

## **Impact of Technology on the Academic Self-Efficacy and Career Selection of African American Students**

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With the continuing debate of the use and impact of technology on young children, this article examines the impact on technology on the academic self-efficacy and career intentions of African American students. The results from this study may be applicable to teaching, implementation, and use of technology with young children.

Due to a high proportion of African American students coming from low-income families and attending under funded schools, instructional approaches and interventions that appear to or have demonstrated a notable pledge for improving the low income students' academic performance need further exploration and implementation country wide. The computer access for African American students should be addressed in order to ensure their participation in the information revolution as well as improve their educational opportunities. Furthermore, technology and it's use are not distributed impartially across all school types. Based upon school location, it is evident that some students, unfortunately, are placed in underdog positions due to the differential access to technology based upon the location of the school they attend. Wenglinsky (1999) stated that students who are African American, poor, or live in rural or urban areas, are less likely to have access to computing technology in their home. While it is apparent that affluent suburban schools typically have more computers per student than urban and rural schools, the manner in which computers are used also varies widely. Urban schools that have predominantly minority students generally use computers for tutorial and rote drill and practice programs, while suburban

school students, on the other hand, use computers for problem solving and programming (Levine, 1994; Wenglinisky, 1999). Furthermore, a major concern related to the differential access and use of technology in schools is that achievement gaps between high and low achieving students may widen, and as a result, a technological underclass may emerge in our public school systems (Becker, 2000).

Additionally, increasing evidence suggests that technology can significantly improve the education of students at risk of failure (Wenglinisky, 1999). Robinson (1998) stated that interaction with technology can offer children the means to reconstruct and internalize new cognitive structures or use higher-order thinking skills.

### SELF-EFFICACY AND AFRICAN AMERICAN STUDENTS

Self-efficacy is defined as the sense of confidence one has to their performance on specific tasks. Bandura (1986) further defined self-efficacy as a person's judgment of their ability to organize and execute courses of action required to attain specific types of performances. Since performance self-efficacy influences choice of activities, effort, persistence, learning, and achievement (Jinks & Morgan, 1999), it may also have an impact on career choice. Literature pertaining to self-concept focuses on three types of influential factors: (a) developmental or age related factors, (b) orgasmic or gender-related factors, and (c) sociocognitive or school-related factors (Madhere, 1991). The self-efficacy theory as formulated by Bandura (1982), is concerned with the interaction between one's assessments of their capabilities and one's judgments of success possibilities in prospective situations. In any given circumstance, affective reactions as well as behaviors can be predicted more accurately when both sets of estimates are taken into consideration. Self-efficacy theory has been used to account for changes in areas of physiological stress reactions, achievement pursuits, social activism, and to explain the pattern of self-esteem in African Americans (Madhere, 1991). Madhere's findings indicated that the majority of African American youngsters do manage to maintain a strong and balanced measure of confidence despite hardships they may endure. The study of self-efficacy is important because of its impact on student achievement (Jinks & Morgan, 1999). Jinks and Morgan (1996) also reported significant relationships between the self-efficacy and self-reported grades of elementary school students. "Students with high self-efficacy will try different strategies and persevere; students who doubt their ability will give up if early efforts do not result in success" (Jinks & Morgan, 1999; Brown & Inouye, 1978).

## METHOD

The purpose of this study was to examine the impact of access to computing technology on the academic self-efficacy and career intentions of African American students. African American students were given a pretest related to self-efficacy and career intentions. After the pretest, students were then given and trained on the use of laptop computers. The laptop computers contained software for word processing, spreadsheets, databases, graphical presentation, e-mail, and Internet access. The students were given the computers for one year to use at home and in school. Volunteers from a high-tech company provided technical support to the students. After using the laptop computers for one year, the students were given a posttest to determine if there were significant changes in academic self-efficacy and career intentions.

## SUBJECTS

Eighty-five 3rd through 12th grade African American students represented 13 different school districts and two private schools in a Northern California city. Fifty-one percent of the participants were female and 49% were male; 38% of the students were from elementary school, 43% were from middle school, and 19% were from high school.

## INSTRUMENTS

The Morgan-Jinks Student Efficacy Scale (Jinks & Morgan, 1999) was adapted and used to survey the subjects in this study. The Morgan-Jinks Student Efficacy Scale was designed to gather information about student self-efficacy as it relates to school success based on three factors; talent, context, and effort. Talent focused on their perceived abilities, while context focused on the conditions under which they functioned, and effort examined how much work was put forth in accomplishing specific tasks. Although the Morgan-Jinks Instrument (Jinks & Morgan, 1999) contained 34 items, the revised instrument used in this study contained 23 items. The items contained in this study's instrument used some Likert-scale responses as well as some multiple choice responses, with all items having five possible responses.

## PROCEDURE

The study was conducted in two stages. In the first stage, pretest surveys were administered to students in a vacant high school classroom at the beginning of the school year, and prior to receiving laptop computers that were donated by a local high-tech corporation. The instructions were explained verbally and also written on the board. In the second stage, the students were given the same survey at the conclusion of the academic year in a similar situation. Frequency data will be illustrated on the results in order to determine whether a difference exists between lack of technological access and after having access to technology during a school year period.

## DATA ANALYSIS

The five responses (a,b,c,d,e) for each question on the instrument were computed using a tally count, frequency distribution. The before and after responses for each question were arranged in categories by question number and are described in this document as percentages.

### 1. What grade are you in?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>37%</b>	<b>40%</b>	<b>13%</b>	<b>7%</b>	<b>3%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>37%</b>	<b>33%</b>	<b>20%</b>	<b>7%</b>	<b>3%</b>

### 2. How good are you at math?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>37%</b>	<b>40%</b>	<b>13%</b>	<b>6%</b>	<b>3%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>34%</b>	<b>31%</b>	<b>19%</b>	<b>13%</b>	<b>3%</b>

### 3. How good are you at science?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>3%</b>	<b>20%</b>	<b>30%</b>	<b>47%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>7%</b>	<b>37%</b>	<b>33%</b>	<b>23%</b>

## 4. Do you like using computers?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>3%</b>	<b>3%</b>	<b>30%</b>	<b>33%</b>	<b>30%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>7%</b>	<b>20%</b>	<b>60%</b>	<b>13%</b>

## 5. How good are you in sports?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>7%</b>	<b>10%</b>	<b>27%</b>	<b>57%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>3%</b>	<b>7%</b>	<b>50%</b>	<b>40%</b>

## 6. How good are you at signing, acting, or entertaining?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>3%</b>	<b>3%</b>	<b>27%</b>	<b>27%</b>	<b>40%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>0%</b>	<b>30%</b>	<b>37%</b>	<b>33%</b>

## 7. How much do you like school?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>7%</b>	<b>3%</b>	<b>40%</b>	<b>10%</b>	<b>40%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>7%</b>	<b>10%</b>	<b>37%</b>	<b>37%</b>	<b>10%</b>

## 8. What overall grade do you think you should get for schoolwork?

BEFORE	% of A	% of B	% of C	% of D	% of E
	0%	7%	17%	47%	30%

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>7%</b>	<b>40%</b>	<b>40%</b>	<b>13%</b>

## 9. How satisfied are you with the education you are receiving at your school?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>73%</b>	<b>27%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>47%</b>	<b>47%</b>	<b>3%</b>	<b>3%</b>	<b>0%</b>

10. How important is education to you?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>7%</b>	<b>17%</b>	<b>77%</b>	<b>0%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>3%</b>	<b>3%</b>	<b>23%</b>	<b>50%</b>	<b>20%</b>

11. What grade do you think you should get in math?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>77%</b>	<b>23%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>63%</b>	<b>30%</b>	<b>7%</b>	<b>0%</b>	<b>0%</b>

12. What grade do you think you should get in science?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>77%</b>	<b>20%</b>	<b>3%</b>	<b>0%</b>	<b>0%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>67%</b>	<b>27%</b>	<b>7%</b>	<b>0%</b>	<b>0%</b>

13. What grade do you think you should get in English?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>73%</b>	<b>23%</b>	<b>3%</b>	<b>0%</b>	<b>0%</b>

Note: One didn't respond in the before group.

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>70%</b>	<b>23%</b>	<b>3%</b>	<b>0%</b>	<b>0%</b>

14. How much time do you spend on homework each night?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>13%</b>	<b>43%</b>	<b>43%</b>	<b>0%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>10%</b>	<b>13%</b>	<b>30%</b>	<b>47%</b>

15. How good are you at using computers?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>6%</b>	<b>32%</b>	<b>32%</b>	<b>29%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>3%</b>	<b>0%</b>	<b>21%</b>	<b>45%</b>	<b>31%</b>

16. How much time day do you spend using a computer?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>10%</b>	<b>23%</b>	<b>20%</b>	<b>30%</b>	<b>17%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>30%</b>	<b>27%</b>	<b>23%</b>	<b>20%</b>

17. What type of job would you most like to have in the future (choose one)?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>33%</b>	<b>26%</b>	<b>33%</b>	<b>4%</b>	<b>4%</b>

Note: A few didn't respond for this category in the before group.

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>23%</b>	<b>37%</b>	<b>27%</b>	<b>3%</b>	<b>7%</b>

Note: One did not respond in this category for the after group.

18. What is the highest level of education you think you will complete (if unsure leave blank)?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>4%</b>	<b>29%</b>	<b>38%</b>	<b>29%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	0%	7%	18%	43%	32%

19. What do you use computers for?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>17%</b>	<b>44%</b>	<b>5%</b>	<b>7%</b>	<b>27%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>13%</b>	<b>43%</b>	<b>8%</b>	<b>5%</b>	<b>33%</b>

20. How much of your homework do your parents help you with?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>8%</b>	<b>50%</b>	<b>31%</b>	<b>4%</b>	<b>8%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>21%</b>	<b>41%</b>	<b>24%</b>	<b>14%</b>	<b>0%</b>

21. Do you work hard on your schoolwork?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>4%</b>	<b>0%</b>	<b>4%</b>	<b>20%</b>	<b>72%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>10%</b>	<b>3%</b>	<b>52%</b>	<b>34%</b>

22. How good are your parents at using computers?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>12%</b>	<b>4%</b>	<b>19%</b>	<b>23%</b>	<b>42%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>0%</b>	<b>7%</b>	<b>34%</b>	<b>34%</b>	<b>24%</b>

23. How much time a day do your parents spend with you on the computer?

BEFORE	% of A	% of B	% of C	% of D	% of E
	<b>40%</b>	<b>24%</b>	<b>8%</b>	<b>4%</b>	<b>24%</b>

AFTER	% of A	% of B	% of C	% of D	% of E
	<b>31%</b>	<b>28%</b>	<b>24%</b>	<b>7%</b>	<b>10%</b>

## RESULTS

From the responses collected at the conclusion of the academic year, it was noted that the target audience's responses to questions (Appendix) had significantly shifted toward answering particular questions. Of those who responded to the question pertaining to math self-efficacy, question 2, the data indicates that the student's math self-efficacy appeared to have increased positively. The students' self-efficacy toward using computers, question 15, appeared to have shifted positively as well. Moreover, generally students' perception pertaining to their ability of singing and entertaining, question 6, tended to lean more toward the negative end of the scale, rating themselves lower than when they received the pretest survey. Homework time, question 14, appeared to have increased, but this may have been attributed to an increase in grade level and the students' measurement of homework time was



calculated based upon the previous school year. Question 18, pertaining to the highest level of education indicated blank answers on few of the pretest surveys, but the posttest survey showed more students answered this question. In addition, the educational level selected in the posttest survey tended to be higher than that indicated in the pretest survey. There appears to be a change in career choices, question 17, between the pretest and posttest surveys. The posttest surveys indicated an increase in the percentage of students who selected science/medicine as a career choice.

It has been shown that technology can have a positive impact on student achievement and student motivation (Wenglinsky, 1999; Becker, 1999). But access to technology must also include access to strategies of utilizing technology and information to achieve specific tasks. To this end, educators should be given the time and support to incorporate and adapt technology into their instructional goals.

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## APPENDIX

### Questions

1. What grade are you in?
2. How good are you in math?
3. How good are you at science?
4. Do you like using computers?
5. How good are you in sports?
6. How good are you at signing, acting, or entertaining?
7. How much do you like school?
8. What overall grade do you think you should get for schoolwork?
9. How satisfied are you with the education you are receiving at your school?
10. How important is education to you?
11. What grade do you think you should get in math?
12. What grade do you think you should get in science?
13. What grade do you think you should get in English?
14. How much time do you spend on homework each night?
15. How good are you at using computers?
16. How much time day do you spend using a computer?
17. What type of job would you most like to have in the future (choose one)?
18. What is the highest level of education you think you will complete (if unsure leave blank)?
19. What do you use computers for?
20. How much of your homework do your parents help you with?
21. Do you work hard on your schoolwork?
22. How good are your parents at using computers?
23. How much time a day do your parents spend with you on the computer?

### Answers

- |                   |                  |             |                  |                    |
|-------------------|------------------|-------------|------------------|--------------------|
| 1. a) 3-6         | b) 7 or 8        | c) 9        | d) 10 or 11      | e) 12              |
| 2. a) poor        | b) below average | c) average  | d) above average | e) excellent       |
| 3. a) poor        | b) below average | c) average  | d) above average | e) excellent       |
| 4. a) not at all  | b) very little   | c) somewhat | d) very much     | e) tremendously    |
| 5. a) poor        | b) below average | c) average  | d) above average | e) excellent       |
| 6. a) poor        | b) below average | c) average  | d) above average | e) excellent       |
| 7. a) not at all  | b) very little   | c) somewhat | d) very much     | e) tremendously    |
| 8. a) A           | b) B             | c) C        | d) D             | e) E               |
| 9. a) not at all  | b) very little   | c) somewhat | d) very much     | e) tremendously    |
| 10. a) not at all | b) very little   | c) somewhat | d) very much     | e) tremendously    |
| 11. a) A          | b) B             | c) C        | d) D             | e) E               |
| 12. a) A          | b) B             | c) C        | d) D             | e) E               |
| 13. a) A          | b) B             | c) C        | d) D             | e) E               |
| 14. a) none       | b) 15 min.       | c) 30 min.  | d) 1 hour        | e) 2 hours or more |
| 15. a) not good   | b) barely        | c) somewhat | d) very good     | e) excellent       |
| 16. a) none       | b) 30 min.       | c) hour     | d) 2 hours       | e) 3 hours or more |

17. a) sports entertainment      b) science/ medicine      c) engineering/ technology      d) education      e) law
18. a) high school      b) 2 yr. College      c) 4yr. College      d) masters degree      e) doctoral degree
19. a) games      b) school work      c) letters, or journal, etc.      d) art or drawing      e) internet e-mail
20. a) none      b) a little      c) about half      d) a lot      e) all
21. a) never      b) once in a while      c) half the time      d) most of the time      e) all the time
22. a) not good      b) barely      c) somewhat      d) very good      e) excellent
23. a) none      b) a little      c) about half      d) a lot      e) all