

The Time Survey: A Course Development Tool That Works!

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“My students don’t spend enough time preparing for class.”
“Students spend more time on this course than on any other course in the program.”
“Students today just don’t spend as much time on their studies as they used to.”

You’ve heard these claims before. Perhaps you’ve even made them yourself. If so, we have a simple question for you: How do *you know*? How do you *really* know how much time your students spend in out-of-class preparation for a given lesson or course?

This paper describes a simple yet powerful tool which, we believe, will help you answer this question. The tool is a time survey, used extensively in the civil engineering program at the United States Military Academy. The survey has been in continuous use since 1988. Today it functions as an integral element of a comprehensive, multi-dimensional assessment system, used to manage the ABET-accredited USMA civil engineering program.* As a course-level and program-level assessment tool, the survey offers much at very little cost. It requires few resources and very little time to administer; yet, the authors have found, this modest tool facilitates improved teaching, responsive course development, and rational management of the entire academic program.

THE TIME SURVEY SHEET

The time survey is used to obtain input from students on the amount of out-of-class time they spend in preparation for each lesson. It is administered to every student, in every class, in every course offered by the civil engineering faculty.

A typical completed time survey sheet is shown in Figure 1. This particular example was administered in EM364A, an undergraduate Mechanics of Materials course. The survey takes the form of a matrix, with a row for each student in the class and a column for each lesson. (Lessons are designated MM-1, MM-2, etc.) The matrix is printed on both sides of the sheet, so that a single sheet can be used for an entire 40-lesson course.

At the start of each class, the survey is passed around the classroom, with each student entering the number of minutes he or she spent in out-of-class preparation for the day’s lesson. To minimize bias in the survey data, the instructor ensures that the students’ entries are entirely anonymous. (A student may record his or her entry on *any* numbered row of the matrix.) Students are encouraged to be completely candid in their

* See Ressler and Lenox, “A Structured System for Outcomes Assessment”, elsewhere in these Proceedings.

responses and are advised that the results will be used *only* for course development and administration. Note that students who participated in this EM364A survey (Figure 1) were not at all reluctant to record a zero when they had done no out-of-class preparation for a lesson.

TIME CHART		MM-1 MM-2 MM-3 MM-4 MM-5 MM-6 MM-7 MM-8 MM-9 MM-10 MM-11 MM-12 MM-13 MM-14 MM-15 MM-16 MM-17 MM-18 MM-19 MM-20																			
Section #1 D																					
#1		0	60	60	120	120	50	490	90	60	50	180	0	15	75	60	180	45	65	0	60
#2		0	30	50	120	180	90	480	90	15	0	175	30	60	60	60	180	75	60	0	30
#3		0	30	60	120	180	90	480	60	90	0	780	0	30	120	80	180	30	60	0	30
#4		0	40	75	180	180	10	600	30	60	60	200	10	0	60	60	60	0	50	0	10
#5		0	60	45	120	180	15	600	10	90	90	100	0	45	70	60	180	0	180	30	0
#6		0	40	55	190	250	60	600	170	60	60	200	10	45	90	15	240	90	70	60	60
#7		0	60	60	180	180	60	480	40	60	10	100	0	45	180	20	300	30	60	60	60
#8		0	45	90	220	220	150	480	90	55	60	60	0	45	45	30	260	80	10	90	70
#9		0	50	60	200	250	40	60	60	60	15	0	30	30	10	200	20	120	40	45	
#10		0	40	90	200	240	75	180	40	30	150	30	0	120	60	700	150	50	10	0	
#11		0	35	20	240	75	60	70	40	40	45	30	30	20	20	20	20	20	20	20	

Figure 1. Typical Time Survey Sheet

THE TIME SURVEY GRAPH

At the end of the academic term, the complete set of time survey data is entered into a computer spreadsheet, analyzed, and graphed in a standard format. (Ideally, the data are routinely entered into the spreadsheet after each lesson, so that the tool can be used to manage the course lesson by lesson, as well as semester by semester.) In courses with multiple sections, the individual section results are consolidated into a single graph. A typical time survey graph is shown in Figure 2.

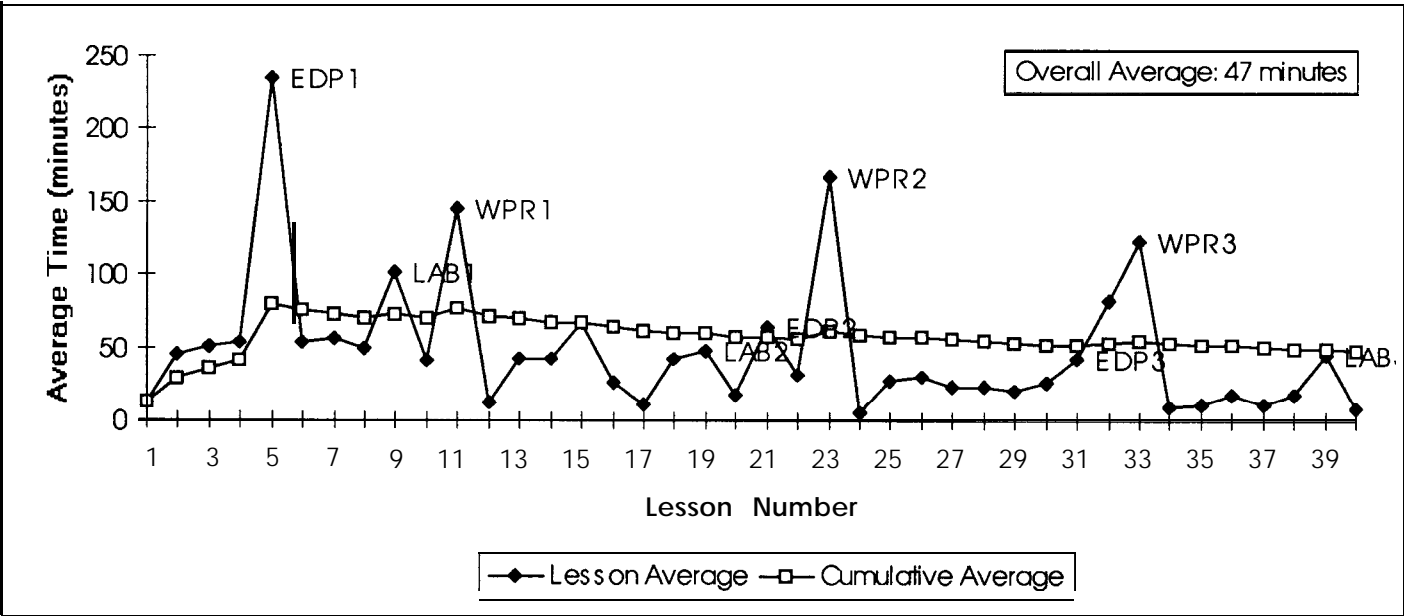


Figure 2. Time Survey Graph for EM-364A, Fall Semester, Academic Year 94-95

Note that the graph consists of two individual plots. The first plot (the “Lesson Average” graph) shows the average time spent on each individual lesson. This curve is annotated with the graded requirements administered during the course--labs, engineering design problems (EDP's), mid-term exams (“written partial reviews”, or

WPR's), and quizzes ("writs"). The second plot is a cumulative average, with each data point representing the average time for *all lessons*, up to and including the lesson corresponding to the plotted point.

- The two curves reveal a considerable amount of information about the course. The "Lesson Average" plot clearly shows how students manage their time, concentrating their efforts on graded requirements (the "spikes" in the curve), while devoting relatively little time to the intervening lessons. For a design problem, lab, or homework assignment, the height of the corresponding spike is a fairly reliable indicator of the level of difficulty. The "Cumulative Average" curve effectively smoothes out the spikes, providing a clearer picture of long-term trends. This plot is appropriate for assessing the relative amounts of time spent on major blocks of instruction in the course. As such, it is a highly effective tool for gauging the level of difficulty of future out-of-class requirements, *while the course is still in progress*. Note that, in this particular offering of EM-364A, there was a consistent, gradual decline in average time spent as the semester progressed. If at some point the course director had considered this trend to be a problem, he could have corrected by increasing the level of difficulty of the remaining course requirements, or by adding new ones.

APPLICATIONS OF TIME SURVEY RESULTS

The time survey graph is an important management tool. It is integral part of the course-end report, a self-assessment submitted by each course director to the civil engineering program director at the end of each academic term. As this report is reviewed, the time survey graph often serves as the impetus for future changes to the course, and as the basis for assessing the impact of previous changes. Specific applications are as follows:

- (1) The survey allows instructors and course directors to determine with reasonable accuracy whether their students are spending an appropriate amount of time preparing for class.
- (2) Survey results provide course directors with a rational basis for modifying the number, scope, and scheduling of homework assignments, design problems, lab reports, and other formal out-of-class requirements.
- (3) Survey results for a group of courses provide the program director with a rational basis for comparing and evaluating the out-of-class demands and academic rigor of those courses.
- (4) Survey results for successive iterations of the same course provide the course director and program director with clear indicators of historical trends; the results also provide a means of assessing the impact of earlier changes to the course.

LIMITATIONS

The most common criticism of the time survey is that students' self-reported time estimates are likely to be inaccurate and, in any event, can never be confirmed. Student time estimates are often assumed to be exaggerated, especially for major requirements like design projects. The authors acknowledge this criticism but respond with the following points:

- (1) Every effort is made to reduce bias in the survey process. Students' responses are completely anonymous, and students are made to believe that their responses will never affect their performance assessment for the course. Some bias is inevitable, but with careful attention to the process, the effects can be minimized.
- (2) The principal applications of survey results are *comparative*. Thus, as long as the bias is relatively consistent from course to course and from year to year, decisions based on comparisons of these results are entirely rational.
- (3) There is no practical alternative method of obtaining data on students' out-of-class effort.



USING THE TIME SURVEY: A CASE STUDY

- In the Fall of 1987, one of the authors (Lenox) assumed supervisory responsibility for EM364A, Mechanics of Materials, and taught the course for the first time in several years. At the time, the course had two large design projects--one near the middle of the term and one at the end. After teaching the course, Lenox was convinced that its design content needed to be restructured. The two projects were too large and were excessively complex. Much of the students' out-of-class work was concentrated during the two narrow windows of time corresponding to the projects. The following year, he instituted four small design projects, one for each major block of instruction. The projects were evenly spaced throughout the course, in order to achieve better design integration and a more uniform distribution of student time. To assess whether or not these changes would produce the desired effect, Lenox instituted the time survey.

The result of this effort--the EM364A time survey graph for the Fall semester of Academic Year 1988-89--is shown in Figure 3. These data suggest that Lenox's changes were successful. The use of four small design problems resulted in a reasonably uniform distribution of student effort, as evidenced by the approximately horizontal Cumulative Average curve. Nonetheless, the results were still not entirely satisfactory. On average, the students were still spending nearly 120 minutes preparing for each class attendance. This average, though consistent with the institutional standard (two hours of out-of-class preparation for each hour of class time), was deemed to be excessive in light of the other demands placed on engineering students at West Point.

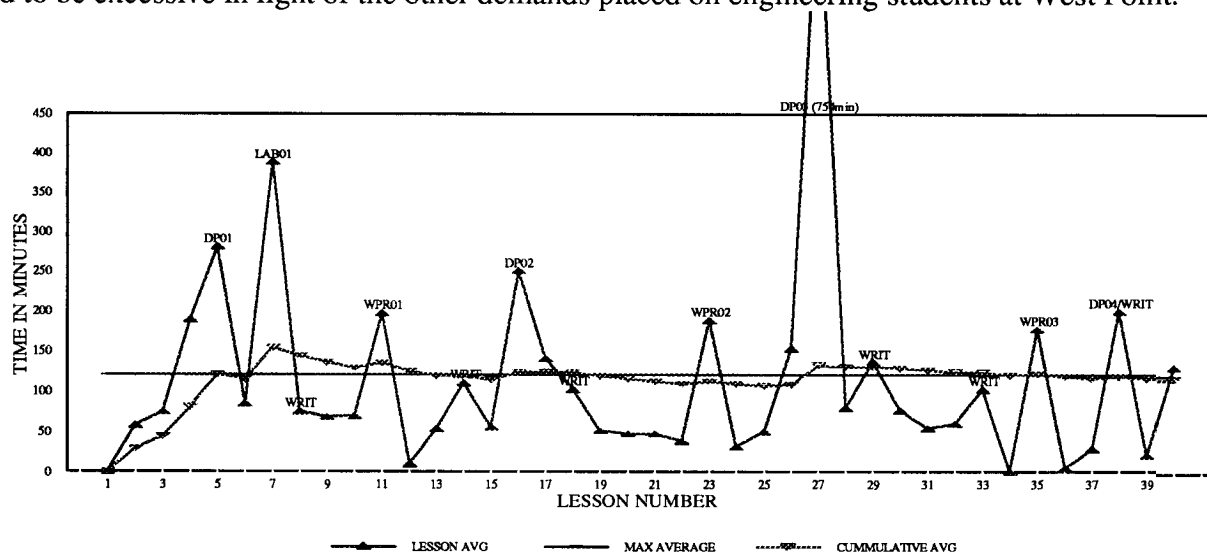


Figure 3. Time Survey Graph for EM-364A, Fall Semester, Academic Year 1988-89

In response, Lenox initiated reductions in the number and scope of graded requirements in the course. Use of the time survey was continued, in order to assess the impact of the changes. By the end of the following academic year, 1990, the average time per lesson had fallen to 100 minutes. This average represented a substantial improvement, though it was still considered somewhat high for this course. As a result, modest efforts to reduce the demands on student out-of-class time continued.

Figure 4 summarizes the EM364A time survey results for 15 consecutive semesters, from 1989 to the present. The curve shows the overall average time per lesson for each academic term. The sharp decline in time per lesson during Academic Years 90 and 91 is clearly in evidence. Note also the continued gradual decline in

average out-of-class time which occurred from 1992 to 1995. The reasons for this decline are complex and beyond the scope of this paper. But the conclusion is clear: by 1995, the academic rigor of the course had slipped below acceptable levels.

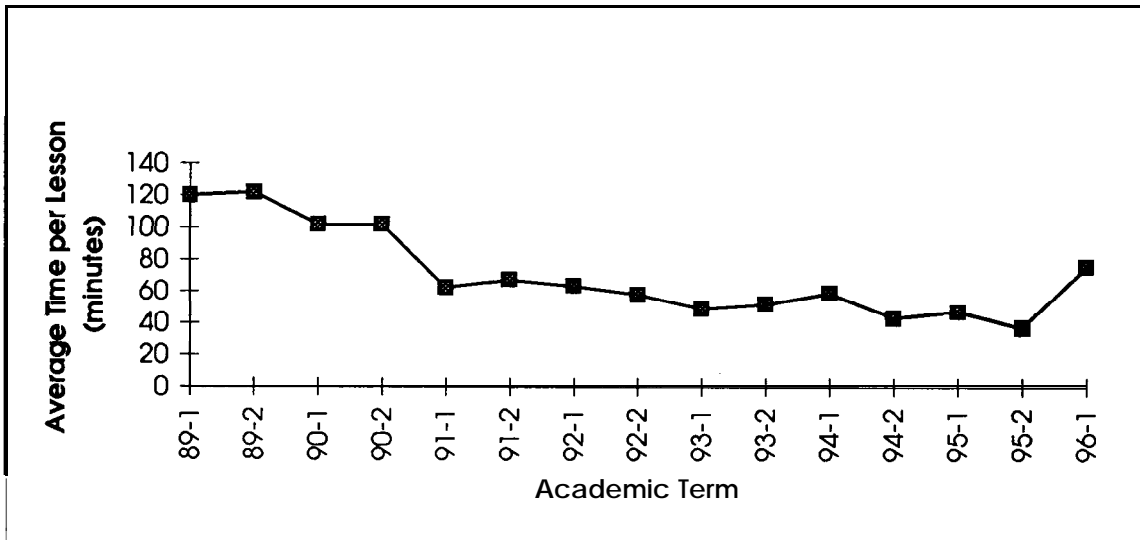


Figure 4. Summary of EM-364A Time Survey Results for 15 Semesters

In the Fall of 1995, as a result of this assessment, the course director instituted a new form of graded homework called the Special Problem (SP), which was assigned to the students every two to four lessons. He also changed the character of the design projects, making them more open-ended and more conceptually challenging. The impact of this change is reflected in the abrupt upward shift of the curve for Term 96-1. Though this result is preliminary (the term is in still progress, as of this writing), it clearly suggests that the course director’s changes have had the desired effect. Student preparation for class is once again at an appropriate level. The interim time survey graph for Term 96-1 is shown in Figure 5.

CONCLUSION

The EM364A case study illustrates the effective use of the time survey as a course development tool. On two separate occasions, six years apart, the survey identified a problem with the academic rigor of the course; corrective measures were implemented, and subsequent survey results provided feedback on the effectiveness of those measures. The management decisions which have made EM364A the rigorous, effective course it is today *could never have been made* without the hard data provided by conscientiously administered time surveys. For this reason, the time survey will continue to serve as a vital component of the US MA civil engineering program assessment system.

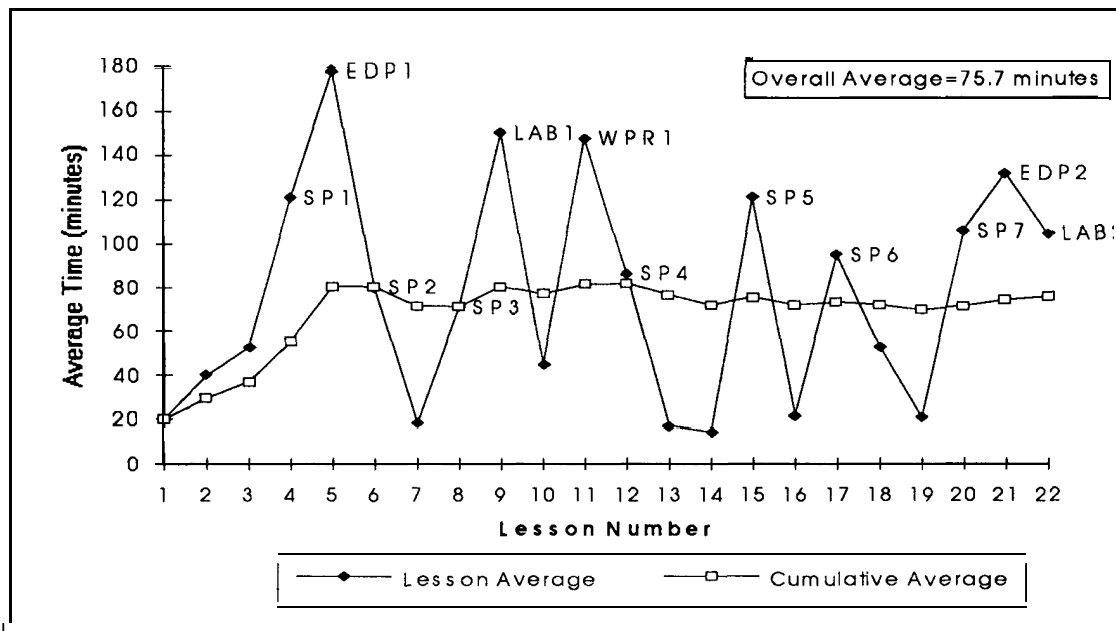


Figure 5. Time Survey Graph for EM-364A, Fall Semester, Academic Year 95-96

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