody>
</table>

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Figure 3. The format of the first page of the lecture guide.
Embryology of the heart and great vessels.

Common congenital defects.

Factors affecting tissue perfusion.

Format of the PBL sessions

Figure 7 shows the format of the PBL. The aim of the PBL sessions is to encourage student autonomy. The autonomous, rather than didactic approaches, gives the students the opportunity to learn through a variety of learning resources. However, our students prefer a concrete, teacher-centred approach. The background and preparation of our students is undoubtedly a factor here. Therefore, this PBL guide introduces students gradually to PBL. Four clinical scenarios are introduced in the cardiovascular modules:

- Patients with chest pain.
- Heart failure.
- Valvular diseases.
- Circulatory shock.

Each case is presented in one page. The aims of the PBL sessions are stated clearly in the next page of the PBL guide. Because our students are not accustomed to PBL, the guide provides them with information about the PBL process, which is important to both students and tutors. The prerequisite of the case is also stated to help the students prepare themselves for the PBL session.
Because the most important aspect of PBL is identification of learning issues by the students, a specific space (empty table) is included for students to summarize their learning issues. These learning issues will serve as a guide for independent and SDL. This will help them to solve the problem in the next PBL session. The learning resources are stated clearly to save the time for students. At the end of each case, ‘Key Facts’ are provided to guide students to more independent learning.

**Discussion**

This article describes a ‘study guide template’ illustrated by an example for an integrated cardiovascular module. A template used to be defined as a pattern or mould (usually wood or metal) serving as a gauge or guide. In engineering, templates were often used to improve the speed or consistency of a mechanical process. Generally, engineering templates were patterns of a spatial nature. However, in ‘educational material design’ the template may become essentially a set of outlines, instructions, format and layout, i.e. a frame. In other words, it is a kind of pattern with which we can design our instructional materials. It contains key design features which become incorporated into the product.

Thus templates are a way of reusing generic aspects of a design created by a designer. A template can be seen as a way of separating the design stage from the content. It may be seen

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**Practical 4: ECG Recording**

**TUTOR: ……………………**

**Department: Physiology**

**SUMMARY:**

In student volunteers, students will locate, and connect the four limb electrodes to the volunteer. A recording will be made of every student at rest. The recording will be analysed by the students, and the following values will be measured: PQ interval, QRS duration, QT-interval, heart rate and the mean QRS vector.

**OBJECTIVES:**

- To be familiar with recording an ECG
- To analyse an ECG.
- To determine the heart rate, several intervals and mean electrical axis.

**READING:**

- Practical Manual
- Guyton, Textbook of medical physiology

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**Figure 5.** The format of the practical guide.
as a way of making connections with the skills of others – especially other designers. The use a template will likely take much less time than creating the design from scratch. Thus, using a template is a way of leveraging design skill inputs into a project. A well-designed template may be an efficient way to provide good design to the study guide developer.

In medical education, if a number of study guides are being produced, it is useful to prepare a template for their production. Holsgrove (1998) reported that students find it more difficult to use guides where each has a different layout. They suggested that an agreed ‘house style’ for study guides conveys important messages about the quality and cohesion of the curriculum. The design and development of a good study guide requires a wide range of skills and is very time consuming. This has long been recognized as a problem for instructional material developers. A study guide template is reusable. It can save time for a busy medical teacher. Furthermore, it ensures the consistency of the study guide production in the whole medical school. This will help the students as well as the staff become more familiar with the study guide. However, there are also possible disadvantages, some of which may be a direct result of the same factors that can make templates an advantage. For example, a poorly designed template may become an efficient way to provide poor design to the developer and it may speed the production of low-quality study guide. A poorly chosen template, designed for a different educational context, will, unless suitably modified, fail to deliver appropriate study guides (Harden et al. 1999).

The ‘study guide template’ described in this article may be used as a tool for the development of a study guide for integrated undergraduate medical modules. It offers a number of benefits:

- It saves time for a busy medical teacher.
- It leads to a production of study guides with a consistent ‘house style’ which help students to become more familiar with the layout and format of the different guides in their study.
- The template may encourage the medical teacher to design a study guide for their course.
- It may be produced centrally to ensure a very high quality for all study guides in the college.

### Figure 6.

The format of ‘Independent learning’ guide.

![Figure 6. The format of ‘Independent learning’ guide.](image-url)
A ‘study guide template’ that includes a well-designed layout is a useful aid for medical teachers who have had no experience in producing a study guide. It allows medical teachers to invest their time in the production of the content rather than in the layout and format of the guide.

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References


Figure 7. The format of the PBL.