Experiences on the Application of WIKI based Coursework in a Fourth Year Engineering Module

D. Hassell and D. De Focatiis

***Abstract*— This paper presents work on the application of wiki based coursework for a fourth year engineering module delivered as part of both a MEng and MSc programme in Chemical Engineering. The module was taught with an equivalent structure simultaneously on two separate campuses, one in the United Kingdom (UK) and one in Malaysia, and the subsequent results were compared. Student feedback was sought via questionnaires, with forty five respondents from the UK and forty nine from Malaysia. Results include discussion on; perceived difficulty; student enjoyment and experiences; differences between MEng and MSc students; differences between cohorts on different campuses. The response of students to the use of wiki based coursework was found to vary based on their experiences and background, with UK students being generally more positive on its application than those in Malaysia.**

***Keywords*— Engineering education, student differences, student learning, web based coursework.**

I. Introduction

INCREASINGLY technology is being used to complement teaching in higher education at all levels of delivery, such as support during conventional taught delivery via the use of electronic voting pads in class, provision of taught lecture material through podcasting, or the dissemination of whole modules through online learning platforms such as MOOC's. Several theories suggest that Wikis are well placed to support collaborative learning through technology [1], with enhanced peer interaction and group work one consequent of their implantation into the curriculum [2]. A Wiki is a collaborative website in which multiple users cooperate to create a set of interlinked pages, much in the same way as the well-known on-line encyclopaedia Wikipedia is organised. [3] have provided a thorough review of recent research into teaching applications of Wikis in higher education. They concluded that students' use of wikis was influenced by four main factors: "wiki usability, pedagogical issues, social environment, and students' technical knowledge and skills". This work focuses on students experiences using a Wiki as a platform to deliver their coursework in a fourth year undergraduate module in Chemical Engineering. Taught across two international campuses of a University, student experiences were analysed with respect to communication, value to their overall development, factors impacting on student grades, and any differences in response between the two student cohorts.Procedure for Paper Submission

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II. Methodology

H84ARM, Advanced Rheology and Materials, is a final year 10-credit module taught in the Department of Chemical and Environmental Engineering at two international campuses of the University of Nottingham: in the United Kingdom (UK) and in Malaysia. Delivered to a mixture of undergraduate and postgraduate students, 50% of the module is taught via traditional lectures and assessed by a written examination whilst the other 50% of the module was taught via small group tutorials and assessed in the form of a collaborative Wiki.

For the Wiki component of the module, students were placed in groups of 3-4 and told to research their own ideas on the subject matter for the coursework, intended to be an aspect at the cutting edge of materials and rheology. The intention was for students to explore whether there was a viable new product that a company could produce in their topic area, and students were encouraged to report back to a fictional manager in the form of a collaborative Wiki. The Wiki served as both the working medium as well as the submitted work, and the final choice of topic was taken in collaboration with the convenors to ensure suitability. Examples of topics selected include shear-thickening fluids, thixotropy, and various types of nanomaterials.

Students at each campus were provided with a one-hour introductory workshop to learn how to structure and how to enter information, images and videos onto the Wiki, and were supported by an academic in four thirty-minute sessions over a period of eight weeks. Students were encouraged to use the non-linear nature of the Wiki as a way of layering information, and to make extensive use of links both within the Wiki and to external websites. The same software engine, PMWiki, was used at both campuses, and both staff and students could easily access the Wikis from anywhere in the world. Student Wikis were password-protected so that each group of students could only see their own Wiki, whilst staff had access to a "master password" which worked for all groups Wiki.

To obtain feedback on student's experiences, two anonymised questionnaires were given out using a Likert seven point scale [4]. The first was given to students near the start of the module whilst the second was provided at the end of the project. Table one provides the demographic of students who responded to the questionnaires at both campuses, and student responses were analysed and interpreted together with additional evidence acquired in the process of teaching. Whilst most of the students in Malaysia were MEng students, there was a greater split between MEng and MSc students in the UK.

Table one: Questionnaire respondents at both campuses, and whether they were MEng or MSc students.

Campus	No. of MEng students	No. of MSc students
UK – before coursework	26	17
UK – after coursework	26	19
Malaysia – before coursework	38	3
Malaysia – after coursework	47	2

III. RESULTS

Results of the first questionnaire indicated that of the two student cohorts, those studying in Malaysia claimed to have more experience with web design whilst more of the UK students had heard of Wiki's. A minority of students on both campuses (~10%) hadn't heard of Wiki's before, yet had used wiki based websites such as Wikipedia, indicating that there was some confusion with regards to what Wiki's were. More Malaysian students had designed a website than heard of Wiki's which implied that they had experience using other programme coding. This was further indicated by individual student comments at the end of the coursework stating that other coding would have been better. Only a small minority of students (17% Malaysian, 7% UK) had edited a Wiki before the coursework.

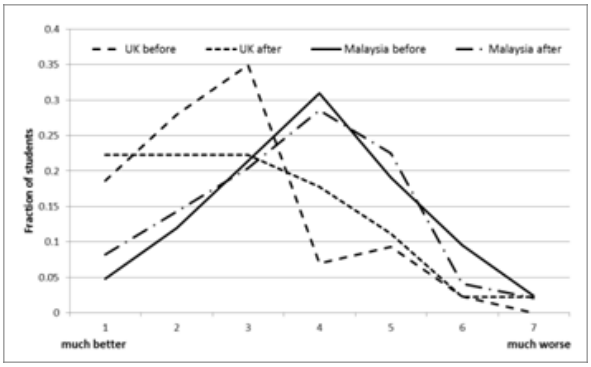

Fig. 1 Student response to the effect of using a Wiki on group communication when compared to traditional written reports both before and after the coursework

Student perception to the impact of Wiki's for group communication is given in Fig. 1. Before undertaking the wiki based coursework Malaysian students didn't think that the website would improve communication between group members, and this didn't really change much after the coursework. However UK students were initially more positive about the impact on communication, although responses after the coursework indicated that after having used the Wiki their opinions more closed mirrored those of the Malaysian students. This seems to indicate that perceptions before exposure to Wiki's was more positive than the actual experience of using them. As Malaysian students had more experience with web design before the coursework, these results are most likely a reflection on the use of websites in general rather than Wiki's in specific. These findings are different to other work [2],[5] which identified Wiki's as potentially useful tools for effective collaboration amongst students. This is especially relevant as it is widely acknowledged that the development of teamwork skills is important for employers [6], and that engaged students are more satisfied and get better grades. Whilst the reason for this discrepancy is unclear, staff experiences indicated that the Wiki was useful when meeting with students to review their progression throughout the semester.

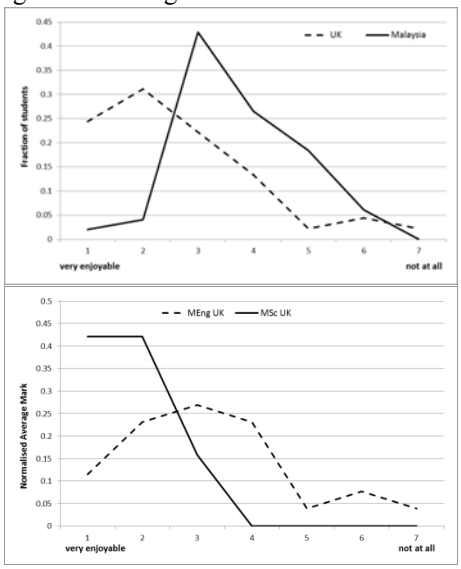

Fig. 2 (top) Level of enjoyment amongst students to the Wiki based coursework and (bottom) breakdown of the results for the UK campus into MEng and MSc cohorts

The level of enjoyment of students to the coursework is presented in Fig 2. Overall it seems that the UK students enjoyed the experience more than Malaysian students, although in both cases the response was generally positive. There is a large difference between the response of MSc and MEng students for the UK students, as shown in the right hand graph of Fig 2, which might explain the difference. It seems that MEng students on both campuses are more neutral to the Wiki experience whilst MSc students are overwhelmingly positive. Fig 3 shows the students opinions on whether Wiki's are a better medium for coursework delivery compared to conventional reports. The opinion of Malaysian students is diverse, with some students feeling that the coursework is a better medium whilst others feeling that it is a worse medium. The response of the UK students is almost all positive when compared to traditional coursework, indicating that they

appreciated the experience more when compared to the Malaysian students.

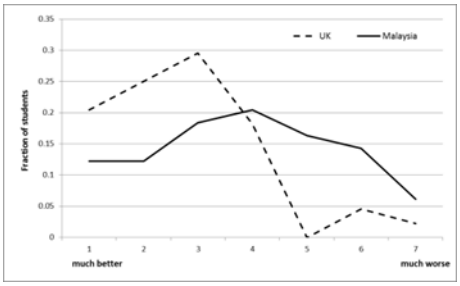

Fig. 3 Student response to the question "Are Wiki a better medium than conventional reports"

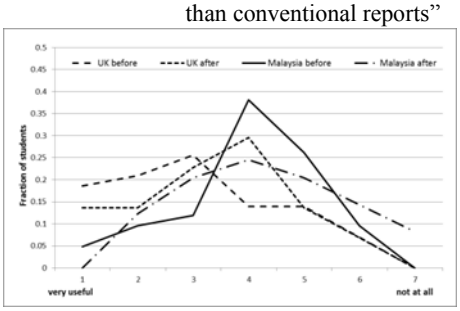

Fig. 4 Student response to the effect of usefulness of learning Wiki's for their degree course both before and after the coursework"

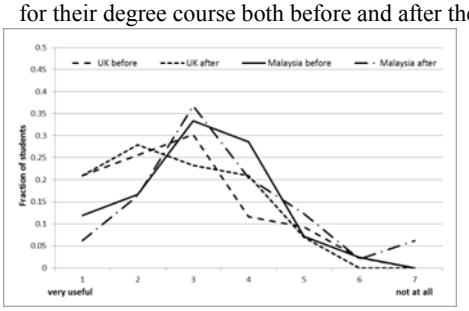

Fig. 5 Student response to the effect of usefulness of learning Wiki's for their personal development both before and after the coursework"

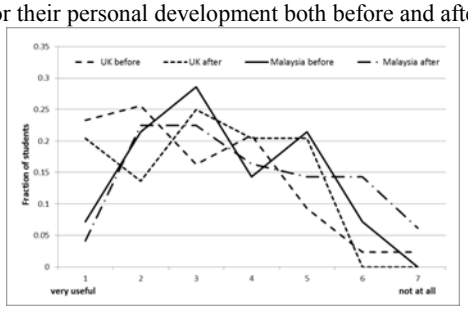

Fig. 6 Student response to the effect of usefulness of learning Wiki's for their future career both before and after the coursework

Fig's 4-6 summarise student perception of the Wiki's usefulness to their course, personal development and future career respectively, both before and after the coursework. For their course, students at the UK campus were initially more positive than those in Malaysia, although responses became more aligned after students had undertaken the coursework. This suggests that UK students began with higher expectations; perhaps as a result of having no previous experience with web design, and that these were not met. However, Fig 5 highlights that both cohorts of students found exposure to Wiki design generally positive to their personal development both before and after the coursework, perhaps indicating that it wasn't that student's expectations weren't met, but rather that they became more aware of its relevance to their degree. Responses to the relevance of Wiki's to students future careers is much more varied on both campuses, which is likely the result of the diverse range of employment opportunities available to chemical engineering students upon graduation.

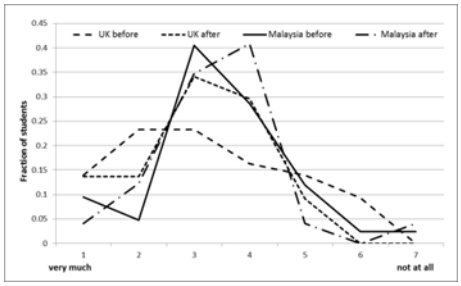

Fig. 7 Student response to the their thoughts on how much IT skills will reflect upon the final marks both before and after the coursework

Given the IT nature of the coursework delivery, it is important to understand student's perceptions towards the impact of IT knowledge on performance and final grade. This is given in Fig 7 for both cohorts. Initially the UK students, who had less experience with web design, felt that IT skills would have a greater impact on student marks. However results indicate that as their experience with the wiki increased their opinions became similar to those of Malaysian students who felt that marks would be less biased by web design experience. This student perception is reinforced in Fig 8, which plots student's perceived IT knowledge against the awarded mark. Instead of a positive correlation between IT skills and marks, a slightly negative correlation is observed, with higher IT skills leading to lower marks. This could be the result of two non-related factors; students with good IT skills took the coursework for granted, given the IT nature of the information delivery and their perceived expertise in web design; it is possible that there is a negative correlation between good IT skills and technical knowledge of the subject within engineering degree courses. From the results published here it is impossible to know which, if either of these possible factors led to the observed results. In either case it is clear that good IT skills have not biased students towards obtaining higher coursework grades on either campus.

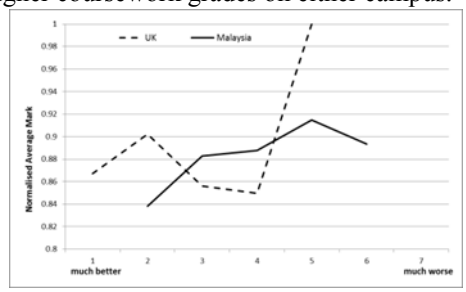

Fig. 8 Normalised final mark plotted against the students perceived IT skills when compared to peers

IV. CONCLUSION

The application of Wiki based coursework for a fourth year engineering module was successfully delivered as part of both a MEng and MSc programme in Chemical Engineering. Comparisons of students on two separate campuses, one in the United Kingdom (UK) and one in Malaysia, highlighted similarities and differences between student experience and perception. Students in Malaysia had more prior experience designing websites, and initially seemed to be less positive about the impact of the learning experience. However, as UK students experience with Wiki's increased, their perception of its usefulness to both their degree and personal development more closely matched that of the Malaysian students. The response of students to the use of wiki based coursework was found to vary based on their experiences and background, with UK students being generally more positive on its application than those in Malaysia. In the UK, where there was a more even distribution of MEng to MSc students, MSc students were found to enjoy the experience more than MEng students. Prior knowledge of IT was found to have no effect on students final grades, with a slightly negative trend observed between students perceived knowledge of IT and coursework mark.

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