Electronic Course Surveys: Does Automating Feedback and Reporting Give Better Results?

1. Introduction: evaluation and scale issues

Any education provider needs to keep a close watch on the quality of its provision, to ensure that standards are maintained, and that the students' perceptions of their education match the provider's expectations. For this reason, like most other higher education providers, every year the Open University surveys a sample of its students to assess the quality of its courses, and to guide future developments.

In the context of a large-scale distance learning institution, however, the sheer scale of the annual courses survey becomes a significant problem. The Open University has a total student base of about 200,000 students, studying more than 400 different courses that vary in scale from tens to tens of thousands of students. Approximately 30,000 of these students are surveyed each year, using questionnaires that vary slightly between courses, to produce annual reports for the University, for the Faculties, for individual course teams, and even for the regional centres that support distance tuition.

When courses are presented only on an annual basis, surveying once a year is just about feasible. However, the University is currently moving to a more varied presentation model, where some courses are presented every three months, or to other complex patterns. One of the first programmes to move to the quarterly presentation model was the Professional Certificate in Management, a programme offered by the Open University Business School. This programme is made up of four three-month modules, which can be taken as stand-alone courses or as a single year-long course. Modules begin every three months, so comparing cohorts and presentations is complicated by staggered start dates and by the modular route. Under these conditions, the traditional paper-based evaluation mechanism became impossibly complicated, both in theory and in practice, and an alternative evaluation model was needed.

In response to this, we have developed and piloted an automated approach to evaluation for the University, using a combination of web-based questionnaires and automatic analysis and reporting scripts, to speed up and reduce the effort involved in evaluation, and to move towards the new model of evaluation needed for modular programmes such as the Professional Certificate in Management. While some other automated evaluation systems exist (e.g., Bollin, 1998), the system we introduced was designed to produce detailed, high quality, semi-formal evaluation reports, with the speed of an automated system.

Although nearly 90% of our 200,000 students have access to computers, and more than 75% have access to the internet, web-based surveying is not wholly straightforward, for a variety of commercial, technical, and social reasons. Being a distance learning institution, our students study in their own homes and workplaces, using many different kinds of equipment and many different levels of internet access. On the Professional Certificate in Management in particular, over 80% of students are sponsored by their employers, and workplace internet access is increasingly being constrained by workplace internet firewalls. Web-based surveys also introduce new sampling and response-rate problems that need to be confronted and resolved. These issues strongly influence any use of the internet to assist evaluation, but it is still very much worth assessing how new technology can enhance the evaluation process.

This paper describes the automated evaluation system we developed and used for the Professional Certificate in Management, and investigates the extent to which it improves support for the evaluation of programmes like this. The next section looks at the previous approach to evaluation of courses within the University, and at some advances in the use of technology for educational evaluation elsewhere. Section 3 then looks at the automated evaluation system that we introduced for the Professional Certificate in Management, and section 4 at the results achieved with the new evaluation systems in place. The last sections of the paper draw out the implications of automated evaluation, looking at possible future developments in this area, and at whether automation helps to meet our needs and provide an improved evaluation structure for this programme.

2. Background: current evaluation and automation issues

Currently, the Open University's principal annual course survey is conducted by a team in its Institute of Educational Technology, IET. This team runs surveys exclusively using paper questionnaires; for the most part it uses an external data entry agency to key data, before analysing using a commercial statistics package (SAS) and compiling reports manually using a standard template. To reduce the effort involved and ensure consistency between courses, the annual survey questionnaire for each course is made of several parts:

- A generic section, consisting of quantitative questions that apply to all courses.
- A course-specific section, consisting of quantitative and open-ended questions selected by the team responsible for that course.
- A generic section of open-ended questions, allowing students to make free text comments about the University's courses and provision.

Currently, feedback to course teams is necessarily a slow process. While the annual courses survey works effectively as a benchmarking tool, and as a way of ensuring quality across the University, it is less effective as a way of helping course teams. This is because the annual survey is run at the end of a course's presentation, after any examination, and by the time the annual courses survey reports are complete, the next presentation of the course is already well under way. Also, because many course materials are printed, there is little time even to refine the presentation that follows. In effect, there is an inevitable two or three presentation lag because of the slow evaluation systems, and speeding up the time from gathering data to completing the report is the only way of providing the feedback needed in a timely manner.

Using web-based evaluation questionnaires can bypass many of the bottlenecks in the evaluation system (e.g., data entry and administration) and move to a more 'just in time' evaluation model. For this reason, use of some kind of internet-based evaluation framework in education is now becoming increasingly common (e.g., Hastie & Palmer, 1997; Seal & Przasnyski, 2001). Although a few of our courses (e.g., our introductory course on

computing) have used electronic course surveying on an *ad hoc* basis, no University-wide framework for this exists: it has been restricted to those few courses with the resources and the will to provide this service directly for themselves. Many of these courses, though, have achieved low response rates compared to the paper-based annual courses survey, and any improved evaluation system also needs to ensure that reasonable response rates are maintained.

Moving to use web-based surveys is attractive for another reason. Much of the delay in the annual courses survey is an inevitable consequence of using manual keying and data entry agencies. Reducing the cost of the annual courses survey – or at least channelling those costs towards the skilled work of evaluation, supporting course teams and Faculties – would be an additional advantage to a new evaluation system.

For the most part the annual courses survey reports only use descriptive measures, although they also make extensive use of empirically determined performance measures on four-point rating scales. If more than 50% of respondents agree that a particular aspect of the course is 'very helpful', this is flagged as an "area of excellence". If more than 10% of respondents agree that a particular aspect of the course is 'not at all helpful', this is flagged as an "area of concern". This means that to automate production of these reports, a degree of customised analysis is required, beyond purely descriptive measures.

The content of these reports is pretty varied. Questions may be reported textually, for example, as "18% of students felt that the web site was very helpful", in a tabular form, or graphically using bar charts to compare the responses to several related questions or aspects of the course. These questions are linked by a textual narrative that makes very little comment about the actual results. Some general guidance on interpretation is provided in these reports, but not much; for the most part assistance on interpretation is provided through consultation with members of the Courses Survey Team. This makes the reports relatively straightforward to complete – if tedious, given that the reports are well over a hundred pages in length, and that very similar reports are constructed for each Faculty in the University.

Finally, for the annual survey, there are separately available data tables, containing a full breakdown of students' responses to each question. These are used extensively by course teams (although less by faculties and the University), enabling them to explore the data and find answers to their own questions, although this does require an element of expertise. A limitation of these data tables is that they only offer a breakdown on a few dimensions. Principally, responses for different courses are compared in detail, although different tables are prepared separately to show the breakdown on a regional basis. (The University delivers courses through 13 different regions, which differ widely in their socio-economic basis and geographic distribution, which may also influence students' perceptions of different courses.) The data tables are an exception to the generally manual evaluation system, in that the Courses Survey Team does use some tools to help generate them automatically. While this kind of automation is technically straightforward, it has already significantly reduced the effort involved in putting together annual survey reports.

Some commercial systems can support elements of these processes. Professional questionnaire design tools (e.g. snap, Question Mark, and MR Paper) make it fairly easy to design feedback questionnaires, and some even provide support for data gathering, usually through proprietary web sites or web servers. There are also many web-based questionnaire-hosting services (e.g., WebSurveyor, NetReflector, and Surveypro.com) where questionnaires can be stored for respondents to use through the web. Dennis and Gambhir (2000) describe a typical example of this kind of system – *Internet*Question and Answer. These services usually make the response data available through some kind of automatically constructed report, although for the most part these simply use pie charts or bar charts to present results descriptively on a question-by-question basis. Some also allow the raw data to be downloaded for further analysis, and many now also provide tools to help build the questionnaire in the first place. A few suppliers even offer specially designed instruments for use in education – for example Coursemetric (at www.e-curriculum.com) provides off-the-shelf student and instructor satisfaction surveys ready for use on the web. Although there is much to be said for using carefully designed external instruments over home-brewed ones (Coffey & Gibbs, 2001), ensuring consistency with the needs of the (many) stakeholders inevitably overrides this.

The web-based surveying tools all tend to suffer from several shortcomings. Some make use of Java applets (especially for displaying charts) but Java may not be enabled or even work on some browsers, and may not allow report pages to be printed properly. Most host results on external sites that don't provide secure access, so that questionnaires that gather sensitive data may be harder for respondents to accept. We had to ensure that our data was being handled securely. Some do not allow full control over the questionnaire contents, perhaps restricting them to quantitative data. Very few offer any analysis tools (although some can display cross-tabulations, allowing descriptive explorations of relationships between variables) – for the most part, they expect data to be downloaded for any further analysis. Only a few allow the reports to be customised in appearance, and none at all allow them to be customised in structure. The reports present all the data and nothing but the data. While these reports may be good enough for use in some contexts, the lack of any integrated analysis components and the web pages that they invariably use to present the reports are not up to the standard required for passing them directly to customers and other stakeholders.

Even without this, there are problems associated with web-based surveys. They rarely achieve the same response rates that equivalent paper-based surveys do (Cook, Heath, & Thompson, 2000). Much of the time, too, there may be significant problems associated with sampling, as web users are demographically different to other populations, and may respond in different ways.

But using new technology to support feedback and evaluation processes also offers opportunities that the previous courses survey model could not deliver. Maurer (1997), for example, proposed 'questionnaire-lets' or 'Q-lets', arguing that many brief but contextualised questionnaires may provide better feedback than a large single questionnaire at the end of a course. This is not an unmixed blessing – sometimes the real benefit of a particular aspect of a course may only become apparent long after that part has been completed. Judiciously used, however, contextualised brief questionnaires may be a more accurate measure of some aspects of the course.

Table 1 summarises the main requirements identified in this section, and shows how they relate to the principal design decisions we made in developing our automated system. The next section shows how these design decisions were taken forward and how the implementation of the automated evaluation system met the requirements of an effective evaluation system.

Insert table 1 about here

3. Introducing an automated evaluation system

We conducted our electronic course surveys using a surveying and reporting environment developed specially for this purpose. There were two separate elements to this environment, one for presenting surveys and gathering response data, the second for analysing response data and automatically generating reports. This enabled us to combine data recorded through other channels (we worked with a data entry company in our first pilot study) with data recorded electronically through the web before the data was analysed and reported. Our innovation was less centred on the questionnaire presentation and data gathering phases of the survey, and more on the analysis and reporting phases, so it would be possible to use a commercial questionnaire hosting services

To give us full control over the appearance and behaviour of the surveys, though, we used a standard web server (Apache) to store and present the surveys, and to record submitted response data. We converted the paper-based survey by hand into a web page form structure that followed the design of the paper original as closely as possible, although we added a left margin bar to maintain consistency with other Open University Business School web pages. The web-based questionnaire was presented in a single page, and contained nearly 900 radio buttons, and nearly 100 other form controls. We did not use pop-ups – despite their common use, we felt that they significantly obscured rating scales compared to the paper-based questionnaire, and chose to use grids of radio buttons instead.

Sampling is a common concern for web-based surveys (e.g., Batagelj & Vehovar, 1998), but this is most significant for self-selecting surveys. In the case of the Professional Certificate in Management, access to the internet is a course requirement, so we can be sure that our random sample of students will all have access to the web-based questionnaire. (This differs from the majority of Open University courses, which currently do not have access to the internet as a course requirement.) Responses may still be biased by the web-based survey (as non-responses are unlikely to be wholly random; Cook et al., 2000) and disclosure effects may influence the responses themselves (Weisband & Kiesler, 1996). These effects are both complex and multidimensional, although they can be partially controlled by good survey design.

We also added authentication to the electronic questionnaire, checking that respondents were registered students using an in-house web authentication system called SAMS (Standard Access Management System). When students completed the survey, the web server used a data recording script to store their response data, along with their authenticated personal identifier (provided by the SAMS authentication) in a plain text response file. We also used a number of other scripts to convert these responses files into file formats compatible with standard analysis tools such as SPSS and Excel.

To implement automated reporting, we developed a script that used Microsoft's Automation (formerly known as OLE). Automation allows scripting languages (usually Visual Basic or Microsoft's JScript, but we used Perl) to control the behaviour of programs; in this case we automated the Office programs Word (to generate word-processed reports) and Excel (to generate charts and graphs). Roth (1998) gives a good overview of using Perl to script Office programs using Automation.

At the core of our reporting system is a template processing script. This works a bit like Microsoft's Active Server Pages, PHP, or Allaire's Cold Fusion, all of which enable results of script fragments to be embedded in a web page. Our template processing script is similar, but operates on Word documents. It is rather more restricted, because unlike web pages, Word

documents have a complex composite object structure and are not represented underneath by plain text.

Our template processing script works by opening a Word-based template report which mixes carefully written guidance text and explanatory notes with presentation and data analysis keys; the script then searches for these keys and uses them to analyse respondents' data and embed the results into the reports in the context of the original text in the template report. The script contains charting components that can pass data to Excel to be drawn as bar charts, and embed these charts into the Word-based template reports. The template processing script provides a set of standard analyses, including simple percentage calculations, filtering, and cross-tabulation functions, all of which can be embedded in reports directly, or passed to a charting component to be rendered graphically in Excel before inclusion in a report. Figure 2 shows an example segment from one of the Professional Certificate in Management reports, along with the generated output.

Insert figure 2 about here

Filtering and cross-tabulation were core requirements, specifically requested by the course team. Virtually all automated feedback systems (e.g., Bollin, 1998; Dennis & Gambhir, 2000) provide reports that treat each variably individually. In distance education, providing proper support in large-scale courses means groups of students with special requirements may need to be identified and considered in more detail. Our reporting system can filter data from one question according to the response to another, or cross-tabulate responses, and these features were used extensively in the final reports.

Inferential statistics did not form a significant component of survey reports, in line with the current manual courses survey model. However, we did make extensive use of the empirically established performance indicators. The template processing script allows custom analysis scripts to be included; in this case we used these to detect when an item was an area of excellence or an area of concern, and add text to the report if needed. This use of text was an innovation beyond other web-based surveying and feedback systems that do not allow

reports to include dynamically selected or generated text. This custom analysis feature is ideal for non-standard analyses and report structures like these.

Perhaps the most complex issue we faced was consistency in labelling variables and values. For consistency with analysis packages all variables in response forms and data were labelled with eight character alphanumeric identifiers. These were, inevitably, wholly unreadable, and could not be used in reports. To provide better labels, the analysis toolkit and charting components shared a label map, stored in a text file, which defined readable versions of these labels for variables and for value codes.

The separation between the questionnaire presentation system and the automated reporting system was ideal for this application, as the authentication and questionnaire delivery system could be run as an integrated part of the course's web site, gathering student's responses for the duration of the evaluation, while the reporting system was only needed at the end of the evaluation to generate the final report.

4. Using the automated evaluation system

To date, we have run six courses survey reports automatically using this infrastructure, although we have also used the same surveying and reporting tools to provide personalised learning styles and management styles assessments to students on the same course. We generated the first courses survey report from data gathered using paper-based questionnaires, and keyed by a data-entry agency. We generated the subsequent reports using an identical template report, but using data gathered directly from web-based questionnaires; the system to generate these reports is now in place and further reports can now be generated automatically.

All reports follow the same basic structure as IET's annual courses survey reports. They begin with a cover sheet, which is customised with the year and course code. The first section of the report is largely a guide to interpretation, and doesn't change between reports. The main body of the report reflects the structure of the questionnaire, and presents the results of

each question in turn, using both bar charts and text. In several cases, the results of one question may be filtered or broken down against the results of a second. For example, the helpfulness of a particular course resource may vary according to the students' educational background, and in these cases, a clustered bar chart may be used to show the interaction between these variables. (Previously, the annual courses survey used cross-tabulations to present this information, but we found that clustered bar charts were much easier for course teams to interpret.) Finally, every report contains two appendices: data tables presenting the full response data for all questions, and the original questionnaire as presented to the respondents.

Generating an evaluation report, directly from the recorded data, takes about thirty seconds on an average personal computer. The data tables take a similar amount of time to generate. This is considerably longer than similar web-based systems take, largely because running Word and Excel to generate the report through Automation inevitably takes longer than simpler dynamic web page technologies such as PHP or Active Server Pages. The resulting reports, though, are standard Word files, and can be saved, printed, exported as web pages, or emailed to stakeholders as the survey staff choose. It is also easy to edit these reports before passing on the results, for example, vetting open-ended comments to ensure that they don't reveal personal data and are of a standard such that they can be passed to the course team and other stakeholders. This ability to edit the report is crucial, yet commercial Internet questionnaire and surveying solutions do not provide this, as the results are presented in web pages not word-processed reports.

This use of web pages rather than word-processed reports reveals a fundamental distinction between our automatically generated reports and those of similar Internet questionnaire hosting services. Web-based reports prepared by an Internet questionnaire hosting service generally cannot be used as a formal report – they are best used as a reference source or a human consultant as an intermediary. Our automatically generated reports are of sufficient quality and depth of analysis that they can be passed directly to a client.

In converting the paper questionnaire for use with the web, we retained the whole survey in a single, rather long, web page, in line with Batagelj and Vehovar (1998). This is different to many web surveys, which divide long surveys into several screens, each containing a block of related questions. We felt that presenting the whole survey in a single page was preferable because it retained the structure of the paper original, made navigation and correction of previous answers easier, and enabled respondents to save the survey and complete it off-line if they chose to. Batagelj and Vehovar also found that single pages took about 15% less time for respondents to complete. We were originally concerned that the long questionnaire could put respondents off so (as with paper surveys) there could be a tailing in responses towards the end of the survey, but like Batagelj and Vehovar we found no evidence of this tailing-off effect, even using our relatively long web-based surveys.

We achieved response rates for the electronic surveys of about 32.6% (273 students surveyed), compared to a rate of 33.3% for the paper-based one (120 students surveyed). There was no significant difference between the response rates (2 by 2 chi square test, $\chi^2 = 0.02$). It is worth noting that although these values are lower than most response rates for the annual courses survey, the web-based survey response rate is significantly higher than previous internal course surveys using this technology. Although the overall response rate is broadly in line with similar studies elsewhere (Cook et al., 2000), there are many factors that can influence the response rates of web surveys (Cook et al., 2000; Couper, Tourangeau, & Steiger, 2001), and it seems likely that improving the design of the survey can improve these response rates substantially.

All reports were passed to the course team. We received the following requests for refinement:

- Inclusion of data tables, showing the raw number and percentage of responses for each value, like the data tables in the IET annual courses survey reports.
- Better conformance with the IET annual courses survey reports, including a formal cover sheet and table of contents, and guidance on interpretation.

- Inclusion of the original questionnaire used to gather the data.

All of these requested features have since been implemented, and are now automatically included in future reports.

5. Future Work

Because there is a significant difference between response rates for electronic surveys and for paper-based ones, we are exploring how we can use intelligent character and mark recognition technologies to largely automate handling paper-based surveys, combining scanned data with that gathered using web-based electronic surveys. This will give respondents a choice between several ways of responding to our surveys.

In this first study, we invited students to respond by sending them written invitations. Similarly, we reminded students who did not respond by sending them written reminders. In the future, we intend to try using electronic invitations and reminders, sent directly using e-mail. This has the advantage that the invitation and reminder messages can include a URL link that can take the respondent directly to the survey form. We are also investigating using Adobe Acrobat's form technology to providing forms that can be filled in and returned electronically, but which can also printed and filled in on paper for scanning and optical character and mark recognition.

Another approach that we are exploring is whether 'instant messaging', or 'chat'-style technologies, can be integrated into the same questionnaire and data-gathering model. This is technically fairly simple, but the precise breakdown of respondents' preferences across paper questionnaires, web-based questionnaires, and instant messaging or other media for presenting questionnaires, remains unclear. Our experiences seem to show that a 'one size fits all' solution does not exist, and that offering a variety of different but equivalent media may be preferable.

Finally, there is a serious limitation of our current system in the template report processing system. Although this works and is reliable, it requires an unusual combination of skills in the template construction process. In order to construct a template report, authors need to be relatively proficient in using Perl, automating Word and Excel, statistical analysis, and evaluation of courses. This skills burden is not maintainable. To resolve this issue, we are considering designing a template report authoring add-in for Word which contains template scripts for most common fragments, with an interface that allows them to be added and configured by people without Word and automation skills, allowing report writers to make the most of their expertise in statistics and evaluation. Although this is a good approach in principle, it is not yet clear how far it can be taken in practice, as there are complex constraints between the theoretical side of evaluation and statistics, and the more practical side of Word and Excel scripting. However, the statistics packages commonly used for evaluation rely on similar scripting skills, so it does seem possible that our system can be a practical replacement.

6. Discussion: issues in automated evaluation

Several issues arise from this project that are relevant to our assessment of the contribution of the automated evaluation framework.

High fixed cost, low variable cost. We ran the project knowing that the set up cost would be high, so that we could reduce the overall running cost. Certainly, eliminating the cost of data entry has reduced the overall running cost, and there hasn't been a significant drop in the quality of the result. If anything, the quality of the reports produced has increased, because we are now able to make effective use of the free-text comments, which because of the additional data entry cost, were only used when really needed, not on a routine basis. There is, therefore, evidence that using technology can help to support low-cost surveying, while the set up cost is inevitably higher than would otherwise be the case.

Achieving objectivity and scientific quality. When we began the project, we did so on the basis that we were automating existing systems, often having piloted them in a 'Wizard of Oz' style (cf. McKillop *et al*., 2001). We discovered that writing the template reports before any data had been analysed seemed to provide a higher quality of report than might otherwise be the case. In essence, the reports were more objective because they could not have been written to emphasise or reduce the importance of any aspects of the data. In retrospect, this objectivity was also present in the manual system, which also used a template model, but we found that writing reports before data was available guaranteed an objectivity that improved the basic report. Human interpretation and emphasis was still possible, but within the framework defined by this clear and objective report.

Integrating formative and summative evaluation. Our previous manual annual courses survey is primarily used as a summative evaluation. This is an inevitable consequence of the delay involved in large-scale paper-based surveys for evaluation in a distance education institution. The automated system generated reports that, although identical in structure and in the use and reporting of performance measures, purely by being available in a timely manner, could be used formatively by the course team. This seems to be evidence that the distinction between formative and summative evaluation may be more in the use of the reports than in the design of the evaluation itself. By taking the delay out of the picture, automation seems to offer a better synthesis of formative and summative evaluation than was achievable with the paper-based manual evaluation systems.

Focusing human effort on effective use of evaluation. Automation also has an influence on the practice of evaluation, principally by giving evaluators more time to attend to how evaluations are used, rather than spending time on the mechanics of surveying, analysis, and reporting. In particular, automation can help to draw out the issues regarding summative and formative use of evaluation, so that evaluators don't need to develop parallel strands of evaluation to ensure both that quality is ensured and that improvements can be made and sustained.

Generating multiple reports from single data set. In the manual system, a single report is written, which has to serve several different purposes. These include:

- Quality assurance and monitoring, for the University as a whole
- Course comparison and benchmarking within a subject area, for the Faculty or School
- Course comparison and benchmarking within a geographical region
- Course feedback, for the course team

Trying to meet all these needs in a single report is less than satisfactory; however, we found that the template approach allows several different reports to be derived from the same data set. In this study, the reports we prepared were intended directly for the course team (as it is here that the speedy turn-around is most necessary) but the same data could easily be combined with data from other courses to provide different reports focusing on the quality assurance and benchmarking aspects needed by the University and the Faculty; similarly, a summary of the key data points could provide a report to the Faculty for benchmarking within a subject area.

Faster, Better, Cheaper? Introducing automation into the current courses surveying system reduces the cost, and increases the speed of providing course survey reports, allowing resources to be channelled into improving the quality of the reports and the analyses they contain. However, there is an unexpected effect on the quality of the surveying system. Introducing a fast evaluation system for courses can help to improve quality, even in courses that make little use of web resources. This directness of feedback will enable us to better compete with other universities where a physical campus and face-to-face contact with students provides an advantage in responding to students' needs. A faster and more direct evaluation system will be essential for Open University course teams to respond to students' needs in a similarly effective manner.

To conclude, then, there is good evidence that automation can help to improve the effectiveness of evaluation in several different ways. We had anticipated and intended a

reduction in cost and an improvement in speed of evaluation, as both of these were directly relevant to the new modular and rolling programme introduced by the Professional Certificate in Management, and were required to set its evaluation structure on a firm foundation. However, we also found that including elements of an automated approach in our evaluation framework had some surprising consequences. The resulting improvement in support for a diversity of stakeholders, and for more objective reporting, may have been unexpected, but they provide us with welcome opportunities for future improvements in the quality of the evaluation services that we provide.

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Requirements	Issues	Design decisions
Increasing speed of turnaround	Internet data gathering removes the need for data entry	Questionnaires present and gather data through the internet
Reducing cost of surveying	Reports are basically the same between courses and years, apart from the data analysed	Use of template reports
Supporting quantitative and qualitative feedback	Questionnaires need to gather both closed quantitative data and open qualitative data	Use both rating scales and comment boxes
Ensuring high participation and response rates	Using the web alone is not sufficient, as purely web-based questionnaires show a lower response rate	Machine readable paper questionnaires integrated with web-based electronic questionnaires
Ensuring high quality of evaluation	Reports need to include detailed analysis, including inferential statistics Reports need to be of a high quality of word processing	Flexible analysis language, embeddable in template reports Template reports written in Word, containing embedded analysis and performance measures
Ensuring that data is handled securely	Data needs to be stored and processed anonymously, yet reminders should only be sent to those who have not responded	Authentication added to web-based questionnaires

Table 1. Requirements and design decisions taken to meet them in automation

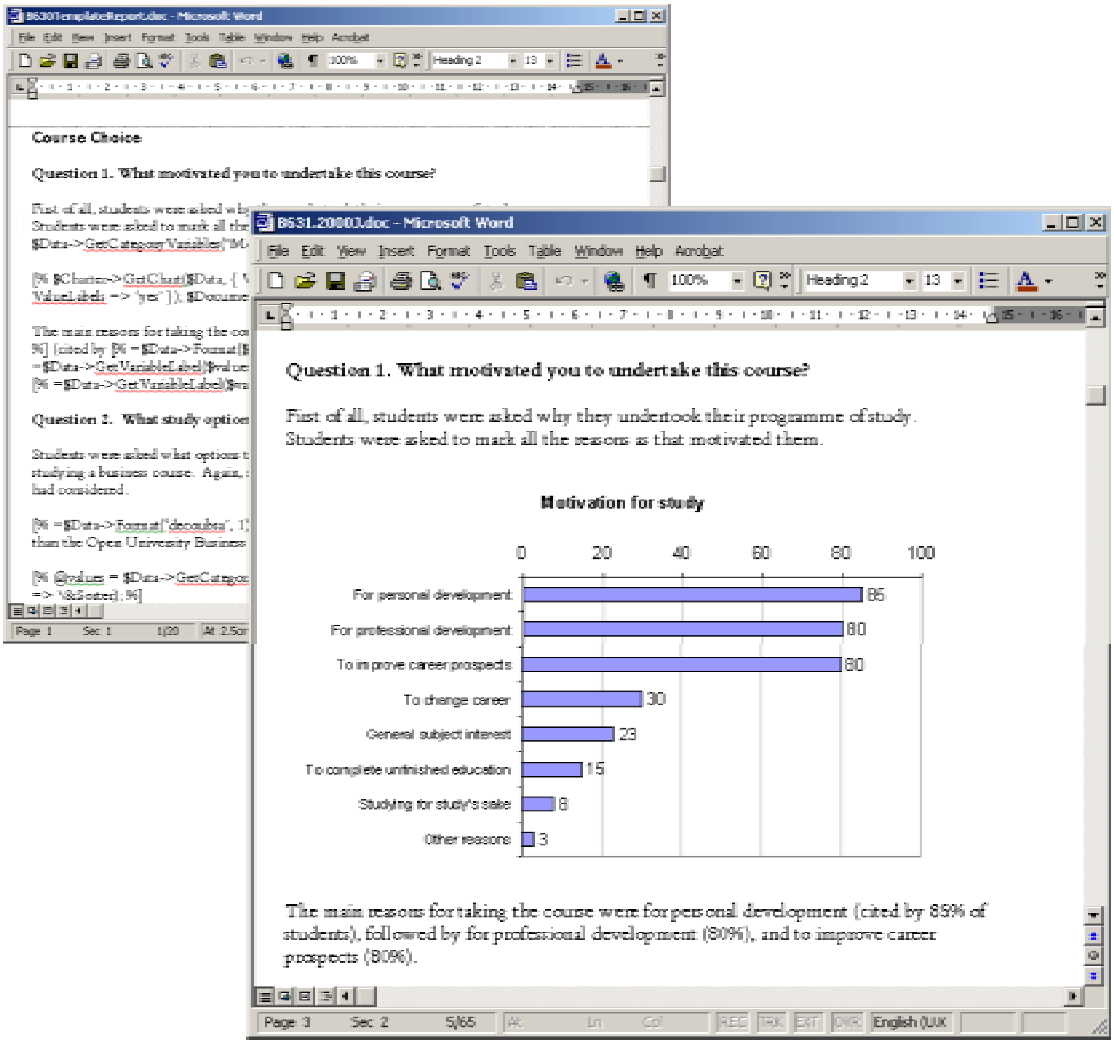

Figure 2. Snapshots of the Word template report and corresponding report page

Summary

This paper discusses an electronic course survey system designed to support evaluation of a modular programme in management taught through distance education. The scale and communication issues raised by distance education, when compounded by a complex rolling modular programme, make conventional evaluation complicated, slow, and expensive. To overcome these problems, we introduced an automated evaluation process, partly based on web-based surveying, but significantly emphasising the reporting process, and allowing performance indicators and complex analyses to be embedded in high quality word-processed reports, that can be quickly and easily generated after each presentation of a module. The paper discusses the system, and the impact that it has had on the evaluation process, before looking to future opportunities for developments in this field, and discussing some of the implications – both expected and unanticipated – that have come out of using automation in the evaluation process.

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