

FLASH ME NOW: USING BLENDED LEARNING TO TEACH SPSS TO UNDERGRADS

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ABSTRACT

The Statistics Package for the Social Sciences (SPSS) is a key component of many university research methods courses. Teaching SPSS is especially difficult when the students have no assumed background in either mathematics or statistics. A group of 300 undergraduate Communication students were taught using a blended learning approach of traditional methods and interactive online Flash video tutorials created with the Macromedia program, Captivate. The tutorials depicted the process by which students could analyze survey data. Observation and feedback showed that students could progress at their own pace, and review the Flash tutorials from home. The value of the blended learning approach is discussed.

KEYWORDS

Education, statistics, blended learning, Macromedia Captivate

1. INTRODUCTION

The term ‘blended learning’ is used to refer to a range of integrated learning activities and is used in diverse ways by different people. It can refer to the technologies being used, the teaching methods employed, the learning experiences being designed for the students, or the locations from which the learning events take place. In fact, any and all of these can be found in discussions about blended learning. The most common understanding of the term still seems to be that blended learning blends different delivery modes and, in particular, online and face-to-face teaching.

Since the Australian higher education sector is increasingly being squeezed by economic considerations and constant government cost-cutting, universities and other institutions have sought to both maintain their curriculums and expand the reach of their programs without incurring expensive infrastructure costs. In many institutions, student interaction with teaching staff is also being reduced as administrators seek to produce quality education with fewer resources. Additionally, students, who are also under pressure from higher fees and economic imperatives, increasingly demand flexibility in terms of attendance and curriculum support accessible off campus. All aspects of higher education – administration, delivery mode, technical support, research, assessment and curriculum design are being re-evaluated.

Background

The evolution of blended learning educational strategies has largely been driven by the advent of the Internet and related electronic communication technologies. It has been argued that these technologies have enhanced the emphasis on “the business of education” and created a new part-time market for university courses – adult online learners. This in turn has created a different demographic of student with different needs and characteristics, which must be taken into account in the design of new courses. These students seek

immediacy of course application, a sharing of life experiences as a source of knowledge, independence, self-direction, and ownership of their learning. Blended or mixed mode instructional models offer a compromise between traditional and fully online delivery modes, which can help meet the needs of adult learners (Ausburn, 2004, 328).

From a pedagogical perspective however, the mere substitution of traditional face-to-face delivery modes with an electronic version is not sufficient and there needs to be a balance between “pedagogy and technology” (Petit, 2005). Traditional modes of delivery in universities and colleges encouraged relatively passive styles of learning. Students attended lectures and took notes, and were not encouraged to engage with the material (Dabbour, 1997) – the “sage on the stage” as the approach has been called. Such passive learning techniques have been shown to be limited because they do not encourage students to process information actively (Shakarian, 1995). Blending traditional modes with experiential learning where students are required to apply theory to real-life situations in a dynamic manner, engages students in higher-order thinking and encourages long term memory retention, as they personalise the subject matter (Anderson, 1997).

The context of the learning environment has also been shown to be very important to the student learning experience. Various researchers have highlighted the importance of social interactions, or the “human moment”, to educational outcomes. While traditional online courses may deliver the factual material to students, they do not allow them to experience the more intangible aspects of the institutions such as sense of inclusion and community (Burgon & Williams, 2003; Waddoups & Howell, 2002). While access to information is an important part of learning, intellectual development has been shown to be largely achieved through active engagement and interaction with others (Pallof & Pratt, 1999; Laurillard, 2000; Garrison & Anderson, 2003).

Bleed (2001) argues that the increasing use of technology can have the paradoxical effect of impelling students to seek “high contact” situations with their peers, tutors and their institution, while Aspen and Helm (2004) examine whether a blended learning approach alters the dimensions of relationships between students and other aspects of their learning experience and to what extent any enhanced sense of connection is attributable to the specifics of the blend. Other studies (eg Rogers et al, 2003; Burgon & Williams, 2003) compared the experiences of both on and off-campus students studying the same course and noted that both sets of students commented on the social interaction aspects as positively enhancing their learning experience. The availability of communication spaces such as bulletin boards, text chat, video etc, not only augmented the spontaneity with which both sets of students could interact (Rogers et al, 2003, 249), but also allowed students to engage with a difficult topic outside of the class, reducing the feeling of isolation and disengagement that might be fostered even in a traditional classroom environment (Aspen & Helm, 2004, 250).

Finally, the composition of the blended strategies adopted is naturally dependent on the nature of what is being taught and needs to be pedagogically driven. Boyle (2005) presents a case study of a blended learning strategy used in a course on introductory programming where historically students had problems dealing with the abstract nature of certain programming concepts. In this instance the instructors developed multimedia learning objects to enable students to engage visually with these concepts and hence overcome the problem of abstraction.

The use of such experiential learning techniques has been shown to be especially important to the teaching of statistical concepts (Hakeem, 2001; Akram et al, 2002 & Zeis et al, 2001). Hakeem (2001) argues that introductory statistics courses need to place greater emphasis on practical understanding by the use of exercises involving real data in order to motivate students and to develop the required skills of analysis and inference. He cites Morse and Basin (1998) who argue that “learning statistics should not be a spectator sport.” (in Hakeem, 2001, 95).

Zeis et al (2001) discuss the teaching of statistics within business degrees and notes that statistics courses traditionally resulted in high levels of anxiety among students, especially those who were not especially mathematically and/or computer-oriented and advocates a problem-solving pedagogical approach to motivate students to engage with statistics for the future benefit of their management careers.

The following case study outlines one example of a blended learning approach using a series of Flash tutorials created with Macromedia Captivate developed to teach the statistics component of a unit called *Communication Research*. Our blended components comprised face-to-face teaching, ordinary Web-based information and special Java-based tutorials. From the researchers’ previous experience, most Communication students found statistics inherently difficult. The case study will identify some of the

difficulties and problems as noted by the tutors and as recorded by the students in an end-of-semester online survey, and will make suggestions for future enhancements of this learning strategy.

2. CASE STUDY: COMMUNICATION RESEARCH

The first year subject, *Communication Research* is a core unit in the University of Western Sydney's Bachelor of Communication program. The unit introduces the modern process of communication research including critical review of research literature, argument and logic, data collection and analysis, writing the research report and research ethics. It also introduces students to a variety of qualitative and quantitative, primary and secondary research methods including electronic research methods.

Beyond the common first year, the students in the UWS Bachelor of Communication nominate a specific communication major such as journalism, public relations, advertising or media production. The curriculum also introduces the basic principles of statistical analysis as well as the statistical software package, SPSS (v12). Later in the marketing stream of the course, Public Relations and Advertising students are expected to use SPSS for the analysis and interpretation of marketing data.

Communication Research classes are typically held in the university's computer labs with the aid of a specially developed website where lectures, exercises, readings and activities are posted weekly and which can be accessed by students from both inside and outside the university. The website also has a built-in bulletin board for staff-student and student-student communication and is regularly updated with other materials such as Powerpoint slideshows which are created by the teaching staff.

Regular weekly classes run for two hours and incorporate a range of traditional face-to-face discussions and explanations as well as student-centred activities on the Web where the tutor instructs the class, highlights particular concepts, then allows students to proceed individually, while moving around the lab, giving feedback and assistance where required.

Problems Teaching Statistics & SPSS to Communication Students

As already noted, the authors have had previous experience teaching SPSS in an earlier version of this unit titled, *Professional Communication Research*. SPSS is one of the most commonly-used statistical packages, which uses a spreadsheet interface and pull-down menus in order to accomplish most statistical computations in a point and click manner. The program is especially useful in managing large volumes of quantitative data. The problem for students in the past was that while it was relatively simple to obtain vast amounts of output, they had no idea what the various statistics, tables and graphs meant.

The unit assessment requires that the students select a small primary research question, complete the university's mandatory research ethics application, prepare a research proposal, analyse and critique relevant secondary literature, select an appropriate method, conduct the research and present the research findings in a traditional scientific report format. Most students tend to choose to conduct a survey and one aim of the unit is to teach them not only how to write and conduct a useful set of questions, but to analyse the data, present and discuss the results in a meaningful way.

In general as a cohort, our students are not especially mathematically-oriented and tend to find understanding statistical principles difficult. Past experience has also shown that while they grasp the idea of survey writing adequately, their findings tend to be more descriptive than analytical. They seem to lack the confidence to experiment with the program and to take risks in speculating on the results. The notion of using SPSS is not only to give them a tool to make analysis of the data easier, but to teach them how to make critical sense of statistical jargon and published results.

Using Captivate As a Blended Learning Teaching Resource

Macromedia Captivate (formerly RoboDemo) is a relatively new program and was used to create the SPSS tutorials. This program allows an author to assemble screen captures, sound files and video into a single, user-controlled animation. The animation can be saved as a native Captivate file or exported to a Flash file. The author can add captions, graphics, sound, buttons and a range of other e-learning interactive elements without having to have specialized programming knowledge.

Most importantly, Captivate creates Shockwave Flash (.swf) files that are easily published online. It also allows the user to record voice-over tracks and synchronise them to particular screens, import Powerpoint

files, add video, tests and quizzes. This level of interactivity allows students to move through a tutorial at their own pace and to replay particular steps from any location, if necessary.

Introducing the Concepts of Content Analysis and Survey Research

Our strategy was to introduce students to various principles of research over a period of weeks and to develop their confidence and skills by melding explanation with real scenarios around which a series of exercises were built.

We started around week 3 with a basic overview of survey and questionnaire writing and a discussion about how to evaluate survey questions. Students were given a brief explanation of different types of survey questions and strategies supported by Powerpoint slides that were also available on the website. Students were then asked to complete an exercise in which they critiqued a series of question formats in terms of their usefulness in measuring the intended outcome.

The next stage of this session asked students to complete a “tongue-in-cheek” online survey about their kissing habits. This fictitious survey is fun but has a number of flaws. For example one question asks, “what type of dessert best describes the perfect kiss?” while another asks “where is the strangest place you have ever kissed?” with the options including “under water”, “under a table” and “on an amusement park ride”. Several questions relate to sending “virtual” kisses which were never defined. In many questions, there were no alternative options such as “none of the above”.

Having completed the survey, students were then asked to critique it in terms of the types of questions asked and responses offered as well as to comment briefly on the type and relevance of the data likely to be collected. We used this data as the basis for later SPSS exercises. Since previous years’ students also completed the survey, there was a fairly large data set (600+ respondents).

In week 9 we began the section of the course related to statistics and SPSS. This introduction was incorporated with an overview of content analysis method using teacher-led discussion based around a Powerpoint slideshow. Online, students were given a fictitious word count of negative words related to terrorist attacks that had been collected from a range of metropolitan Australian newspapers.

Students were asked to create a data file in SPSS and save it. The aim was to use real numbers as they needed to be able to make fine distinctions between newspapers. The exercise required that they work through the steps by either manually keying the data or by using a cut and paste shortcut using Microsoft Excel. The Flash tutorial took them step-by-step through the creation of the data file, labeling and combining the variables and correcting the problems of missing data (see samples in Figs 1-2).

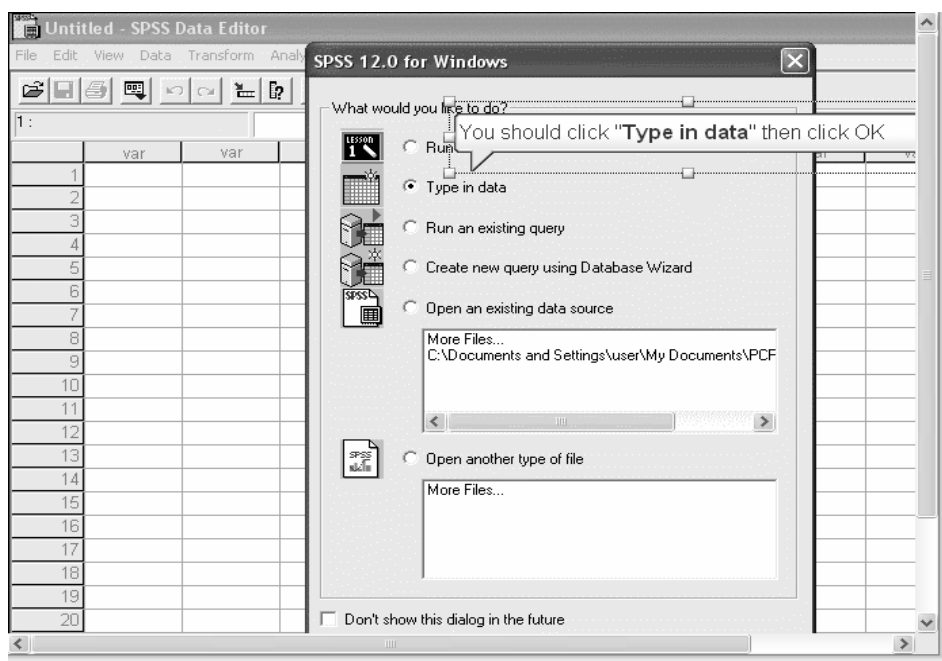


Figure 1. Sample screen shot of the 'Introduction to SPSS' Flash Tutorial'

One of the most useful features of Captivate is the ability to add text and buttons to screen captures of any Windows application. By placing text hints in the exact context of SPSS, and asking users to press the Continue button, we created a very basic interactive screenshow of the application students needed to understand.

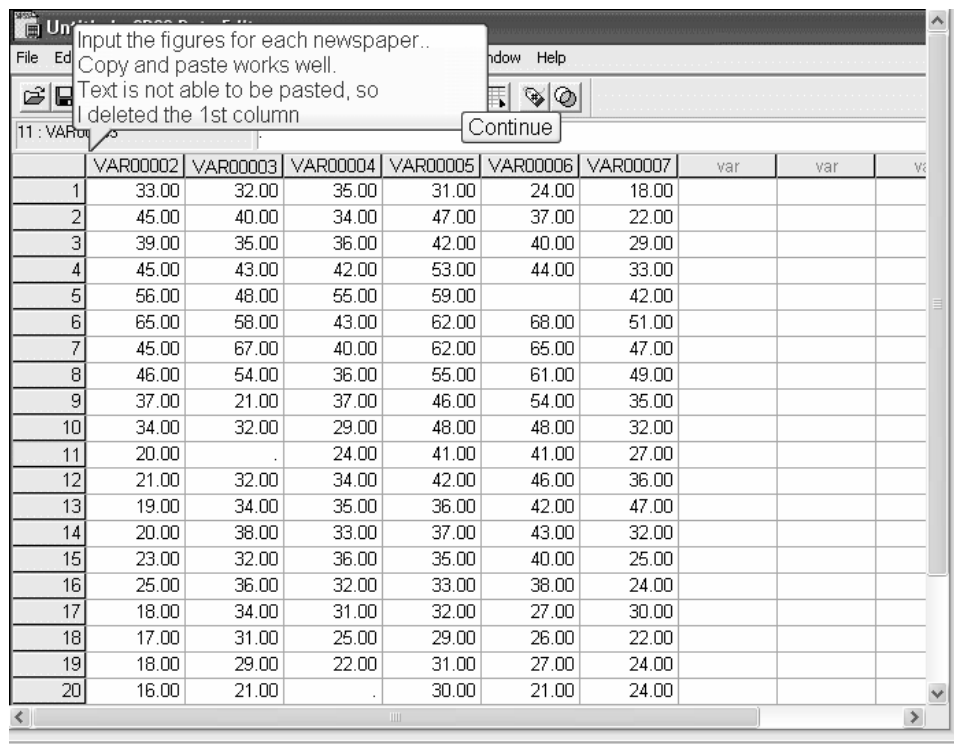


Figure 2. Sample screen shot of the 'Introduction to SPSS' Flash Tutorial"

At each step, a speech bubble highlighted the required actions and students could move back and forward through the tutorial as required. When they were unable to follow the process, they could ask the tutor for additional explanation and guidance.

Tutors reported that the benefits of this process for teaching these initial steps were numerous but the major one was that it allowed a large group of students to work relatively independently (the tutorial could also be accessed from their home computers or on another campus of the university). In previous years, students' fear of making mistakes, or doing the wrong thing, meant that they were inclined to ask questions of the tutor before they began, rather than once they had hit a problem. In a class of 20 students working simultaneously, the tutor was constantly repeating instructions to anxious individual students while others had to wait for the tutor's attention before they would proceed. The Flash tutorials were thus able to do the 'hand-holding' that the students needed, releasing the tutor for students who had other problems. The Flash tutorials also acted as a resource to which students could refer in future weeks when they were being asked to use the program for their own data and research reports. Student feedback confirmed that the Flash tutorials were appreciated as being highly useful, and were rated as one the best aspects of the unit.

Past experience teaching statistics and SPSS has shown that while students could mostly follow the instructions on how to create a data set, label variables, draw frequency charts and graphs and so on, they still lacked confidence in identifying and interpreting these results and discussing them in a meaningful and insightful way. To overcome this, later Flash tutorials (Fig 3, 4) highlighted and commented on significant findings from the exercises and incorporated discussion and questions relating to the test data.



Figure 3. A sample screen shot from the Kissing Survey SPSS data analysis Flash Tutorial – students are prompted to look at certain figures

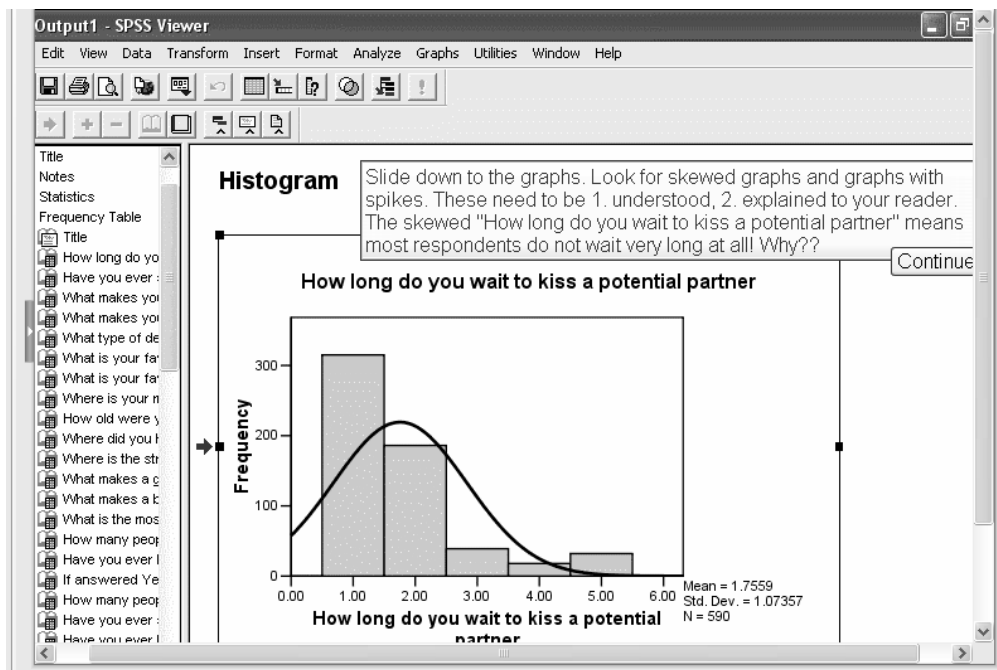


Figure 4. Sample screen shot of the Kissing Survey SPSS data analysis Flash Tutorial – students are given a sample of the type of question they should be asking and what they should be doing with these graphs

The Success of This Approach

We would be inflating the truth to say that all students used SPSS to test hypotheses in their major reports. Only a few confident students attempted to analyze their survey data using statistics that went beyond mere percentages, means and standard deviations. The vast majority of students used SPSS to output familiar graphs of descriptive measures, and then proceeded to elaborate on the highlights of their figures. A handful of students appropriately used correlation, t-tests and ANOVA.

The most successful aspect of this aspect of blended learning was the ability for students to individually progress through the Web-based learning experiences, especially the Flash tutorials, which allowed repetition and home-based revision. In previous years students were always frustrated by the whole SPSS experience. Tutors would begin a class and spend the entire session answering questions and explaining problems. Students and tutors were freed from this frustration and anxiety by working through the specimen Kissing Survey analyses. However, applying the principles from one survey to their own assignments still proved difficult for many.

What was transferred was the concept of the “creative” interpretation of graphs and tables, which enabled vastly improved Results sections for their major report assignments. Many students went beyond reporting the “what” in a skewed graph, to the “why” explanation. The Discussion section of their reports was also much improved given the meaningful content of the Results.

3. CONCLUSION

When we first started teaching online ten years ago, blended, Web-based learning was in its infancy. Not so now, in an era that celebrates technology and sees the combination of the online resources and Web-based educational management systems as almost a panacea for economic constraints and sound pedagogy. The availability of different technologies from simple standalone computers through to more complex and interactive systems potentially allows teachers from all educational levels to experiment with different delivery modes in an effort to motivate students and to maximise learning. However, quite often teachers assume that the both the inherent qualities of the technologies themselves and their novelty value for students, are sufficient to ensure that the learning outcomes are met. This is a false assumption and the design of any unit needs to be mindful of the online context in which the learning will take place, the skills/content being taught and the nature, background (educational and cultural) and expectations of the students themselves. Many students in this particular cohort, for example, are not as computer literate as those in another cohort taught by the authors in the UWS School of Computing and Mathematics and so it was necessary to keep this in mind when designing the various blended learning elements.

For example, alongside the development of Flash tutorials, we developed three alternate websites for accessing the different weeks’ resources of readings, exercises and instructional material. We found a definite student preference for a website which could not be created via ordinary Web-based learning systems such as Web CT or Blackboard. Students surprisingly preferred the busiest, most colourful, most congested website to access the weekly material. The most popular site had multiple links, multiple columns and included extended text on the very first page.

The blended learning approach described in this case study was devised as an attempt to adapt an innovative software program to the needs of a specific group of students being taught a specific skill set in a specific delivery mode. The strength of the SPSS Flash tutorials was the interactive, visual nature of the statistical process which used screen grabs from the actual software being practised. It encouraged student independence and permitted students to practise their skills with an online tutorial by their side. The main progress compared to students from previous semesters, was the recognised student ability to confidently move from graphical and tabular data to explanations and discussion of those findings. However, the higher-level skills of hypothesis formulation and statistical testing with student-derived data, was not enhanced by the blended learning approach. This may be an intractable problem given the non-mathematical nature of the students and the one-semester long limit of the unit.

Note: Flash tutorials may be viewed at <http://stc.uws.edu.au/CR/>. Click on weeks 9 to 12.

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