ADVISING STUDENTS AT SCALE: USING SINGLE-SOURCING TO ADVISE A LARGE COHORT OF POSTGRADUATE STUDENTS ON THEIR FINAL PROJECT

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Abstract

Maintaining high quality teaching and learning materials becomes even more relevant in times of increasing student to staff ratios. Instructors rely on their institution's Virtual Learning Environment (VLE) to distribute materials and, as a result, often have to prepare materials in a word processor before copying content selectively into the VLE. This process makes regular updates of teaching materials time-consuming. In the following, I describe a technical feasibility study where single-sourcing was applied to this problem. As a method to build modular documents [1], single-sourcing can assist instructors in maintaining consistent and up-to-date teaching and learning materials. Its application benefits learners and instructors, most notably by improving accessibility to teaching and learning materials, which can encourage learners to engage more frequently with these materials.

Keywords: Accessibility, Course documentation, Single-source publishing.

1 INTRODUCTION

In his well-known "Paradox of Technology," Don Norman [2] states that "[t]he same technology that simplifies life by providing more functions in each device also complicates life by making the device harder to learn and harder to use" (p.31).

A similar paradox can be observed when reviewing the evolution of popular VLEs over the past decade. While VLEs now offer an array of features to help instructors engage learners, their increasing complexity also complicates the life of instructors; specifically, when content is written and managed directly within the VLE (i.e., where the VLE is used as a content management system [CMS]).

This contemporary approach of using VLEs is not without problems. First, most instructors have a preferred way of writing their teaching and learning materials, often using a dedicated word processor they are familiar with. Second, their choices in terms of format and software may not be a matter of personal taste as many institutions require the use of specified formats to ensure compliance with internal validation and quality assurance processes for instance.

As a consequence, the use of VLEs within institutions tends to fall on a continuum ranging from what [3] describes as a "simple repository" (p.539) of existing materials to an all-encompassing CMS for creating and managing all teaching and learning materials within the VLE. Instructors either upload existing documents ("simple repository" approach) or write content directly in the VLE ("VLE as CMS" approach) with both approaches having advantages and disadvantages. While word processors are optimised for writing long form texts, content written directly in a VLE automatically uses that VLE's styling conventions, which can result in a more professional and consistent overall appearance, improved accessibility, and potentially even faster load times.

In reality it seems that many instructors follow a mixed approach where they first create materials in a word processor and then copy relevant content manually into the VLE. While this combines the advantage of efficient content creation with a VLE's use of standardised styling conventions, such a mixed approach nevertheless means that instructors face a practical dilemma when creating teaching and learning materials.

2 PROBLEM DESCRIPTION

In a mixed approach, instructors move content from one source (e.g., a document created in a word processor) to another (e.g., the course introduction page on a VLE). This can lead to version control issues, increases the workload for manual updates and may thus result in materials being updated
less frequently. While copying content between sources may be tolerable to those who make infrequent changes to their materials, it constitutes a major headache for instructors who update their teaching and learning materials regularly.

Such a dilemma may sound rather benign, especially to those who perceive it an unavoidable inconvenience of using computers in the workplace. Their argument may be that new software comes and goes and that instructors will always have to learn and adapt to new software. But to instructors committed to high quality teaching and learning materials, this dilemma constitutes much more than an inconvenience. Instead, they perceive it as having the potential to undermine the integrity and quality of the materials they create.

The complexity of the problem is best illustrated using an example. At the beginning of each academic year, important dates, such as a submission deadline, have to be updated in course materials. For this, instructors go through their materials to update each occurrence of that date. The more instances of a specific date there are, the more time this process takes—and the higher the risk of missing an instance. Consequently, their incentive is to show each date only once, such as in the course outline, but not in subsequent materials.

Learners, however, may benefit from important dates being highlighted in a number of places. As a result, what benefits learners creates an additional burden for instructors. This burden is further exacerbated when (a) content is shared between different courses and (b) the amount of content that requires regular update increases. (Examples of content that requires regular updates are responses to requests for clarification from learners and changes in regulations.) Taken together, this can lead to fragmented and inconsistent teaching and learning materials; despite increasing efforts from instructors to avoid such inconsistencies.

In the following, I illustrate a response to the challenge of maintaining consistent teaching and learning materials by using single-sourcing (see [1] for an introduction). Firstly, I outline the case of a U.K. Higher Education institution where a technical feasibility study of using single-sourcing has been employed. Secondly, I explain the benefits resulting from this approach. Third, I conclude with a brief summary of research opportunities that have arisen from this study.

3 CASE

The support that students on a large postgraduate programme receive for their final project was recently changed from a traditional 1:1 supervision model to model with a dedicated support course consisting of lectures during the summer-term combined with personal meetings with an adviser. The rationale for introducing a dedicated support course was twofold: (a) to develop a coherent and consistent approach to giving advice to a growing group of students; and (b) to create a dynamic learning environment where class discussions are quickly codified into a comprehensive course manual suitable for review and self-study.

A further change was the introduction of a subject-specific pathway option. As a result, students have a choice between the general programme and a subject-specific pathway option. Support courses for both programmes were developed in parallel: One for students on the general programme and one for students on the subject-specific pathway.

While support courses across these two programmes share most of the content, they differ in their disciplinary focus and thus require different examples, illustrations, and reading materials. There are also different arrangements in place in terms of assessment and the provision of feedback. Beside the need to share content across courses, a key requirement was to let learners access their manual in a variety of ways, such as mobile-responsive HTML (hypertext mark-up language) or printer-friendly PDF (portable document format).

4 IMPLEMENTATION

These requirements make both of the two approaches described above impractical. Neither the "simple repository" nor the "VLE as CMS" approach are suitable given that a substantial amount of

\[\text{By "comprehensive course manual," I mean a document that contains all the teaching and learning materials that learners receive throughout the course, incl. important updates and detailed lecture notes.}\]
material has to be maintained for two separate courses, some of which is shared between them. Instead, single-sourcing was employed as a method of reusing modular content.

4.1 Single-sourcing

Single-sourcing is typically referred to as either single-source authoring or single-source publishing [4]. Ament [1] introduces single-sourcing as a method to "develop modular content, then assemble that content into different formats" (p.1) and "for different audiences and purposes" (p.3).

A number of software packages exist to facilitate a modular approach, such as Flare [5] and Robohelp [6]. Notable free-and-open-source (FOSS) alternatives to these commercial software packages are the typesetting system TeX [7] that can be used for single-source publishing [8], and the Sphinx content management system [9]. Sphinx was originally created by [10] for the purpose of documenting the Python programming language. It is now used in a wide variety of ways, including the documentation of various software projects [11].

4.2 Functionality

Sphinx invites experimentation, which was an important reason for its use in this project. Its FOSS nature and the fact that Sphinx can be extended using the Python programming language makes it the ideal candidate for testing the technical feasibility of using single-sourcing.

Sphinx offers a number of features that helps instructors tailor their course materials, such as generating different output formats, aggregating content selectively for different audiences, and using placeholders for content that changes frequently.

4.2.1 Different output formats

Teaching and learning materials are generated from a single-source into different output formats. Sphinx supports a number of output formats and the three used for teaching and learning materials were HTML (easily accessible through a mobile device), PDF (printer-friendly and can be read offline), and an experimental format for electronic books.

4.2.2 Different audiences

Teaching and learning materials are adapted for different audiences. The concept of 'comptententization' [4], where only audience-specific components are maintained separately, makes it possible to keep a single version of content that is shared across courses. Componentization—sometimes also referred to as 'conditional text' [1]—allows instructors to share content across courses while embedding different examples and readings into materials specific to an individual course.

4.2.3 Placeholders

Important information, such as submission deadlines, course codes and contact details, are inserted automatically into teaching and learning materials during output generation. Instead of the actual content, placeholders—referred to as 'substitutions' or 'variables' [1]—are embedded into the text. These placeholders are substituted with the corresponding content during output generation. (The placeholder |submission deadline|, for example, may be used to indicate where the actual submission date appears in the final output.)

5 BENEFITS

The use of single-sourcing benefits learners and instructors. While the main benefits for learners are increased convenience and improved accessibility to materials, the main benefits for instructors are flexibility and the ability to maintain consistency of their teaching and learning materials.

5.1 Benefits to learners

For learners, course manuals constitute a "one-stop-shop" of relevant information. The use of single-sourcing benefits them by enhancing convenience and accessibility. Each manual is offered in different output formats, most notably as mobile-friendly HTML and printer-friendly PDF versions.

The HTML version uses the responsive design from ReadTheDocs [12] where the layout adapts automatically to the screen size of the device it is viewed on. This allows easy and convenient access
from a variety of devices, such as mobile phones and tablets. This version also includes interactive content that would normally be hosted separately on the VLE, including a dedicated search function for quick navigation, as well as dynamically embedded content, such as YouTube videos and a booking form that allows learners to manage their appointments with an adviser.

At a pre-designated cut-off point during the summer term of each academic year, no further changes are made to the manual. The last revision of the course manual is then published as a printer-friendly PDF on the VLE. This allows learners to read the course manual off-line without requiring access to the VLE.

5.2 Benefits to instructors

The use of single-sourcing also benefits instructors, most notably by enabling them to create and update course materials easily and efficiently. Moreover, it reduces the time it takes to upload materials to the VLE as only a single compressed file has to be replaced each time an updated version of the manual is published on the VLE.

'Componentization' and 'substitutions' make it possible to share content across courses and also to maintain a single instance of that content. This ensures consistency and reduces the time required to update content. A further benefit is the automatic generation of different output formats. Although some formats, such as that for electronic books, may appeal to only a small number of learners, the ability to generate a dynamic and mobile-friendly HTML version together with a printer-friendly PDF from a single source of text significantly reduces the time it takes to publish updated materials in more than a single format.

Sphinx is customizable using the Python programming language. This makes it straightforward to add new placeholders and even more sophisticated functionalities that may be required for specific uses. For example, for the two course manuals discussed here, it was important to be able to add bibliographic data (imported from a file during output creation) and flowchart diagrams (using the DOT language [13] for creating directed graphs).

6 CONCLUSION

In conclusion, the use of single-sourcing has the potential to improve accessibility to course materials for learners and to reduce the time instructors spend managing content. (Which they can, instead, dedicate more productively to writing and improving their teaching and learning materials.)

As a "one-stop-shop" for learners, the creation of a comprehensive course manual from a single source may suggest that the VLE on which the manual is hosted becomes almost "invisible" to the learner. While it is true that in the feasibility study described here learners were engaging less with the VLE itself, it nevertheless remained the essential gateway that connects course materials with institutional services, such as submitting work and downloading feedback.

The implementation presented here constitutes an initial exploration into the use of single-sourcing. For it to be transferable and thus applicable more broadly, it must fulfil at least the following criteria:

1. It must be technically feasible
2. It must benefit learners
3. It must benefit instructors

This project has shown that it is technically feasible to create comprehensive course manuals using single-sourcing, which means that it passed the first criterion. While anecdotal evidence suggests that the second criterion also holds true, a systematic test will be required to better understand the effects design decisions taken in creating these support manuals have on learning motivation and subjective user experience.

As for the third criterion, further research will also be required to determine whether the benefits outlined above are worth the effort it will take instructors to adjust their current practices to the use of single-sourcing, and what kind of institutional support would be required to make this possible.

* While the PDF output is automatically generated together with the HTML version each time an updated course manual is generated, the PDF version is published on the VLE only once it is clear that no further changes are required during the current academic year.
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REFERENCES


