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ATTITUDES TOWARD COMPUTERS: A COMPARISON OF INDIAN AND NIGERIAN STUDENTS

Fred O. Ede* and Bhagaban Panigrahi**

*Associate Professor of Marketing, Benedict College
**Associate Professor of Marketing, Norfolk State University

ABSTRACT

There may be a general belief among people in developed countries that students in developing countries have negative attitude toward computers. However, this study found that both Indian and Nigerian students in general have positive attitude toward computers, although Nigerian college students have significantly less positive attitude than Indian college students do. More specifically, the results of the study indicate that Indian students like computers more, find computers more useful, have more confidence in computers, have less computer anxiety, and have a more general positive attitude toward computers than Nigerian students do. With regard to gender and attitudes toward computers, the results showed that male students had slightly (although not statistically significant) more favorable attitudes than female students. Surprisingly, correlation analysis revealed no relationship between age and attitude toward computers. Implications of these findings for governments and multinational corporations are also discussed.

INTRODUCTION

The computer is one of the most revolutionary single inventions in organizations of the twentieth century. The computer has created a new information and communication technology that is drastically affecting ways organizations are designed and how executives manage their operations. Concurrently, the computer is affecting the degree of efficiency and effectiveness of organization's performance (Brink, 1969; and Simon, 1977). For developing countries, both the potential of computing to accelerate development and the foreseen obstacle to achieving successful utilization have been broadly outlined (Bogod, 1979; and Pool, 1990). Furthermore, some authors have identified computing as one of the few fields where developing countries can successfully bypass evolutionary phases and "catch up fast" via direct high level transfer, yet others argue that the opposite is true (Reddi, 1986). Computers can also become an important aid in a country's economic development (ACAST, 1973; Sayer, 1987; Dharmadhikari, 1988; Pool, 1990). The contribution that computerization can make in this regard has been succinctly stated by the United Nation's ACAST (Advisory Committee on Application of Science and Technology Development) Ad Hoc Working Group on computer technology:

> Technology has an essential role to play in reducing the disparities that exist between the developed and developing countries. Computers are especially important in this context, because so many computer applications have a direct bearing on some of the main facets of the development process and reflect certain aspects of the technology that has facilitated the growth of the economically advanced countries (ACAST, 1973).

During the past four decades or so, since the introduction of the computer, a plethora of writings on various perspectives including attitudes toward computers in developed countries have appeared (Campbell, 1988; Fleisher and Morell, 1985; Gilroy and Desai, 1986; Igbaria, 1989; Kaohang, 1986; Neidleman, 1979; Nilsen 1978; Sensales and Greenfield, 1995). However, little has been documented on the public s attitudes, especially students, toward computers in developing countries (Ghani and Al-Sakran, 1988; Lu, Youzin and Guimares, 1988).

PURPOSE OF THE STUDY

The importance of computer skills has long been a topic of concern for business firms, governments, colleges and universities. Much of the concern arises because effective computer skill in business, industry and various professions has become increasingly important in recent years. Many students after graduation will be employed by both public and private companies that require much of their working hours to be spent with computers (Myers, 1976; Simon, 1977; Render and Stair 1985). Therefore, the primary purpose of this study is to determine Indian and Nigerian students attitudes toward computers in general, and to compare their attitudes toward computers with regard to computer anxiety, computer confidence, computer liking, and computer usefulness.

The findings will provide an indication of computer's present and future status in developing countries. This is especially important for multinational agencies, both profit and non-profit oriented. Profit-oriented multinationals (especially computer hardware and software manufacturers) need information that studies such as these provide to help them plan their marketing strategies. Today’s university students will become tomorrow’s corporate executives and decision-makers that will influence the profitability of these multinationals in developing

countries. This is especially true since 75 percent of the world's total trade growth in the next decade and beyond will come from developing countries (Business America, 1994).

Non-profit oriented organizations should also find results of this study interesting. They provide a large share of the aid to developing countries and much of this aid come in the form of information technology. They need an understanding of the effectiveness of their aid and how best to focus its deliverance.

Furthermore, the results may assist colleges and universities of developing countries especially in India and Nigeria in creating effective computer education for would-be employees/managers.

BACKGROUND AND HYPOTHESES

The computer is not new to India. All kinds of computers such as mainframe, mini, micro as well as personal computers have been assembled, produced and marketed to both domestic and foreign customers since 1970 (Brunner, 1991; Grico, 1985; Mukhi, 1985; and Weiner, 1980). Furthermore, during the past decade, India has emerged as one of the fastest growing software producers in the world (Lakha, 1990; and Udell, 1993). Armed with economic, educational and efficiency advantages, India continues to build up its software development muscle to the benefit of Information Systems (IS) companies around the world.

A 1992 World Bank study of eight nations rated India as the most attractive nation for U.S., European, and Japanese companies seeking offshore software development partners. India's emerging software prowess is due to the innate mathematical abilities of its people. In addition, the ready availability of educated, low-cost computer trained personnel is a mainstay of India's software promotion policy backed by the Indian government. This is the latest move in the

country's five-year plan to improve the industrial and commercial structure of the country through the use of new technologies. At present India has more than 2.5 million computer and software professionals working in various capacities in both private and public sectors. Every year Indian universities and computer trade schools produce more than 30,000 computer science graduates (Udell, 1993). India is determined to continue in improving that level of expertise by expanding computer education. As a result, the market for computers is also growing very rapidly in India.

Africa, the second largest continent, on the other hand, is the least computerized and has been described as "the lost continent of the information technologies" (Anonymous, 1993). Nigeria's romance with the computer (especially microcomputers) is a very recent phenomenon. According to Adekoya (1993), the microcomputer in Nigeria can still be described as an innovation and microcomputing in Nigeria is still haphazard because the skills and procedures that underpin the technology are lacking. A major factor contributing to this is, according to Odedra (1993), that what Africa has experienced for the most part so far is not IT (information technologies) transfer but transplantation, the dumping of boxes without the necessary know-how." Or as Adekoya (1993), sees it Computing in Africa may appear presumptive: in areas of drought or malnutrition it is hard to persuade some people that IT is something on which money should be spent." Unyimadu (1989), has also outlined lack of continuous and stable power supply as well as spare parts and affordable selling prices as other factors that have contributed to the late arrival of computers to Nigeria.

The discussions above, therefore, lead us to two important hypotheses relevant to this study. For each of the hypothesis below, μ represents the relevant population mean.

H_1: Indian students will have a more positive attitude toward computers than Nigerian students with respect to computer liking (CL), computer usefulness (CU), computer confidence (CC) and overall computer attitude (CAS).

H_O: $\mu_{INDIA} = \mu_{NIGERIA}$

H_A: $\mu_{INDIA} > \mu_{NIGERIA}$

In addition to the above, studies (e.g., Loyd and Loyd, 1985 and Wilson and Daubek, 1992) have found an inverse relationship between computer anxiety and computer confidence. Because of these, we hypothesize that:

H_2: Indian students will have less anxiety toward computers than Nigerian students.

H_O: $\mu_{INDIA} = \mu_{NIGERIA}$

H_A: $\mu_{INDIA} < \mu_{NIGERIA}$

METHODOLOGY

A number of computer attitude scales have been developed (Cambre and Desmond, 1985; Hayck and Stephens, 1989; Loyd and Loyd, 1985). Most of these scales focus on computer anxiety and, to a lesser extent, on computer likings.

Loyd and Loyd (1985) have developed a Computer Attitude Scale (CAS) which measures four different components of computer attitudes: anxiety, confidence, liking, and usefulness. According to them, all four are measured as sub-scales that can be evaluated separately or combined to provide an overall

computer attitude measure for the respondent. This study used the 40-item Computer Attitude Scale (CAS) developed by Loyd and Loyd. The CAS instrument uses statement similar to those used by others; however, it is shorter, requires less time for respondents, and has been tested for validity and reliability (Gressard and Loyd, 1985; Loyd and Gressard, 1984; Loyd and Loyd, 1985). The 10-item questions for each of the subscales are distributed evenly throughout the instrument and are measured on a four-point agreement scale. Respondents check whether they strongly agree, slightly agree, slightly disagree, or strongly disagree with statements such as, "I get a sinking feeling when I think of trying to use a computer" and, "Working with computers would make me very nervous."

For the study, a set of demographic and experience-related questions was added to the survey instrument. These questions included the respondents' gender, age, class standing, and major. Complete and useable responses to the CAS instrument were obtained from 229 Indian students who were enrolled in one of India's major southeastern universities and 184 students of one of the major universities in Nigeria.

Computation of the Attitude Scales

The first step in the data analysis was the computation of the attitude scales. The attitude of Indian and Nigerian students were computed both for the various sub-scales as well as their overall attitude toward computers. Since each sub-scale had ten items that were evaluated on a 1 to 4 point scale, the possible range for each sub-scale was 10 to 40 points. That is:

$$10 \leq X_{(subscalej)} \leq 40.$$

Where $X_{(subscalej)}$ represents a respondent's total score for each sub-scale.

The individual responses were scored so that, according to Wilson and Daubek (1992), in each case a higher score (for confidence, liking, and usefulness) represents a more positive attitude than does a lower score. For computer anxiety, on the other hand, a higher score while indicating a more positive attitude also means lower anxiety about computers (Loyd and Gressard, 1984). The overall scale (CAS) ranges from 40 (least positive) to 160 (most positive). That is:

$$40 \leq X_{(subscalej)} \leq 160.$$

Where $X_{(subscalej)}$ represents a respondent s overall CAS score.

Reliability of the Scales

It is usual that in circumstances where a construct is measured by a group of scale items, the homogeneity or internal consistency of the scale items (reliability) be established (Nunnally, 1967). The reliability of the Computer Attitude Scale (CAS) and its four subscales - Computer Anxiety (CA), Computer Confidence (CC), Computer Liking (CL) and Computer Usefulness (CU) - has been demonstrated by several authors (e.g., Gressard and Loyd (1985), Loyd and Loyd (1985), and Wilson and Daubek (1992).

The reliabilities of the CAS and its sub-scales were also determined in the present study both for the entire sample as well as the two countries (India and Nigeria, see Table 1) by computing their Cronbach s Alphas. The Cronbach s Alphas ranged from .65 for CU for the Indian sample to .91 for CAS for the entire sample. These results substantiate the reliability of all the scales and are consistent with those of earlier studies.

TABLE 1
RELIABILITY OF THE SCALES

Scales	Number of items	Entire Sample	Indian Sample	Nigerian Sample
Computer Anxiety (CA)	10	.72	.72	.71
Computer Confidence (CC)	10	.76	.73	.79
Computer Liking (CL)	10	.71	.74	.67
Computer Usefulness (CU)	10	.70	.65	.74
Computer Attitude Scale (CAS)	40	.91	.89	.91

TABLE 2
BACKGROUND OF RESPONDENTS (Percentages, n-413)

	All Respondents	Indian Respondents	Nigerian Respondents
SEX			
Male	56.2	59.0	52.7
Female	43.8	41.0	47.3
CLASSIFICATION			
Freshman	15.2	10.9	20.6
Sophomore	19.3	13.1	27.2
Junior	20.1	21.8	17.9
Senior	26.6	25.7	27.7
Graduate Student	18.6	28.4	06.5
MAJOR			
Business	42.6	50.2	33.2
Science/Engineering	38.2	28.4	50.5
Other	19.1	16.3	16.3

TABLE 3

ATTITUDE TOWARD COMPUTERS (MEAN SCORES)

Scale	Number of Items	Entire Sample	Indian Sample	Nigerian Sample	P*
Computer Anxiety (CA)	10	32.2	33.1	31.0	0.00
Computer Confidence (CC)	10	32.2	33.0	31.2	0.00
Computer Liking (CL)	10	31.0	31.6	30.4	0.03
Computer Usefulness (CU)	10	31.9	32.8	30.8	0.00
Computer Attitude Scale (CAS)	40	128.1	131.4	123.8	0.00

* = One Tail Significance
** = For computer anxiety only, a higher score indicates lower anxiety

Attitude Toward Computers

As stated in our first hypothesis, we expected Indian students to have a more positive attitude toward computers than Nigerian students with respect to computer liking (CL), computer usefulness (CU), computer confidence (CC) and overall computer attitude (CAS).

The means of students' attitude toward computers are shown in Table 3. As shown in the table, Indian students consistently had higher attitude toward computers both with respect to the sub-scales (computer liking (CL), computer usefulness (CU), computer confidence (CC), and overall computer attitude (CAS).

Comparisons using the t-test (one-tailed) also shows that the higher scores of the Indian students were significant ($p \leq .03$).

In our second hypothesis, we expected Indian students to have less anxiety (CA) toward computers than Nigerian students. To test this hypothesis, one-tailed t-test was also conducted. The hypothesis was supported by the significant

difference (p = 0) between the mean of Indian students (33.1) and Nigerian students (31.0).

Although much of our interest in this comparative study is descriptive, we also investigated some relationships between some student characteristics (age, gender, and major) and student attitude toward computers. We concentrated on these variables because we believe they are important variables that should provide foundation on which future comparative studies of the two countries can build.

TABLE 4
CORRELATION COEFFICIENTS
FOR AGE AND THE ATTITUDE SCALES

Scale	Number of Items	Entire Sample	Indian Sample	Nigerian Sample
Computer Anxiety (CA)	10	.10	.19	.10
Computer Confidence (CC)	10	.08	.11	.07
Computer Liking (CL)	10	.07	.18	.12
Computer Usefulness (CU)	10	.15	.24	.22
Computer Attitude Scale (CAS)	40	.11	.21	.12

Age and Attitude Toward Computers

To determine the relationship between age and the sub-scales as well as the overall CAS scale, a partial correlation analysis, controlling for country (Nigeria and India) was computed. The partial correlation estimates are shown in Table 4. All the sub-scales were negatively correlated with age, although only the

correlation with computer usefulness was significant ($p < .05$). Age was equally negatively correlated with the overall attitude toward computers, although not significant ($p = 0.065$).

The highest correlation was 0.24 for Indian students and 0.22 for Nigerian students for the computer usefulness sub-scale. The correlation for the Indian sample was, however, consistently higher than those for the Nigerian samples.

The covariate (country), however, was significant ($F = 12.97$; $p = .00$). That is, male and female Indian students had statistically significant higher positive attitudes toward computers than their corresponding Nigerian counterparts.

TABLE 5
MEANS OF GENDER AND ATTITUDE TOWARD COMPUTERS

		Men		Women	
Scales	**Number of Items**	**India**	**Nigeria**	**India**	**Nigeria**
Computer Anxiety*	10	33.4	31.8	32.8	30.6
Computer Confidence	10	33.3	31.9	32.4	30.5
Computer Liking	10	31.7	31.2	31.4	30.6
Computer Usefulness	10	33.0	30.7	32.6	30.9
Computer Attitude Scale	40	132.5	124.8	129.8	122.5

* For computer anxiety only, a higher score indicates lower anxiety

Gender and Attitude Toward Computers

Since a country main effect had been established in the first hypothesis, a 2 x 4 repeated measures ANOVA design (with country as a covariate) was used to test the effect of gender on the attitude-toward-computer sub-scales. The main effect (gender) was not significant ($F = .50$; $p = 0.479$). Table 5 shows the means for the sub-scales as well as the overall CAS scale. The table shows that men

consistently had more favorable attitude (although not significant) toward computers both for all the sub-scales as well as the overall attitude scale (CAS).

TABLE 6
MEANS OF INDIAN AND NIGERIAN STUDENTS
ATTITUDE TOWARD COMPUTERS (By Major)

Scale	Number of Items	Mean for India	Mean for Nigeria
Business Students			
Computer Anxiety (CA)*	10	32.9	29.2
Computer Confidence (CC)	10	33.0	29.9
Computer Liking (CL)	10	31.8	29.3
Computer Usefulness (CU)	10	32.5	29.3
Computer Attitude Scale (CAS)	40	131.0	118.5
Science/Engineering Students			
Computer Anxiety (CA)*	10	34.7	31.9
Computer Confidence (CC)	10	34.3	32.3
Computer Liking (CL)	10	33.3	31.0
Computer Usefulness (CU)	10	34.9	31.6
Computer Attitude Scale (CAS)	40	137.7	127.4
Other Students			
Computer Anxiety (CA)*	10	30.7	28.8
Computer Confidence (CC)	10	30.7	27.3
Computer Liking (CL)	10	28.9	27.8
Computer Usefulness (CU)	10	30.4	25.5
Computer Attitude Scale (CAS)	40	121.0	109.3

* For computer anxiety only, a higher score indicates lower anxiety

Major and Attitude Toward Computers

Next, the attitudes of students from various majors were compared across the two countries. Again a 3 (business, science/engineering, and other) x 4 (CA, CC, CU, and CL) repeated measures ANOVA (with country as covariate) was used to test the effect of student major on the sub-scales. Again Indian students consistently had more positive attitude toward computers than Nigerian students do. The means are shown in Table 6. The results show significant differences between the attitude of students from various majors toward computers ($F = 31.26$; $p = 0$) both for the various sub-scales as well as the overall attitude scale (CAS). According to Wilson and Daubek (1992), "these findings hide some differences between pairs of majors" that show up when the three different majors are compared against each other. Using Scheffe's post-hoc contrasts in the 3 X 4 ANOVA repeated measures design each pair of means was statistically different ($p \leq 0.01$). That is, for example, that 'other' students had significantly higher computer anxiety than both business as well as science/engineering students while business students had significantly higher computer anxiety than science/engineering students.

DISCUSSIONS, IMPLICATIONS, AND DIRECTIONS FOR FUTURE RESEARCH

That Indian students would like computers more, find computers more useful, have more confidence in computers, have less computer anxiety, and have a more general positive attitude toward computers than Nigerian students is understandable. The two countries are, obviously, at different stages of the diffusion process for computers. Whereas computers are relatively an innovation in Nigeria, all kinds of computer hardware (mainframe, mini, micro as well as personal computers) and software have been assembled as well as produced in India and marketed to both domestic and foreign customers since 1970.

Therefore, it is possible that Indian students feel they need to be more proficient in terms of computer skills in order to be productive and successful in their economy than Nigerian students.

This finding has some obvious implications for governments as well as multinational corporations. With respect to Nigeria, especially, government policy makers must provide the necessary computer equipment and facilities as well as trained faculty to develop the interest of students in computers. In this respect, the Nigerian government needs to emulate the policies of the Indian government that has resulted in the ready availability of highly educated, low-cost computer trained personnel which has been a mainstay of India's software development program. Unfortunately, a feasibility study on establishing a computer manufacturing plant in Nigeria in the 1970s was shelved by the government (Szuprowicz, 1978).

For multinational corporations, the situation in Nigeria presents a tremendous opportunity. Just like Indians, Nigerians possess the vital ingredient in most software development efforts - fluency in English language. A Computers Association of Nigeria has been formed (Jason and Thompson, 1995). While the few competitors that exist do fierce battle in the computer marketplace, they are also creating a brave new information culture through reorganizing the industry itself. Computer trade schools are springing up all over the country (Thompson, 1993), and the computer is being introduced in various sectors of the economy (Adeniran, Adigun and Okoh, 1993). This is the ripe time for major multinational computer software and hardware companies to establish a foothold in the market, especially for long run profitability.

However, correlation analysis revealed no relationship between age and attitudes toward computers in the two countries. This is surprising given that age has been identified in studies as a surrogate for several variables. Wilson and Daubek (1992), for example, considered age an indicator of experience and

associated age with maturity as well as resistance to learn new habits. According to them, we generally assume that because older students have typically had less exposure to computers in their pre-college education, there should be a negative correlation between age and computer Anxiety, computer Liking, and computer Confidence. On the other hand, we also would generally assume that because most of the older students are employed and presumably have seen the application and usefulness of the computer in the workplace, there should be a positive correlation between age and computer Usefulness.

According to Campbell (1988), computers have been associated with the mathematics curriculum and many students view the use of computers as a mathematics skill. Other studies have also found that females have more math anxiety than males (Sells, 1980; Naiman, 1982; Kiesler, Sproull and Eccles, 1983; Holder, 1984; Paterson and Howe, 1979; and Tobias, 1987). We were, therefore, surprised to find in this study that although male students had slightly more favorable attitudes toward computers than female students this difference was not statistically significant.

Three majors were utilized in this study - Business, Science/Engineering, and other (a combination of all other 'liberal arts' majors). Our study demonstrated a statistically significant difference in attitude toward computers between students from various majors. To a large extent, other researchers (Wilson and Daubek, 1992) have found similar differences between students from various majors. This is to be expected, given the fact that the application and usefulness of computers to science/engineering as well as business has been emphasized more than its application to the liberal arts. Moreover, in both India and Nigeria, while a demonstrated competence in mathematics is a prerequisite for admission to a science/engineering or business major, such is not true for liberal arts majors. To address this, universities in both countries must begin to embrace the application of computers in liberal arts fields like music, fine, graphic and applied arts, law

etc. Unfortunately, the introduction of computers to these areas of study has always come from application programs written by computer professionals outside these areas.

CONCLUSION

The worldwide computer revolution that is impacting on business and non-business sectors in developing countries is also having a tremendous effect on emerging/underdeveloped countries' business environment. Employers not only want computer-literate graduates in general, but micro-computer-literate graduates in particular. Colleges and universities across the developing countries are responding to such pressures in a substantive way, with a complete rethinking of the traditional data processing education. They are also making a quick move away from the mainframes to new, powerful microcomputer laboratories (Lu, Youzin, and Guimaraes 1988, Nilsen 1978; Sayer, 1987; Orne and Wallace, 1985; and Robina, 1987). As a result, colleges and universities with the help of governments need to strive for a means of integrating computer competencies into their curricula if tomorrow's students are to be well trained for success and the needs of business. These solutions are not complex but at the same time are not easy to implement due to numerous constraints which affect underdeveloped and developing countries like Nigeria and India respectively.

Although relatively late, the outlook for computers in Nigeria is looking better. An association of computer professionals has been formed (Jason and Thompson, 1995). Computer trade schools are springing up all over the country (Thompson, 1993), the computer is being introduced in various sectors of the economy (Adeniran, Adigun and Okoh, 1993) and the idea of manufacturing computer parts and equipment in Nigeria has even been suggested (Szuprowicz, 1978).

In summary, this study provides some initial insight into the attitudes of college students/would-be-managers and decision-makers in developing countries. The result may be useful for government policy makers/university administrators and faculty when planning curriculum for students. The relationship between students' exposure and computing success remains to be determined.

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