Introducing dental students to e-learning at a South African university

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Background. This article reports on the introduction of an innovative 'blended learning' approach in the Paediatric Dentistry Department at the University of the Western Cape (UWC) in Cape Town, South Africa. This intervention was the first of its kind to be introduced at UWC's dentistry faculty.

Methods. Educational resources were placed online to supplement didactic and clinical teaching and thus compensate for the lack of chair-side teaching. An online learning platform was therefore provided for students to engage with.

Results. Forty-seven per cent of students accessed the site. The evaluation of the course by these 4th- and 5th-year students was mostly positive. Students who did not access the site provided a variety of reasons for not doing so, the main reasons being 'lack of time' (40%) and 'lack of IT resources' (41%).

Conclusion. This intervention highlighted the fact that 'blended learning' definitely has its place in the dentistry curriculum, especially if minor issues such as access to resources can be addressed. The Paediatric Dentistry Department at UWC is continually pursuing current trends in teaching to provide an education that is on par with global standards.

The University of the Western Cape (UWC)'s School of Dentistry has two training platforms, situated at the Mitchell's Plain Oral Health Centre and Tygerberg Oral Health Centre.

The Paediatric Dentistry module spans a two-year period during the 4th and 5th years of the undergraduate dentistry programme. Three full-time permanent staff members manage the department between the two sites and additional part-time clinical supervisors are employed to assist with supervision of approximately 200 students. Part-time staff members with a keen interest in Paediatric Dentistry are recruited from the private sector to assist with student training in the clinic.

The department has a structured teaching protocol with regard to clinical teaching, and guidelines aligned with the clinical outcomes are routinely provided to the staff to standardise what is being taught. Yet, from student evaluations of the course, it was evident that part-time staff members do not follow these guidelines and do not engage in chair-side teaching as often as the department would like them to.

Two interventions were introduced to address these issues – one for staff and one for students. The staff intervention involved a workshop where questionable treatment plans signed off by part-time staff members were used as a departure point to illustrate how they could be improved.

This article focuses on student intervention involving the use of an e-learning management platform to impart more detailed information to students to compensate for the lack of chair-side teaching, i.e. a blended learning approach was followed to supplement the department's traditional teaching methods.

Introduction

There has been a 'phenomenal uptake of new technologies' by the younger generation, to the extent that today's students think and process information differently than their predecessors.[1] Technology has changed the way students access information.[2-4]

Computers provide easy access to unlimited knowledge and resources in every field and computer literacy is considered to be a priority for student development.[2] Currently, computers enjoy prominence as a learning tool. Integration of technology into academic practice is dependent on how well it fits into existing systems and to what extent it contributes to the generation of knowledge.[2] The e-learning platform creates an opportunity to explore unconventional methods of teaching.[5] However, computer literacy is vital if this platform is to be used.[6]

E-learning or 'technology-enhanced learning' refers to the transfer of knowledge via the internet, intranet or through other digital means, such as previously recorded audiovisual media or satellite television.[4] This wide

range of online tools enables users to engage with the information on different levels and caters to variations in learning styles.[3]

In cases where e-learning is used as an adjunct to face-to-face teaching, the term 'blended learning' applies. Formal lectures provide 'directed learning', which is supplemented by online learning resources.[7] Computer-based activities are thus integrated with traditional teaching methods.

Teaching methods or tools should enhance student learning.[2,4] For the successful implementation of e-learning, the underlying pedagogy must be taken into consideration as to how learning takes place online.[8] E-learning cannot exist without a sound foundation of pedagogical theory.[8] The e-learning platform should not only be a different means of delivering information but should actively encourage learning.[5] This was the motivation for providing an online resource in this study.

Incorporation of e-learning into university programmes should be a gradual process.[2] Varying degrees of online resources can be utilised, including the provision of very basic information such as access to module information, course content, suggested reading and lecture content, to the other end of the spectrum where courses are interactive and fully integrated with limited formal contact time.[7] Some e-learning systems only provide text-based learning materials that do not engage the students adequately for them to gain a good understanding of the topic.[9] The current advances in multimedia technology allow for e-learning systems to combine multimedia content to make it interactive and stimulating.[9]

In the Paediatric Dentistry course, the first phase of implementation involved creating a basic online module, purely as a means of providing access to additional information. An interactive component, including the use of multimedia technology, will be introduced to the course at a later stage once students have engaged sufficiently with the current material. The 'phases of engagement framework' reported by Conrad and Donaldson[10] provides a framework for the instructor to develop appropriate activities for their course and introduce them in an effective sequence. Learners can be guided through more advanced activities once they have gained more confidence and expertise.[10]

The objective of the current intervention was to make additional resources available to students to supplement their lectures and enhance their understanding of the subject matter. A wealth of information on Paediatric Dentistry is available on the internet, but students at 4th- and 5th-year level have yet to develop the skills required to critically appraise the literature. Internet resources can be unreliable because their credibility is often not checked.[6] Lecturers can overcome this problem by screening the content and making relevant, updated, evidence-based information available. Providing easily accessible information on an e-learning platform could therefore be a means of 'quality control'.[6]

The content on the Paediatric Dentistry online environment would also be supplemented by in-depth explanations and definitions to clarify concepts and improve students' understanding of the more challenging sections of the syllabus. This could then provide a means of 'filling in the gaps' and help compensate for the lack of clinical teaching.

Methods

The e-learning team created a framework of the Paediatric Dentistry course online, within UWC's e-learning/e-teaching management platform. The lecturers who co-ordinated the module then tailored the course to address 'gaps'. Sanders and Walsh[4] refer to this type of content-specific resource as a 'quick snack' which could 'satisfy a hungry learner'. This was the first phase of implementation and involved the placement of the following resources onto the e-learning management platform:

- An overview of the course including assessments, quotas, clinical guidelines and course expectations.
- A clinical diagnosis and treatment planning form with detailed explanations. All the relevant information on this form that needed clarification was linked to explanations that would assist students with diagnosis and treatment planning.
- Lecture notes and presentations.
- Concept maps to give an overview of lectures and assist with revision.
- Possible test and exam questions.
- Additional relevant reading material, e.g. links to journal articles.
- A calendar with test dates and assignment due dates.

The course was first made available online. Students were given training by means of a short power point presentation to acquaint themselves with the e-learning management platform. They did not receive any other formal training but were given the basics on how to navigate through the site. Additional training would only be arranged if more than 25% indicated that it was necessary.

Students were given a two-week period in which to access the online site. Thereafter, they had to complete an anonymous evaluation form with regard to their e-learning experience. Student evaluation forms provided the data for analysis. Responses were analysed by grouping the comments made by the students into themes related to positive and negative aspects of e-learning.

Results

A total of 118 responses were received. Of these, only 55 students accessed the module online (Fig. 1).

Students provided a variety of reasons for not accessing these resources (Fig. 2). Twenty-five per cent claimed not to have access to the internet at home, while others blamed the lack of computer availability for not accessing the site. They claimed that there are not enough computers in the computer lab as well as at the residences. Ten per cent of students reported that the computers did not work, and 2% did not have access to the computer lab.

The majority (40%) cited the lack of time and huge clinical workload as the main reasons for not accessing the site. Website problems were also common with students citing slow internet connection and log-in problems as the main obstacles. Sixteen per cent of students complained that the servers were down on numerous occasions (Fig. 3).

The majority of students found the site easily accessible, easy to navigate and user friendly (Fig. 4). No additional training was arranged as only 18% of students felt they needed it.
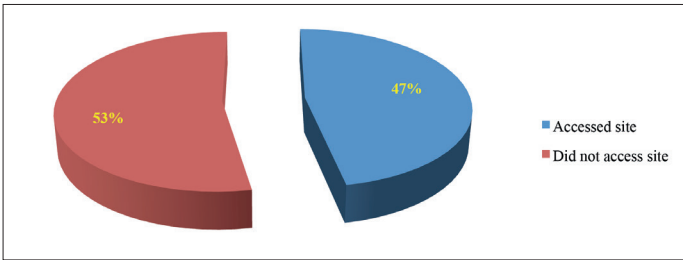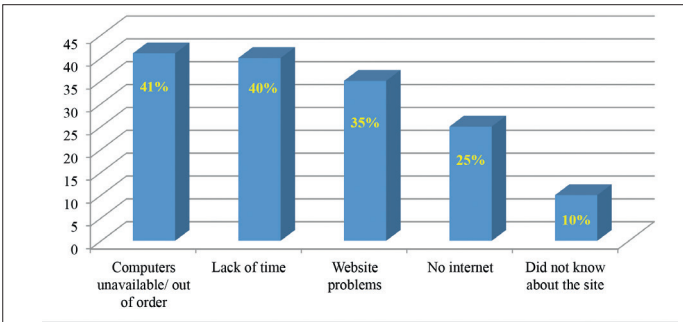
Fig. 1. Access to site (N=118).

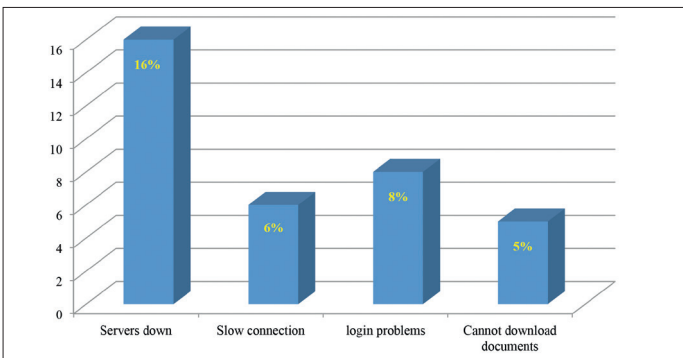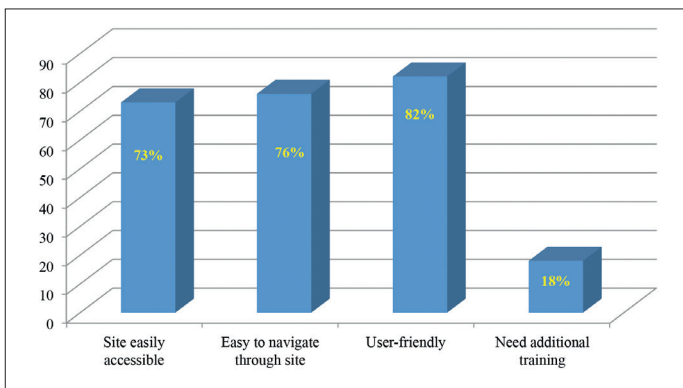Fig. 2. Reasons for not accessing site.

Fig. 3. Website problems.

Fig. 4. Ease of navigation through site.

Students were asked what would motivate them to access the module online. Their responses (according to their year of study) are given in Table 1. More general comments are summarised in Table 2.

Table 1. Students' motivation for accessing the online module

4th-year students	5th-year students
Curiosity	It encourages more advanced learning
To obtain notes	Good supplement to lectures and tutorials
Only if it will be helpful for exam purposes	Helps with preparation for exams

Table 2. General comments from students with regard to the online module

4th-year students	5th-year students
Not a good idea	Good idea
Not all students have access	Interesting
Not enough working computers	Broadens knowledge base
Do not want to learn from a computer screen	

Discussion

The current body of evidence supports the effectiveness and acceptance of e-learning within the realm of medical/dental education.[11] E-learning is enhanced when combined with traditional classroom activities in a blended-learning approach.[11]

An advantage of the e-learning platform is that it enables students to learn at their own pace, and information can be accessed at the student's convenience.[3,4,6,7] In this study, however, students claimed not to have had the time to access the resources due to their clinical workload that is spread over two teaching platforms. As is evident from the responses, the junior students had a very different attitude towards accessing the module online. They mostly intended to use the facility to access notes if printed ones were not provided. A possible reason for the lack of interest shown by the junior students is that 'engagement of e-learning by students requires more maturity than classroom teaching does'.[12]

The majority of 4th-year students were not open to the idea of accessing these resources online as they felt it was more difficult to learn from a computer screen and they preferred information in the form of printed notes. This invariably means increased cost for the university. Peterson *et al.*[3] found that when given a choice between purchasing a traditional textbook and accessing the electronic version of the textbook online, not a single hard copy was sold as the online textbook did not cut into their budget and was more accessible.

Paediatric Dentistry students at the University of Washington found value in online resources for lectures, reading, instruction/demonstration, self-assessment and testing.[3] Students at the University of Basel in Switzerland also reported that the possibilities offered by e-learning had a positive impact on their studies.[13] Similar responses were received in the present study but, unlike at the universities of Washington and Basel, these students were not exposed to interactive assessment. The majority of them did, however, find the possible test and examination questions at the end of each chapter to be very helpful.

The final-year students were generally more positive about their experience and commented that the information provided a good guide for studying purposes and helped them to prepare for theory and clinically based examinations. Many students found the information relevant, helpful and informative. It is, however, imperative that the content on these learning platforms is updated regularly.[4]

In addition to website-related problems, students in this study cited the lack of resources and poor access to computers as the major obstacles. Bozalek *et al.*[14] reported that students at UWC generally did not have access to computers and the internet at home, whereas the majority of students at Stellenbosch University (SU) did. UWC students could only use the computers available at the university.[14] The situation at UWC as reported by Bozalek *et al.*[14] is in stark contrast with the scenario at the University of Basel, where 'all except one student owned at least one computer or laptop'.[13]

Despite the fact that both UWC and SU had computer labs, it appears that the labs at the former were often very full and not readily available to students. This situation was exacerbated by the fact that these labs were closed after hours.[14]

Inability to access resources can become frustrating and could impact negatively on students' willingness to engage with these online resources.[3] The lack of technical resources among the students in this study contributed to their negative attitudes. Some students even suggested that making use of the university's shared drive would be an easier way to access the information. This would, however, negate one of the benefits of creating an online module where public access to the course is limited to students who are registered, thereby also safeguarding original material.

The students also found that some documents were difficult to download if their computers did not have the appropriate version of Windows. Peterson *et al.*[3] experienced similar glitches where students were unable to access certain quizzes from computers that were not equipped with the newer version of the Java computer program. Downloading information from home can also be problematic owing to the possibility that access to broadband could be limited.[4] Faster internet connectivity would therefore be a major advantage.[3] Other barriers to access would include computer failures and viruses.[6]

Recommendations for improvement
IT-related
- Improve accessibility to the site. Students found it very frustrating that the network was down for long periods of time and they did not have the time to return when the computers were eventually online.
- Make the downloading of documents easier. Documents should be made available in a format that is accessible to all and should be compatible with older versions of Windows.
- Allow students to open more documents simultaneously. The system is very awkward as one has to keep going back.
- Increase the number of working computers to improve student accessibility.
- Ban access to social networking sites so that all students can access the computers for legitimate reasons.
- Send e-mails to students when the site has been updated.

Module-related
- Add clinical cases.
- Combine test and exam questions with a case.
- Include mock tests with memos.
- Add all student case presentations to use as mock OSCEs.
- Include notes on additional topics, e.g. prophylaxis, fluorides, sedation and general anaesthesia, to clear up confusion.
- Keep updating the site.
- Include section for 'suggested reading'.
- Give more references.

With the migration of e-learning to a new e-teaching platform which is more structured, it is envisioned that many of these concerns will be addressed. Students may therefore be more inclined to access these resources, thereby encouraging them to take responsibility for their own learning.

Conclusion
A change in mindset needs to occur, especially among the younger dentistry students before they are ready to accept this intervention as an adjunct to traditional teaching methods. Final-year students recognised the value of this teaching tool.

This study highlights areas where the content of the site could be improved to make it more attractive to students and where problems regarding IT support were also brought to light. A good support structure is essential to facilitate a positive e-learning experience and encourage students to routinely use this facility to enhance their learning experience.

The success of such an intervention also depends on the student's willingness to make use of the resources provided. Adding an interactive component to this learning platform could be used as an incentive for students to engage more actively with the material. This would be the next phase of implementation for this department and could take the form of interactive self-assessment and discussion boards. Weekly questions could be posted and discussed on the discussion boards and incorporation of some of these topics in test and examination questions could be an added incentive. This would shift the focus from the more traditional teacher-centred approach where students take on a passive role in the learning process to a student-centred learning approach where students are encouraged to actively engage with the material and take responsibility for their own learning.[15] Active learning was shown to develop important 'graduate capabilities'.[15]

E-learning definitely has a place in the Paediatric Dentistry curriculum. Studies have shown that technology can be used to enhance student learning.[7,16] Online resources should not replace lectures but should be used as an adjunct to formal contact sessions.[7] It is important that institutions of higher learning move with the times and embrace technology as a teaching tool.

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