

Web-based versus paper-based data collection for the evaluation of teaching activity: empirical evidence from a case study

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The collection of teaching evaluation questionnaires in the traditional paper-and-pencil format is a costly and time-consuming process and yet it is a common assessment practice in many university systems. web-based data collection would reduce costs and significantly increase the efficiency of the overall evaluation process in numerous ways. Results for both types of surveys are reported from two years of progressive introduction of the web-based survey by the University of Modena and Reggio Emilia, Italy. In the first year, two faculties representing scientific and humanistic fields were selected for a web-based survey. In the second year, eight out of 12 faculties took part in the web survey. This data collection strategy allowed for responses from non-attending students and facilitated a comparison of attitudes between attending and non-attending students.

Keywords: Internet surveys; response bias; response rates; teaching evaluation; Web surveys

Introduction

Student evaluation of teaching activity (SETA) has become increasingly important for institutions of higher education mainly for internal assessment and also for constructing various performance indicators for external purposes. In Italy, SETA and research evaluation are regulated by Law no. 370 (of 19 October 1999, Official Gazette, General Series, no. 252 of 26 October 1999) which prevents administrations failing to comply from applying for certain grants. The same law established the National Committee for University System Evaluation (*Comitato Nazionale di Valutazione del Sistema Universitario*, CNVSU), replacing the Observatory for University System Evaluation founded by the Ministry of the University and Scientific and Technological Research (MURST) through the MD of 22 February 1996, although its tasks were established by Article 5 of Law no. 537 of 24 December 1993 (Ordinary Supplement no. 121, Official Gazette no. 303 of 28 December 1993) and subsequently by Articles 9, 15 and 19 of the Decree of the President of the Republic (D.P.R.) of 30 December 1995 (Official Gazette no. 50 of 29 February 1996) concerning the Universities Development Plan for the triennium 1994–1996. In the two or three years following the publication of Law no. 370, all Italian universities planned the evaluation of their courses. Therefore, SETA is a relatively recent practice in Italy, compared to some universities of North America where it was introduced in the mid-1920s. Research on this topic developed largely in the 1970s and 1980s (Marsh 1987), but it has continued

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up to today exploring theoretical and practical issues and producing an immense literature, especially from the USA, Britain and Australia. As an example of monographs, see Walberg and Haertel (1990), Harvey and Knight (1996), Brown and Glasner (1999) and Brennan and Shah (2000).

The fact that SETA is compulsory, the shortage of financial and human resources and the need to have the results immediately generated the demand for a tool that is able to offer adequate solutions. The Internet has these potentialities. Therefore, the first aim of the paper is to describe the Internet as SETA survey technology, that is, the use of the web to collect student evaluations of courses, reporting the experience at the University of Modena and Reggio Emilia in the academic years 2005/06 and 2006/07. Perhaps, this is a question of minor interest, but it is not necessarily a negligible issue; in fact, traditionally, SETA is carried out by means of paper-and-pencil questionnaires, hereinafter referred to as *paper surveys*, to be filled in by students in class in the final part of the semester. Such a survey method takes all available classes into account and, like a census, aims to acquire information about each unit of the target population. The process of data gathering and circulation of the results is articulated in seven main steps.

- *Step 1.* Census of the classes in each faculty or in each degree programme and codification of the target variables: 'faculty', 'degree programme', 'class' and 'instructor'.¹ Such information is usually provided in the first section of the questionnaire and identifies the pair (class, instructor) which is the object of the evaluation. This procedure is repeated each academic year.
- *Step 2.* General set-up of the questionnaire, which was performed only once, on the occasion of the first wave. Generally, the questionnaire includes several sections, where the second or the last section concerns the student's personal data: gender, diploma type, current year of study, mode and type of enrolment, and other information.
- *Step 3.* The questionnaire is filled in by students in the classroom. The instructor, or another designated person, hands out the paper forms with the questions and provides students with the codes identifying 'faculty', 'degree programme', 'class' and 'instructor', writing them down on the blackboard.
- *Step 4.* The completed questionnaires are gathered in a manner that respects the privacy and anonymity of the respondents.
- *Step 5.* Each questionnaire is scanned by means of an optical device, which generates data files with a specific record format.
- *Step 6.* A computer program reads the data files derived from the optical scanner output and converts them to the overall matrix of data. The actual statistical analysis of data for the triplet class–instructor–faculty or class–instructor–degree programme starts here.
- *Step 7.* The results are first given to the chairs of the faculties, who can either submit them directly to the individual instructors or indirectly via the directors of each degree programme.

One delicate point in the overall process is Step 3, due to frequent transcription errors regarding the faculty, degree programme, class and instructor codes made by respondents. In addition, handwriting can lead to scanning errors and the intervention of a human operator is needed during Step 5, when the optical scanner is unable to interpret properly the handwritten responses. Usually, these drawbacks significantly slow

down the overall process, and at the University of Modena and Reggio Emilia, they required about three months of work per teaching period. Even with the employment of an additional scanning device and the assignment of more personnel to this job, the estimated cost and the delay in time for the transfer of results would remain substantial. Observations along these lines motivated the evaluation team (*Nucleo di Valutazione*, NdV) – the administrative board responsible for the evaluation process at the University of Modena and Reggio Emilia – to promote the introduction of new mechanisms of data gathering and results circulation favourable to time and cost savings.

Although the paper survey procedure could have been improved by introducing some new strategies (e.g. the heading part (Step 3) of the questionnaire could have been pre-printed), the delay between the end of the semester and the delivery of the results to instructors could not have been reduced to under two months, on average, because of calendar constraints. Therefore, given the structural features of the Web survey, the NdV decided to use the Internet for both data collection and circulation of the results, establishing the two main variables of interest: the participation rates of students and the percentages of evaluated courses. Both variables are compared with their corresponding values obtained from the paper-based survey of the previous academic year. It was the first experience of a web survey carried out directly at the institutional level in Italy and addressed to all (attending and non-attending) students of the university. In fact, in Italy, there were few empirical studies on this topic (Natale and Porzio 2004; Romano 2000). The abrupt and theoretical decision adopted implied that it did not follow the formal structure and procedure of an experimental design. However, the compulsoriness of SETA, the efficiency of the web for data collection and dissemination of the results, and the encouraging outcomes of this experience induced the KION-CINECA work group to implement the procedure in Esse3 (see below).

The objective of the present work was two-fold: first, to document the results obtained from the introduction of the web survey to collect SETA data, which took place over two academic years (2005/06 and 2006/07) at the University of Modena and Reggio Emilia. Therefore, the focus was on the preliminary implementation phases concerning data collection and two response variables: the number of evaluated courses and student participation rates. Although one could expect a notable decrease in the response rate for the web survey, our empirical results showed that this was not the case. A second goal was to study, for the first time, some characteristics of non-attending students. Whereas non-attending students are considered anomalies in many school systems, in Italy students are allowed to take exams without attending classes in most of the offered degree programmes. In this respect, they are similar to distance-learning students in other university systems. Therefore, understanding more about their characteristics is of value beyond the Italian case.

Web survey and dissemination of results

Literature review

The rapid increase in use of the Internet has generated a considerable development of surveys on the World Wide Web, termed variously as Internet, online or web surveys. This approach is not without its critics and must be evaluated within the context, form and objectives of each survey. In addition, the choice of an approach should take into account its specific data collection mode and potential opportunities for intervention on several dimensions of survey quality (Couper 2000; Dillman 2000; Lozar Manfreda

and Vehovar 2008). Therefore, the web-based survey mode is outlined below, considering its disadvantages and advantages since it is characterised by general/physiological issues, as well as specific problems referring to SETA (Carini et al. 2003; Moss and Hendry 2002; Yun and Trumbo 2000). Each survey strategy is generally evaluated with respect to coverage, sampling, non-response and measurement errors (Särndal, Swensson, and Wretman 1992):

- (1) *Coverage errors*. They are generated by the mismatch between the target population and actual respondents (Dillman 2000). Generally, for Internet surveys, coverage errors are the most critical point. However, this is not an issue in the case of SETA because each student usually has access to the Internet at home or in the university computer labs.
- (2) *Sampling errors*. In general, they occur with the failure to collect sampling units that are representative of the target population, which is a serious concern. In the case of SETA, however, since there is no proper sample, this is not a substantial problem. Nevertheless, the inferences on the complete population can still be distorted by a type of selection bias and the conclusions should be limited to groups having access to the web.
- (3) *Non-response errors*. They concern the failure to obtain observations on some elements selected and designated for the sample (Kish 1965) and are often dependent on a respondent's willingness and ability to complete the survey. They are present in almost all surveys, even the best ones, and can have a greater impact than other types of errors (Goyder 1987; Groves et al. 2002; Hox and de Leeuw 2002). Non-response error can occur as *item* non-response in which one or more items in a questionnaire have missing values or as *total* non-response, concerning overall refusal to participate in the survey. Item or total non-response can bias estimates because the person responding is self-selected and does not always follow a random process in deciding on participation. Incidentally, it should be noted that biased estimates also derive from how the person responds, which includes acquiescence, yea-saying or nay-saying, primacy effect, central tendency, leniency, satisficing, overclaiming, etc. (Albaum 1997; Chan 1991; Ray 1990). Currently, only little is known about non-response rates in web surveys (Couper 2000; Schaefer and Dillman 1998), but we expected it to be high for SETA (Porter and Umbach 2006; Porter and Whitcomb 2003, 2005). Therefore, efforts directed towards stimulating student response are necessary to increase participation in a web survey.
- (4) *Measurement errors*. They reflect the discrepancies between the answers of respondents and their true values on the measure. On this topic, the web surveys for SETA might present more issues than the traditional paper surveys, like different browser settings, user preferences, hardware and so on. The latter can generate difficulties that irritate the respondents, leading them to provide responses reflecting their frustration. However, design conventions, such as colour, sound and images, may improve the administration of the questionnaire. In fact, it is possible to launch the request to fill out the questionnaire form using an attractive web-design, with appealing colours, soft music, nice images and engaging animation to convince students to carry out the task.

Other characteristics, more specific to the web surveys and often appearing as disadvantages, are the following:

- (1) *Environment control.* Web surveys do not guarantee proper control over factors that affect case-to-case variability. For example, in SETA, the possibility of independent responses is much higher when the survey is administered in the classroom in the presence of an instructor, compared to outside the classroom setting where clusters of students might give collective answers.
- (2) *Completion time.* The questionnaire cannot be completed after taking the exam because exam results might bias responses (Eiszler 2002). Therefore, the procedure ensures that the student has not already evaluated that class and has not passed that exam before allowing him/her access to the SETA questionnaire. Moreover, it should be noted that the targeted period of the SETA survey can be chosen by faculty, within a 12-month limit, even if as more time passes after a semester ends, memory errors are likely to affect student ratings. Therefore, many efforts should be made to draw students into the evaluation process in a fixed and short period of time near the end of the term or immediately after it.
- (3) *Computer availability.* The effect of computer availability to access the site or difficulties with the Internet connection can equally influence student judgements.
- (4) *Privacy.* Concerns about privacy and data integrity may be more prevalent with Web surveys, as the process is less transparent compared to paper surveys; this may result in lower participation (Sax, Gilmartin, and Bryant 2003).

The survey mode (web or paper) can affect judgements because students who are less inclined to use computers and the Internet would tend to respond more negatively. However, the perception of the survey content is often assumed to be unrelated to the administration mode (Leung and Kember 2005). As far as the results are concerned, some studies have shown that the discipline is an important factor, whereas changing the collection mode appears to be inconsequential (Layne, DeCristoforo, and McGinty 1999). In general, small changes in the survey mode did not show any significant impact or only negligible effects on the results. Finally, considering all the difficulties mentioned above, it should be noted that the major sources of inaccuracies come from coverage, sampling, non-response and measurement errors contaminating any survey's process. Unfortunately, given the objectives of a survey in a specific situation, there is no absolute benchmark to evaluate the best survey strategy or to decide what one should do or achieve. However, each survey design must be adapted suitably to the circumstances and evaluated with respect to costs and objectives (Biemer et al. 1991; Couper 2000).

When implemented properly, web-based surveys offer a number of substantial advantages, including the following:

- (1) *Cost savings* for data collection and circulation first and foremost because it reduces the number of people involved in the survey process. This is crucial for SETA because the human and financial resources of Italian universities have reached a critically low level.
- (2) *Time savings for administrators*, as it relieves staff of tasks related to survey administration. Moreover, the circulation of the results can be done in real time via online publication. In fact, results can be provided to instructors as soon as they are given by students and, although partially, before the end of their course, allowing them time to make adjustments for improvement.

- (3) *Time savings for respondents* because the personal data regarding teachers and students, in the first and second sections of the questionnaire, are provided automatically by the system and there is no need for the student to fill in those sections.
- (4) *When and where the respondent wants*. Students can choose the most convenient time to complete the questionnaire. All that is required is access to the Internet. This has the additional advantage of putting students at ease in expressing their judgements.
- (5) *No interviewers* are required in web surveys. For SETA, this implies that no personnel are engaged to hand out the questionnaires and to collect them after completion. However, involving students in the evaluation process is crucial, and the instructors and coordinators thus continue to have a pivotal role in encouraging students to complete the web-based questionnaire.
- (6) *More space for comments*. Students can enter more easily additional comments in the electronic format and reach the instructors immediately. This is particularly important in Italy, where the relationship between instructors and students is often defined by a lack of direct communication. Nevertheless, to have an immediate solution of problems emerging in a course, the instructor should address students' remarks directly in the classroom creating a confidential climate. On the other hand, the faculty should have a committee of teaching activity where students could pass on their opinions about the courses. In fact, SETA is not specifically directed to solve these problems.
- (7) *Non-attending students* – of which very little is known so far – have the opportunity to participate in the evaluation process for the first time, although only on a limited number of items.

Methods and results of the web-based survey

The computer software used to manage the collection and circulation of the survey results was developed by the technicians of the University Information Services (*Centro Servizi Informatici di Ateneo – CeSIA*), in cooperation with the work group of KION (*CINECA*) because the latter also provided the automated management system of the registrar's office – 'Esse3'.

The exam registration procedure through the Esse3 link was and is crucial for increasing student participation and reducing the non-response rate. Further, the NdV agreed that the web survey should be mandatory in order to take the exam, meaning that an instructor could refuse admission to an exam if the student did not show the 'receipt' of the completed questionnaire. Although the instructors had a wide margin of autonomy on decisions concerning this matter, the strategy carried the risk of providing biased responses. Students more observant of rules than others may have responded more frequently, as well as more positively, in their evaluations, but this psychological self-selection could, at least in principle, bias their responses. Since the variables of interest were only the student participation rate and the number of evaluated courses, that effect was not observed.

During the academic year 2005/06, the web survey was introduced in two faculties, differing with respect to various factors. The first was the Faculty of Biosciences and Biotechnology because it was located in Modena (one of the two geographical locations of the university); it was a scientific field and it required mandatory attendance. In particular, it is worth mentioning that students were required to show the survey receipt

released by the system in order to obtain the attendance signature required by the university at the very end of the classes. The second was the Faculty of Communication and Economic Sciences. It was located in Reggio Emilia (the other geographical location of the university); it represented disciplines in humanities and mandatory attendance was not required. In this case, students needed to show the system receipt at the moment of the exam. Note that this approach generated data similar to a natural experiment (Shadish, Cook, and Campbell 2002) because the causes were not manipulated and the web survey was introduced on the basis of aprioristic considerations. Therefore, the analysis was carried out only by comparing proportions in a descriptive way. Table 1 summarises the results of the web-based survey compared to those of the previous year, when the survey was paper-based.

In the Faculty of Biosciences and Biotechnology for academic year 2004/05, the number of collected questionnaires was 1836 (from 98 classes); in 2005/06 the number of respondents was 4930 (from 253 classes). The overall increase in the number of respondents was 168.5%. This is likely due to the mandatory attendance for students, the widespread circulation of information about the web survey among students and the rigorous application of the provided procedure by the instructors. Interesting terms of comparison would have been the percentages of students registered for the exams in those academic years. In the Faculty of Communication and Economic Sciences, the number of respondents was 1977 (from 79 classes) in the academic year 2004/05 and 1742 (from 230 classes) in the academic year 2005/06. This implies an overall 11.9% decrease in the number of respondents. Also, the data show that the number of classes being evaluated increased, whereas the number of respondents per class decreased. This is likely due to the fact that the persons in charge (chairpersons, directors of degree programmes and administrative coordinators) did not do a sufficiently good job in motivating and delegating responsibility to the instructors. In addition, it was not clear to all students that taking the exam was conditional to survey completion and obtaining a receipt from the system. In summary, more effective action on the part of the instructors would have been decisive for a higher response rate.

In the academic year 2006/07, all the faculties were invited to participate in the web survey mode on a voluntary basis. The faculties who did not take part were: Agricultural Studies, Engineering (Modena and Reggio Emilia), Education Sciences (except the degree programme in primary education sciences) and a few degree programmes in Sciences, but continued with the paper-based survey. Table 2 reports the results concerning participation rates and the number of evaluated courses.

In the paper-based survey, we observed significant decreases in the participation rate for the Agricultural Studies Faculty, the degree programmes in primary education

Table 1. Absolute frequencies by faculty and academic year: 2004/05 paper-based survey and 2005/06 web-based survey.

Faculty	Number of surveyed classes			Number of respondents			NAS
	2004/05	2005/06	%V	2004/05	2005/06	%V	
Biosciences and Biotechnology	98	253	158.2	1836	4930	168.5	—
Communication and Economic Sciences	79	230	191.1	1977	1742	-11.9	329

Note: %V, percentage variation; NAS, non-attending students.

Table 2. Absolute frequencies by faculty and survey mode.

	Number of classes			Number of respondents			
Survey modality (by faculty)	05/06	06/07	%V	05/06	06/07	%V	NAS
Paper (both years)							
Agriculture	79	49	−38.0	578	280	−51.6	
Engineering/RE	73	70	−4.1	2118	2155	1.7	
+ <i>Primary Education Sciences/RE</i>	36	23	−36.1	1656	983	−40.6	
Engineering/MO	233	219	−6.0	8326	7764	−6.7	
Literature and Philosophy	140	148	5.7	4529	4254	−6.1	
* <i>Chemistry – U</i>	28	25	−10.7	423	422	−0.2	
* <i>Physics – U</i>	34	31	−8.8	307	404	31.6	
* <i>Information Sciences – U</i>	21	19	−9.5	240	178	−25.8	
* <i>Physics – G</i>	17	22	29.4	81	120	48.1	
* <i>Chemistry – G</i>	18	20	11.1	139	170	22.3	
Web (only 06/07)							
Communication and Economic Sciences/RE	122	131	7.4	1695	1478	−12.8	290
+Education Sciences/RE: Total	67	73	9.0	2306	2169	−5.9	
+ <i>Education Sciences – U/RE</i>	9	22	144.4	453	1103	143.5	337
+ <i>Public Administration Sciences – G/RE</i>	6	18	200.0	42	38	−9.5	38
+ <i>SSHSA – U/RE</i>	16	10	−37.5	155	45	−71.0	22
Biosciences and Biotechnology	170	222	30.6	5778	6264	8.4	–
Economics	162	236	45.7	6123	4447	−27.4	238
Pharmacy	76	92	21.1	2561	4456	74.0	–
Law	56	57	1.8	2018	1395	−30.9	265
Medicine	167	330	97.6	10649	36316	241.0	–
*Mathematical, Physical and Natural Sciences: Total	286	329	15.0	3092	4258	37.7	–
* <i>Mathematics – U</i>	35	33	−5.7	447	321	−28.2	8
* <i>Mathematics – G</i>	14	14	0.0	61	42	−31.1	–
* <i>Geological Sciences – U</i>	30	35	16.7	384	412	7.3	–
* <i>Geological Sciences – G</i>	14	21	50.0	67	112	67.2	–
* <i>Natural Sciences – U</i>	29	35	20.7	248	356	43.5	12
* <i>Environmental Sciences</i>	15	20	33.3	61	69	13.1	–
* <i>SRPAH – G</i>	9	14	55.6	48	223	364.6	134
* <i>Sciences of Cultural Heritage</i>	22	38	72.7	586	1420	142.3	–
Total	1631	1954	19.8	49773	75227	51.1	1344

Note: %V, percentage variation; NAS, non-attending students; G, graduate; U, undergraduate; MO, Modena; RE, Reggio Emilia; SSHSA, Sciences of Social and Health Services' Administration; SRPAH, Sciences of Recovery and Preservation of Archaeological Heritage; +, Faculty of Education Sciences; *, Faculty of Mathematical, Physical and Natural Sciences.

(Reggio Emilia) and information sciences, while degree programmes in physics and chemistry experienced an increase in the number of respondents. In the remaining cases, although the decrease in the number of respondents seemed to prevail, the variation appeared to be modest. In general, a smaller number of classes being evaluated corresponded to a smaller number of respondents. The degree programme in physics was an exception to this general behaviour. Overall, the outcome of the survey varied

substantially across faculties and degree programmes. For both collection modes, there were positive and negative variations in the number of respondents and classes being evaluated, but it clearly emerged that the collection mode was not neutral with respect to the outcome.

The web survey, which was not readily accepted by faculties and instructors, showed both positives and negatives. First, we observed a general decrease in the number of evaluating students. The Faculty of Communication and Economic Sciences exhibited a further decrease of 12.8% with respect to the previous year. Also, the Faculties of Law and Economics showed a decrease of 30.9% and 27.4%, respectively. In all three cases, there was veiled, but often clear, opposition of the instructors to the evaluation. In particular, the number of evaluating students in law fell during the second semester, indicating that the strategy suggested by the NdV did not achieve the desired objectives, which included increasing student engagement. Actually, the further decrease in student response for the second semester, not reported here, was quite a concern. Instead, the high decrease reported for the degree programme in Sciences of Social and Health Services' Administration derived from its imminent termination.

On the other hand, there were significant increments in the overall number of evaluations: clear examples were the Faculties of Medicine and Education Sciences. In general, the classes being evaluated increased remarkably, encouraging the continuation of the project in the future for both data collection and circulation of the results.

In the academic year 2007/08, the web survey became mandatory at the University of Modena and Reggio Emilia and was extended to all faculties. Direct experience in the field, however, showed some lack of cooperation at the department level, thus negatively affecting the data collection process. Actually, each step of the process was slowed down by polemics and requests to modify the modalities for students to access the questionnaire. Clearly, planning the details of procedure under such conditions became more difficult, as did obtaining a strong participation of students. In particular, in the spirit of a traditional paper-based process, there were certain time windows where students could access the questionnaires. As a consequence, the classes being evaluated were only those attended during the class lecture period. Often, however, such a window was too short to properly inform students of the opportunity to evaluate their classes. Some faculties did not use Esse3 for the registration of their exams. Since these students were not required to use the Internet for registration, in most cases they did not complete the web questionnaire.

During the year 2008/09, based on the suggestions of the NdV, the university intervened and decided that: (1) the registration for exams had to begin three weeks before the end of classes, (2) the completion of the questionnaires was mandatory for students registering for the corresponding exam, and (3) the time frame for questionnaire completion was determined by the respective faculty, but within the lecture period only. Such decisions were somewhat limiting, as there were many exam dates scheduled outside that period. Therefore, each student should have been given the chance to evaluate the class once, but at different times besides the teaching periods. Note that 'mandatory' meant only that students registering for an exam received an invitation to fill in the questionnaire on the screen. However, students were able to avoid responding by hitting enter, and thus submitting a blank questionnaire. Although this requirement was in reality not enforceable online, the intention to make the survey mandatory was a source of long and animated debate within the academic senate and faculties. Two main opposing approaches emerged from the disputes. One defended students'

freedom without too many constraints. Another defended students' duty or right to evaluate teachers, that is, if being evaluated is a duty of the instructor and to evaluate a right of the student, then being evaluated is the right of the instructor and a duty of the student. In the end, students' freedom prevailed over their duty to evaluate.

Conclusions on the use of the web survey for SETA

The experience of the progressive introduction of the web survey showed both encouraging results and numerous interesting challenges related to the participation of the faculties, organisation and management of data collection, and engagement of students. In principle, survey data collection via the Internet, associated with the automation of registration for exams, has several advantages. Hence, the dominating idea was to proceed despite the existing issues. The main directions, not all based on data, but on direct experience in the field, can be summarised as follows:

- (1) In order to obtain higher participation rates, more responsibility needs to be assigned to the whole didactic structure: faculty chairpersons, presidents of degree programmes, coordinators and instructors.
- (2) The separation between the electronic management of the evaluation process – carried out by the technicians of the University Information Services – and career management for students (managed by Esse3) clearly generates some technical limitations. Integrating these systems in the future could increase participation though more efficient automation.
- (3) Each student should be allowed to register for the exam only after the completion of the questionnaire. As a consequence, inconvenient receipt printouts and monitoring by the instructor could be avoided. Furthermore, part of the responses of the students who are generally not inclined to spend their time on the survey can be recovered, as can some information about the non-attending students. The organisation in semesters produces, however, a slight asymmetry, as the number of exams available in a 12-month period for the first semester is greater than those available for the second semester. Symmetry could be obtained by not allowing classes taught in the first semester to be evaluated during the summer exam period.
- (4) Besides requiring students to complete the questionnaire before registration for an examination, the people in charge (faculties' chairpersons, presidents of degree programmes, instructors, etc.) should take steps to encourage their students to express their opinions on teaching activities during the three weeks before the end of the term. Relying solely on the mandatory nature of the survey neglects the most important intrinsic aims of SETA, which are involvement of students in the educational process and reinforcement of a positive perception of their role in the university.
- (5) The survey modes affect the two variables under consideration, that is, the participation rate and the number of evaluated courses. Although the web-based survey leads to a general decrease in the number of evaluating students in most faculties, the total number of respondents almost doubled due to the Faculty of Medicine where attendance is mandatory and the number of completed questionnaires was three times more than it used to be. Moreover, in that faculty the instructors were active in the data collection process and encouraged the students to complete the questionnaire in order to obtain the

required signature of attendance. In almost all cases, the number of classes being evaluated increased markedly. This alone is an extremely positive outcome.

Dissemination of results via the Internet

The circulation of results via the Internet allows for a reduction in the personnel supporting the NdV, as well as a reduced need for paper documents. The instructors can access the Esse3 system by entering their *user id* and *password* and view only their results in the form of a simple table for each class. In particular, for each item, the response frequency corresponding to each element of the scale, mean, standard deviation and the number of completed questionnaires are reported. For each binary response option, the frequencies and percentages are also reported. Each instructor can observe in real time the evaluations of his or her classes, as can others who have access to them (NdV support office, faculty chairpersons, presidents of degree programmes, etc.). This type of circulation does not guarantee a total savings in paper, as many instructors like to print out their results. Nevertheless, it is still a remarkable improvement for the overall organisation of the evaluation process.

The data collected via the Internet are processed in real time and, therefore, instructors can check their evaluation results and read the free-form comments of students at any time. This happens towards the end of the term, but instructors can still make changes as a result of suggestions emerging from the data. Previously, when data were collected via paper questionnaire, the information was transmitted to instructors two months or more after the end of the term and without free-form comments. In the web survey, the comments are collected and transmitted easily. Some universities, for example, the University of Florence, were able to gather comments together with questionnaire items, but this task complicates data gathering and processing, requiring an increase in human resources devoted to SETA and resulting in a time lag between the end of data collection and the transfer of the results to instructors.

Questionnaire and profile of non-attending students

Questionnaire for non-attending students

After a student accesses the Esse3 website and either selects the evaluation page and subsequently the instructor's name to be evaluated or selects the page to register for an exam, a question is displayed on the screen: 'Are you an attending student?' If the answer is 'yes', the student is led to the SETA questionnaire. If the answer is 'no', the student is led to an alternate battery of 15 question items. This was designed to discourage attending students from declaring themselves as non-attending in order to avoid answering questions and save time. For these reasons, it is preferable that the completion time required to complete such a questionnaire be the same as that for attending students. This strategy is fundamental in order to collect the valuable (and somewhat different) perspective of students who do not attend classes. These considerations motivated the construction of a special questionnaire for non-attending students, which included the same number of questions (15) as in the questionnaire for attending students, and five dichotomous items referring to organisational aspects of the course. The battery of 15 items deals with the individual class and degree programme and asks about reasons for not attending the classes.

The first semester of the academic year 2005/06 was designed to be the pilot period with a two-fold objective: (1) to verify the correct functioning of the new set of questions, and (2) to study the responses concerning both the motivations of students to enrol in the degree programme and the quality of the programme organisation. In the pilot study, the answers from students not attending in the period from October 2005 to February 2006 were collected. In March various analyses of the dataset were performed, the results of which helped to design a final version of the questionnaire. Specifically, the analysis of the free-form questions together with further considerations on the semantics and profile of the questions led to some changes in the questionnaire.

The final questionnaire for non-attending students was structured in sections. The first section contained information for identifying the object of the evaluation: faculty, degree programme, class name and instructor's name, similarly to the standard questionnaire. The second section asked for general characteristics of the respondent: gender, high school diploma, current year of enrolment, enrolment status, enrolment mode (the same as on the questionnaire for attending students) and the reasons leading to enrolment and for not attending.

The body of the questionnaire had a 15-item battery in the third section dealing with course organisation; the fourth section included additional information and satisfaction factors; the fifth section concerned the organisation of the degree programme. The sixth section had five items concerning observations and suggestions, as reported in Table 3.

The 15-item battery in the third, fourth and fifth sections followed the same response options as the questionnaire for attending students: '1' = *definitely no*, '2' =

Table 3. Specific items for non-attending students.

15-item battery and 5-item observations	Acronym
I01 – Is the workload consistent with the credit units?	WL
I02 – Are the teaching materials adequate for the subject?	TM
I03 – Was the given information helpful for preparing the exam?	IE
I04 – Were the exam modalities clearly defined?	EM
I05 – Did you learn more than expected?	LM
I06 – Were you interested in the subject?	IIS
I07 – Was it possible to study the subject without attending?	SWA
I08 – Did family economic conditions affect your attendance?	FEC
I09 – Was your work schedule the cause for not attending?	WS
I10 – Did your preliminary knowledge affect your attendance?	KA
I11 – Was your preliminary knowledge sufficient to understand the subject?	KU
I12 – Are you satisfied with the course overall?	OS
I13 – Is the faculty webpage properly organised?	WP
I14 – Was the total workload of the courses sustainable?	TWL
I15 – Was the organisation of the courses acceptable?	OCA
O1 – Improve coordination with other courses	ICC
O2 – Diminish the overall workload of courses	OWL
O3 – Provide more basic knowledge	PBK
O4 – Improve the quality of the teaching materials	ITM
O5 – Remove topics already discussed in other courses (redundancies)	RR

more no than yes, '3' = more yes than no and '4' = definitely yes. This scale was transformed into numerical values on a decimal scale (2, 5, 7, 10) for subsequent data analyses as proposed by Chiandotto and Gola (2000). This transformation was accepted by the National Committee for University System Evaluation (Italian acronym CNVSU) and was also adopted by the University of Modena and Reggio Emilia because SETA is mandatory in Italian universities and the use of the same procedures is important for comparisons. The scale has some known drawbacks: absence of the middle category, possible ambiguity of the labels for many students, arbitrariness of the numbers assigned to alternatives and high level of uncertainty about option intensities. Moreover, since the variables are ordinal, their mean and standard deviation should not be used, although the latter would require a more detailed discussion beyond our present scope. Nevertheless, the proposal by Chiandotto and Gola (2000) seemed reasonable because values are similar to those used in the Italian schools preceding the university and they are near the opinions of students. In fact, in an empirical study the numerical values (2, 5, 7, 10) were similar to the student opinions about the decimal values of the options. An exception was given by the last option, which proved to be lower than 10, as ascertained in a survey carried out by Lalla, Facchinetti, and Mastroleo (2004).

Outcomes for non-attending students

This section presents some data collected from the questionnaires completed by non-attending students in the academic years 2005/06 and 2006/07. Descriptive statistics were used to illustrate the data, as above, and a simple *t*-test was carried out only to compare the means of the items appearing on both survey questionnaires (attending and non-attending students).

The main results are summarised in a set of a few tables. The percentage of non-attending female students (72.5%) was higher than that of male students (Table 4) and it was higher than that of attending female students (64.1%). In particular, the percentage of non-attending female students was higher than that of females attending the Faculty of Communication and Economic Sciences and the Faculty of Mathematical, Physical and Natural Sciences, while it was lower in the Faculties of Education Sciences and Law.

The individual motivations for enrolment and non-attendance showed some interesting patterns. The enrolment at university, reported in Table 5, presented two main

Table 4. Absolute and per cent frequencies of non-attending students in the academic year 2006/07 by faculty and gender.

Faculty	Female		Male		Total		AS
	<i>n</i> (i)	%F	<i>n</i> (i)	%M	<i>n</i> (i)	%T	%F
Communication and Economic Sciences/RE	200	69.0	90	31.0	290	100	63.1
Education Sciences/RE	350	88.2	47	11.8	397	100	93.6
Economics	138	58.0	100	42.0	238	100	58.6
Law	170	64.2	95	35.8	265	100	69.0
Mathematical, Physical and Natural Sciences	116	75.3	38	24.7	154	100	48.7
Total	974	72.5	370	27.5	1344	100	64.1

Note: AS, attending student.

Table 5. Reasons for pursuing university studies.

Reasons for pursuing university studies	05/06 (%)	06/07 (%)
Cultural/knowledge enrichment	36.5	62.3
Subjective interest in the subject	27.7	52.8
Pursuing a challenge/personal satisfaction	18.8	29.0
Enjoy studying	8.2	18.9
Without a degree finding a job is hard	28.9	16.6
Increasing work profile and preparation	21.6	44.3
Increasing career possibilities	26.4	38.5
Continuing previous studies	8.2	14.1
Aspiring to a better paying job	8.5	14.7
Working in a job that you enjoy	10.3	30.9
Other reasons: specify	3.3	0.2
Total respondents (base of percentages)	329	1344

factors: personal motivation (cultural, intellectual, psychological challenge) and career-oriented motivation connected to the labour market and career possibilities. A conspicuous portion of students choose whether or not to enrol with no clear plan for future employment, and this is an interesting outcome for the Faculty of Communication and Economic Sciences. The reasons for enrolment in that specific degree programme highlighted a large portion of students motivated by work-related aims (Table 6), partially contradicting the results in Table 5. Moreover, the total number of choices was lower than that obtained for the question on the reasons for enrolment, denoting that the two aspects were strictly related. The reasons for not attending courses, reported in Table 7, showed that 43.9% of students did not attend mainly because their work and class schedules conflicted, while other options had values lower than 7%.

The comparisons between item means (common to both questionnaires: non-attending and attending students) showed both expected and unexpected outcomes.

Table 6. Reasons for enrolling in the degree programme.

Reasons for enrolling in the degree programme	05/06 (%)	06/07 (%)
Increasing the chances of finding a job	13.7	23.1
Preparing for the desired job	21.6	54.1
It gives you the culture you desire to have	21.9	49.2
You have a natural aptitude for the subjects taught	11.6	30.7
It allows you to study while working	10.9	20.3
There is a desired post-graduate degree programme	6.7	8.0
Likely to be useful in the future	22.8	43.9
Easy	0.0	0.7
Conveniently located	8.5	11.1
Friends' choice or trendy	0.9	0.4
Distance learning is possible	7.0	4.0
Other	0.0	0.8
Total respondents (base of percentages)	329	1344

Table 7. Reasons for scarce attendance.

Reasons for scarce attendance	05/06 (%)	06/07 (%)
Conflicting class schedules	6.1	11.0
Generally inconvenient class schedule	3.3	13.2
Inconvenient class schedule because commuting	6.1	18.4
Lecture location too far away	6.1	16.3
Conflicting class and work schedules	46.8	56.2
Previous knowledge of the subjects	1.5	4.8
Lack of interest in the subject	2.1	2.4
The subject can be studied without attending	4.3	12.9
Prefer study independently	5.8	10.9
Need to study other subjects	7.0	13.0
Lack of motivation	1.8	1.6
Personal problems (family or health)	4.3	11.7
Other commitments	4.9	9.4
Distance learning is possible	5.5	3.0
Other reason: please specify	1.2	0.0
Total respondents (base of percentages)	329	1344

For the questions in common with attending students, Table 8 reports results for both types of students. A number of cases smaller than 160 implies that the item was included after the pilot survey and replaced a previous question. Formally, non-attending and attending students are considered as independent groups. Therefore, for testing the hypothesis of no difference between two independent means, $H_0: \mu_{NAS} = \mu_{AS}$ and $H_1: \mu_{NAS} \neq \mu_{AS}$ for a two-tailed test, the following t statistic has been applied (Minium, King, and Bear 1993):

$$t_{k;dof} = \frac{\bar{X}_{k;NAS} - \bar{X}_{k;AS} - (\mu_{k;NAS} - \mu_{k;AS})}{\sqrt{\frac{(n_{k;NAS} - 1)S_{k;NAS}^2 + (n_{k;AS} - 1)S_{k;AS}^2}{n_{k;NAS} + n_{k;AS} - 2} \left(\frac{1}{n_{k;NAS}} + \frac{1}{n_{k;AS}} \right)}}$$

where the symbols $\bar{X}_{k;NAS}$, $S_{k;NAS}$ and $n_{k;NAS}$ denote the mean, the standard deviation and the number of cases of k -th item for non-attending students, respectively. Analogously, $\bar{X}_{k;AS}$, $S_{k;AS}$ and $n_{k;AS}$ indicate the mean, the standard deviation and the number of cases of k -th item for attending students, respectively. The degrees of freedom (dof) are equal to ' $n_{k;NAS} + n_{k;AS} - 2$ '. These quantities are accordingly reported in Table 8. The previous formula is easily adapted to the case of percentages, which refer to the means of binary variables multiplied by 100 and concern the five-item observations. Results for percentages are reported in the last five rows of Table 8.

The workload evaluated by non-attending students proved to be higher than that evaluated by attending students, although not significantly. The adequacy of the teaching materials showed the same pattern at the significance level of 0.018. The clarity of the exam modalities and interest in the subject did not yield any significant differences. The usefulness of preliminary knowledge for understanding the subject and overall satisfaction reported means significantly lower than those obtained by

Table 8. Descriptive statistics for non-attending students (pilot and final surveys) and attending students with *t*-test results on the equality of the means.

Items	Non-attending students			Attending students			Statistical information		
	Mean	SD	n_{NAS}	Mean	SD	n_{AS}	<i>t</i> -Stud.	dof	<i>p</i> -val.
I01 – WL	7.6	2.1	315	7.4	2.1	1601	1.545	1914	0.092
I02 – TM	7.9	2.0	315	7.6	2.3	1598	2.197	1911	0.018
I03 – IE	5.3	1.6	300						
I04 – EM	8.1	2.1	315	8.2	2.1	1580	–0.772	1893	0.399
I05 – LM	7.1	2.2	143						
I06 – IIS	7.9	2.0	316	8.0	1.9	1579	–0.846	1893	0.350
I07 – SWA	7.1	2.1	145						
I08 – FEC	3.4	2.5	315						
I09 – WS	7.1	3.6	140						
I10 – KA	3.8	1.9	128						
I11 – KU	6.6	2.3	314	6.9	2.3	1594	–2.113	1906	0.021
I12 – OS	7.1	2.2	307	7.4	2.1	1595	–2.274	1900	0.012
I13 – WP	7.8	2.1	314						
I14 – TWL	6.7	2.0	310	6.4	2.1	1587	2.318	1895	0.012
I15 – OCA	6.6	2.0	307	6.5	2.0	1584	0.802	1889	0.382
O1 – ICC	19.8	65	329	14.5	236	1623	2.242	1950	0.007
O2 – OWL	24.9	82	329	25.4	412	1623	–0.191	1950	0.835
O3 – PBK	16.1	53	329	19.5	317	1623	–1.510	1950	0.121
O4 – ITM	17.9	59	329	19.5	317	1623	–0.686	1950	0.464
O5 – RR	18.5	61	329	9.2	149	1623	4.119	1950	0.000

Note: NAS, non-attending student; AS, attending student; dof, degrees of freedom.

attending students, as expected. The mean of the sustainability of the total workload was significantly higher than that of attending students. Although the latter is a somewhat unexpected result, it leads to a natural explanation: the non-attending students saved time by avoiding commuting to attend lectures and, consequently, were able to optimise their own schedule and workload. Finally, the acceptability of the course organisation received a similar evaluation by the two groups.

Two of the five-item observations presented statistical differences between non-attending and attending students: the percentages in favour of improving coordination with other classes and of removing topics already discussed in other classes turned out to be higher among non-attending than among attending students. Although the former is not surprising, the latter clashed with the request of diminishing the overall workload of classes indicating that almost a fourth of all students claimed this difficulty.

Non-attending students judged the information given for exam preparation (I03) to be insufficient. In general, this should entail a thorough revision of syllabi, communication and strategies, but it is not perfectly consistent with the results concerning the clarity of the exams' modalities (I04). Therefore, it required a further investigation.

Most students declared that they learned as much as they expected (I05), it was possible to study the subject without attending (I07) and the family economic conditions did not affect their decisions about attending (I08). Work schedules seemed to be most responsible for non-attendance (I09), while preliminary knowledge did not

affect attendance (I10). The organisation of the faculty webpage proved to be satisfactory (I13).

Conclusions and future actions

The analysis of the results obtained from the introduction of the web survey for SETA motivates the following considerations for possible future action.

First, it is necessary to involve everyone in the teaching organisation structure and to obtain *positive* feedback in terms of responsibility and interest in the new procedure. Thus, the NdV initiated a series of meetings in order to pinpoint the sources of the issues observed in these two years of the progressive introduction of the web survey method. Additional meetings were specifically addressed to faculty chairpersons, coordinators of the degree programmes, instructors, teaching coordinators and other personnel identified by faculty members. The main goal was to ensure that students fill in the questionnaires and that they understand the new survey mode. Clearly, the instructors, being in contact with students, have a key role in this process.

Some relevant points that emerged from the meetings are as follows: (1) *control* of the process is best distributed among those in closest contact with the students, as it may be the main way to obtain maximum participation in the survey; (2) it is necessary to organise regular meetings to prepare teaching *coordinators* and to concretely identify their programme of activities; and (3) management of the process should be carried out within the overall Esse3 computer system by KION-CINECA. Particularly, the priority should be to activate an automatic mechanism for mandatory completion of the questionnaire in order to access the exam registration procedure.

The most relevant criticism to the web-based survey concerns the time window for the evaluation, which was from October through September of the following year. In general, this issue involves the timing of surveys and, specifically, the data collection period. However, the overwhelming practical details are out of the scope of this paper and, in this case, they seem mostly related to peculiarities of the Italian university system. Therefore, they will be omitted here. In fact, to give one example, a possible time window for evaluation is presented. The latter should begin three weeks before the end of the term and stop the day before the date of the first exam, to limit survey completion only to the period immediately after the course ends. This also avoids evaluations following the exam date. More flexible strategies could be planned with thorough consideration of the teaching organisation.

The questionnaire form for non-attending students does not collect ideal information about them because the number of items is low. Nevertheless, it could be improved to acquire more information about them. One constraint in this revision is to ensure that attending students do not opt for this survey version as a way to save time, and so the number of questions for non-attending students should be equal to that for attending students. A revision that does not take this issue into account could lead to a deterioration of data quality and a decrease in response rate. More knowledge about non-attending students requires a specific survey, not a questionnaire linked to the SETA survey.

Theoretical and practical considerations, as well the empirical results, seem to lead to the conclusion that the web-based SETA surveys bring remarkable advantages. Certainly, the cost reductions, time savings and the real-time circulation of results, made possible through the web-based survey alone, suffice to overcome other disadvantages and support the utilisation of this data collection mode.

Acknowledgements

Davide Ferrari has a research scholarship at the University of Modena and Reggio Emilia, provided by the Associazione Nazionale Cavalieri del Lavoro (Emilia Romagna Group, Italy). The authors are grateful to Michele Ferrari for her valuable comments and suggestions. They also thank the NdV for permitting use of the data from the paper-based and Web-based surveys. We thank the President of the NdV, Professor Fausto Fantini, whose determination made implementation of the Web survey possible. Michele Lalla is a member of the NdV, but the views expressed in this paper are those of the authors and do not necessarily reflect those of the NdV.

Note

1. In the Italian university system, the term *faculty* identifies a branch of the local university system (*Ateneo*) which is a homogeneous group of disciplines (e.g. Faculty of Economics, Faculty of Medicine, etc.). Personnel, such as professors, researchers, administrative assistants, can be affiliated to specific *departments* within the faculty (e.g. Department of Political Economy, Department of Business Economics). In general, the term *Corso di Studi* denotes a degree programme offered by a faculty. A five-year degree programme includes two modules: (1) undergraduate-level (*Corso di Laurea*, CL), and (2) graduate-level (*Corso di Laurea Specialistica*, CLS). Moreover, some particular programmes can be completed by accessing lectures via the Internet (*Formazione A Distanza*, FAD).

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