

HARDWARE, SOFTWARE, AND TECHNOLOGY TOOLS IN THE BUSINESS EDUCATION CLASSROOM

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Abstract

Background: Technological advancements in the educational classroom may still result in failure to integrate technology. **Purpose:** This study provides information that may be utilized to improve the integration of hardware, software, and technology tools in business/marketing education programs. **Method:** Business/marketing education teachers in a southern state were surveyed to determine the degree of availability, usage, and barriers to integrating hardware, software, and technology tools. **Results:** Significant differences were found in the use of hardware and technology tools based on the years of teaching experience. The majority of respondents reported integration barriers as extrinsic with leading barriers being budget constraints and information technology limitations. **Conclusions:** Business/marketing educators integrate technology into the classroom in varying degrees and perceive that barriers to integrating hardware, software, and technology tools exist. Teaching experience is a critical indicator of the integration of technology tools into the business/marketing classroom.

Thomas Jefferson once said, “As new discoveries are made, new truths discovered, and manners and opinions change with the change of circumstances, institutions must advance also to keep pace with the times.” These words are etched on the Thomas Jefferson Memorial in Washington D.C. Although these words were spoken over 200 years ago, they are still relevant in today’s society. The Policies Commission for Business and Economic Education (PCBEE) (2002) recommends that business educators teach students to learn, think, and embrace the challenges of the 21st century. According to the Commission, educational changes must be top priority.

Integrating technology is not a simple execution if the teacher strives to integrate technology effectively. Simply having technology available is a disservice to the students if it is not going to be utilized in an enriched learning environment. Teaching effectively with technology to a diverse population of students can prove to be cumbersome. Young (2005) proposes the real question that business educators

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face is not should technology be integrated, but how technology can be integrated effectively. According to Gorder (2008), in order to effectively integrate technology many factors have to occur, but the most important factor is the teachers' competence and the ability to shape instructional activities to meet the students' needs.

Over a decade ago, the leading barriers for integrating technology into the classroom were lack of equipment, unprepared teachers, and risk of hardware or software failure (Houseman, 1997). These are not leading barriers in today's education world, but unfortunately are still factors. Hewitt (2008) suggested that schools are better equipped than ever before. In addition, teachers are encouraged to invest in professional development for technology. Most schools now have information technology departments to assist with technology issues. Even with all the technological enhancements to the educational classroom, teachers may still fail to integrate technology into the classroom.

For the purpose of this study, technology is defined as an ever-changing definition, but is a tool created by humans to produce products, solve problems, fulfill needs, or satisfy wants (Mishra & Koehler, 2006). In addition, hardware is defined as the physical parts of a computer or related equipment (Oliverio, Pasewark, & White, 2007). Furthermore, software is defined as a term for the programs or instructions that tell the computer what to do (Newby, Stepich, Lehman, & Russell, 2006). Lastly, technology tools are defined as a web-based application used for collaboration, communication, reflection, research teaching, and/or learning (Solomon & Schrum, 2007).

Purpose of the Study

This study was designed to investigate: (a) the availability of hardware, software, and technology tools in the business/marketing classroom, (b) the extent to which business/marketing education teachers differ in their frequency of use of hardware, software, and technology tools, and (c) the barriers preventing integration of hardware, software, and technology tools by business/marketing education teachers. The purpose of this study was to provide information that may be utilized to improve the integration of hardware, software, and technology tools in business/marketing education programs. The study is valuable to administration in planning, budgeting, and implementing technology in their school systems. This study may also provide data to be used in the continuing professional development of business/marketing education teachers.

Statement of the Problem

Integrating technology in the classroom has been a top priority at the state and national levels. The International Society for Technology in Education (ISTE) is a not-for-profit organization devoted to supporting the use of information technology to assist in improving teaching and learning of K-12 students and

teacher education (International Society for Technology in Education [ISTE], 1997). The main goal of ISTE was to develop national standards for educational uses of technology to enhance educational and literacy improvements in school (Lam, 2007). ISTE promotes the effective integration of technology by teachers and students. The research problem for this study was to ascertain the degree to which business/marketing educators in a southern state utilize hardware, software, and technology tools, as well as barriers to integration.

Research Questions

The following research questions were designed to address the statement of the problem:

1. Which hardware, software, and technology tools are available for business/marketing education teachers in the classroom? What is the frequency of use of the hardware, software, and technology tools available for use in the business/marketing classroom?
2. To what extent do business/marketing education teachers differ in their frequency to use (a) hardware technology, (b) software technology, and (c) technology tools based on: (1) school type (city or county); (2) highest degree earned (Bachelor, Master, Specialist, Doctorate); and, (3) years of experience (1-5, 6-10, 11-15, 16-20, 21+)?
3. What are the perceived barriers preventing integration of hardware, software, and technology tools by business/marketing education teachers?

Review of Literature

The literature reviewed indicated that students are using technology like never before. The reality of teachers learning technology one step ahead of students is constant in this digital age. Klopfer and Yoon (2005) asserted that constructively promoting the educational advancement of today's technology-confident students requires implementing new technological tools creatively. Remarkably, Web 2.0 is transforming into a fully collaborative space with the control of content being decentralized to allow everyone to create, publish, subscribe, and share information (Asmus, Bonner, Esterhay, Lechner, & Rentfrow, 2005).

According to Nworie and Houghton (2008) "Emerging technologies have brought about innovation and flexibility in instructional delivery systems resulting in improved online and distributed learning, mobile computing and learning, engagement in multimedia instruction, use of wireless communication, and an increase in interactive and collaborative instructional tools" (p. 53). Information technology is often viewed as either a tool or content. Mundrake (2008) described the trend of including information technology in course titles, indicating that teachers spent much of their time teaching the details of how to use the tool. The

teaching paradigm is shifting to a more problem-solving approach, which teaches students how and when to use technology to perform tasks more efficiently.

With the development of technology rapidly increasing, there is no surprise that barriers will occur when integrating technology. Even the most dedicated teachers committed to integrating technology into the classroom will encounter challenges along the way. Ertmer (1999) discussed both extrinsic and intrinsic barriers. Extrinsic barriers were described as those outside of the teacher's control, including access to technology, insufficient time to plan, and inadequate support from both administration and information technology departments. Intrinsic barriers were described as those within the teacher's control, including beliefs about teaching and technology, established practices, and unwillingness for change.

Literature reviewed indicated that business educators are still hesitant when utilizing technology tools in the classroom (Gorder, 2008). Several researchers (Earle, 2002; George, 2000; and Whitehead, Jensen, & Boschee, 2003) found technical support, teacher expertise, time for planning, budget and pedagogical applications to be barriers when integrating technology into the classroom. This study will update previous research to determine if improvements have been made and to determine current barriers to the integration of hardware, software, and technology tools in the business/marketing classroom.

Methodology

Population

The population for this study consisted of secondary business/marketing educators in a southern state. The State Department of Education Business/Marketing Education Directory provided the roster of names and email addresses.

Instrumentation

Data were collected through a researcher-designed survey. The researcher developed the survey instrument after an appropriate instrument was not revealed in the review of literature. The survey included the following sections: (a) demographic data; (b) degree of availability, usage, and barriers of hardware and software technology; and (c) degree of availability, usage, and barriers of technology tools.

The demographic data in section one included age group, gender, type of school, highest degree held, grade levels taught, and years teaching business/marketing education. Section two of the survey instrument included information regarding hardware and software technology. Participants were given a list of hardware and software and were instructed to indicate the availability in the classroom and how often the hardware and software were utilized. Participants were then asked to identify barriers, if any, preventing the integration of hardware and software technology in the classroom.

Section three of the survey instrument included information regarding technology tools. Participants were given a list of technology tools and were instructed to indicate the availability in the classroom and how often those specific tools were used. Participants were then asked to identify barriers, if any, preventing integration of technology tools in the classroom.

Data Collection

Each member of the population received an email. Participants were asked to complete the survey within a two-week time period. Because submissions were anonymous, each member of the sample received a follow-up email asking for their help in satisfying research requirements by completing the survey if they have not already done so. Participants were contacted once for follow-up purposes in compliance with institutional research protocol. A total of 772 emails were sent requesting participation. Two-hundred thirty one (231) email addresses were returned as undeliverable. Eight (8) surveys were submitted that were not usable. At the conclusion of data collection, 116 surveys were returned.

Validity and Reliability

The items of the survey were derived from the research objectives and the review of literature. A panel of expert judges, including secondary business educators, was used to evaluate the survey instrument to determine content validity and usability. The panel of experts consisted of university faculty members and a selected group of educators and researchers known for their experience in descriptive survey research design, survey instruments, and/or data collection. The panel of experts was asked to review the survey instrument for clarity of directions, concepts, and definitions. Panel recommendations were considered and incorporated into the final instrument. In addition, a pilot study was conducted, and minor modifications were made.

Cronbach's alpha was calculated in this study to ascertain reliability coefficients for the following sections of the research instrument: (a) frequency of use of hardware, (b) frequency of use of software, and (c) frequency of use of technology tools. Reliability coefficients for each scale were .77, .50, and .79 respectively, which indicated that the items had relatively high internal consistency for all scales except for software. Since Chronbach's alpha ranges from 0 to 1, with 1 indicating perfect reliability and 0 indicating no reliability, the scale for frequency of use of software was accepted as reliable.

Data Analysis

Statistical treatment of the data included the use of the software application Statistical Package for the Social Sciences (SPSS) 18.0. Descriptive statistics were used to analyze, organize, summarize, and describe the collected data. Research question one was analyzed using descriptive statistics to calculate frequency counts

and percentages for availability of hardware, software, and technology tools. In addition, the Mean and Standard Deviation were calculated for usage. According to Gall, Gall, and Borg (2005) descriptive statistics serve a useful purpose by summarizing all the data in the form of a few simple numerical expressions. Research question two was analyzed using Analysis of Variance (ANOVA) tests to determine the difference in business/marketing educators' frequency of use of hardware, software, and technology tools and (a) school type (city or county), (b) highest degree earned (bachelor, master, specialist, doctorate), and (c) years of teaching experience (1-5, 6-10, 11-15, 16-20, 21+). Research question three was analyzed using descriptive statistics to calculate frequency counts and percentages of perceived barriers to integration.

Findings and Discussion

The majority of respondents were female (84.5%). Age categories ranged from 20 to 61+, with the highest reporting in the category of 51 to 60 (31.9%). The highest reported grade level taught was 11th grade (67.2%). Most respondents taught at a county school (56.9%). In the category of teaching experience, 25% had been teaching for 6 to 10 years. The largest percent of respondents held a master's degree (67.2%).

Research Question 1: Which hardware, software, and technology tools are available for business/marketing education teachers in the classroom? What is the frequency of use of the hardware, software, and technology tools available for use in the business/marketing classroom?

The results indicate that new and emerging hardware is not integrated into the classroom and more dated hardware is readily available. The hardware most available were Projector (93.1%) and Scanner (91.4%). The hardware least available were iPad (6.9%) and Tablet PC (26.7%). Table 1 presents the availability and usage of hardware in the business/marketing classroom.

Table 1
Availability and Use of Hardware

	Availability				Usage (if Available) ^a	
	No		Yes			
Item	<i>f</i>	%	<i>f</i>	%	M	SD
Projector	8	6.9	108	93.1	4.49	.75
Scanner	10	8.6	106	91.4	3.25	.88
Digital Camera	16	13.8	100	86.2	3.32	.85
Headphone	19	16.4	97	83.6	3.34	1.02
Laptop	25	21.6	91	78.4	4.21	.86
Microphone	42	36.2	74	63.8	2.89	.91
Music Video Player	42	36.2	74	63.8	3.41	.95
Digital Video Camera	51	44.0	65	56.0	3.15	.79
Smartboard	55	47.4	61	52.6	3.93	1.01
Webcam	72	62.1	44	37.9	2.5	.90
Student Response System	78	67.2	38	32.8	2.62	1.02
Tablet PC	85	73.3	31	26.7	3.58	1.31
iPad	108	93.1	8	6.9	3.00	1.41

^a Usage (if Available) Likert-type scale: 1=never, 2=rarely, 3=sometimes, 4=very often, 5=always

The results indicate that the respondents have relatively up-to-date software in the classroom. While most respondents do not have the latest Microsoft Office Suite 2010, the previous version, 2007, is available in many classrooms. The software most available were Education Data Management (89.7%) and Testing (70.7%). The software least available were Microsoft Office Suite 1997 (2.6%) and Microsoft Office Suite 2000 (5.2%). Table 2 reflects the availability and usage of software in the business/marketing classroom.

Table 2
Availability and Use of Software

	Availability				Usage (if Available) ^a	
	No		Yes		M	SD
Item	<i>f</i>	%	<i>f</i>	%		
Education Data Management	12	10.3	104	89.7	4.87	.58
Testing	34	29.3	82	70.7	3.25	.91
Microsoft Suite 2007	40	34.5	76	65.5	4.76	.69
Electronic Messaging	49	42.2	67	57.8	4.18	.95
Photo Editing	52	44.8	64	55.2	3.06	.96
Web Design	61	62.6	55	47.4	3.22	1.07
Microsoft Suite 2003	62	53.4	54	46.6	4.28	1.22
Video Editing	71	61.2	45	38.8	2.96	1.04
Audio Editing and Recorder	80	69.0	36	31.0	2.69	.71
Screen Recording	93	80.2	23	19.8	2.87	1.01
EBook	93	80.2	23	19.8	3.22	.99
Microsoft Suite 2010	104	89.7	12	10.3	4.75	.45
Microsoft Suite 2002	110	94.8	6	5.2	3.17	1.83
Microsoft Suite 2000	110	94.8	6	5.2	2.67	1.63
Microsoft Suite 1997	113	97.4	3	2.6	1.50	.71

^a Usage (if Available) Likert-type scale: 1=never, 2=rarely, 3=sometimes, 4=very often, 5=always

The results indicate that technology tools are utilized in the classroom; however, the older technology tools are utilized more than the cutting-edge technology tools. The technology tools most available were the Internet (98.3%) and Wikis (58.6%). The technology tools that were least available were Vodcast (10.3%) and Social Networking (15.5%) Table 3 presents the availability and use of technology tools.

Table 3
Availability and Use of Technology Tools

	Availability				Usage (if Available) ^a	
	No		Yes		M	SD
Item	<i>f</i>	%	<i>f</i>	%		
Internet	2	.7	114	98.3	4.64	.65
Wiki	48	41.4	68	58.6	2.79	.97
Blog	53	45.7	63	54.3	2.92	1.25
Simulation	54	46.6	62	53.4	3.55	.95
Webinar	54	46.6	62	53.4	2.74	.63
Internet Modules	60	51.7	56	48.3	3.32	.69
Webquest	65	56.0	51	44.0	2.65	.89
Podcast	72	62.1	44	37.9	2.52	.98
Video Sharing	83	71.6	33	28.4	3.00	.75
Social Networking	98	84.5	18	15.5	2.33	1.89
Vodcast	104	89.7	12	10.3	2.00	.71

^a Usage (if Available) Likert-type scale: 1=never, 2=rarely, 3=sometimes, 4=very often, 5=always

Research Question 2: To what extent do business/marketing education teachers differ in their frequency to use (a) hardware technology, (b) software technology, and (c) technology tools based on: (1) school type (city or county); (2) highest degree earned (Bachelor, Master, Specialist, Doctorate); and, (3) years of experience (1-5, 6-10, 11-15, 16-20, 21+)?

Use of Hardware

There were no statistically significant differences in use of hardware for teachers based on type of school [$F(1,77) = .15, p = .70$] or highest degree earned [$F(3,77) = .62, p = .60$]. Results showed statistically significant differences for teachers based on years of teaching experience [$F(4,77) = 3.05, p = .02$]. Pairwise comparisons revealed statistically significant differences between teachers who had 6 to 10 years of teaching experience and those with more than 21 years of teaching experience ($p = .04$). The mean of the sum scores for teachers with 6 to 10 years of teaching experience was 31.00 compared to the mean of the sum

scores of 23.14 for teachers with more than 21 years of teaching experience, with standard deviations of 9.81 and 8.56 respectively. Teachers with 6 to 10 years of teaching experience integrated hardware more frequently than teachers with more than 21 years of teaching experience ($M = 7.86$). Table 4 presents the mean of the sum scores and standard deviations for differences in business/marketing educator's use of hardware.

Table 4
Mean and Standard Deviations for Use of Hardware Based on School Type, Highest Degree, and Years of Teaching Experience

	Item	M	SD
School Type			
	City	26.64	10.85
	County	27.25	10.21
Highest Degree			
	Bachelor	26.36	11.24
	Master	26.42	10.42
	Specialist	30.33	9.61
	Doctorate	26.98	
Years Teaching			
	1 to 5	24.12	9.12
	6 to 10	31.00	9.81
	11 to 15	28.64	12.62
	16 to 20	29.73	11.08
	More than 21	23.14	8.56

Use of Software

There were no statistically significant differences in use of software for teachers based on type of school [$F(1,77) = .43, p = .51$], highest degree earned [$F(3,77) = .36, p = .78$], or years teaching [$F(4,77) = 1.17, p = .33$]. Although not statistically significant, the data indicates teachers with advanced education levels integrated software more than others.

Use of Technology Tools

There were no statistically significant differences in use of technology tools for teachers based on their type of school [$F(1,77) = 1.19, p = .28$], or highest degree earned [$F(3,77) = .95, p = .42$]. Results showed statistically significant differences for teachers based on their years of teaching experience [$F(4,77) = 3.21, p = .02$].

Pairwise comparisons revealed statistically significant differences were revealed between teachers who had 1 to 5 years of teaching experience and those with 6 to 10 years of teaching experience ($p = .02$). The mean of the sum scores for teachers with 1 to 5 years teaching experience was 12.60 compared to 18.45 for teachers with 6 to 10 years of teaching experience, with standard deviations 7.24 and 8.73 respectively. Teachers with 1 to 5 years of teaching experience integrated technology tools less frequently than teachers with 6 to 10 years of teaching experience ($M = 6.71$).

In addition, pairwise comparisons revealed statistically significant differences between teachers who had 1 to 5 years of teaching experience and those with 16 to 20 years of teaching experience ($p < .01$). The mean of the sum scores for teachers with 1 to 5 years of teaching experience was 12.60 compared to 18.55 for teachers with 16 to 20 years of teaching experience, with standard deviations 7.24 and 10.56 respectively. Teachers with 1 to 5 years of teaching experience integrated technology tools less frequently than teachers with 16 to 20 years of teaching experience ($M = 9.25$).

Moreover, pairwise comparisons revealed statistically significant differences were revealed between teachers between teachers who had 6 to 10 years of teaching experience and those with more than 21 years of teaching experience ($p = .04$). The mean of the sum scores for teachers with 6 to 10 years of teaching experience was 18.55 compared to 15.17 for teachers with more than 21 years of teaching experience, with standard deviations 8.73 and 8.61 respectively. Teachers with 6 to 10 years of teaching experience integrated technology tools more frequently than teachers with more than 21 years of teaching experience ($M = 6.07$).

Furthermore, pairwise comparisons revealed statistically significant differences between teachers who had 16 to 20 years of teaching experience and those with more than 21 years of teaching experience ($p = .02$). The mean of the sum scores for teachers with 16 to 20 years of teaching experience was 18.55 compared to 15.17 for teachers with more than 21 years of teaching experience, with standard deviations 8.73 and 8.61 respectively. Teachers with 16 to 20 years of teaching experience integrated technology tools more frequently than teachers with more than 21 years of teaching experience ($M = 8.61$). Table 5 presents the mean scores and standard deviations for differences in business/marketing educator's use of technology tools.

Table 5
Mean and Standard Deviation for Use of Technology Tools Based on School Type, Highest Degree, and Years of Teaching Experience

	Item	M	SD
School Type			
	City	18.46	9.45
	County	14.68	8.19
Highest Degree			
	Bachelor	13.95	8.66
	Master	15.73	8.10
	Specialist	23.20	10.75
	Doctorate	10.00	
Years Teaching			
	1 to 5	12.60	7.24
	6 to 10	18.45	8.73
	11 to 15	18.09	9.59
	16 to 20	18.55	10.56
	More than 21	15.17	8.61

Research Question 3: What are the perceived barriers preventing integration of hardware, software, and technology tools by business/marketing education teachers?

Results indicate the leading barriers for hardware and software integration are extrinsic. Interestingly, the respondents reported the two highest barriers as budget constraints and information technology limitations and the lowest perceived barrier lack of motivation as preventing the integration of technology tools as well. Table 6 presents the frequencies and percentages that indicate perceived barriers to integrating hardware and software in the classroom. The highest perceived barriers were budget constraints (84.5%) and information technology limitations (48.3%). The lowest perceived barriers were lack of motivation (9.5%) and lack of support from administration (13.8%).

Table 6
Perceived Barriers to Integrating Hardware and Software

	Item	f	%
Budget Constraints			
	No	18	15.5
	Yes	98	84.5
Information Technology Limitations			
	No	60	51.7
	Yes	56	48.3
Lack of Time for Learning			
	No	65	56.0
	Yes	51	44.0
Lack of Time for Implementation			
	No	72	62.1
	Yes	44	37.9
Lack of Understanding			
	No	78	67.2
	Yes	38	32.8
Lack of Professional Development			
	No	78	67.2
	Yes	38	32.8
Fear of Change			
	No	96	82.8
	Yes	20	17.2
Fear of Appearing Incompetent			
	No	98	84.5
	Yes	18	15.5
Fear of Technology			
	No	99	85.3
	Yes	17	14.7
Lack of Support from Administration			
	No	100	86.2
	Yes	16	13.8
Lack of Motivation			
	No	105	90.5
	Yes	11	9.5

Results indicate the leading barriers for technology tools integration are extrinsic. Table 7 presents the frequencies and percentages that indicate perceived barriers to integrating technology tools in the classroom. The highest perceived barriers were budget constraints (60.3%) and information technology limitations (53.4%). The lowest perceived barriers were lack of motivation (10.3%) and fear of technology (10.3%).

Table 7
Perceived Barriers to Integrating Technology Tools

	Item	<i>f</i>	%
Budget Constraints			
	No	46	39.7
	Yes	70	60.3
Information Technology Limitations			
	No	54	46.6
	Yes	62	53.4
Lack of Time for Learning			
	No	68	58.6
	Yes	48	41.4
Lack of Time for Implementation			
	No	73	62.9
	Yes	43	37.1
Lack of Understanding			
	No	86	74.1
	Yes	30	25.9
Lack of Professional Development			
	No	86	74.1
	Yes	30	25.9
Fear of Change			
	No	88	75.9
	Yes	28	24.1
Fear of Appearing Incompetent			
	No	104	89.7
	Yes	12	10.3
Fear of Technology			
	No	104	89.7
	Yes	12	10.3
Lack of Support from Administration			
	No	104	89.7
	Yes	12	10.3
Lack of Motivation			
	No	104	89.7
	Yes	12	10.3

Conclusions

The following conclusions were based on the findings of the study:

1. Business/marketing educators integrate technology into the classroom in varying degrees. Respondents reported integrating older hardware; relatively up-to-date software; and, dated technology tools into the classroom.
2. Business/marketing educators perceive that barriers to integrating hardware, software, and technology tools exist. These barriers were identified as extrinsic barriers. The leading barriers in all categories (hardware, software and technology tools) were budget constraints and information technology limitations.
3. Teaching experience is a critical indicator of the integration of technology tools into the business/marketing classroom. When analyzing demographic information, the data revealed that the years of teaching experience (1-5, 6-10, 11-15, 16-20, 21+) was the only demographic variable that showed a significant effect on the frequency of use for integration of hardware and technology tools. Business/marketing educators with 1 to 5 years and more than 21 years of teaching experience integrated technology less frequently than others.

Recommendations

Based on the conclusions, the following recommendations are made:

1. Consideration should be given to implementing a plan to prepare both pre-service and in-service business/marketing educators to effectively integrate emerging technologies into the classroom. With training, teachers would be more capable of integrating technology, increasing students' knowledge of emerging technology and preparing the students to enter the 21st century workforce.
2. Business/marketing educators should begin to look for resources, grants, and community efforts to overcome budget constraints in the classroom. Administration and Information Technology departments should be informed of the available technology that is currently being restricted and the benefits of making this technology available to educators.
3. Participation in professional development regarding integrating technology should be offered to all business/marketing educators. Teachers with 1 to 5 and more than 21 years of teaching experience should be encouraged to participate.
4. A follow-up study should be conducted to determine the degree of information technology limitations that are prohibiting business/marketing educators from integrating technology into the classroom.

5. A follow-up study should be conducted in two years to determine progress toward the goal of preparing business/marketing educators to effectively integrate technology into the classroom.
6. A follow-up study should be conducted to determine the type of professional development that business educators prefer.
7. A follow-up study should be conducted to determine why teachers with 6-20 years of teaching experience use technology more frequently than those with 1-5 or 21+.

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