

**A Model of Freshman Use of Microcomputers Related to Intellectual
and Social Development**

by
Daniel Richards Judd

ISBN: 1-58112-157-1

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ABSTRACT

A Model of Freshman Use of Microcomputers Related to
Intellectual and Social Development

by

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Utah State University, 1999

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Department: Business Information Systems and Education

The purpose of this study was to determine the relationship between freshmen's use of microcomputers and their social and intellectual development in a university environment. A review of related literature describes the theoretical foundation of this research and identifies questionnaire items for measuring the critical variables of microcomputer use and student development. To conduct the study, data obtained from 400 freshman students prior to entering Utah State University (USU) in the fall of 1996 were compared to data collected from the same students during Spring Quarter of 1997. Correlational analysis was used to study changes in freshman students' use of microcomputers and variables known to predict students' social and academic integration into the institution. Regression analyses were used to identify variables and dimensions of microcomputer use that contributed to and detracted from students' intellectual and social development.

(267 pages)

ACKNOWLEDGMENTS

I am deeply indebted to the USU community and colleagues who have helped me conceptualize, carry out, and bring to fruition this project. Thomas Hilton was an excellent guide throughout graduate school. He gently advised me on research and patiently monitored my progress through the entire program. I will be forever in his debt. Many thanks to Lavell Saunders for his sponsorship of the research and insights into student development. Thanks to James C. Scott, Charles Lutz, and Lloyd Bartholome who are great examples of business and information systems educators. Ron Thorkildsen and Charles Salzberg provided guidance from the outset and were always ready with their expertise. Thanks to the staff at the Early Intervention Research Institute who were exemplary of honest researchers and who taught me by example the details of this work. Special thanks to Richard Roberts, Mark Innocenti, Jim Akers, Linda Goetze, Matt Taylor, and Perry Sailor for unraveling the many riddles I encountered and supporting me through the difficulties. Thanks to Mary Ellen Heiner, who managed to put my dissertation together despite the complex rearrangements. A very special thank you to my esteemed colleague Babu Kaslingham for his friendship and dedication. My fellow graduate students also deserve thanks.

For their inspiration, friendship, questions, and enthusiasm for microcomputers, I am grateful to USU freshmen. I am honored to be graduating with those I first taught and who inspired this work. You have profoundly influenced my understanding of higher education and student development.

To my family and friends goes my deepest gratitude, especially to my wife, Bonnie, whose patience, support, interest, encouragement, and questions were invaluable. I deeply love our children, Corinne, Skye, Lauren, and Daniel, who are a

constant source of love and who have enlightened me in their area of expertise—fun.

Thanks to my mother, Louise Judd, my brothers, Rob and Steve Judd, and to my sister, Carlie Hardy, whose support and unselfishness made this possible.

This doctoral dissertation is dedicated to the memory of my father, Robert L. Judd, Jr., for his love, excellent business knowledge, and ideal of family happiness.

Daniel R. Judd

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CHAPTER I

PROBLEM STATEMENT

Introduction

As educational computer use evolves, researchers will need to alter their approach to address the demands of microcomputer-related research in education. Studies conducted over the past 15 years have largely focused on defining and describing variables that affect adoption of computer technology or computer literacy (Boettner, 1991; Demetrulias, 1985; Dologite, Ryan, & Ferns, 1990-91; Duncan, 1990; Gabriel, 1985a, 1985b; Geissler & Horridge, 1993; Kagan & Pietron, 1987; Khan & Jessup, 1991; Loyd & Gressard, 1984; Marcoulides & Xiang-Bo, 1990; Martinez & Mead, 1988; Von Holzen, 1993). However, researchers must now focus on the relationship between microcomputer technology and educational goals and values (Ehrmann, 1991; Kay, 1989, 1992a, 1992b, 1993a, 1993-94). Kay (1992a) observed that "ultimately educators will have to focus not on how to use computers, but on how to apply computers to educational goals" (p. 446). The first change needed is research into how the use of microcomputers relates to known predictors of student development within the college environment (see Ehrmann, 1995). Ehrmann advised that "what matters most are educational strategies for using technology, strategies that can influence the students' total course of study" (p. 24). Second, researchers need to focus on microcomputer use as a measurable behavior, rather than focusing on the changing concept of computer literacy. Computer literacy measurements have too often in the past relied on a definition of computer literacy arrived at through an internal consensus of educators (see Dologite et al., 1990-91; Duncan, 1990; Von Holzen, 1993) or external experts (see Gabriel, 1985a; Martinez & Mead, 1988;

Simonson, Maurer, Montag-Torardi, & Whitaker, 1987). This has led to what Thompson, Higgins, and Howell (1991) referred to as the "the framework of the month" for examining the impact of technology.

A shift to behavioral measures facilitates the third necessary change--application of a theoretically based methodology for research into microcomputer use. As the field has progressed, a number of researchers (e.g., Davis, 1989; Kay, 1993b; Robey, 1979; Thompson et al., 1991) have supported the observations of Keen (1980) that to be productive, investigation into microcomputer use needs to be based on a "cumulative tradition" that builds upon the research and theory of psychology and other disciplines. Theoretical models that have been used in computer-related research (e.g., Bandura, Azjen and Fishbein, Tinto, and Triandis) were examined in the review of the literature.

The fourth change that is needed is in the scope of research. Researchers who have assessed microcomputer use in higher education have consistently looked at microcomputer use within a single university course (Boettner, 1991; Dologite et al., 1990-91; Duncan, 1990; Hilton, LaBonty, Bartholome, & Stocker, 1993; Kagan & Pietron, 1987; Khan & Jessup, 1991; Lee, Pliskin, & Kahn, 1994; Szajana, 1994). A review of the literature (see Appendix A) yielded only a handful of studies that sampled a larger student population (i.e., Anderson & McClard, 1993; Gabriel, 1985b; Geissler & Horridge, 1993; Martinez & Mead, 1988), yet issues requiring assessment of microcomputer use are no longer confined to a single course or even to a single department, but are institutional in scope (Resmer, Mingle, & Oblinger, 1995).

An extensive review of the literature, however, found no theoretically based studies linking uses of microcomputers with specific factors representing students' overall development. It is incumbent, therefore, that a theory-based study utilizing a

more comprehensive student population be conducted to investigate the relationship between various dimensions of students' use of microcomputers and their social and intellectual development while attending a university.

Statement of the Problem

Utah State University's mission statement begins with this commitment:

"Students are the focus as they seek intellectual, personal, and cultural development" (USU, 1996). The effectiveness of microcomputer technology as a resource can be assessed against this statement. Use of microcomputer technology in higher education warrants assessment because of its explosive growth over the past decade (Green, 1996; Green & Gilbert, 1995; Snyder & Hoffman, 1995). While students' use of microcomputers at USU has been studied in the past (see Hilton et al., 1993, Lutz & Hilton, 1990-91; Sanderson, 1992), research describing the effect of microcomputer use on student development delineated in the mission statement was not available. Because of the cost of obtaining and supporting microcomputer technology at USU and other institutions¹ (Blumenstyk, 1994; Green, 1995) research is needed on how students' use of microcomputers relates to the educational goal of student development (Ehrmann, 1995). Currently, the possible benefits of microcomputer use may not be fully realized. Research linking microcomputer use to factors that are known and proven predictors of students' social and intellectual development would provide a knowledge base for maximizing time and money in this era of tight educational budgets.

¹ The Gartner Group, a respected consultancy, calculated that a "PC costs more than \$13,000 a year when maintenance, training, and time lost by users is included." This splits as 21% hard equipment, 27% in technical support, 9% administration, and 43% in lost cost opportunity (Weighing the Case for the Network Computer, 1997).

Purpose

The purpose of the research is to explore how recognized dimensions of students' microcomputer use (i.e., computer self-efficacy [Compeau & Higgins, 1995], microcomputer skills [Furst-Bowe et al., 1995-96], and frequency of microcomputer use [Davis, 1989; Thompson et al., 1991]) relate to factors predictive of student development (i.e., social and academic integration [Pascarella & Terenzini, 1980], satisfaction, and involvement [Astin, 1993]). The model for this study is built upon the hypothesis that microcomputer use has a positive relationship with freshman social and intellectual development during their first year attending USU.

Research Objectives and Questions

Objectives for accomplishing the purpose of this study are: (a) to determine the extent of freshman students' use of microcomputers prior to their becoming full-time students participating on the USU campus; (b) to obtain measures of freshman students' social and intellectual development while attending USU; (c) to examine changes occurring in freshman use of microcomputers while attending USU; and (d) to determine how freshman use of microcomputers relates to their development.

The research questions to be answered by this study are as follows.

1. Breadth of Use--What types of microcomputer skills do freshmen at USU report being able to perform, and how many different skills do freshmen perform on microcomputers?

2. Frequency of Use--How often do USU freshmen use microcomputers, and when they use microcomputers, how long does a session last?

3. Depth of Use--How confident are USU freshmen about learning new microcomputer software?
4. Change in Use--How does microcomputer use change the first year that students attend USU?
5. Social Development--To what degree do freshman attending USU experience social development and how satisfied are they with social development.
6. Intellectual Development--What do the indicators of intellectual development tell us about the experience of freshmen at USU and how satisfied are they with their intellectual development?
7. Use and Social Development--What relationship exists between microcomputer use and freshman social development?
8. Use and Intellectual Development--What relationship exists between microcomputer use and freshman intellectual development?

Importance of This Study

This research is potentially valuable as an institutional evaluation of the educational uses of technology. Hopefully it is most valuable to the target institution (Utah State University); however, the methodology and results of this study may be valuable for other institutions. The study is expected to assist educators and administrators with (a) decisions about microcomputer technologies taught in the college classroom, (b) institutional or departmental strategies for enhancing student learning through access to information resources, and (c) budget decisions requiring information about the value of specific microcomputer uses (Ehrmann, 1995; Green & Gilbert, 1995).

Results from this study provide the following information on freshman use of microcomputers which is valuable for developing educational strategies incorporating technology in a university setting.

1. Clarification of the relationship between dimensions of microcomputer use and student development in the context of various input, environmental, and output variables (e.g., demographics, time involvement, goal satisfaction, and so forth).
2. Identification of the specific variables that are most closely related to grade point average (GPA) as the conventional measures of student performance.
3. Identification of the specific computer-related variables that are positively or negatively related to freshman social and intellectual development.

Limitations

Even though student development theorists widely accept an age limitation when describing student populations, it is also recognized that including only the traditional-aged student limits the universal applicability of student development theories and models (Pascarella & Terenzini, 1991). Some theorists are critical of existing student development theory and research due to the number of nontraditional students currently attending college (Dannefer, 1984; Feldman, 1972) and expected to attend in the future.² This limitation on applicability applies to this research. The limitation of student development theory to the traditional undergraduate student points to a need for theory and research pertaining to the "new majority" of students who have not followed the traditional path from high school to college. Also, because institutional

² The Annenberg/CPB project "New Pathways" develops educational materials for the nontraditional student. According to the project's web site (<http://www.learner.org/contents>), "if current trends continue, this new majority will reach 60% of all enrollments by the year 2000" ([acpbinfo.html](#)).

character and resources are unique, the generalizability of the findings of this study is limited to USU freshmen.

Definition of Terms

Several key terms are defined to assist the reader in clearly understanding this study.

Analysis terminology, borrowed from experimentation in the physical sciences, may be more familiar to the reader; however, this terminology usually implies cause and effect. Inasmuch as this research is inductive and exploratory of a social phenomenon, any implication of causation is avoided. Therefore, instead of searching for causation, the focus in this research is placed on the relationship between phenomena. Following is a list of terms typically used in describing analysis with equivalent terms.

Preassessment: data from fall 1996 collected prior to fall quarter

Postassessment: data collected in spring 1997

Independent variables: predictor variables

Dependent variable: criterion variable

Microcomputer (or personal computer [PC]) use is employing a microcomputer (PC) to meet a perceived need (e.g., problem solving or communication) or enjoyment (e.g., playing games; Davis, Bagozzi, & Warshaw, 1992; Igbaria, 1990). A review of the literature has yielded four dimensions of microcomputer usage for this study: (a) measurement in terms of frequency of use (how often in a week or year a microcomputer was used); (b) intensity, meaning session length or the minutes or hours that were spent at the machine during an episode of use (Astin, 1993; Igbaria, Schiffman, & Wiekowski, 1994; Thompson et al., 1991); (c) breadth, meaning the

number and types of different activities the operator can perform on the machine (Furst-Bowe et al., 1995-96); and (d) depth or computer confidence, meaning an individual's perceptions of his or her ability to use computers in the accomplishment of a task (Compeau & Higgins, 1995).

Student development is described as a process of affective and cognitive growth fostered by a university environment through a balance of challenge and support (Chickering & Reisser, 1993). According to Chickering and Reisser (1993), students' affective growth is evident in interpersonal competence and students' cognitive growth is evident in intellectual competence. Astin (1993) relied on overall satisfaction as an important measure of affective growth (see also Baker & Schultz, 1992) and academic achievement and critical thinking ability to gauge intellectual development. Cultural development is another dimension of student development; however, it is not dealt with here because it is considered beyond the methodology and scope of this study.

Student satisfaction: Tinto (1993) stated that "generally, the more satisfying those experiences (at the university) are felt to be, the more likely are individuals to persist until degree completion" (p. 50). Student satisfaction is presented as a valid measurement of social development by Astin (1990) and Tinto. Astin (1993) made the following observation about student satisfaction.

Of all the types of student outcomes that have been studied so far in college impact studies, student satisfaction shows the weakest relation to student input characteristics (those that students bring with them)...Virtually every other type of outcome measure is more strongly correlated with student input characteristics than with environmental characteristics. In other words, student satisfaction seems to be the only type of college outcome that is not heavily dependent on student input characteristics. (pp. 116-117)

Hence, student satisfaction is in this study as a measure of the relationship between the university environment and student development. Satisfaction is defined as the

difference between what was expected and what was experienced (Vavra, 1997; Zeithaml, Parasuraman, & Berry, 1990).

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

This review of the literature describes theory and research used to identify and operationalize assessment instruments for the research. From these instruments, questionnaires deemed useful in a preassessment and postassessment of freshmen's use of microcomputers and development before and during the time that they attended USU were identified. The objective of the literature review was to identify variables suited to a study of the problem and formulate these into questionnaires (Sekaran, 1992). To this end, the review begins with the underlying premise that unites student development and microcomputer use. Then, authoritative views critical of the central premise are presented in the second section. The third section presents theoretical foundations for the constructs of microcomputer use and student development. In the last section, theoretical concepts are organized into a research model and variables are selected to operationalize the model.

Premise

The basic premise of this research is that technology in higher education should serve each institution's mission and values (Chickering & Ehrmann, 1998; Gilbert, 1996). The technology under examination is microcomputers. An underlying assumption of this premise is that institutions of higher education espouse a common value that can be used to assess the value of microcomputer technology. Astin (1996) has claimed that the frequent mention of student development in mission statements is evidence that student development is a value common to colleges and universities

(see also Chickering & Reisser, 1993; Gilbert, 1996; Pace, 1986; Pascarella & Terenzini, 1991). A fitting example is USU's mission statement, which begins with this commitment to student development: "Students are the focus as they seek intellectual, personal, and cultural development" (USU, 1996). Indeed, as Chickering and Reisser (1993) asserted, student development is not simply a common value but the unifying value of all higher education, and it "should be the organizing purpose for higher education" (p. 265). With this in mind, the premise of this study is made more specific by saying that microcomputer technology in higher education should serve student development.

Critical Views

Despite the popularity of microcomputer technology in higher learning, even advocates concede the lack of "...after a dozen years into the 'micro' revolution--any real gains in *instructional productivity*" (Green & Gilbert, 1995, p. 10, emphasis added). Muffoletto and Knupfer (1993) introduced their anthology, Computers in Education, by noting that "no long-term supporting empirical or qualitative evidence shows that technology has made schools and teachers more effective or significantly affected the lives of their students" (p. 2). This lack of supportive evidence has led several leading educators to question the commitment that educational institutions are making to computer technology.

Postman (1992, 1995) pointed out that "embedded in every tool is an ideological bias, a predisposition to construct the world as one thing...to value one thing over another" (1992, p. 13). Postman's claim is that computer technology overvalues efficiency: The high price of educating students for increased efficiency is a socially responsible, spiritual, and moral education. Using the automobile as an analogy to