

Estimating student workload, readability and implications for student learning and progression

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Concern over student workload, readability of materials and impact upon student learning and progression prompted the study. Representative segments of an undergraduate course in Law at Manchester Metropolitan University (MMU) have been identified. Academics responsible for these segments have estimated their conceptual difficulty and associated study time. At the time of this paper being written, students are maintaining a study diary recording the difficulty of the materials studied and study time expended. Independent estimates of conceptual difficulty and workload, using existing tools, will be compared and contrasted with those from both staff and students. The implications for the design of teaching materials upon student learning and progression are being explored.

Background

There is a danger that, in their enthusiasm to provide detailed and comprehensive teaching material, teachers are presenting over-length material for study. Staff are in danger of working too hard in generating teaching materials, and students are in danger of having to work too hard to study it – if in fact they study all of it. This is likely to be more pronounced as students are directed to an array of web sites and to the growing amount of published literature, and as expectations are raised. Furthermore, previous and current indicators suggest that ‘more is not better’ and that making excessive study demands on learners, albeit inadvertently, is likely to be counterproductive. Presenting over-length courses is likely to have serious implications for the quality of student learning and the potential for student drop-out.

Three key questions were formulated in an attempt to explore the issues surrounding student workload, the readability of learning materials, and implications for over-length materials. These questions form the structure of this paper.

- How much time do students have for study?
- How can we estimate student study time?
- What evidence is there of over-length materials being presented?

How much time do students have for study?

It is useful to divide this question into two parts: ‘How much study time does the course in question officially represent?’ and ‘How much time are students prepared to study?’ It is now common, internationally, to denote courses in terms of the study time they represent. For example, a sixty credit course within MMU equates to 600 hours of study time; a thirty credit course 300 hours, and so on. Indeed, whole qualifications are represented in terms of their

credit weighting. For example, the Masters Degree in Distance Education from the UK Open University equates to 120 credits (Open University, 2005). The allocation of credit points to courses serves to ensure comparability between courses and enables credit transfers between institutions.

The second question, 'How much time are students prepared to study?', can be addressed in a number of ways. For example, it has been suggested that students are only able, or prepared, to study for what they consider an appropriate length of time (Vos, 1991). In the study reported by Vos, full-time students adjusted the time devoted to different components that contributed to their study so that it equated to the total they were prepared to commit; about forty hours per week. In the intervening period since this study, it is unlikely that the time to be devoted to study will have significantly increased within the UK. Indeed, the financial pressures on students are such that many students work part-time – as well as studying full-time! In a report from the Open University Centre of Higher Education and Information and the University of Central England Centre for Research into Quality ('Students strive to stave off debt', 2001), it was revealed that 60 per cent of UK students worked during the academic year in an attempt to reduce the cost of their study. They worked an average of approximately eleven hours per week in term time, with 80 per cent working in vacations. This leaves relatively little time for other social, domestic and leisure activities. Furthermore, those students from poorer backgrounds, identified as in the bottom two social classes, formed a majority of those undertaking work. Other studies at Northumbria University ('Students jobs may be the cause of failure', 2001) indicated that less affluent students were more likely to work in term time, were from lower socio-economic groups, obtained lower grades and were twice as likely to fail their courses. It is noteworthy that the UK government is directly targeting these very students as they strive to increase the participation rate of eighteen to thirty year olds in Higher Education to 50 per cent by the year 2010.

Many institutions survey their students in an attempt to estimate the workload associated with their courses and to ascertain whether they feel the time they spend is what they expected to spend. It is noteworthy that in some surveys the headline figures disguise the fact that the form of analysis systematically depresses the average study times. For example, in an analysis of workload estimates amongst part-time students, those who claimed to have studied for over forty hours per week were excluded from the analysis (Ashby and Tomkins, 1996). These authors also revealed that amongst those students following a single sixty credit course, almost 30 per cent felt they were spending 'a little more' or 'a lot more' time than expected.

How could we estimate student study time?

Many of those who presented *Second Generation* distance education courses equated student study time to the number of pages of reading material presented or to the number of words. Unfortunately the conceptual complexity of teaching materials, even *Second Generation* teaching materials, makes equating simple page lengths and number of words to study time extremely suspect. Depending on the font and page size, it is possible to present different amounts of material on a page.

Word processing packages can readily calculate numbers of words irrespective of page and font size. However, the problem of conceptual difficulty remains. Computer packages are available that will allow one to assess the readability of textual material by calculating Fog Indices and Flesch Reading Ease Scores. These and other programmes, typically based on the average length of sentences and on words of three or more syllables, do offer a reliable way of determining a readability score – a measure of syntactic and semantic complexity that predicts the difficulty of the text. The problem comes in equating these levels of complexity to student workload – and in estimating the study time associated with other course components. This was evident in the large scale study (Macdonald-Ross and Scott, 1995) that revealed large variations in readability between topics, between courses, and between authors on the same

course. It also revealed significant differences in the word totals for UK OU Foundation Courses; for example 1,175,000 words for A102 Arts Foundation Course compared to 642,500 for T102 Technology Foundation course. Study of these two courses was expected to consume similar amounts of study time; they were identical in terms of their credit rating. This and associated studies, employing a series of Cloze tests, revealed that the conceptual complexity of UK OU Foundation courses was pitched beyond the comprehension of a significant proportion of students. Students were learning despite the teaching!

A further problem arises when trying to estimate the study time for non textual components. The study of a map, chart, diagram, photograph, drawing or whatever could involve a student in anything from a few seconds' observation to hours of work. Similarly, activities such as self-assessment questions, in-text questions and exercises, CBT and CAL packages, and computer mediated conferences, could involve a few moments' reflection – or hours of work. Indeed, many teachers note the emphasis they give to requiring students to think, to reflect, or practise particular skills. The study time associated with these components bears no relationship to the amount of words or pages associated with them.

Equating the conceptual difficulty of textual materials to study time in any precise way is difficult. However, crude guidelines to estimate study workload using a 'rule of thumb' were offered over twenty five years ago (Lockwood, 1978). The study time for materials judged 'easy' (for those students for whom it is intended and at a particular point in their course) is estimated at 100 words per minute (w/m). Material judged of 'moderate' difficulty is estimated at seventy w/m and 'difficult' at forty w/m. (Note that these rates relate to study time and not reading speed.) It would not be unusual for individuals to read at over 200 words per minute. However, the Rule of Thumb relates to study time – the time to comprehend the material, to relate the ideas and concepts, and to reflect. This Rule of Thumb has proved to be remarkably resilient across many different subject areas and different academic levels of study. For example, it has been used within the UK Open University in estimating the workload on courses in Modern Language (Chambers, 1994), within the Indira Gandhi National Open University (Garg, Vijayshree and Panda, 1992), and within the University of the South Pacific (Garg, Tuimaleali Fano and Sharma, 1998).

If estimates can be made of the study time associated with textual materials, it is not too difficult to use one's best judgement to estimate the study time likely to be consumed by non text materials. Table 1 illustrates how this would work in practice. The typical components of a blended learning course – face to face sessions (tutorials and seminars), print based material, non text media, audio and video materials, online resources and activities – can be readily identified. Teachers drawing upon their own experience and the Rule of Thumb can readily estimate the likely study time of different components. Table 2 indicates how the Rule of Thumb and other study time estimates can be combined to estimate the likely study time for a fictitious module.

Table 1: A framework within which to estimate student workload

Teaching material	Method of calculation
Textual materials: study guide, set books, articles and extracts	Rule of Thumb based on: 'easy' 100 words per minute 'moderate' 70 words per minute 'difficult' 40 words per minute
Activities associated with textual materials: self assessment questions, exercises, experiments, reflection and practice	Estimate time within which a majority (three quarters or two thirds) of students could complete satisfactorily
Non text and audio visual materials: photos, maps, charts, diagrams audio and video resources – CD or online	Depending upon the teaching purpose of the image/element, estimate likely study time

Face-to-face sessions:
seminars and tutorials, laboratory sessions,
field trips and day schools

Electronic media:
computer mediated communication, email,
computer-based training, computer assisted
learning and web based resources.

Assignments:
computer-marked assignments, project work,
examinations and other assessed work.

Estimate study time likely to be consumed –
before, during and after the sessions

Estimate essential online time

Estimate time associated with these tasks

For the purpose of illustration, let us assume our fictitious blended learning module draws heavily upon a prepared study guide - lengths and estimated difficulty as indicated in Table 2. There is a chapter of the set book and two articles to study. The Study Guide contains a number of self assessment questions, several of which are linked to the chapter in the set book and articles. The study time for each activity is estimated separately and a total calculated. In our module there is an experiment to conduct. Our estimate, for the purpose of the illustration, is that this would consume fifteen minutes per day for five days. Within the module there are no non textual materials but there are two seminars and a tutorial. The preparation for the two seminars is represented by the book chapter and articles. For the purpose of the workload estimate, no follow-up activities are to be set. However, a series of online discussion boards are to be operated in preparation for the tutorial. Students are expected to work with their 'buddy' and work group to plan and conduct the experiment. In an attempt to extend their study, students are directed to several web sites, and are required to seek and report on similar sites. The whole module culminates in a project report for which the members of each separate project group receive the same grade. A nominal time allocation is given for the assignment. The best estimate of the study time for the module is, at most, 26 hours. The question, of course, is how this estimate relates to the expectations of staff, to actual student workload, and to what the institution is contracted to provide.

Table 2: Example of workload estimates

Component	Word length	Difficulty	Study Time
Study Guide:			
Part 1	2500 words	Easy	25 mins
Part 2	3500 words	Moderate	50 mins
Part 3	4500 words	Difficult	1 hr 53 mins
Set Book Chapter	5000 words	Easy	50 mins
Article A	4500 words	Moderate	1 hr 5 mins
Article B	3500 words	Difficult	1 hr 27 mins
Activities	6000 words	Difficult	2 hr 30 mins
Experiment			2 hr 15 mins
Online Discussion			3 hr 00 mins
Seminars x 2			
Tutorial			2 hr 00 mins
Group Assignment			1 hr 30 mins

1 hr 00 min

5 hr 00 mins

25 hrs 45 mins

What evidence is there of over-length materials being presented?

Within MMU, like other higher education institutions, there is direct and indirect evidence that over-length materials may be being presented. Mid-course and end-of-course surveys repeatedly identify 'lack of time', 'too much reading', and 'lots of difficult material' as factors responsible for poor performance. Analyses of those problems presented by students to student support staff typically identify an inability to cope with the workload associated with their study. Unfortunately, when the issue of over-length materials or conceptual difficulty is raised, and evidence from surveys of perceived study time is presented, it is not unusual for some colleagues to remark: 'They would say that, wouldn't they?' However, there is some evidence to suggest that when students are asked to indicate the amount of time they spend studying, they systematically underestimate that amount (Chambers, 1994). In an attempt to provide additional evidence, the current Student Workload Project was mounted.

Student workload project

With the aid of the MMU Student Union and senior Learning and Teaching Fellows (<http://www.ltu.mmu.ac.uk>), a first year course in Law, *Contract*, was identified as representative of courses within the Faculty of Humanities, Law and Social Science – a Faculty considered no better or no worse with regard to student workload than any other. In the 2004-05 academic year there were 213 students undertaking this course. A similar number is expected in 2005-06 and will be the population for the study. In formulating the project, the following guidelines were instituted:

- With the cooperation of the Head of Department and faculty colleagues, segments from the first year course, spanning a three week period of study, were identified. Every element that constituted the materials for study, over the project period, was listed by the lecturer. A judgement was made as to the respective difficulty of each element.
- Students were asked to maintain a study diary for the segment of the course to be surveyed. They were to be given the list of elements that made up the study materials and asked to note the study time they devoted to each element and to indicate whether they regarded it as 'easy', 'of moderate difficulty', or 'difficult'. They were also asked to record any other impressions related to the workload of specific elements over the project period.
- For textual materials, a Flesch Reading Ease Score was calculated and the Rule of Thumb was applied to derive an estimate of study time.
- It was planned that the estimates of study time and judgements of difficulty for each of the elements in the course segments derived from the teachers, the students and via existing tools would be compared and contrasted. They would also be compared to the workload calculated in relation to the credit points represented by the course segments.
- An end-of-year survey of the whole first year course, including comments on workload, was planned.

Implications for excessive workload

There are several important implications for over-length material for teachers and trainers, administrators and learners. Generating over-length courses is likely to take the academic and technical staff involved more time and effort than was envisaged or is necessary. If the production of an over-length module is an isolated occurrence, a teacher may be able to absorb, with some temporary difficulty, the additional time and effort into their workplan. However, if it is a regular occurrence, the cumulative effect will tax, and eventually drain, those involved. The corollary is that generating over-length material will have consumed more resources than necessary and will inevitably make that institution less competitive – with fewer resources for investment in new courses, new technologies, student support etc. Others have identified staff costs as the major element in a university budget (Rumble, 1995).

However, if the implications are serious for teachers and administrators, they are critical for learners. Teachers and learners enter into a contract. The learners often pay a course fee and, with a few exceptions, commit themselves to diligent study. If the teacher or trainer indicates a particular task is likely to take x minutes or y hours to complete, learners invariably accept this as indicative of expected course demands, commensurate with the expected ability and skill level of the learner at this time. However, if the study time is an under estimate, learners are likely to believe that their pace of study is too slow or the demands are beyond them. If only an isolated module is over-length, it is likely that learners will cope – albeit with some temporary difficulty. However, if a majority of the modules are over-length, the effect is cumulative – and potentially devastating as revealed in an early study where more than 80 per cent of students dropped out of the course in the first half of the semester! (Lockwood, Williams and Roberts, 1988).

Authors have revealed (Ashby and Tomkins, 1997), not surprisingly, that those students with lower educational qualifications had a significantly higher workload, with all the pressures that brings not only to study but also to other aspects of their lives. Where students have poorly developed reading skills to cope with the bulk and complexity of the materials provided, the effect on workload is significant. The study by Macdonald-Ross and Scott, notes:

It has been shown by Klare in a series of studies that the effect of a mismatch between reading skill and text readability is more pronounced if subjects are put under time pressure (Macdonald-Ross and Scott, 1995, p. 2).

It is noteworthy that the Macdonald-Ross and Scott study revealed gross fluctuation in the conceptual difficulty of material assembled by different authors (as calculated by Flesch Reading Ease Scores). The study also suggests that learners were not alerted to these fluctuations.

Furthermore, studies elsewhere have demonstrated that students employ a cost benefit analysis model (Lockwood, 1992) as they balance the benefits offered by the various course components against the costs they are likely to incur. The consumption of study time is regarded as a major cost. The skipping of set readings, and failure to respond to associated activities, to contribute to discussion boards, and to ignore whole parts of the course in an attempt to save time, not only detracts from both the scope of their learning and its quality but also contributes to feelings of inadequacy. It results in a poor learning experience. It is noteworthy that the UK Government has recently adopted the *Australian Course Experience Questionnaire* in seeking to monitor the quality of the student via a National Student Survey (HEFCE, 2004). Such measures, coupled with an increase in undergraduates, many without the qualifications and skills enjoyed by current undergraduates, will test quality assurance mechanisms. Certainly, those institutions who report high levels of drop-out may be subject to scrutiny.

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