Recommendations for enhancing the quality of flexible online support for online teachers

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Flexible online support of teaching and learning at university is increasingly used in preference to face-to-face and blended formats to provide self-directed and just-in-time resources for teaching staff. Few have been evaluated to date. This paper outlines a pilot evaluation framework using the University of Newcastle's online resource, "Teaching in the Online Environment". The framework utilises web analytics (keyword search data) combined with data mining to evaluate this online staff development resource. In this paper we discuss the methodological challenges and benefits associated with our approach and make recommendations applying our findings to improve the Teaching in the Online Environment resource.

Keywords: evaluation, staff development, support, text mining, analytics

Introduction

Many universities today invest significant effort in developing staff development programs in a flexible online format in an attempt to increase their appeal and accessibility to an increasingly diverse academic workforce (Salas & Cannon-Bowers, 2001; Taylor, 2003). Examples of these approaches range from formal facilitated online or blended courses and self-directed web-based learning packages, informational websites to tip sheets, and resource directories (O'Reilly, Ellis, & Newton, 2000). Of these approaches, most universities have developed elaborate web-based support websites to deliver and or support more formal professional development programs and to enable the academic development unit to provide staff to leverage the immediacy of access to just-in-time support electronic information (Wilson & Stacey, 2004).

The effectiveness of staff development website hinges on the extent to which they can effectively address the learning needs of staff. (Boud, 1999) This issue is particularly important to the success of self-directed learning resources. Differing from facilitated professional development activities, designers of flexible support resources are provided with fewer opportunities to gauge the ongoing usefulness of their resources. We argue that these circumstances have resulted in a situation in many institutions where the quality improvement activities associated with flexible online resources are too often driven by external factors such as upgrades to major technology rather than the real-word need of staff in front line teaching roles.

In contrast, we argue for a more responsive, staff centred approach to the development of flexible staff support resources. With the advancement of web analytics combined with data mining technology we will show that designers of flexible staff support resource have a greater opportunity to identify the learning needs of staff and in turn to ensure their learning materials are personalised to the individual needs of learners (Romero & Ventura, 2007).

Background

In September 2009, the University of Newcastle (UoN) launched the professional development resource, Teaching in The Online Environment (TOE). This online resource was developed in order to improve the quality of online learning provided at UoN. Specifically, TOE aimed to increase staff capacity in the areas of online course design and preparation, facilitation and communication, and evaluation and assessment. The resource targeted staff commencing teaching in an online course. TOE was organised in six interconnected modules, each of which provide staff with practical suggestions, tips and instructions for using a range of learning technologies supported by the UoN.

In August 2009, before, TOE was launched CTL staff undertook a formative evaluation of TOE. In this process a total of 23 academic and general staff were asked to use and explore the resource for 10 - 15 minutes. During this time, CTL staff documented participants' behaviour and any verbal feedback participants provided. After using the resource, participants provided more detailed feedback about their experience via a modified version of questionnaire developed by (Reeves, 2003, p. 146).

This evaluation design was effective in gauging the participants' reactions to specific design elements of the resource. For example, the quality of: graphics, images, navigation and information design. Critical issues identified in this process were used to refine the resource before being launched in September 2009. However, as many of the participants were experienced with online teaching we had little evidence if the resource would be effective for a wider university audience once it was implemented. Consequently this pilot aimed to trial a more naturalistic approach to evaluating TOE. Specifically, it aimed to identify:

7. What types of support users seek about online teaching and learning?
8. How can search-query data be used to improve the TOE resource?

In this paper we discuss a pilot evaluation methodology that utilizes web analytics (keyword search data) combined with data mining to evaluate an online staff development resource. We begin by providing the background and context for the project. Then we discuss the methodological challenges and benefits associated with our approach. We conclude our discussion by providing two recommendations for using search query data to improve a resource developed at the UoN.

Methods

The design team implemented two mechanisms to identify the information needs of TOE users. First, several online surveys were strategically placed within six frequently used pages of the resource. These surveys aimed to gauge what impact the use of TOE had on respondents' online teaching skills and practice. Second, a web analytics service (Google Analytics) was used to collect TOE user-tracking statistics. Similar to other web tracking systems, Google Analytics (GA) collects qualitative and quantitative data that provides designers with insights into real-world user behaviour and their interaction with a website (Ledford & Tyler, 2009).

In this study we aimed to utilise one dimension of web analytic data recoded by GA, the individual search queries users employed to access the TOE resource. The premise of this study is that search queries represent the underlying learning needs of web users (Rose & Levinson, 2004). User search queries are collected unobtrusively from authentic real-world situations and under these conditions are more likely to provide an accurate account of user needs than the questionnaires and structured interviews most common with traditional instructional design systems (Yardy unpublished data). By developing effective and efficient techniques to interpret these data designers can respond more rapidly to trends user feedback.

For the purposes of this study each unique search query collected by GA was used as an evaluation case. First, each case was analysed using a text mining process combined with content analysis as per (Broder, 2002). Next,

features of common cases were identified. Finally, these findings were used to establish recommendations for using search query data to inform the ongoing quality improvement of web based staff support resources. \

Preliminary Findings and Discussion

5,665 unique keyword searches were recorded during the period between September 2009 and September 2010. During our initial work, we identified several challenges in analysing the keyword search data. For example, a preliminary analysis of the initial 5,665 cases showed a high proportion of search queries unrelated to online teaching. After removal of these search queries, a random selection of 500 from the remaining 4,233 queries was stratified by month to avoid potential bias between peak and low periods of usage. We qualitatively analysed these 500 search queries employed by users of the TOE resource using text mining software.

To automate the removal of unrelated terms present in the sample, an automatic text classification process was created using Rapidminer. The results of this trial were mixed. For example, the text classification model correctly classified 99% of irrelevant cases; however, it also incorrectly classified 40% of relevant cases. In addition, we also used "association rule analysis" in Rapidminer, to identify content themes, topics and their associated relationships. This provided us with an interactive content map identifying topic themes, their frequency of occurrence and terms commonly used in the same search query. For example, the diagram below shows the association rules found for the term "feedback". When the term feedback was present in a search query, the terms "online" or "informal" or "formal" or "giving" were also used in the same query.
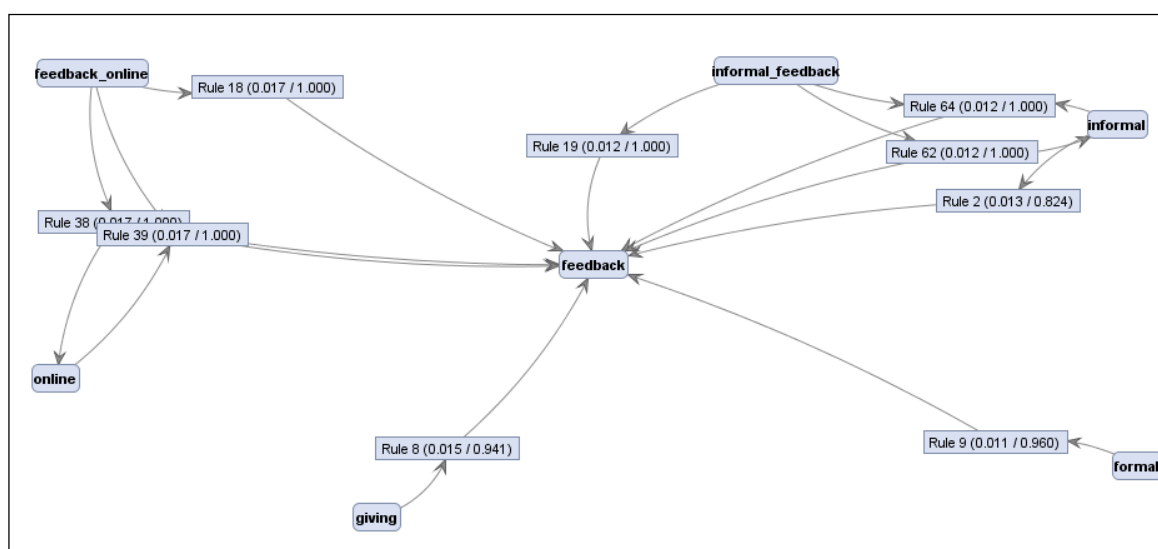

Figure 1: Association rules identified for the term 'feedback'

Using this process, broad content themes were initially identified from the search query sample. As shown in Table 1, subcategory themes were manually identified by two content experts.

Table 1. Categories and sub-categories of search queries submitted by users of TOE, identified using text mining and qualitative content analysis.

Search Category Name	Subcategory
Tools	Campus Pack, Adaptive Release, Early Warning System, Groups and Lectopia
Blackboard Assessment	Quiz, Grademark, Grade center, Turnitin
Assessment	Peer assessment, Rubrics,
Communication	Discussion, email, Chat
Online teaching	
Course Management	
Behaviour	Netiquette, difficult
Feedback	Examples, Giving / providing, formal and informal

We identified 8 major support topics and a further 27 sub – categories (Table 1). The nature of support queries differed across the 8 support categories identified. General informational queries were most prevalent representing 40% of the cases sampled. These queries included a single object of focus. For example, 'online communication tools', 'blackboard course banner size', 'copyright for students in an online environment' and 'blackboard staff guide'. These queries contained on average 2.3 terms. Further, our findings echoed those of (Barr, Jones, & Regelson, 2008) in that many of these cases were commonly grammatically incomplete as many cases omitted common parts of speech, eg., "is lectopia. As a consequence, inferring users' needs from these types of queries proved to be problematic. For example, consider the following case "lectopia book". The information needs of the user who made this query could be interpreted in two ways. First, it could suggest that the user was seeking to find a book about Lectopia. Second, and perhaps more probably, the user was seeking information about book[ing] a Lectopia recording.

In contrast to general information queries we also observed cases where users were more explicit in expressing their support needs, i.e., "transactional" as per (Broder, 2002). These cases represented occasions where staff sought assistance to complete a specific action. For example, 'How to make a membership rule', 'engaging and motivating practices in online learning', 'giving grades in online course', 'using online discussion as a course activity', 'conversion of student work from face to face courses to online courses' and 'convert your on campus to online'. We also observed that 20% of cases represent occasions where users sought assistance to decide on a range of possible action to adopt. For many of these cases the terms, 'benefits', 'best', 'advantages', 'disadvantages and implications' were used. For example, 'benefits of using on-line resources in teaching', 'implications for evaluating students in an online environment'.

Irrespective of their specificity, linguistic structure or subject focus this procedure also provided important insights into the natural language usage of online educators. By comparing the language (terms) used in keyword samples with those used by the TOE designer we were efficiently able to identify the commonalities and differences in ways users "talk" about online learning. Overall, our analysis revealed that users tended to use conversational language in their search queries. For example, while designers used the term pedagogy in the TOE resource, on no occasion was this term used in the query sample. Similarly, the term 'course design" was used frequently in TOE, while our results suggest that users preferred the term course conversion.

This analysis procedure also revealed cases where the terminology used to name concepts, and objects associated with specific online technologies could be made more accessible to staff beginning to develop online teaching practices. In these instances, terminology was used from the LMS not the user's background. For example, TOE designers frequently used the term 'grades' in topics relating to assessment. However, we suggest that, while this term is used in the LMS, using the term 'marks' would increase the readability of these topics. This of critical importance as it is common for users to have an incomplete understanding of a domain's terminology (Rinaldi F, Hess M, Dowdall J, Moll´a D, & Schwitter R, 2004).

Conclusions and Recommendations

By analysing 500 user search queries we have identified: the areas staff seek support in; the types of information they seek; and the common terms staff use in their search queries. Users of TOE mostly seek general information about online learning and teaching through their search terms. A smaller group (30%) are seeking more specific information about how to and the best ways to use online technologies. Through the use of text mining we have identified several opportunities to streamline the analysis process.

Our work to date has leads us to make following recommendations for using keyword search data to improve the TOE resource:

1. Use selected terms from informational search queries to refine the language usage within TOE. In particular, use these terms to refine the names of page titles, modules and topics
2. Use transactional search queries to identify opportunities to increase the content relevance of TOE.

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