

# INTERACTIVE VIDEO: ONE MONITOR OR TWO?

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## ABSTRACT

*Interactive video is a rapidly growing technology which holds great promise for teaching foreign language and culture. Multimedia contextualization of the language and simulations of typical cultural situations are powerful tools for language teachers and learners. Interactive video is often delivered with alternate workstation designs: one with a single monitor to present simultaneous video and text, and one with different monitors for video and computer text and graphics. This study investigates the possibility that the workstation configurations might have a differential impact on student performance on a test of Spanish culture. Students in second semester college Spanish classes studied five interactive video Spanish culture simulations during the semester. Some students used a single monitor workstation and others a dual monitor design. They were given pre- and post-tests on Spanish culture and the results were analyzed for significant differences. Additional factors influencing workstation design (e.g., hardware and software costs, user friendliness) are also discussed.*

## INTRODUCTION

One of the perennial dilemmas of foreign language teaching has been how to integrate the language and the culture(s) of the people who speak it. Both are complex, demanding, and essentially open ended, particularly when the teacher hopes to move beyond the relatively restricted confines of prescriptive, elitist views of either language or culture. In the last twenty five years, both teacher training and available materials have placed progressively greater emphasis on the language of everyday living and a more anthropological approach to culture, encouraging teachers and students to explore "hearthstone" or "low" culture.

Most foreign language teachers have come to believe that knowing the language (with some of the multitude of social and regional variants) as well as possible, plus having a good grasp of the patterns of everyday life, are prerequisites to appreciating the fine arts and literature emphasized

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in the more traditional, "high" culture, approach. As a result, the problems have multiplied for language teachers. If students are to know (1) the target language and its dialectal diversity, and (2) the target cultures with their equally imposing richness and variability, how is the teacher to address these goals?

One way to confront these problems is to provide new culture materials which can be integrated into the existing language-based curriculum. Since *contextualization* is crucial for rapid comprehension and effective long-term learning, these materials should provide students with a multimedia, real-world context for the language they are studying. Further, since *control* is valuable for active learning, convenience and flexibility, the materials should allow for a high degree of control by both teachers and students. Recent developments in both video and microcomputer technologies have great potential to improve culture materials along both these dimensions.

Videotapes and videodiscs represent a significant advance in the materials available for language students. They can provide visual and auditory reinforcement for the language presented in a lesson. The immediacy and impact of video far surpasses text alone, or even text plus illustrations.

Computer assisted instruction is another major improvement in the array of techniques available to the language teaching profession. With authoring systems, materials developers can produce interactive lessons that require the students' active involvement in the learning process, give them opportunities to control the computer tasks, provide immediate feedback, individualize the branching paths through the materials based on students' responses, allow unlimited repetition of key text or video sequences, and permit self-pacing.

The combination of computer control

with videodisc images gives language students a previously unequalled opportunity to explore multimedia tutorials and simulations. By linking these two powerful technologies together in interactive video (IAV), we can provide unparalleled *contextualization* and *control* for both instructors and students. Interactive video helps students construct a richly meaningful, multidimensional picture of the target language and culture.

Since interactive video represents such a powerful means of presenting not only language and culture, but virtually any lesson content, many materials developers have begun to experiment with IAV. Major publishers are beginning to market IAV packages, particularly in the sciences. Software developers are promoting IAV authoring packages that promise to solve any instructional problem (without any programming, of course). Hardware manufacturers are producing multimedia extravaganzas.

Given the current enthusiasm for multimedia products, it's appropriate to examine the kinds of workstation needed to deliver IAV. Clearly, at a minimum, we need a way to display color videodisc images, plus a way to display accompanying text from the files in the computer. One common workstation configuration permits both text and video images on the same screen. Another common layout separates the two kinds of images, showing the video on a color monitor or TV set, and presenting the text on either a color or monochrome computer monitor.

In this context, some interesting questions arise. First of all, is one of these workstation configurations better than the other in terms of student learning? Do students learn more if the images are displayed on the same monitor? Does shifting focus from the computer monitor to the TV screen have a negative impact on how much they learn? Secondly, is one of these workstations

better in terms of other criteria? Does it cost less? Is it easier to operate, that is, is it more "user friendly," for either the materials developer or the student? Is maintenance a consideration?

A search of the literature reveals relatively little written about these questions. Iuppa presents five kinds of interactive video systems, ranging from single screen point-of-sale video systems using a touchscreen (with no computer visible to the end user) to high-end single monitor systems that merge video and "video quality" computer graphics. He perceives these factors in favor of the two screen system: (1) "no special circuit boards are needed to mix the computer and video images into a single image" and (2) the single screen system has "to deal with one image at a time, which can make it less effective than the two screen system" (1988). He does not elaborate further on the second point, nor does he provide any references to research into the question. Iuppa later reminds us to keep the end user in mind when designing the workstation, with a particular concern about keeping operations simple, so the user won't "end up worrying more about which button to push than about learning the desired material" (1988). Several recent volumes on interactive video, computer-assisted instruction, multimedia, and language laboratory design (Ambron and Hooper 1988, 1990; Arwady and Gayeski 1989; Kennedy 1991; Dunkel 1991; Bush et al. 1991) cover many facets of IAV development and use, but do not include specific discussions of the relative merits of single versus dual screen stations.

At EMU, we had an opportunity to explore some of the questions related to workstation configuration. For two years, the Department of Foreign Languages and Bilingual Studies had a federal grant (under Title VI of the Higher Education Act) which permitted three members of the Spanish language faculty (Cline, Cere, and McCoy) to develop innovative materials for

teaching culture. These materials use computers and videodiscs to provide students with interesting, visually reinforced lessons about key aspects of everyday life in Spain. We found some of the advantages of computer assisted instruction, such as multiple branches with immediate feedback, pop-up windows for vocabulary items, and random access control of video images, to be particularly useful in designing lessons about a different culture.

The hardware and software options we used over the two year period expanded as different computers and authoring packages became available. We began with a Zenith (IBM-PC clone) with a special color monitor and a video interface card connected to a Pioneer LD-V4200 videodisc player. This combination allowed us to present text, graphics and video images simultaneously on the same screen. The authoring software we started with was Quest, a powerful and flexible program from Allen Communications. After we had worked with this combination for six months, we started experimenting with an additional configuration: a Macintosh SE controlling the same model videodisc player connected to a separate video monitor. For this combination, we used an authoring package called Course of Action (from Authorware).

With this background, we conducted the present study to examine the impact of our interactive lessons and to explore the relative merits of the two common workstation configurations we described earlier. The results were expected to guide our future use of the culture lessons and to assist us in making decisions about hardware and software purchases for our learning laboratory. Specifically, this study addresses two questions:

Did our students learn anything about Spanish culture while using our interactive video materials?

## Interactive Video

Did the students using a single monitor with simultaneous presentation of text and video learn more than the students using a dual monitor configuration?

### METHOD

#### Subjects

Students enrolled in second semester college Spanish classes participated during the fall and winter semesters of 1989-90. The semesters were 15 weeks long. During the fall, participants belonged to a day class that met 5 days per week; during winter, two day classes meeting 5 days per week and one evening class meeting 2 days per week were involved. The total number of students was 41. Of these, 23 used the Zenith single monitor station, 13 in the fall term and 10 in winter. The remaining 18 students all used the Macintosh dual monitor setup during the winter term. All the Zenith users attended during the day; 14 of the 18 Macintosh users were day students as well.

The students' prior experience with Spanish consisted of both high school and college study. Only eight students had no high school Spanish, three had one year, eight had two years, eleven had three years, and ten had four years. When they got to college, 18 went directly into the second semester classes used in this study, 21 took the first semester on the college level before entering the study, and one had already taken two semesters at the college level.

Prior stays in a Spanish speaking country were distributed as follows: 27 students had never been to a country where Spanish was the official language, four had been to Spain, four to Mexico, two to Puerto Rico, one to a South American country, and two had visited two or more Spanish speaking countries.

#### Instructors

Cline and two other members of the Spanish faculty at EMU participated. Each

had one class per semester involved in the study. Cline's students did the lessons on the Zenith in both fall and winter terms (one class each term). The other instructors' students were involved only in the winter and both classes used the Macintosh. All three instructors have at least 10 years experience teaching beginning level Spanish.

#### Materials

The five Spanish culture lessons we used were locally developed with external funding. The lessons were prepared with two authoring systems to run on two hardware platforms. For the MS-DOS machine, lessons were prepared with Quest 2.4 from Allen Communications. For the Macintosh, we worked with Course of Action, version 1.0, from Authorware. With either machine, the videodisc player was a Pioneer LD-V4200. Our videodiscs were locally developed also. They were used to present still images in color at appropriate points in the lessons. The versions of the lessons used in this study did not include any audio component.

The fundamental lesson design is a simulation. The culture capsules present daily life situations that are commonly confronted by American students residing in Spain. The students read descriptions of problematic situations and are asked to choose among several possible responses to the situations. The possible solutions are displayed in multiple choice, yes/no, or true/false format. The most appropriate responses depend on knowledge of Spanish cultural norms. Depending on the responses they choose, the students receive different "reactions," or feedback, with the consequences of their choices. The different "reactions" are really different paths, or branches, through the lesson program. The multiple branching capabilities of the programs provide a more interesting, varied and individually appropriate learning experience for each student.

In lesson one, the student is the protagonist. He or she is cast in the role of a foreign student who arrives in Madrid to study at the university. The principal task of the lesson is to choose housing for the semester; this provides opportunities to read newspaper ads, take the Metro, and visit different neighborhoods and types of accommodations, before finally making a choice that will maximize contact with the Spanish people, language and culture.

The next group of situations are those encountered by a fictitious male college student who is in Madrid to attend the university. In lessons two and three, he makes friends from different social classes and is invited to their homes for the main Sunday meal. He meets their parents and family and has to make several choices for each visit. Students running the program must decide which clothing to wear, what gift to take, how to find the right floor in the building where his friend lives, what style of language is appropriate to use with the parents, which topics to discuss, and how long to stay after the meal is over. Each choice leads to feedback about the suitability and success of the option chosen.

The next group of lessons present a day in the life of a fictitious female college student living with a middle class family in Valencia. Lesson four introduces the three generations that live together and explores the dynamics of daily life in the morning. Within the house, the student must make decisions about who gets to use the bathroom when, and with whom, learns about the limited hot water available, encounters a significant group of affectionate and abusive terms used by family members when addressing one another, and learns what they eat for breakfast. For activities that extend beyond the house, the student learns what the normal schedules for school and work are, and observes the typical distribution of chores and responsibilities to members of the family. Lesson five continues the

activities of the family during the afternoon and evening. The student selects a typical menu for the main meal of the day, discovers who returns to the house to eat and what means of transportation each one uses, practices describing several members of the extended family and the oldest daughter's boyfriend, learns who is responsible for disciplining the young son when he deserves it and what is considered an appropriate punishment, explores several entertainment and recreational possibilities, and sees how the family brings its day to a close.

The language level of the lessons presents no major syntactic problems to second semester students; the verb tenses used are present, present perfect, present progressive, and formal and informal commands. The major linguistic challenge is vocabulary. Many culture specific items are presented, and students often have to make use of the pop-up vocabulary translation windows.

Students did the lessons as out-of-class assignments in the language laboratory. They could work individually or in pairs; we did not control for this. The time spent on each lesson was determined by the students, and their oral reports indicated most spent from 45 minutes to an hour per lesson, although again we did not control for this. Students were not specifically tested on the lesson content, but completing the lessons did count as part of their grade for participation and preparation for class.

### Study design

The two workstation designs were compared using a pretest posttest intact comparison group design. Because students could not be assigned randomly to a condition, a quasi-experimental design was used. The design compared classes using the two systems over the course of a semester. Students were tested at the beginning of the semester and at the end.

The test was a locally developed

questionnaire covering 10 background information items about the student and 40 questions about Spanish culture. (See Appendix.) For the forty culture items, students produced short written answers, 39 in English, one in Spanish.

The culture questions fell into eight subcategories: language (8 items, 6 translations or definitions, 2 on acceptability); invitations (6 items, 4 about gifts, 2 about timing); meals (6, 2 on timing, 4 on customs); male/female roles (5 items regarding expectations); factual information (6 items on sport, history, religion, fashion, technology); economics (3 items); family (5 items, covering chores, extended family, bathroom occupancy, bedtime); and children (3 items on school hours and discipline).

**RESULTS**

We first analyzed possible effects on performance of any background factors, such as prior experience with Spanish or visits to a Spanish speaking country. Since none of the correlations between background factors and either initial pretest performance scores or gains from pre- to post-test were significant, we can rule out such factors as possible confounding influences in subsequent analyses.

Table 1 presents the means on pre- and post-tests for the students in the two conditions, for both global performance and each subcategory. For the Zenith single monitor workstation (N = 23); for the Macintosh dual monitor workstation (N = 18).

*Table 1. Table of Means  
Results for Different Content Areas  
Pre-Post and Total Performance Means Across Conditions*

Content Area	Zenith			Macintosh		
	Time of Testing			Time of Testing		
	Pre	Post	Total	Pre	Post	Total
All Content Areas	1.01	1.71	1.36	1.23	1.89	1.56
Children	0.48	1.20	0.84	0.57	1.59	1.08
Economics	1.25	1.84	1.54	1.33	1.74	1.54
Facts	1.20	2.03	1.62	1.46	2.22	1.84
Family	0.85	1.37	1.11	1.02	1.79	1.41
Invitations	1.21	2.00	1.61	1.42	1.97	1.69
Language	1.07	1.77	1.42	1.38	1.83	1.60
Meals	0.95	1.65	1.30	1.35	1.94	1.64
Sex Roles	0.77	1.40	1.08	0.79	1.79	1.29

Performance was also analyzed using a series of 2 (conditions) X 2 (pre-post) analyses of variance. These were conducted on the total performance scores across all content areas and on each content area separately. Important results are the pre-post main effects and the Conditions X Pre-post interaction effects. These are shown in Table 2. The main effects represent the performance gains for all students, regardless of workstation used. The interaction effects present the differences in performance increase depending on the workstation used.

To return to the first of the questions posed earlier: Did our students learn anything about Spanish culture while using our interactive video materials? The answer is clearly yes; these students did in fact learn something about Spanish culture over the course of the semester. As can be seen in

Table 2, overall Performance gains for all students from the pre- to the post-test were significant ( $F(1,39) = 128.31, p < .0001$ ). This was true not only for global performance, but also for each of the subcategories as well.

The second question was: Did the students using a single monitor with simultaneous presentation of text and video learn more than the students using a dual monitor configuration? Apparently not. As shown in Table 2, differential gains were not significant for global performance ( $F < 1$ ). Nor were the differences between workstations significant for seven out of eight subcategories. (Only in the case of the language items was there a significant interaction effect indicating differential learning rates.) Taking all these results into consideration, we can conclude that work-

*Table 2. Summary Table of Analysis of Variance  
Results for Different Content Areas  
Shown are Pre-Post Main Effects and Interaction Effects*

Content Area	Main Effect		Interaction Effect	
	Indicates Gains Across Conditions		Indicates Differential Gains	
	F	p	F	p
All Content Areas	128.31	0.0001	<1	ns
Children	60.88	0.0001	1.78	ns
Economics	25.00	0.0001	<1	ns
Facts	87.72	0.0001	<1	ns
Family	35.18	0.0001	1.31	ns
Invitations	28.11	0.0001	<1	ns
Language	106.75	0.0001	5.00	0.03
Meals	66.82	0.0001	<1	ns
Sex Roles	46.52	0.0001	2.42	ns

station configuration was not an important factor in determining student learning; students using a single monitor did not learn more than students using dual monitors.

### DISCUSSION

#### Interactive lesson design

As the analyses of this study indicate, students benefited from the lessons on Spanish culture. Their performance on the lessons showed clear gains on content that was not covered in any of the other materials used during the semester. Our informal assessment of student satisfaction indicated that most felt the lessons were worthwhile and interesting. Several students complained about problems with the MS-DOS/Quest interface. Some of them were unable to successfully log back on to the system after they had interrupted a lesson, and others found that logging back on caused all text printed in yellow to disappear. A few students recommended that we add sound, since they believed audio reinforcement of at least some of the vocabulary items would be beneficial.

From the point of view of the authors, there was a clear difference in how difficult it was to create lessons for the two workstations. Some of the perceived differences were due to the well known contrasts between the Macintosh graphical user interface and the MS-DOS command line interface. Other differences had to do with the quality of the documentation for the authoring systems, which was notably better for the Macintosh package, *Course of Action*.

Both the design process and student use of the lessons were subjectively easier with the *Course of Action*/Macintosh based lessons. Authors and students seemed to learn the icon based interface more quickly and with less frustration, since it was more intuitively obvious and definitely more forgiving of user errors.

#### Workstation Design Criteria

Overall, the study shows that for students in beginning level college Spanish, working with Spanish culture materials, at a large public institution, there is no difference between the workstations. Students seem to learn as much with two monitors as when the video images are displayed on the same monitor as the text. Shifting focus from the computer monitor to the TV screen does not seem to have a negative impact on how much they learn.

These generalizations are true for global performance and for seven of eight subcategories. However, with respect to the language subcategory, the significant difference we found at the borderline level suggests workstation design should be studied further with respect to presenting language items. As shown in Table 1, mean scores for the students using the Zenith started lower on the pretest and finished at almost the same level on the post-test as the Macintosh users (1.07 and 1.77 for Zenith; 1.38 and 1.83 for Macintosh). We can speculate that the differences in text legibility (CGA versus Macintosh) may have required greater attention to purely lexical items on the part of student users. Possibly the use of color had an impact on vocabulary learning, or the vocabulary items may have been reinforced by spontaneous or incidental use not included in the pre-planned, standard classroom activities. At this point, we simply do not know. We need to carry out more investigations into this difference.

Turning to secondary criteria, there were some definite advantages in favor of the dual monitor design. It cost slightly less for the hardware (approximately \$4200 as compared to approximately \$4450 for the single monitor setup). In addition, the process of installing the hardware and software, making the connections, and debugging it all was dramatically simpler for the Macintosh dual monitor design. The single



monitor setup cost more than three days of skilled technician time to get it up and running. The software used for authoring was also cheaper for the Macintosh (c. \$700 for Course of Action with video, including student runtime disks, versus \$1,300 for Quest 2.4).

To date, maintenance has not been a problem for either workstation, although the Zenith color monitor used in the single monitor design has begun to distort the colors of the video images somewhat. Based on the relative complexity of the initial installation of the two systems, we anticipate that long term maintenance for the dual monitor system should be simpler and less costly.

The cost advantage of the dual monitor configuration is fairly clear. For hardware, \$250; for software, \$600; for installation time, approximately \$500; the total initial difference amounted to some \$350. Even if we assume installing a second single monitor workstation would go more rapidly, the difference would still be at least \$1000. The advantage in terms of authoring and debugging time is much more difficult to quantify, but seemed at least 20% less for the Macintosh using Course of Action. Also difficult to quantify in dollars, but important as an indicator of students' satisfaction with the stations, was the fact that we received several student complaints about problems with the MS-DOS/Quest interface, and none about the Macintosh.

Given all of the above, we recommend the two monitor workstation design as the most appropriate for situations similar to ours, where the emphasis falls on the culture content of the lessons and on controlling costs. The important differences lie not in student learning, but rather in the practicalities of installing, writing for, and using the two systems.

## ACKNOWLEDGMENTS

I would like to express my sincere appreciation to Dr. Stuart Karabenick, Director of the Center for Research Support, Eastern Michigan University, for his helpful comments on various aspects of this paper and particularly for his assistance with the statistical analysis. I would also like to thank the EMU Faculty Research Grant Program for making it possible for me to carry out this study. An earlier version of this paper was presented at IALL '91; I am grateful to LeeAnn Stone and David Herren for their encouragement to publish it.

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APPENDIX

SPN 122 CULTURE UNITS PRETEST SEP 89

Name:

Student #:

Instructor:

Section:

Previous study of Spanish:

Years in high school:

Semesters in college:

Time spent in a Spanish speaking country:

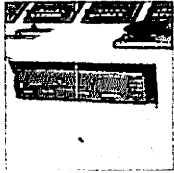
Which country?

When?

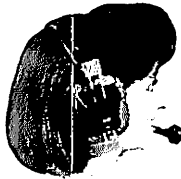
1. Please define the following terms related to housing:
  - a. una pensión
  - b. un colegio mayor
  - c. un piso
2. Is it customary to take a gift when you are invited to eat at a Spaniard's house?  
If so, what sort of gift is appropriate for an upper class family? If so, to whom would you give the gift and when?
3. In general, when do Spaniards eat on Sunday afternoons?
4. In Spain, are you expected to arrive at an appointment at the time agreed upon?
5. What title or form of address should be used when talking to an upper class woman?
6. Should you shake a woman's hand when you meet her on the street?
7. In what order are the following courses served in a typical Spanish meal? Salad, soup, fish, meat, fruit.
8. What does the term "sobremesa" mean?
9. What is the most popular sport in Spain?
10. To what important economic organization does Spain belong?
11. What is the most common religion among Spaniards?
12. Is it possible to openly discuss abortion and divorce in modern Spain?
13. Are the Spaniards more conservative than Americans in their dress styles?
14. Are the floors of a building numbered the same way in Spain? If not, what's the difference?
15. When is it acceptable to use the form "tú"?
16. When you eat with a lower class family in Spain, who serves the food?
17. Can children drink wine with their meals in Spain?
18. How long should you stay after finishing the meal when you've been invited to eat with a Spanish family?
19. Who was Francisco Franco?

20. In Spain, how is the water heated for the bathroom?
21. Is it common for several members of the family to occupy the bathroom at the same time?
22. Who gets to use the bathroom first in the morning?
23. Do Spanish men typically do more or fewer chores around the house than American men?
24. What do Spaniards typically eat for breakfast?
25. What is the normal school schedule for Spanish children?
26. At what hour do Spaniards serve the main meal of the day?
27. Is it common for other relatives to live in the same house with the immediate family?
28. Who punishes the children when they don't behave properly?
29. What's a typical punishment for a child who hasn't behaved?
30. What does a typical Spanish husband do when he gets off work?
31. What does a typical Spanish wife do when she gets off work?
32. At what hour do adult Spaniards typically go to bed at night?
33. How do poor workers get to their jobs in large Spanish cities?
34. Do Spanish workers make as much as U.S. workers with similar jobs?

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