

## SmarTTeaching in Pharmacology

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**Abstract**—The state of education is changing mainly due to developments in the electronic media. SmarTTeaching in Pharmacology at Sefako Makgatho Health Sciences University (SMU) has been developed to introduce the principle of the flipped classroom to students using electronic lectures and social media platforms. This was done by reducing face to face lecture time, providing downloadable PowerPoint slideshows and worksheets, offering potential test and examination questions on Instagram and introducing applications of basic pharmacology concepts on Twitter. Completed worksheets are photographed with smartphones by students and these are emailed to the lecturer for e-filing. Important to note with this approach is that it can also be completely used for e-learning where students are mostly not in classrooms.

**Keywords** - SmarTTeaching; e-learning; e-pharmacology; flipped classroom; social media.

### I. INTRODUCTION

The flipped classroom concept was in practice for a number of years before Bergmann and Sams in their published book, titled "Flip Your Classroom: Reach Every Student in Every Class Every Day" established it as a teaching model in 2012 [1]. The aim of this newly introduced model is to transform dated teaching methods that are ineffective and often fail to engage students in the classroom [2]. The flipped classroom aims to give students the opportunity to prepare themselves on a specific topic, with the aid of technology. Classes are then structured for problem solving and guided by the lecturer [1].

Globally, students can be divided into two studying clusters. The first group is characterized by passive learning and relies extensively on the lecturer as the leading source of information. The second group highly values independent learning and will readily make use of new sources of information. The flipped classroom is ideally suited to students who learn autonomously and will use online teaching materials for example slide shows or videos.

The role of the lecturer differs greatly in these two teaching methods. Previously lecturers were required to be present during classes while in flipped classroom lecturers

are now facilitators working alongside prepared students, guiding them as groups or on individual level.

Section 2 discusses the features and challenges of smarTTeaching in a flipped classroom. Section 3 looks at various components used in the smarTTeaching model and Section 4 briefly shows the e-learning cycle. In Section 5, the conclusion is that smarTTeaching in conjunction with electronic and social media is the future of education.

### II. THE FUTURE OF MEDICAL EDUCATION: SMART-TEACHING IN A FLIPPED CLASSROOM

#### A. Features of the Flipped Classroom

Technology will play a huge role in the future of medical education [3]. While there is not much literature as yet regarding the relatively new concept of the flipped classroom approach, the limited data has shown the following:

- An analysis of 62 articles indicated that flipped learning gained popularity amongst engineering educators after 2012 [4]. This could point to a more positive attitude regarding flipped classrooms.
- One of the most commonly cited benefits of flipped learning is its flexibility, which allows students to work at their own pace. This includes being able to pause or re-watch videos [5].
- The rationale behind flipped learning is for students to prepare for lectures, while face to face class time is used for exercises and interaction between students and lecturers [6].
- Several authors argue that flipped learning contributes to students' professional skills such as life-long learning [7], learner autonomy [8], critical thinking [9] and interpersonal skills [10].
- It was also observed that class attendance improved [11], students were better prepared for lectures and information better retained [12]. In the case of flipped classrooms more time was devoted to studies and better study habits developed when compared to traditional teaching [13].

### B. Challenges of Flipped Learning

As with any new initiative, flipped learning offers a few challenges for both instructor and student.

The most challenging for lecturers is the input in converting a course from a traditional teaching approach to a flipped format. Challenges for students include uninteresting online material [14] while Ossman and Warren indicated that rather than watching the videos, students prefer reading slides [15]. This increases the workload of the lecturer who has to create the slides.

It was also reported that class attendance for certain courses was made not compulsory but students had no excess to high speed internet connectivity [16]. Student resistance was another challenge that flipped learning instructors faced. This was due to the traditional approach throughout their educational career and students feeling overwhelmed with a new class format requiring active participation in the learning process.

### III. SMARTTEACHING PHARMACOLOGY AT THE SEFAKO MAKGATHO HEALTH SCIENCES UNIVERSITY, SOUTH AFRICA

Pharmacology is unique due to the fact that medicine is crucial in the practice of almost all medical disciplines. To be in line with global educational trends the Department of Pharmacology and Therapeutics at the Sefako Makgatho Health Sciences University (SMU) has in recent years developed an e-learning pharmacology course called SmartTTeaching. Many components of social media are applied in conjunction with the flipped classroom approach in this blended learning model. The focus is to encourage studying independent of classroom attendance yet supported with high quality electronic learning resources.

#### A. e-Lectures: PowerPoint Slides

Microsoft PowerPoint is used to create e-lectures in which a topic is composed of various slides. Such a slideshow consists of a title slide (slide 1), a slide showing the index (slide 2), and slides with sub-topics each followed by slides with the content. The final slide indicates the topic of the next slideshow. For best results the majority of slides should reflect content and contain keywords regarding the subject of that particular slide. Slides should also be dynamic with movement and colour, graphs and diagrams that clearly illustrate lecturing content.

#### B. Worksheets: Content-based Worksheets and their Submission

Each e-lecture has a worksheet that must be printed and completed by students as they progress through a slideshow. The questions of a worksheet are based on the content of the slideshow and completed worksheets are photographed with students' smartphones. These photographs are then emailed to the lecturer and all submissions are stored in a dedicated e-file for future reference and as proof of the completion of both the e-classes and their worksheets.

#### C. Instagram: Example Questions

Instagram is used to provide students with examples of typical test and examination questions as well as related information concerning topics in the pharmacology syllabi. This platform is well visited and constantly assists students with revision of lectures and by providing additional information on topics [17].

#### D. Twitter: Application of Basic Concepts

This account is mostly used for short courses to support the theoretical aspect of topics covered in e-learning or flipped classroom lectures. For example, the potential changes which medicines undergo in the body are explained and discussed in a slideshow. The Twitter account is then used to inform students of changes which specific medicines would undergo. These discussions are not limited to a time frame but carries throughout the academic year. Students are examined on information presented on this platform [18].

#### E. Facebook: Global Research

The Pharmacology Facebook page is used very effectively to inform students regarding the latest global research developments in all fields of medicine. This Facebook page has also become a well-recognized international pharmacology vehicle and is followed by many medical students, pharmacologists, pharmacists, scientists and practitioners in different fields of medicine [19].

#### F. Website: Central Platform

A web-site dedicated to SmartTTeaching in Pharmacology is used as the central platform for interaction between students and lecturers. e-Lectures can be studied online or downloaded from the site. Worksheets are available for download in pdf-format or can be printed directly from the website. The site is designed to supply information regarding various aspects of the Pharmacology Department's teaching content and research [20].

#### G. Slides: Additional Features

Figure 1 is an example of an e-slide dealing with subject content. On the top right hand of the slide are icons for direct access to social media (WhatsApp, email, website, Facebook, Twitter and Instagram) as well as the last three icons for learning objects, the index and to exit the slideshow. Page numbers are indicated to the right of the slide which, when clicked on, will take the student to slides with additional information.

### IV. E-LEARNING CYCLE

The aim of smartTTeaching is to establish and place in practice an e-learning program for Pharmacology teaching based on information supported by social media. The e-learning cycle is represented in the figure 3. During this e-learning cycle the study material is made available to the students on a website from where the content can be downloaded or printed.

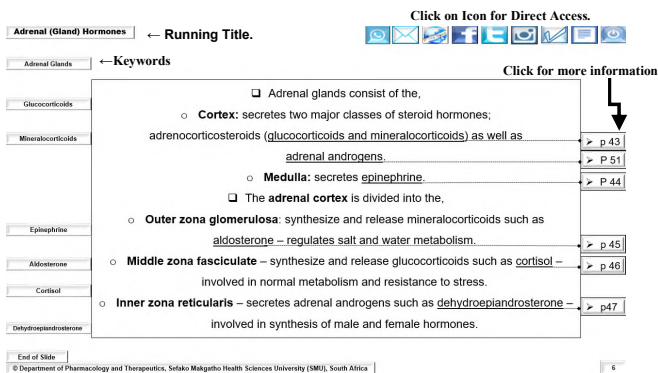


Figure 1. Example of an e-slide dealing with subject content.

Figure 2 is an example of a worksheet also containing the various social media platforms.

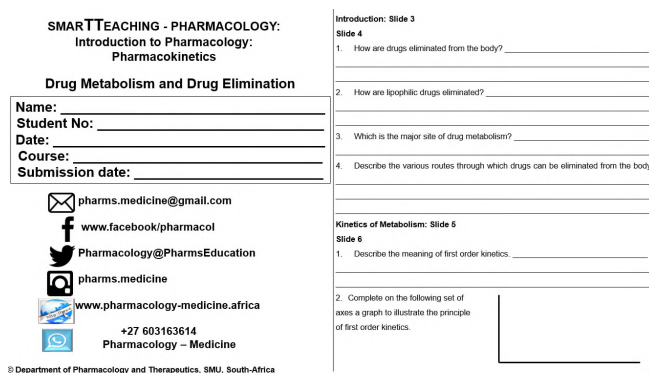


Figure 2. Example of a worksheet used to answer questions related to information on e-slides.

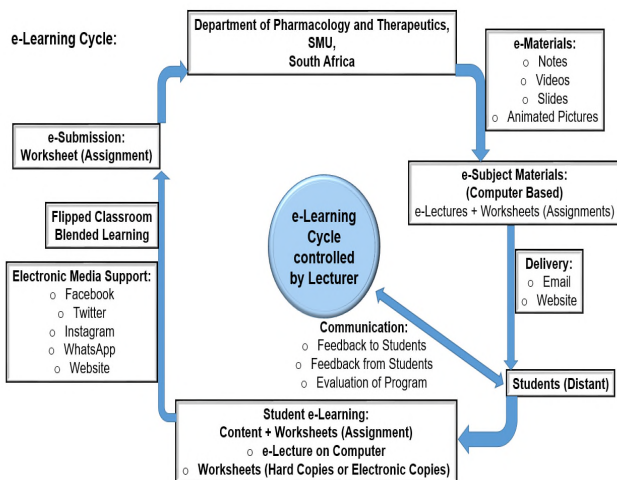


Figure 3: The e-learning cycle as modelled by the smarTTeaching approach.

It is however important that the online delivery system is reliable to ensure effective use of electronic media. Social media can be used to different extents and purposes to make the learning process effective. Worksheets need to be submitted electronically on a date and time determined by a lecturer.

## V. CONCLUSIONS

The impact of electronic and social media on education is permanent and irreversible. It should therefore be a logical move for lecturers and students to apply electronic devices and applications towards the improvement of academic performance. SmarTTeaching as an initiative not only focuses on students, but also provides opportunities for lecturers to be creative to a level not previously possible without electronics.

Due to their previous exposure to only a face to face classroom approach, students were initially resistant to the flipped classroom concept. Once the benefits of using electronic devices such as smartphones, tablets, laptops and desktop computers were realized, appreciation of the smarTTeaching classroom method greatly escalated.

Participation amongst Pharmacology students at SMU has become the norm and the various social media platforms are well utilized. This is especially true for Instagram where potential test and examination questions are shared. Besides the students of SMU the information shared on social media also attracts international attention especially the Facebook page as it is focused on both students and practitioners of various medical disciplines.

The compulsory completion and email submission of worksheets is very effective as studying is immediate and continuous and not postponed until the first test or examination.

The introduction of the SmarTTeaching concept to lecturers has been met with some resistance regarding the transition from the old way of doing things to the new. Although the initial input in developing such an e-learning concept is time-consuming and demanding, the process when implemented is extremely dynamic for both lecturers and students. Updates of content are immediately available and new information can easily be introduced into an e-lecture. Supporting data such as graphs, figures and videos can also easily be added. The future and success of such an electronic teaching intervention requires a mind-shift, mostly by the teaching staff as students are more susceptible to alternatives, especially as it utilizes electronic and social media.

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