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ABSTRACT

The thoughts of a group of preservice teachers about classroom technology were studied by asking them to visualize their ideal classrooms. They were then asked to visualize, or visually represent, their thinking on paper by completing a map of the ideal classroom. Subjects were 106 education majors, 8 of whom were male. Classroom maps were analyzed to determine the presence and types of visual representations depicting electronic learning resources in the ideal classroom. Eighty (75.5%) subjects included electronic learning resources in their classroom maps. The most often cited was the computer. Seventy-seven (72.6%) of all participants included in the computer as a learning resource. This number represented 96.2% of only those subjects who included electronic resources. The second most often cited resource was video technology, included by 25 education majors. Audio media were included by 18 subjects, and others cited various resources such as projection screens or multimedia technologies. The majority who included electronic learning resources in their maps positioned them around the periphery of the classroom, although 24 indicated that the resources would be distributed throughout. Implications of these subjects' maps for instruction are discussed. Six figures present the study data. Contains 4 references.) (SLD)

Visualizing Technology: An Analysis of Preservice Teacher's Classroom Maps

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Observing the arrangement of a teacher's classroom can suggest much about the educational perspectives and values of that professional. Kohl suggests that "the placement of objects in space is not arbitrary and rooms represent in physical form the spirit and soul of places and institutions. A teacher's room tells us something about who he [sic] is and what he [sic] is doing" (1969, p. 35). As Kohl points out, a classroom reflects a teacher's personal as well as professional philosophies and interests. A classroom also reflects, on direct and symbolic levels, a teacher's views of teaching and learning (Cohn, Kottkamp & Provenzo, 1987; Provenzo & Wolfe, 1974). Traditionally, the teacher has been seen as a dispenser of knowledge and the students as ready vessels to be filled. On a direct level, this perspective may be reflected by a teacher arranging the classroom with straight rows of desks facing toward the preeminent teacher's desk located at the front of the room. If this straight-row arrangement precludes students from seeing and conversing appropriately with each other, analysis of the classroom arrangement on the symbolic level would suggest that the teacher does not value class discussion or interaction.

Recently, the teacher's role has shifted to that of a supporter, facilitator, and coach as well as a creator and organizer of learning environments. If a teacher believes that learning involves the active engagement of students in constructing their own knowledge and understanding through interaction with and support from "the world of people and objects and through the use of technology of many kinds" (Sheingold, 1991, p.18), a teacher may be especially interested in arranging a physical learning environment conducive to these goals and in providing a variety of learning resources for students.

Technological innovations such as videotape, laser discs, and audio recordings provide teachers with electronic resources to develop classroom learning environments. In the context of this paper, the term *technology*, and its related derivatives, is used interchangeably with the term *electronic learning resources*. Both terms, narrowly defined herein, refer to equipment such as television sets, cassette tape players, and film projectors as well as

the materials and programs presented using the equipment. The mere physical presence and the organization of these electronic resources in the classroom can provide insight into preservice teachers' thinking about technology and the role electronic resources play in the teaching and learning process.

Objectives of the Study

This study investigated a group of preservice teachers' thoughts regarding classroom technologies by asking them to *visualize* their ideal classrooms. The term *visualize* was first used to represent a request that the preservice teachers imagine, think about, and form mental images of what their ideal classroom would be like, based upon their personal philosophies of teaching and learning. Preservice teachers were then asked to *visualize*, or visually represent, their thinking on paper by completing a map of their ideal classroom.

The objectives of this study were to: 1) determine preservice teachers' perceptions of the electronic learning resources that they would include in their ideal classrooms, and 2) examine the distribution and placement of these electronic learning resources. In addition, the teachers' classroom maps themselves were examined to determine the general quality of the visual responses to the task and to look for patterns indicating potential uses of electronic learning resources and implications for classroom interaction.

Subjects

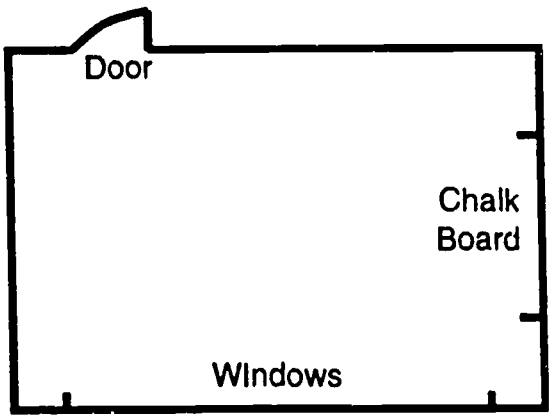
The participants in this study were education majors enrolled in undergraduate elementary education programs at two major state universities in the southeastern United States during the 1990-91 and 1991-92 academic years. A sample of 106 preservice teacher education majors, including 69 white females, 29 black females, 5 white males, and 3 black males participated in this study. Participants ranged from 19 to 25 years of age. These preservice teachers possessed a variety of knowledge and experience with the use of electronic learning resources.

Methods

The preservice teachers in this study were presented with a floor plan of a rectangular classroom showing only a door and a chalkboard appearing on the outline (see Figure 1). Participants were asked to think about and then to draw or visually represent a floorplan of their ideal classroom. Participants were instructed to include as much or as little detail as they felt necessary. There was no prompting by the instructor or discussion of ideas during this data collection period.

The ensuing classroom maps were analyzed to determine the presence and types of visual representations depicting electronic learning resources in the ideal classrooms. Data were triangulated and

Figure 1: Classroom map.



coded by category of the technology represented. This coding process included frequency counts for the learning resources represented in the classroom maps. No attempt was made to count individual units or numbers of the specific learning resource represented. For example, if six computers were drawn on the map, one tally mark was recorded in the computer category, not the actual number of individual computers that appeared on the map.

The analysis included an examination of the types of electronic learning resources represented, as well as identification of the location of the majority of the learning resources within the classroom. Since preservice teachers may have cited multiple learning resources on their classroom maps, percentages cited in this study total more than 100%. Non-electronic learning resources were excluded from this study.

Results

Of the 106 preservice teachers in this study, 75.5% (n=80) included electronic learning resources in their ideal classroom maps. Twenty six (24.5%) of the participants included no electronic learning resources of any kind (see Figure 2).

The most often cited electronic learning resource was the computer (see Figures 3 and 4). Seventy seven (72.6%) of the all participants (n=106) included the computer as an electronic learning resource; this number represents 96.2% of only those participants (n=80) who included electronic learning resources of some type. Participants' responses in this category included personal classroom computers, printers, computers designated for teacher's use, and computer supplies.

The second most often cited electronic learning resource in the classroom was video technology. Twenty five (23.6%) of the all preservice teachers (n=106) included video equipment in their classroom maps; this number represents 31.2% of only those participants (n=80) who included electronic learning resources of some type. The video category included responses that represented video images, either live or taped, and monitors to display video signals.

Figure 2: Preservice teachers' inclusion of electronic resources (N = 106).

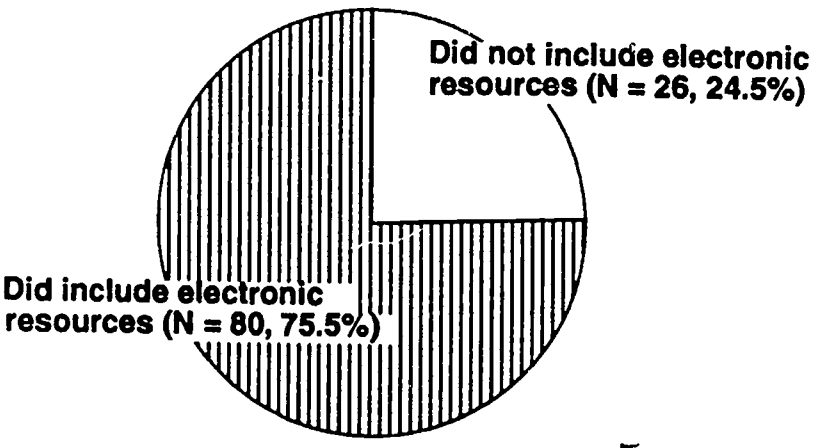


Figure 3: Type and frequency of electronic resources identified by preservice teachers (N = 106).

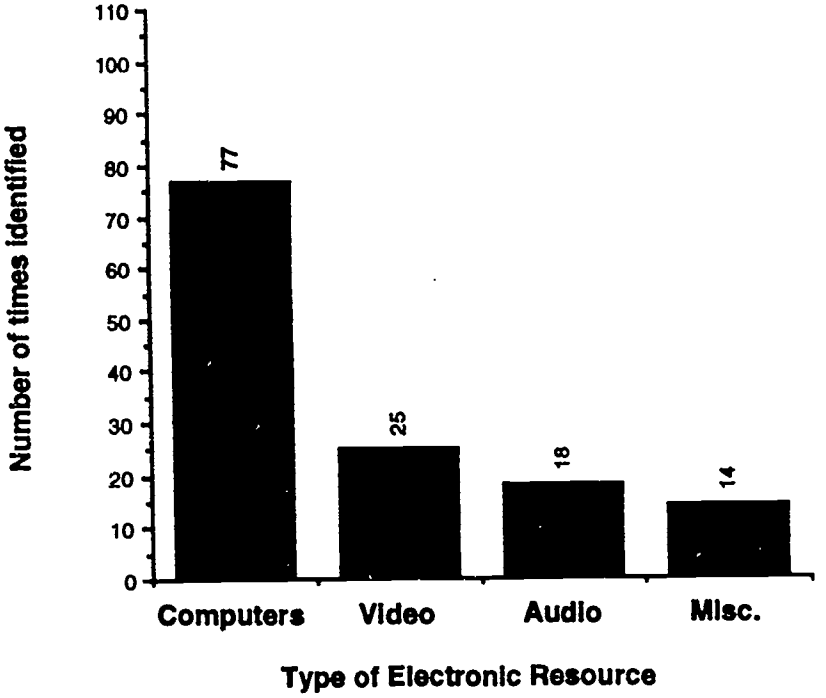
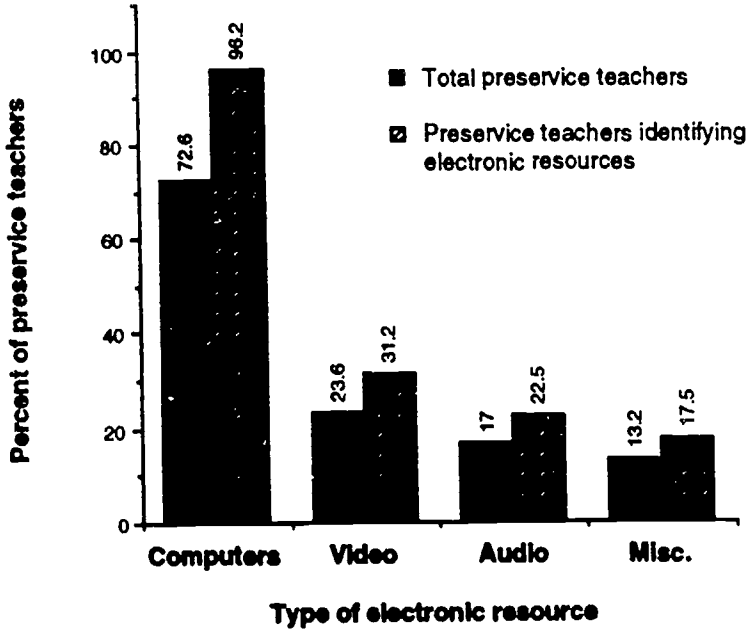


Figure 4: Type and percent of electronic resources identified by total preservice teachers (N = 106) and by only those preservice teachers who identified any electronic resources (N = 80).



This category also included references to broadcast, cable, or closed-circuit television and also videotape technology.

The third most frequently cited type of electronic learning resource was audio media. Eighteen (17.0%) of all the preservice teachers (n=106) included some type of audio equipment; this number represents 22.5% of only those participants (n=80) who included electronic learning resources of some type. Types of audio media included tape recorders and audio tapes, record players and records, and headsets. This category included only audio resources described as hardware or software and excluded areas generically termed "listening centers" in which the preservice teacher did not specify the presence of specific technology. The rationale behind this decision was that "listening center" is a general term which can refer to areas for conversation or dialogue as well as areas in which electronic equipment is available. Therefore, preservice teacher responses were noted in this category only when a particular type of equipment to be used in these centers was specified.

In addition to these three primary technologies cited by the preservice teachers, various other electronic learning resources were mentioned as well. Fourteen (13.2%) of all the preservice teachers (n=106) identified miscellaneous electronic learning resources; this number represents 17.5% of only those participants (n=80) who included electronic learning resources of some type. Responses tabulated in the miscellaneous category included projection screens, overhead projectors, and a diverse array of other technologies such as telephones, film, "multimedia," and interactive video. This category also included those technologies which researchers were not able to categorize by the description given; for example, "tapes" could be considered either audio or video tapes and were therefore counted in the miscellaneous category.

Distribution Of Learning Resources

As mentioned above, 75.5% (n=80) of the 106 preservice teachers responding to this study included electronic learning resources in their classroom maps. Only 24.5% (n=26) of those responding included no learning resources of any kind. Of the 80 preservice teachers who included electronic learning resources, 69.8% (n=56) indicated that those resources would be positioned around the perimeter of the classroom. Twenty four (30.2%) of the 80 respondents indicated that the learning resources would be distributed throughout the classroom. None of the respondents indicated that learning resources would be distributed in the interior of the classroom only (see Figures 5 and 6).

Discussion And Suggestions For Further Research

If as Kohl (1969) stated, the physical organization of a teacher's room tells us something about what the teacher is thinking and doing regarding classroom instruction and learning, then the classroom maps produced by these preservice teachers do indeed provide us with a glimpse into their thinking about electronic learning resources and their role in the classroom. Three-quarters of all preservice teachers (n=106) participating in this study included electronic learning resources in their classroom maps. These resources consisted primarily of computers, video, and audio media and which would be located

Figure 5: Preservice teachers' distribution of electronic resources (N = 106).

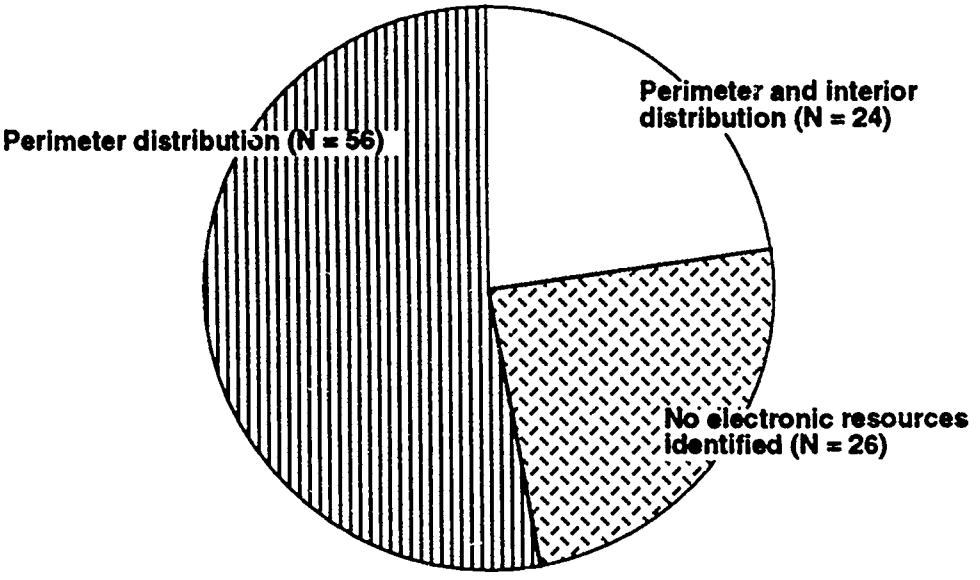
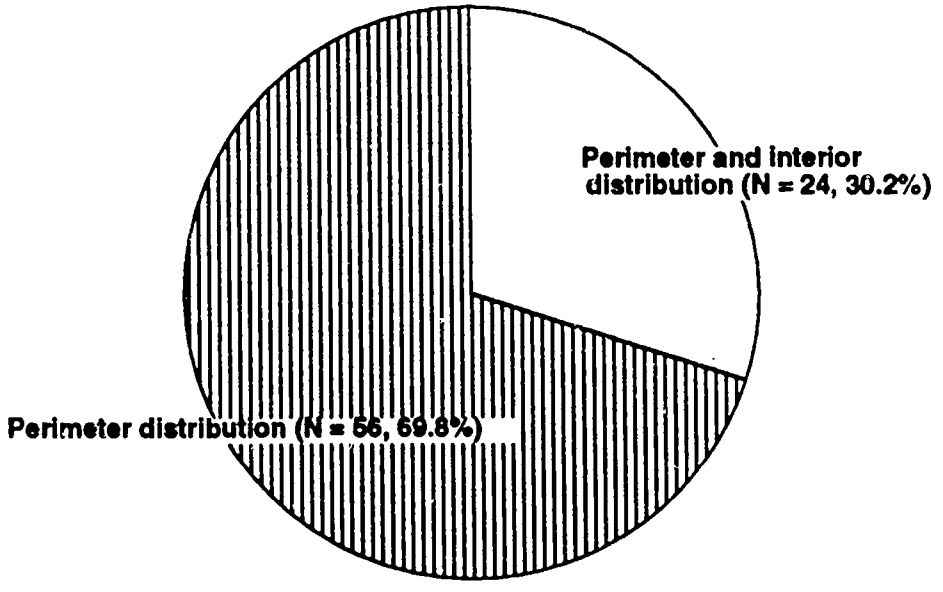


Figure 6: Distribution of electronic resources by preservice teachers who identified any type of electronic resource (N = 80).



primarily around the perimeter of the classroom.

At first glance, the data are encouraging and appear to indicate an awareness on the part of preservice teachers that computers, video, and audio media are important aspects of what "happens" during some teaching and learning processes and that these technologies are desirable elements in the classroom. The computer was the most frequently cited electronic learning resource, identified by almost 73% of all participants and over 96% of only those participants who cited some for of electronic learning resource. Although it may be tempting to be pleased with data which suggest that computers are apparently a highly recognized form of classroom technology, these figures must be balanced with the knowledge that nearly one-quarter of the preservice teachers included no electronic resources whosoever on their classroom maps. Similar caveats hold for the other types of classroom technologies identified in the study.

In addition, results of the study in no way can be taken to indicate that the same number of preservice teachers who *identify* classroom technologies on their maps would actually *use* these electronic resources during instruction. Nor can it be assumed that their students necessarily would do so. Tremendous gaps may exist between awareness of the availability of electronic resources and thier actual integration into classroom use.

Another disconcerting fact arising from the study is that the richness of electronic resources varied greatly. The classroom maps themselves indicate a great disparity among those preservice teachers who indicated any type of electronic learning resource, and responses of the 80 students who included electronic learning resources varied greatly in terms of the numbers and types of technologies identified. Researchers noted a trend that appeared to indicate that students who had been exposed to classroom uses of technologies in their coursework visualized numerically more as well as more varied types of electronic learning resources than students who did not receive this exposure. However, lack of control over prior experience of the participants prevent this finding from being offered as more than an observation. Further study of participants' visual representations of electronic resources in their ideal classrooms would be valuable if the influence of participants' prior knowledge of and experience with electronic learning resources could be included as a factor. It would also be interesting to ascertain if the type of electronic resource identified, for example, computers of video media, was related to prior knowledge of and experience with that particular technology as well. Preservice teachers may have a proclivity to identify electronic resources with which they feel most comfortable or knowledgeable, or they may merely be including the technologies which they have heard about and feel somehow obligated to identify. This is an area for further study.

The finding that the majority of preservice teachers who identified electronic learning resources placed them around the perimeter of the classroom is hardly surprising knowing that typical classrooms have power sources around the classroom walls and only in rare cases in the interior of the room. It is interesting to muse that traditional architectural constraints rather than educational philosophy may influence how preservice

teachers organize and arrange electronic resources. This architectural obstacle may add a new dimension to Kohl's (1969) contention that classrooms operate on direct and symbolic levels. If teachers do value electronic resources and wish to make them an integral part of the teaching and learning environment by arranging them in the "center of the action in the center of the room," they may be confronted with physical barriers to the actualization of their educational philosophy. This speculation goes beyond the data collected, but the preservice teachers' classroom maps may reflect a predisposition to arrange technology according to their awareness of existing physical limitations rather than in accordance with their instructional aspirations.

Although the data do no more than support an observational comment, a great disparity in the quality of the visual representations also was noted. Some preservice teachers' visual representations were rich, colorful, and carefully detailed. Other classroom maps were impoverished, both in terms of content and creativity. Faculty working with the preservice teachers noted that students whose other work in class indicated that they would design rich, interactive learning environments produced thoughtful, creative, detailed visual representations that indeed would support a facilitative, interactive learning environment replete with electronic learning resources. Students who performed less well in other class assignments tended to submit less thoughtful, less detailed classroom maps and included fewer types of technology. Additional research could be conducted to support these observations.

Finally, assigning the production of a visual representation of an ideal classroom was in itself a successful aspect of the class in which the activity was included. Students found that visualizing their thoughts and philosophies by reflecting them in a classroom map was a valuable exercise. One preservice teacher who had been required to draw a classroom map at the beginning of her program also voluntarily completed a map at the end of her two-year program of study. The first map depicted straight rows of chairs facing toward the teacher's desk; the second map showed student desks grouped together and the teacher's desk in the corner. During conversations, the preservice teacher emphasized how her educational philosophy had changed over the terms and that the most current classroom map demonstrated her interest in cooperative learning groups and the role of teacher as facilitator and mentor. The student chose to include these two classroom maps in her professional portfolio to show her growth and development as a teacher. Additional research and student interviews should be conducted to investigate whether visual representations indeed depict preservice teachers' verbalized educational philosophies and also their priorities related to electronic learning resources.

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