Does the order of presentation and number of online resources affect the frequency of access by learners?

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ABSTRACT

INTRODUCTION: Provision of web-based resources is a valuable addition to face-to-face teaching in a blended learning environment.

AIM: To understand how both order of presentation and number of online resources impacts on the frequency of access by learners in postgraduate vocational training in general practice.

METHODS: Information was collected on how many times individual online resources were accessed. Data regarding access rates for 15 separate topics used in postgraduate general practice vocational training were aggregated. Analysis was on the basis of order of presentation where the mean of percentages of hits by order of presentation with standard deviations was calculated.

RESULTS: The first four listed resources were accessed at a higher rate than the remainder of the resources. All resources after the first four were accessed at a relatively uniform low rate.

DISCUSSION: It would appear that providing more than four resources per topic is associated with learner overload. The number of online resources to support face-to-face teaching should be limited to four. Resource material needs to be carefully considered in terms of how it adds educational value. The ability of resource material to present a different perspective on a topic and adherence to both curriculum and assessment objectives are important considerations.

KEYWORDS: Education, medical; education, distance; internet; provision of resources; general practice

Introduction

Online learning has created diverse and innovative delivery mechanisms and an active education research stream.[1] Outcomes research on internet-based learning suggest that enhanced learning opportunities may be generated, but there are no time efficiencies gained.[2] One enhanced learning opportunity of e-learning is the ease of placing education material within reach of the learner and the self-paced nature of subsequent learning.[3]

The availability of online educational material does not, however, predict how this material will be used.[4] Issues relevant to the use of resources within online resources include the level of literacy necessary to incorporate the available material, the complexity and quantity of material provided and the motivation of students to use the material.[5] Many medical education courses now utilise both face-to-face small group learning and internet-based learning within an integrated and mutually supportive framework (blended learning). The creation, sharing and sourcing of this e-content is receiving increasing focus.[6] Guidelines regarding content of e-learning within this blended environment are available, but tend to provide broad rather than specific information, such as not overloading the learner with content.[7]

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There is little specific data on how learners access online resource content within a blended structure. Educators therefore lack important data that informs on the effect of volume or organisation of online resource content. This research reports on rates and patterns of access to online resources by learners in a blended learning environment.

Methods

All general practice registrars in The Royal New Zealand College of General Practitioners (RNZCGP) training scheme enter a year of intensive training that utilises a blended learning environment. Each clinical topic (adolescent medicine, for example) has both a set of online resources chosen by medical educators as well as several hours of structured interactive face-to-face learning with discussion, case studies, guest speakers etc. The order of presentation of the online resources within each clinical topic is unplanned.

The online resources are available through a Moodle platform. Moodle is an open source learning management system that facilitates content access and communication for web-based teaching and learning. The number of online resources per clinical topic is variable. Data are collected on each topic, recording the number of times each of the online resources for that topic is accessed.

There were 144 registrars in the programme with approximately 70% being female in the 2011 year in which the data were collected. Data were available for 15 topics and were aggregated and anonymised. Each access to, or download of, a resource by a registrar was considered as a 'hit'. For each scaffold, the number of hits for individual resources was calculated as a percentage of all hits for that scaffold.

Results

There were between five and 32 resources available for each of 15 clinical topics, with a mean of 15.5 (SD of 6.9). The overall number of hits per clinical topic varied considerably (487 to 2136). The aggregated data on hits for the top 15 resources across all clinical topics is presented in Figure 1. The mean of the aggregated data over 15 topics is given with one standard deviation on

Figure 1. Level of access to the 15 most accessed online resources across all clinical topics based on order of presentation
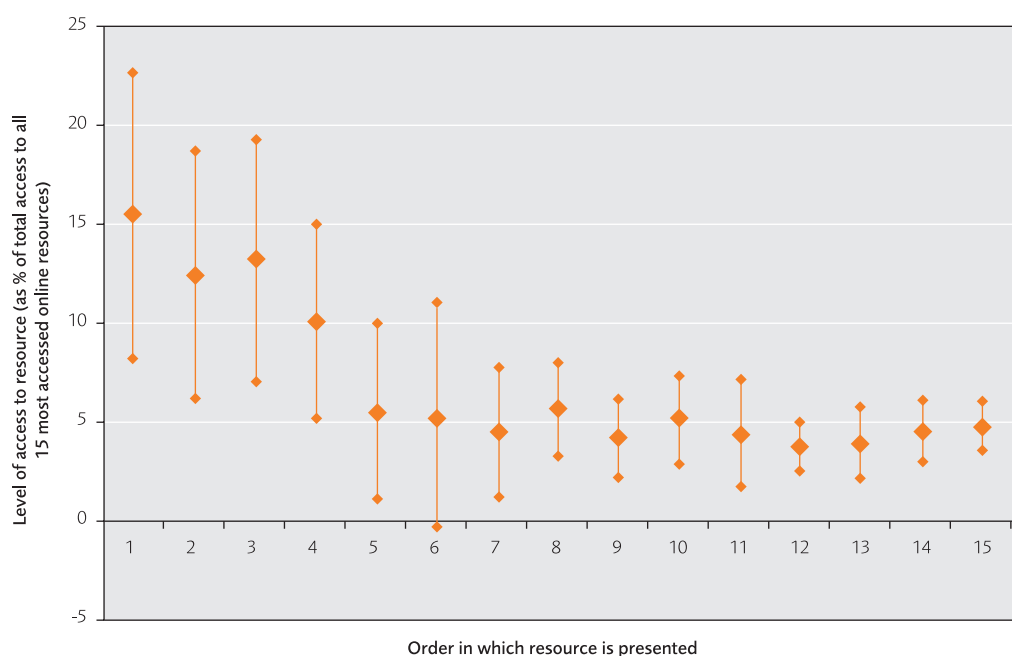
each side. The first listed resource accounts for just under 16% of all hits, with an SD of 7%. The first four resources accounted for 10% or more of all hits each. Thereafter, the percentage of hits that each resource attracted was lower.

Discussion

It would be expected that learners may access resources that are at the beginning of a list more frequently than those at the bottom of a list and sheer curiosity may well be the major driver of exploring what the first-listed resources contain. What is surprising from this research is how marked this behaviour is. After the fourth resource, the frequency of access declines and remains low. Even within the first four listed resources, the order of appearance would appear to influence the frequency of accessing the material.

The data show that the third resource was more frequently accessed than the second resource. A

> ### WHAT GAP THIS FILLS
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> **What we already know:** Provision of web-based resources is a valuable addition to face-to-face teaching in a blended learning environment.
>
> **What this study adds:** The order in which resources are listed significantly dictates the frequency of access of individual resources. Providing more than four resources per topic is associated with decreased access rates for subsequently listed resources.

that all participants will read them, others may be provided as a library of material that can be drawn upon if there is a need, but there is no expectation that all participants will access them. In this case, as is likely in the majority of blended educational courses, no distinction was drawn between resources considered essential and others.

The data also raise questions about the nature of learning from resources in this environment.

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more detailed analysis of the resources was undertaken to seek an explanation for this. If appropriate for the topic of a scaffold, the Best Practice Advocacy Centre (BPAC) guidelines are included amongst other resources and guidelines. For three of the scaffolds, the BPAC guidelines were placed third in the order of presentation by coincidence. The hit rate for each of the BPAC guidelines was high in comparison to other resources and therefore skewed the results.

These data suggest that providing more than four resources per clinical topic is associated with learner overload. However, there may be several reasons for making resources available; some resources may be provided with the intention

Social learning theory promotes the notion that cognition is not an individual process. Rather, learning and knowing are shaped by both interaction with others and the context of these interactions.[8] Resources within a social learning context become methods of exploring different ways of knowing as well as finding material that suits individual learning styles. As described by Cook and McDonald, 'Ultimately, the rationale for using computers in education comes not because of any inherent instructional advantage but because computers facilitate the use of effective instructional methods'.[3] Accordingly, resources should be structured to provide alternative ways of understanding or cater to differing learning styles using methods either

not available or inappropriate for face-to-face learning in small group meetings. As the availability of resources increases due to cooperation and sharing between institutions and countries, it will become even more important that careful thought is applied to what resources are included as part of the curriculum.[9]

An alternative view is that resources should be considered carefully for their ability to contribute to learning that is likely to be assessed. This position is based on the well-researched premise that what is assessed will drive what is learned.[10,11] A plethora of resources for a curriculum topic, some of which contain conflicting and contradictory views or where the resource is of marginal interest, is clearly not examinable material irrespective of its ability to encourage deep learning. The response of assessment-driven students will be to avoid committing time to such learning.

It is suggested that, in planning the use of online resources in a blended learning environment, the following guidelines may be helpful:

- Limit the number of resources to four for each clinical topic unless there are pressing reasons to include more
- Carefully consider the value of each resource for its ability to represent an alternative view of a topic or to cater to different learning styles
- For each resource, consider if the material is considered essential or 'if needed' and clearly indicate this difference.

Conclusions

When lists of resources are provided in a blended learning environment, the order of presentation of the resources will substantially affect the rate at which the resources are accessed. The first four listed resources are likely to have much higher access rates than the remainder of the resources. Resources need to be considered carefully for how they add value to learning within a social learning theory, whether the resource is 'essential' or 'if needed' and the number of resources should be kept to four or below.

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