Developing automated ways to give essay writing feedback to students

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DEVELOPING AUTOMATED WAYS TO GIVE ESSAY WRITING FEEDBACK TO STUDENTS

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Abstract

Students are likely to receive feedback on their writing from several different academics during their undergraduate studies. Sometimes this feedback is partial, only mentioning one or two highlights and issues: ignoring the bulk of what was written. Sometimes feedback can be inconsistent between academics and confuse students. Even where there is a very clear rubric for marking a piece of academic writing, different colleagues may give significantly different marks; and the mark a single academic gives might depend on the time it was given. This variation reveals an opportunity to better support students in learning to produce good quality academic text.

In this paper we describe a new online tool designed to give students automated feedback on their academic writing. Students’ work is held confidentially and feedback is provided without any interaction from their tutor. It forms a zero stakes transaction. The resulting Open Essay Optimiser (OEO) is a tuned and enhanced successor of an earlier tool called Open Essayist. It was tuned using many anonymised scripts from students and enhanced with the input of expert programmers and designers. OEO examines the argument coherence within a text: how ideas are set out, discussed and then brought together in a conclusion. It provides different ways to present this coherence to students, whilst allowing them to edit their text within the tool and see the impact of these changes. There are other features including the listing and highlighting key words and phrases, and key sentences. Also, a review of the references used and the possibility to suggest others.

This paper will include the outcomes of the initial trial, including the student response to it, and consider its potential to support students.

Keywords: assessment, feedback, automated feedback, educational technology, online learning, enhancing student experience

1 INTRODUCTION

The Open Essay Optimiser (OEO) is a tool that has been developed from the earlier OpenEssayist (OE) which was produced in 2013 [2].

OE was developed to provide real time feedback to students as they draft essays and reports prior to submitting for assessment using an automated linguistic analysis engine. Feedback was provided through several features. The primary feature was a plot showing coherence within the text. Other features showed key words, phrases, and sentences. Unlike a number of other essay writing tools OE ‘engages the user on matters of content, rather than pointing out failings in grammar, style, and structure.’ [1].

OE was trialled in the 2013/14 academic year with encouraging results that suggested students engaging with the tool found it gave them an insight into how to improve their writing [2].

Through its development in 2019-2020 OEO gained several improvements over OE. Amongst them, perhaps the most important was the professional development of the user interface, with user development testing, to be more informative and with improved layout. Another of the most important changes was the several improvements to the graphical representation of coherence: improved scaling for greater clarity; adding the ability to view the text at a node by hovering the cursor; adding the identification of nodes with links to the student’s conclusion (these changes are shown in Fig. 2). A new feature was added to OEO. This is the ability to identify which of the course references had been used, along with the suggestion of further quotations that may be relevant based on what the student had already written.

The aim of these changes was to produce a significantly improved tool that was piloted with students during the 2020/21 academic year. As a tool designed to assist students develop their writing skills, it should improve confidence but might also impact on grade and on the likelihood a student will continue their studies.
This report details the initial findings of a pilot study of this new tool.

Figure 1. Left: The graphical plot of the coherence of ideas within the text from OE. Right: The revised plot with key as displayed within OEO. The greater the number of nodes within the circle, the greater the coherence within the writing.

Figure 2. Within OEO when one hovers the cursor over a node, it enlarges and the text it represents is displayed. The text is also highlighted in the panel on the right. This text can be edited with the graph replotting when changes are saved.
2 METHODOLOGY

Students studying the Open University’s masters module, H817 Openness and innovation in eLearning in 2021 were asked to use OEO as they worked on their first two written assignments and to provide feedback through pre and post questionnaires. They were also invited to make a screen recording with audio as they used the tool. OEO remained available for students to use for their subsequent assessments. A website was created with instructions and videos on how to use the tool and make a screencast. A small FAQ section was added to include common questions as they arose. A comparison was made between the coherence score generated by OEO’s algorithm and the mark awarded by tutors to the first assessment (Ass 1).

3 RESULTS

There were 31 students studying the module, counted at the University’s key audit point. A summary of the numbers involved in the project is given in Table 1 below.

Table 1. The numbers of students engaging with the OEO trial.

<table>
<thead>
<tr>
<th>Number of students:</th>
<th>Continuing</th>
<th>New</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studying module</td>
<td>22</td>
<td>9</td>
<td>31</td>
</tr>
<tr>
<td>completing module</td>
<td>21</td>
<td>9</td>
<td>30</td>
</tr>
<tr>
<td>logging into OEO</td>
<td>12</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>uploading a file to OEO</td>
<td>11</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>uploading a version of Ass 1 OEO</td>
<td>7</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>uploading a version of Ass 2 to OEO</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Completing pre-questionnaire</td>
<td>13</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>Completing post-questionnaire</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Providing screencasts of use</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Reporting technical issues</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

All login issues. 1 was properly fixed.

3.1 Demographics

The demographics of those that did engage with the OEO were not significantly different to those of those who did not. Fig. 3 shows comparisons of age and biological sex.

![Figure 3](image)

Figure 3, Left: Comparison of the spread of age. Right: Comparison of biological sex

The low numbers also means that in terms of ethnicity, employment, declared Special Educational Needs (SEN), and career motivation, the two groups are similar.
3.2 Questionnaires

3.2.1 Pre-questionnaire

The pre-questionnaire, completed prior to students receiving any detail about the OEO sets the baseline for which to measure any impact of engaging with OEO.

All five new students and the majority of continuing students valued discussing their assessment with someone else. This was mainly described in terms of building confidence that their ideas were on the right track.

The idea of drafting was well embedded within students’ practice with half of the 18 students (9) stating they make at least three drafts of an assignment before submitting it for marking.

For these students, producing an assessed piece of work represented a significant commitment of time with 13 of 18 saying they spent more than 10 hours on their most recent assessment. Of the remaining 5, 4 said it was between 5 to 10 hours.

Time was the most requested additional item that would help in writing assessments. The next most common thing that would help related to getting feedback and guidance from peers, tutors or others prior to submission. OEO would provide one channel for automated feedback and guidance.

3.2.2 Post-questionnaire

With four responses, it would not be feasible to draw firm conclusions. One of the students responding to this questionnaire did not engage with the tool at all because it was clearly additional to the module materials and they were already time poor. Of the other three, two said they would find the tool somewhat useful if it was offered on another course. The last student stated they were already proficient in their writing and didn’t need to engage further than necessary for this project.

Interestingly, one student felt that adjustments they made to improve coherence on their second assessment actually cost them marks from their tutor. However, it seems the change they made was to reduce the text, rather than to increase its coherence through improving linking within it.

3.3 Screencasts

Two students made screencasts. The recordings show the students responding positively to OEO. The narration from the one with audio talked us through their response and it was clear that the various elements of the tool were prompting a consideration of emphasis and balance, the potential overuse of some words, and possible gaps in the text. The tool was evidently providing food for thought.

3.4 Comparison between coherence and assessment score

An underlying hypothesis behind this pilot was more coherent writing would also score more highly when marked by a tutor. The graph in Fig. 4 shows that this is not supported by these data. It may be possible that there are other factors involved. Perhaps the most obvious is that the mark scheme for the assessment does not award any marks for anything that can be related to coherence.

![Figure 4, Ass 1 scores plotted against OEO measure of coherence.](image-url)
Other possible factors might relate to subgroups within the cohort, for instance, those for whom English is not their first language, those who are not used to academic writing, and those struggling with a course in general. This latter group may score highly on coherence but be awarded a low score in assessment.

3.5 Ongoing use of tool
Students were only asked to use OEO for their first two assessments but knew the tool would remain available through their study which included three further assessments. The last of which was the End of Module Assessment (EMA), which has to be passed for a student to pass the whole module. Whilst most of those engaging with the tool stopped after Ass 2, three students went on to use it again to assist with writing their EMA.

4 CONCLUSIONS
The primary finding from the initial analysis of this pilot study is that whilst there is definitely some evidence this is a tool that can have a positive impact for some students and their writing, the exact benefit in terms of overall grade or levels of retention has not been demonstrated. A further study would be required and this would ideally focus on an undergraduate module with a large cohort for which the development of good essay writing is important.

The enhancements added to the tool through the development of the Open Essay Optimiser (OEO) do appear to make it easy to work with and informative. Areas that were problematic for its predecessor, with some students definitely appreciating the information it provides as feedback on their writing. This was well demonstrated through the screencast with audio and supported by the ongoing use of the tool by some students.

In this pilot of OEO, it was clearly seen as an add-on to the module. Although this was completely within the spirit of the module’s focus on innovation in elearning, a number of students opted not to engage with the tool at all. There was no clear split between those engaging and not engaging in terms of demographics, and a range of personal reasons are most likely. These may well include the additional stress due to the COVID-19 pandemic. Only one student declared why they did not engage with the tool, through the post-questionnaire, stating it was because it was an additional element. It would be important therefore, to embed the tool within the module for any subsequent trial. Or, at least to ensure that students more readily see it as integral to their studies.

The pre-questionnaire revealed the potential for OEO to provide some of the additional feedback and guidance desired by students. Therefore, whilst the conclusions from the analysis so far, are not definitive, they are encouraging and certainly invite further trialling.

ACKNOWLEDGEMENTS
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REFERENCES