Raising Standards: A Dialogic Approach to Improving Computing Students' Writing for Assessment

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ABSTRACT
This paper describes and analyses an intervention to improve the approach to, and the qualitative content of, written work for a computing module in one new UK University. Concerns about the standard of written documentation produced in earlier cohorts initiated collaboration between a subject expert, a Write Now CETL writing fellow and a learning and teaching specialist who, using an action research approach, attempted to address the issue by: (1) up-skilling the students involved and modelling the process for staff development (2) attempting to engage students in the process of writing for assessment within the academic discourse of their discipline (3) creating opportunities for dialogue concerning literary practices in academia. This paper evaluates this process including, the reported benefits to students and the difficulties encountered. Results are presented showing a significant improvement in the quality of student documentation. Recommendations are made for future developments and collaborations within the Computing curriculum.

Keywords
Academic writing, Gaming, Computing, Documentation Assessment

INTRODUCTION
It is now generally accepted that overall standards of academic literacy are falling. [3, 10, 13] Pedagogic discourse, as to the reason for this decline, often divides its focus between student inability to write in an appropriate academic style and the rigid demands of discipline specific work. [10] The need for reflective research in the area of student writing is clear given the emphasis of undergraduate courses on transferable skills that provide benefits to employers. The ability to transfer academic skills to the working environment is often stated to be dependent on the level of literacy that a candidate demonstrates, this is indicated in the following quote:

"professional written communication skills form an important subset which contribute to many other skill categories". [3]

Computing is an example of a discipline where courses are becoming more diverse in their content. The fact that modern courses embrace a variety of topics, requiring a variety of different literary skills highlights the need for students to engage with competing literary practices in order to fully conceptualise the demands of a broad curriculum. Students are expected to develop evaluative and analytical skills in a range of genres in addition to completing the practical elements of courses. However, many still view computing subjects as practical activities and do not engage with the written elements of the course.

The concept of simply up-skilling ‘deficit’ students is a contested element of current theoretical approaches to developing student writing. But recent seminal studies have proposed a model in which a focus on developing skills is allied with an appreciation of a variety of academic literacies [10] and a more transparent process of academic socialisation [8]. Lillis argues this can be achieved through ‘dialogues of participation’ [11] and this multi-faceted, dialogic, model formed the basis of our approach.

This paper describes an intervention within one Computing module implemented by a team of experts working collaboratively: the module leader/tutor, a writing specialist and learning and teaching fellow. What follows is an account of this process exploring the attitudes of the students and researchers involved and evaluating the impact of the chosen intervention. The paper is organised as follows: the following section outlines the context for the research; the next section describes the intervention; the results are then presented and finally conclusions are drawn as to how to extend the intervention within the computing discipline.
The intervention was instigated by the module tutor for 3D Modelling Tools, a second year undergraduate module. This module was developed for first delivery in 2005-2006 as part of the new Gaming minor pathway at Liverpool Hope University. The module covers the concepts and theories of three-dimensional modelling. The students create three-dimensional objects and environments using appropriate software. The models that the students create are supported by documentation where the students outline and critically evaluate their research, planning and decisions made in the development of the model.

Practical modules such as 3D Modelling Tools, must achieve a balance between training in the use of the software and suitable academic reasoning. The documentation then forms an important part of the assessment, firstly to the students have developed critical evaluative skills, but also as a means to record methods used. In order to achieve an A grade the students are asked to use methods that go beyond the scope of the course. In order to receive these higher level marks the student must record this in their documentation, supported by evidence of how they researched their approach. In the first run of the module the documentation that the students produced to accompany their project work was disappointing.

Early discussions with the subject specialist described what was currently lacking in the students’ performance in order for them to be successful. The planned intervention drew heavily on the principles expressed in [2, 6, 14] which do not see the processes involved here as creating simplistic ‘remedies’ to achieve improved outputs. Rather, the intervention was intended to engage students in the process of writing itself as a learning experience, so raising awareness of the need to spend appropriate time and effort on task. Attention focussed upon developing students’ understanding of the assessment criteria and their current performance against this and not on their personal characteristics or any perceived ‘deficit’. Therefore, providing formative feedback which identified how students could improve their documentation and transfer developing academic writing skills to future assignments was a priority.

**The Project Aims**

It was proposed to improve the standard of documentation by the module tutor working with a writing expert to instigate activities dedicated to writing through which the students would:

- improve their understanding of why documentation is needed;
- clarify the role of documentation in a practical subject, such as computer modeling;
- discuss and model technical writing skills/styles in the discipline of computing;
- understand the necessity of referencing skills in the discipline of computing;
- improve their planning and time management strategies;
- improve their self-assessment skills of documentation.

**The Intervention**

Placing the practice of writing at the centre of the learning process requires ‘institutional change and innovation’. [4] Planning such an intervention to promote good practice was informed by the three level model currently used to categorise approaches to the development of academic writing in higher education: ‘socialisation’; ‘skills’ and ‘academic literacies’. [8, 10] The subject specialist reported that in previous assignments assumptions of implicit socialisation had not been fulfilled and a deficit in academic writing skills had been identified across all ability ranges. In particular, the tutor expressed concern about the consistent use of the first person in academic writing and of a lack of appropriate presentation, including referencing in documentation. Research has shown that students are often unaware of what is expected, cannot always understand the requirements of academic writing [9, 13] and that apparent problems relating to the use of conventional academic forms are often symptomatic of deeper conceptual difficulties, such as understanding the need for critical evaluation. [7] Initial collaboration, therefore, between the tutor and the Write Now Fellow explored the need to make both surface features of academic conventions and the requirements of deeper learning explicit through a process of modelling writing in the discipline.

This working partnership then developed appropriate resources and agreed teaching strategies for two workshops and a feedback session led by the writing fellow. The first session provided activities to promote discussion of student perceptions of ‘ideal documentation’ and the assignment brief to identify important mismatches in expectations. [15] It has been argued that ‘motivating students to want to write is more useful than teaching them writing’ [1] and, as students openly acknowledged their reluctance to write prior to the intervention, this affective dimension seemed key to the creation of a transferable learning and teaching strategy. Thus, in exploring the question: ‘Why write documentation?’ the first session was presented not as addressing any perceived skills deficit, but situated within a discursive context of continuing professional development and academic progression. Significantly, 100% of students judged that this approach increased their confidence to undertake the written assignment. A distinctive feature of the teaching intervention was the explanation and modelling of assessment criteria,
such as critical analysis, through the use of exemplar material as it was recognised that merely presenting these descriptors to students would have little impact upon performance. [7, 16] Finally, the theoretical perspective of Academic Literacies [10] informed a pedagogical design which consistently focused upon opportunities for ‘dialogues of participation’. [11] Throughout all sessions, group discussions with both the tutor and writing fellow aimed to explore students’ prior experience and understanding of writing for assessment and to encourage critical engagement with the required academic literary practices: the rules of the game.

Central to this dialogic approach was the use of formative feedback on drafts [4] at ‘the point of writing’ [5] thereby aligning practice in higher education with student expectations and needs [11]. The decision to use peer and self-assessment to supplement tutorial guidance was informed by current frameworks of assessment good practice [6] and the need to create a sustainable strategy. Student writing and review skills were developed and practised during the workshops, all of which provided ongoing clarification of expectations. This formative intervention was then followed up by a feedback session, once marks had been awarded, in which students were encouraged to ‘feed forward’ [14] transferable skills and further develop their writing in future documentation.

THE RESULTS
Three sets of results are presented in this section: a content analysis of the written assignment, student perceptions are then evaluated and finally reflections from the subject tutor are given.

Analysis of the Documentation
A comparative content analysis of student documentation was undertaken to assess the impact of the intervention. The interpretation of these findings was moderated and the results show significant percentage increases in the quality of academic writing in all key areas previously regarded as problematic and across all ability ranges. In particular, the comparison of documentation from the 2005-6 control cohort of 11 students with that submitted by participants in the 2006-7 workshops, the intervention cohort of 18 students, demonstrates that the most significant change in writing practices relates to a sustained increase in the use of analytical or evaluative statements.

The assessment criteria provided a framework for a content analysis with a particular focus upon the use of critical evaluation. From the marking scheme seven topic areas were identified and, taking the 500 word limit into account, students were expected to make at least one qualitative statement relating to each aspect of the assignment task that went beyond mere description and explained their thinking during the design process. Using the grade descriptors: Good (5-7); Some (2-4) and Poor (0-1), 78% (14) of the intervention group were found to have written a good, sustained, critical evaluation across five or more of the topic areas with 22% (4) communicating evidence of some deeper engagement with up to four aspects of the modelling process. No student was identified as poor in their use of critical evaluation. These results compare favourably with those from the control group in which 27% (3) of the cohort were judged to be poor in their use of analysis or evaluation; 78% [8] used some, and no student provided a sustained critical evaluation in their documentation.

A similar important change in writing practices is shown in the use of the personal pronoun. The majority of students, 78% (14) attending the workshops used this rarely {0-1} in their final report compared with 82% (9) of the 2005-6 cohort who used the first person throughout (>5) their documentation. Significantly, when reading some sample exemplar material from this previous cohort, students in the intervention group found the experience illuminating: “I can see now, it’s all ‘I did this, I did that’ but what did they think about the model?” Content analysis, therefore, supports initial findings that students found exemplar extracts instructive and their use appears to have supported their engagement with required conventions.

The experience of giving feedback to students as they worked to produce texts reflecting a far deeper approach to learning indicated that the process of developing critical analysis can have an initial impact upon the consistent use of an appropriate academic register and GAPS (grammar, spelling and punctuation). For example, overall the comparative results show an increase of 11% (2) in the use of some errors (<10) in academic register and of frequent errors (>10) in GAPS by the intervention cohort, as students changed their practice from a routinely descriptive approach. Given the complexity of improving student writing this is not an unexpected result, particularly in the case of International students. These findings strengthen the case for embedding the drafting process within the curriculum, providing short, formative writing activities to enable students to practice new strategies as part of the learning process.

Further comparative analysis of the documentation, however, provides striking evidence of consistent and wide-ranging improvement in the structuring and presentation of written work, including the use of referencing skills. Again a possible correlation can be identified between a greater engagement with critical evaluation and an increased use of: references, 94% (17) compared to 64% (7); citations, 61% (11) compared to 18% (2) and a qualitative improvement in the structuring of
documentation; 30% (6) more students making a good attempt and 8% (4) of students making some attempt, for example, to use appropriate devices such as headings to organise their ideas.

Interestingly, these findings imply that an intervention that prioritized discussion of students’ conceptual uncertainties relating to the language and requirements of assessment criteria, rather than simply taking a ‘deficit’ skills approach, appears effective in actually engaging students in the use of academic conventions. Even more importantly, this approach appears capable of making a qualitative impact upon the development of students’ deeper, critical thinking. Encouragingly, the results of the content analysis align with evaluations of the first session in which a majority of students reported: they agreed or strongly agreed that as a result of the workshop not only did they have a clearer awareness and understanding of assessment criteria and the academic conventions for writing documentation, they were also more confident in their ability to undertake the assignment. Finally, reflection upon this dialogic approach during the process of collaboration revealed that the experience had given the subject tutor the opportunity to review the terms of the assignment brief leading to suggestions for improvement.

**The Student Experience**

In support of the findings of the content analysis, participants reported that the intervention had changed the way they thought about academic writing.

They reported that they were more confident in applying analytic/evaluative thinking to their own written work and had “more of a think” about their ideas before committing them to paper. It was also stated that post intervention, participants understood more fully the criteria used to assess written work and made explicit links between their own writing and the criteria. One participant described this outcome in the following terms:

“… how key it is to make what you write fit with the mark scheme, I think that’s one of the most important things that we actually covered….. a lot of the time. I think what Jim (anon) is saying is that you’d write something and just think fine that’ll do but unless it actually covers what the mark scheme says and you look at the mark scheme and analyse what it wants you to do, there’s no point in writing what you think”.

Further to this, participants also reported a heightened awareness of the need to plan their writing more thoroughly and of managing their time more carefully, beginning to think about assignment months and weeks in advance of the due date rather than days before as was the case prior to the intervention. In general most participants reported added precision when using language to explicate their practical work, an added understanding of the system of referencing and a more detailed knowledge of the rules governing academic writing, for example, the contextual use of the word ‘I’.

There was general agreement over the positive effects of sessions to discuss the practice of academic writing, with one focus group concluding that they hoped this type of approach would be adopted earlier in the course for future cohorts.

**The Subject Expert Reflection**

The documentation submitted by the control cohort of students was poor, not only in the technical aspects of writing, but also demonstrating a lack of understanding of the role of research and the need for critical evaluation. It had been assumed that some of these skills had been acquired during or before the students first year at university. The collaboration between the subject tutor, the Writing and Learning and Teaching Fellows gave this project special dynamics. Without the input of these specialists changes would still have been made to the module but it would have been achieved using a deficit skills approach as defined by Lea and Street. [10] The collaboration between the three experts meant that a move was made towards a pedagogical model for the development of academic literacies, as discussed by Lillis, [12] in which students and tutors participate in reflective discussion and practice of the required academic writing skills.

The close involvement of the Writing Expert with the project was crucial to success, in particular she made considerable effort to understand the nature of the subject material and therefore, her use of exemplar material was excellent. This encouraged students to critically evaluate and discuss how descriptive writing could be improved, to continually ask ‘so what?’ It was also used effectively to help students evaluate their work against the marking criteria. Students were allocated ‘writing partners’ to encourage dialogue about their writing and asked to ‘mark’ a draft of each others’ work. Interestingly this exercise was not completed; the students spontaneously moving on to making amendments to their own work in consultation with feedback from their partners.

Practical aspects of the intervention were important. The timing of the writing sessions was key, the peer review of drafts was very successful probably because it was three days before the project deadline. The students were reluctant to print draft work, possibly because of the charges made by the University. The writing sessions were held in the computing lab, which for paper work and dialogue are less than ideal, but this kept the students in a familiar space.

Whilst the results from the analysis of the documentation demonstrate that the intervention
was extremely successful, there is room for improvement. The time allocated for the intervention was inadequate, and it would have benefited from a number of short writing sessions, perhaps of the order of 5-6, rather than the two which were planned. Students need more time to assimilate what are for many, new concepts. They also need to practice some of the skills, in a similar manner to practising programming: small tasks performed in the classroom with immediate feedback. A move from paper based activities to a blended approach needs to be researched, computers are a more natural tool for computing students. Finally, the process enabled effective referral: one international student in the group, whilst achieving an excellent mark for his work, was advised to seek on-going support from the University Writing Centre.

**THE NEXT STAGE**

The results show a significant shift in the perceptions and confidence of students regarding the need to write, the process of planning to write, actually writing and the assessment process. The intervention also modelled the process of writing for assessment using sustainable teaching strategies with the objective of embedding successful evidence based practice in a changed Computer Studies curriculum.

We are now in a position to refine the model and the next Action Research cycle will develop research into improving the embedding of academic literacies within the curriculum in the School of Computing. A longitudinal study is planned to implement the intervention throughout the three undergraduate years of the BSc. in Information Technology. As with this intervention, work from the preceding year will be used to both measure improvement and to provide exemplar material. The use of blended learning using elearning techniques will be investigated. Staff will be encouraged to adopt a dialogic approach with the students and to increase the amount of practical writing with formative feedback.

**ACKNOWLEDGEMENT**

Our thanks to the students who took part in this research which was funded as a mini-project by the Write Now CETL.

**REFERENCES**


