Gender Grouping: Effects on Technology Attitudes, Perceptions, and Uses

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Introduction

Brain and gender research conducted and collected at the Gurian Institute indicates that differences in male and female brains impact the way males and females use technology. Girls are more comfortable using computers to instant message friends, but less comfortable than males with technology equipment (Gurian & Stevens, 2004; Wolters, 1989). The role of gender in learning has been confirmed with the brain imaging technologies of the positron emission tomography (PET) and MRI, which show significant structural and functional differences between female and male brains that impact learning (Gurian & Stevens, 2004). According to Gurian and Stevens, differences in female and male brains are found throughout the world. Females tend to have better language skills, enjoy reading and writing, generally meaning better grades, and they are relatively quiet in class. Males tend to have better math skills, but weaker language skills than females, meaning males usually do not enjoy reading and writing as much as females. Males tend to make lower grades, are typically more rowdy in class, like to move around more, and talk louder (Gurian, Henley, & Trueman, 2001). Nunley (2003) cautions readers that physical gender does not always determine brain hemisphere dominance.

Gender Class Research

When President Bush signed the No Child Left Behind Act of 2001(NCLB Act), elementary and secondary schools were reauthorized to provide same gender classes (U. S. Department of Education, 2002a). Until the NCLB Act, single gender classes had been banned by Title IX, which prohibited sexual discrimination in schools that received federal funding (Bell, 2003). Section 5131 of the NCLB Act also allows local education agencies to use funds from Innovation Programs to fund same gender classes (U.S. Department of Education, 2002b). The NCLB Act has resulted in an increase in the number of single-gender classes being offered

at public schools. During the past eight years, the number of public schools in the U.S. offering same gender classes increased from 4 to 140 (*Alabama School Journal*, 2004).

Since males and females have different brain structures and learning styles, would they benefit from separate gender classes? Research indicates that both genders do benefit (Bell, 2003; Freeman, 2003; Gurian et al., 2001). In single-gender classes, females show improvement in math and science, while males show improvement in reading, writing, and discipline (Gurian et al., 2001). Both genders are less inhibited and more eager to learn when they are in single-gender classes (Freeman, 2003). Single-gender classrooms promote greater student participation, interaction, and fewer social distractions for both genders (Bell, 2003).

Friend's (2006) study of eighth grade science students grouped in same-gender classes in a public middle school setting examined achievement in and attitudes toward science. She found no significant differences in science achievement with gender grouping and that grouping did not create a more positive classroom climate. Mulholland, Hansen, and Kaminski (2004) reported on research conducted to address the underachievement of males by placing students in single-gender and coeducational mathematics and science classrooms. Results indicated no significant differences in achievement in mathematics for either the single-gender or coeducational classes, although scores in English improved for students in the single-gender classes. They reported that in the single-gender classes, females improved more than males. Silverman and Pritchard (1996) found that females enjoyed technology education and had confidence in their technological abilities at the beginning of their study, but as the study progressed, gender issues emerged when male students monopolized the equipment and made fun of the females when they used the equipment. This had a negative impact on female enjoyment and confidence levels regarding computers.

Purpose of the Study

The purpose of this study is to examine the differences of gender grouping on attitudes, perceptions, and uses of technology.

Null Hypotheses Guiding Quantitative Data Collection

- There will be no difference in females' attitudes toward computer importance, enjoyment, anxiety, or interest based on class grouping.
- There will be no difference in males' attitudes toward computer importance, enjoyment, anxiety, or interest based on class grouping.
- There will be no difference in females' pre and post attitudes toward computer importance, enjoyment, anxiety, or interest based on class grouping.
- There will be no difference in males' pre and post attitudes toward computer importance, enjoyment, anxiety, or interest based on class grouping.
- There will be no relationship in females' perceptions of computer use by boys and girls based on class grouping.
- There will be no relationship in males' perceptions of computer use by boys and girls based on class grouping.

Research Questions Guiding Qualitative Data Collection

- Will students differ in how much time they spend on the computer?
- What relevant ideas will emerge from the students involved in the study that will contribute to increasing the body of knowledge regarding gender based grouping, use of computers by students, and computer use in the home environment?

Methodology

This study utilized a mixed method approach, combining qualitative and quantitative research techniques (Onwuegbuzie & Collins, 2004), which provides an opportunity to corroborate findings across different approaches. Adding qualitative interviews and observations to quantitative data provides the researcher with the opportunity to understand the phenomenon from the participant perspective (Johnson & Onwuegbuzie, 2004; Merriam, 1998). The researcher is then able to build theory from observations obtained from the fieldwork (Merriam, 1998).

Setting of the Study

This study took place in a neighborhood school in a planned urban development community in central Alabama, which is affluent and consists of professionals and high level managers of the business community. The community continues to experience rapid growth with school enrollment increasing 297% since the school opened in August, 1999. The racial composition of the community and school is predominately white. The neighborhood elementary school had 545 students enrolled in kindergarten through sixth grade; 516 white students, sixteen black students, ten Asian students, and three Hispanic students. Sixty-one students were in the sixth grade class; 56 were white, 3 were black, 1 was Asian, and 1 was Hispanic. Fifty nine of the sixth grade students participated in the study.

The sixth grade classrooms provide the students with a rich technology environment. Each classroom has five computers with high speed Internet access with one computer in each classroom connected to a television for whole class instruction. Teachers have access to an interactive Smart Board, a class set of AlphaSmarts, iPods, and a computer lab equipped with 25 eMacs. The science and technology classroom has a set of Palm Pilots and science probes for data collection, data analysis, and experiments. Data collected with the Palm Pilots is hot synced

to a computer where they can be examined and printed for analysis. Students and teachers interact with technology on a daily basis.

Participants

Fifty-nine sixth grade students volunteered to participate; 29 boys and 40 girls. SPSS 11.5 was used to randomly assign females to the mixed- or single-gender class; 20 to the single-gender and 10 to the mixed-gender class. Twenty boys agreed to participate, enough to form the male single-gender class. Eleven boys who elected to not participate were in the mixed-gender class. Once the gender groups were formed, nine additional boys agreed to participate in the study.

Procedures

A letter included with the last report card of all fifth grade students informed parents of the gender study to be conducted during the 2004-2005 school year and provided parents and possible student participants the opportunity to decide if they wanted to participate prior to registration, held the week before school started. A parent meeting was held prior to registration to explain the study, answer questions, and address concerns. A letter of introduction with detailed information about the proposed study, informed consent, and informed assent forms were included in sixth grade registration packets. The researcher attended registration to answer questions and collect participant forms. Participating students were placed in the single-gender and mixed-gender classes, and non- participants were placed in the mixed-gender class. Students rotated between three teachers for math, science/technology, and social studies in their groups. The classes were taught the same information by the same teachers. The students remained with their regular assigned homeroom for all other classes.

Instrumentation

The Computer Survey, adapted from the Computer Attitude Questionnaire (CAQ) and the Pupil's Attitudes Toward Technology (PATT-USA), was used in this study. The original PATT instrument developed by Mar de Vries at Eindhoven Technology University in the Netherlands in 1984 (Becker & Maunsaiyat, 2002; Heywood, 1998) was adapted in 1987 by E. Allen Bame, William E. Dugger Jr., and Marc deVries for use in the United States (Heywood). The PATT-USA consists of 100 questions divided into three sections to obtain demographic information, assess students' attitudes toward technology, and assess students' concepts of technology. The CAQ is a 65-item Likert instrument for measuring students' computer attitudes in grades four through eight. The instrument was developed and validated by researchers associated with the Texas Center for Educational Technology (Knezek & Miyashita, 1993).

The Computer Survey (TCS) uses statements from the PATT-USA and CAQ. A panel of experts reviewed and analyzed the TCS, which has 54 items divided into four sections to assess the technical home environment, computer uses, and attitudes toward computers. The first section has 26 four-point Likert-type self-report statements about computer interest, enjoyment, anxiety, and importance. All attitude subscales on the TCS were analyzed using Cronbach's alpha to determine internal reliability. Alpha values ranged from .71 to .78, which are acceptable (Garson, 2005). Twelve items in the TCS subscales have negative wording and scores for these items were reversed. The second section contains nine, four-point Likert-type self-report statements regarding gender attitudes about computer use. The third section has eleven yes/no statements to obtain demographics and information about the technological home environment. The fourth section contains eight free-response items regarding computer use and home technological equipment.

Data Collection

The quantitative part of the study consisted of a pretest, posttest survey. The pretest survey was administered the first week of school prior to instruction. The posttest survey was administered during the last week of the fall semester. The researcher administered the surveys during the science and technology class. Additional quantitative data were obtained from computer logs where students documented time spent and activities done on home computers.

Qualitative data consisted of responses to eight free-response items on The Computer Survey (TCS), field notes, classroom observations, student work, student interviews, and student reflections. Every week the researcher selected a different cooperative group in each class to observe as they completed an activity. The researcher used the Teacher Observation Checklist to record observations of these groups. The target group was videotaped to allow the researcher to review interaction of the students with each other and with technology as they worked. Participants were requested to record their home computer time and activities on the Student Computer Use Documentation Record. Four randomly selected students from each class participated in ten minute interviews conducted during the last two weeks of the first semester during morning homeroom. During the interviews, students were asked questions about their experiences and opinions regarding their placement in the male, female, or mixed gender class. All study participants were also given the opportunity to write a reflection on the gender class in which they were placed.

Data Analysis

Quantitative data were analyzed using t-tests and chi-square to look for differences and relationships. Qualitative data were analyzed using recurring themes. One researcher reflectively coded each written observation, document, and free response survey item with keywords to

identify and categorize reoccurring themes. The other researcher then compared the themes to the collected data to insure that the coding was appropriate.

Assumptions and Limitations

Assumptions for this study include: (a) participants have had computers in their classrooms since they started school, (b) students were the objectives in the *Alabama Course of Study: Technology Education* (2002), (c) students understood the survey questions and answered them honestly, and (d) students were honest with documentation and interviews participation.

Several limitations affect the generalizability of this study. Males in the single- and mixed-gender classes were not randomly assigned due to the lack of male participation at the beginning of the study. Students were responsible for documenting home computer time and activities. Some students kept accurate records while others did not and several students misplaced logs, therefore, data were used from one week instead of the planned twelve weeks. The study was in a high socio economic area neighborhood school, therefore results are generalizable to a similar population. The school system experienced technology problems that delayed most of the technology instruction until the second quarter, which reduced the technology originally planned for integration in the science lessons and the number of observations of students interacting with technology.

Results

Quantitative Analysis

Null Hypothesis One

An independent samples *t*-test was calculated for each subscale to determine if a difference in attitudes toward computer importance, enjoyment, anxiety, or interest based on class grouping existed between females in the single- and mixed-gender classes. No significant difference was found in any subscales ($p > .05$), therefore, the null hypothesis was not rejected.

Table 1 presents the group means, standard deviation, t-values, and significance levels for each subscale.

Table 1. Female Attitudes

Subscale	Class	*N*	Mean	Std. Dev.	*t*	*Df*	Sig.
Computer Importance	Female	20	22.7000	3.24605	.432	28	.669
	Mixed	10	23.2000	2.34758			
Computer Enjoyment	Female	20	31.5000	2.64575	-.388	28	.701
	Mixed	10	31.1000	2.68535			
Computer Anxiety	Female	20	28.3000	2.29645	-.406	28	.688
	Mixed	10	27.9000	2.99815			
Computer Interest	Female	20	18.6000	3.53032	-.510	28	.614
	Mixed	10	18.0000	1.56347			

Null Hypothesis Two

An independent samples *t*-test was calculated for each subscale to determine if a difference in attitudes toward computer importance, enjoyment, anxiety, or interest based on class grouping existed between males in the single- and mixed-gender classes. No significant difference was found in any subscales ($p > .05$), therefore, the null hypothesis was not rejected. Table 2 presents the group means, standard deviation, t-values, and significance levels for each subscale.

Table 2. Male Attitudes

Subscale	Class	*n*	Mean	Std. Dev.	*t*	*Df*	Sig.
Computer Importance	Male	20	22.3000	3.40433	-.102	27	.920
	Mixed	9	22.4444	3.84419			
Computer Enjoyment	Male	20	29.8500	4.19618	.158	27	.875
	Mixed	9	29.5556	5.52519			
Computer Anxiety	Male	20	26.9500	3.59056	.381	27	.706
	Mixed	9	26.3333	4.92443			
Computer Interest	Male	20	19.4000	4.05748	-1.284	27	.210
	Mixed	9	21.4444	3.74537			

Null Hypothesis Three

Change scores and an independent samples *t*-test were calculated for each subscale to determine if a difference in pre and post attitudes toward computer importance, enjoyment, anxiety, or interest based on class grouping existed between females in the single- and mixed-gender classes. No significant difference was found in any subscales ($p > .05$), therefore, the null hypothesis was not rejected. Table 3 presents group means, standard deviation, t-values, and significance levels for each subscale.

Table 3. Female Attitudes Based on Class Grouping

Subscale	Class	*n*	Mean	Std. Dev.	*t*	*Df*	Sig.
Computer Importance	Female	20	.8000	2.41922	-1.350	28	.188
	Mixed	10	2.2000	3.15524			
Computer Enjoyment	Female	20	.9000	2.24546	-1.609	28	.119
	Mixed	10	2.4000	2.71621			
Computer Anxiety	Female	20	2.6500	3.58762	1.629	28	.114
	Mixed	10	.5000	2.99073			
Computer Interest	Female	20	-.8000	1.70448	1.292	28	.207
	Mixed	10	-1.6000	1.34990			

Null Hypothesis Four

Change scores and an independent samples *t*-test were calculated for each subscale to determine if a difference in pre and post attitudes toward computer importance, enjoyment, anxiety, or interest based on class grouping existed between males in the single- and mixed-gender classes. No significant difference was found in any subscales ($p > .05$), therefore, the null hypothesis was not rejected. Table 4 presents group means, standard deviation, t-values, and significance levels for each subscale.

Table 4. Male Attitudes Based on Class Grouping

Subscale	Class	*N*	Mean	Std. Dev.	*t*	*Df*	Sig.
Computer Importance	Male	20	.3000	2.73573	-.932	27	.360
	Mixed	9	1.3333	2.82843			
Computer Enjoyment	Male	20	-.5000	3.41051	-.476	27	.638
	Mixed	9	.2222	4.54911			
Computer Anxiety	Male	20	-.3500	4.28308	-1.120	27	.273
	Mixed	9	1.3333	1.93649			
Computer Interest	Male	20	-.5000	1.93309	-.213	27	.833
	Mixed	9	-.3333	2.00000			

Null Hypothesis Five

A chi-square was calculated to determine if a relationship existed between females in the single- and mixed-gender classes and their perceptions of computer use. No significant relationship was found ($p > .05$), therefore, the null hypothesis was not rejected. Table 5 presents the means, standard deviation, chi-square, and significance levels for each subscale.

Table 5. Female Perceptions

Subscale	Class	*n*	Mean	Std. Dev.	Chi-Sq	*Df*	Sig.
Computer Use	Female	20	31.2500	3.69744	9.000	9	.437
	Mixed	10	29.1000	2.88480	1.200	7	.991

Null Hypothesis Six

A chi-square was calculated to determine if a relationship existed between males in the single- and mixed-gender classes and their perceptions of computer use. No significant relationship was found ($p>.05$), therefore, the null hypothesis was not rejected. Table 6 presents the means, standard deviation, chi-square, and significance levels for each subscale.

Table 6. Male Perceptions

Subscale	Class	*n*	Mean	Std. Dev.	Chi-Sq	*Df*	Sig.
Computer Use	Male	20	29.3500	3.82891	3.400	12	.992
	Mixed	9	31.5556	4.06544	2.333	5	.801

Qualitative Analysis

Research Question One

Research Question One explored whether students differed in time spent on the computer. The Student Computer Use Documentation Record provided data regarding home computer time and activities. Participants were requested to record data for twelve weeks; but when several students did not, all students were then asked to keep a record for one week. Forty-seven students turned in computer records for one week: 29 females compared to 18 males. Females averaged 4.57 hours and males averaged 2.96 hours on the computer. All participants in the single-gender female class turned records for one week with a class average of 4.12 hours spent on the computer. Eleven of twenty females identified instant messaging as the most frequent activity. Twelve of the twenty participants in the single-gender male class turned in records for one week with a class average of 2.9 hours spent on the computer. Six males identified instant messaging as the activity on which they spent the most time (14.25 hours), while six identified games (19.58 hours). In the mixed-gender class, fifteen of nineteen participants turned in records for one week, with a class average of 1.22 hours spent on the computer; nine of ten females turned in records with an average time spent on the computer of 5.57 hours; and six of nine males turned in records with an average time spent on the computer of 3.06 hours. Instant messaging was the most frequently identified activity by six females (40.96 hours) and four males (16.88 hours).

Research Question Two

Research Question Two asked, "What relevant ideas will emerge from the students involved in the study that will contribute to increasing the body of knowledge regarding gender based grouping, use of computers by students, and computer use in the home environment?" Several relevant themes emerged, including that single gender classes have the potential to

provide a more comfortable learning environment and increase the self confidence level of many students. More females than males preferred single-gender over mixed-gender classes. Students in single-gender classes indicated they felt more comfortable asking questions, sharing ideas, and making class presentations.

Student Interviews

Four students in each single-gender class were randomly selected for interviews about their class placement. The interviews were conduced during morning homeroom in the science and technology classroom. The atmosphere was relaxed and informal and the interviews lasted about ten minutes.

Female Class Interviews. All participants in the female class interviews indicated they enjoyed being in the all female class. Their favorite group activities were using Palms to conduct experiments such as testing temperature of sand and water and beaming information. Responses concerning the least favorite activity involving technology were split. Two students had no least favorite activities while one student did not like measuring hand temperature and one did not like taking the vocabulary test on the Palm. When asked whether being in a single-gender class helped them to be a better student, two said yes and two said no, although of the two who said no, one commented that there were less distractions in the all female class and the other said it was more fun. Two participants said they missed having boys in the class while two said they did no. When asked what contribution boys bring to class, one participant said “Nothing”; one said “They are a distraction; they make noises while the teacher is talking.”; one said “They have different opinions, fun to hang around with.”; and one said “Disturbances, rude noises, they don’t make a good study/work environment.” All four participants indicated they would like to have more all female classes. When asked if they could have picked which class they were in, three participants said the all female class and one said “Mixed, because I didn’t know what the girls’

class would be like, but now I like the girls class better, a lot better." When asked for additional comments, two students said it was fun and things were easier in an all girl class.

Male Class Interviews. All participants in the male class interviews indicated that they enjoyed being in the all male class. Their favorite group activities in the class were using Palms to conduct experiments such as testing temperature of sand and water and using temperature probes. There were no least favorite activities. When asked whether being in a single-gender class helped them to be a better student, two said yes and two said no. Two participants said they missed having girls in the class, while two said they did not. All four participants commented that girls contributed to the class. One said girls made the class quieter, one said girls were more obedient and the other two commented that girls contributed, but did not say how. Three participants said they would like to have more all male classes and one said he would not. Two participants indicated that they would have picked the all male group given the choice and two would have picked the mixed class. None of the interviewees had additional comments.

Mixed Class Interviews. The mixed class interviews consisted of two males and two females. All four indicated that they enjoyed being in the mixed class. All four had the same favorite activity: using Palms and probes for measuring temperature. None of the interview participants had any least favorite activity. When asked if being in the mixed group helped them to be a better student, one male indicated it did because "you also talked about other things besides science." The other male said "Not really." One female was not sure and the other said "Not really." When asked which class they would have picked to be in if given the choice, the males and one female selected the mixed-gender group. One female indicated that she would have preferred the all female group because she wanted to see if it would help her learn differently. Additional comments were that the class was fun and interesting.

Student Reflections

Student reflections provided additional insight into how students felt about placement in the gender classes. Students in the single-gender classes indicated they were less inhibited asking questions and participating in class discussions because they were not concerned with being made fun of or being embarrassed. Eighty-seven percent of the females, compared to 58 % of the males, reported they would select the single-gender class if given the choice.

Teacher Observations

The teacher observation checklist was used to record observations of student interactions with each other and with technology as they completed science assignments using classroom technology. The students worked in cooperative groups to gather data using Palm Pilots and science probes, performed a hot sync with the computer, analyzed the data recorded, and added labels to their charts and graphs. A total of six evaluations were conducted. The target group for each evaluation was recorded so the researcher could review the tape and make additional observations.

Several themes emerged from the data collected during the group observations. Students in the single-gender classes provided assistance to each other. Males in the mixed-gender class tended to set up the equipment and troubleshoot technical problems, while females tended to perform the hot sync and arrange the data for analysis. Male students in general operated the equipment more independently and with little assistance from the teacher. Female students needed more assistance and guidance with equipment set up and troubleshooting. By the end of the study, females were more comfortable and worked more independently with equipment setup and troubleshooting.

Discussion

One of the major findings of the study was that gender differences in attitudes, perceptions, and uses of computers were not found to be significant based on gender groupings. This finding agrees with the findings of other researchers who looked at achievement of single-gender classes in a variety of subjects (Friend, 2006; Mulholland, Hansen, & Kaminski, 2004), although Mulholland, Hansen, and Kaminski did find differences in English classes. Although significant differences were not found in the quantitative data analysis, qualitative procedures indicated differences in computer activities and time spent between females and males use. Students in the mixed-gender class spent more time on the computer than students in the single-gender classes and spent the majority of the time on the computer instant messaging. Another major finding was the increase in the confidence level of some students in the single-gender classes. The majority of single-gender class participants enjoyed the freedom to express themselves without fear of embarrassment. Several students felt comfortable enough to share their reports with the class, something they had never done in the past.

The single-gender classes provided students with an environment in which they were comfortable asking questions, participating in discussions, and expressing themselves without fear of being made fun of or being embarrassed. A few students felt they were better students in a single-gender class because there were fewer distractions, which they felt resulted in better grades; however, the majority of the students felt they would have the same grade regardless of their placement in a class. The majority of the females and males in the single-gender classes reported they would select a single-gender class if given the choice. The majority of the males in the mixed-gender class indicated they preferred the mixed class because they felt there would be more distractions in an all male class.

Most of the girls indicated they enjoyed being in the all female class. They preferred doing assignments on the floor, sitting on the carpet or pillows. They loved to talk and share experiences related to the lesson. Most of the girls felt they could express themselves without fear of being made fun of, which supports the findings of Baker (2002) and Davis (2003). Several girls commented that they felt the boys were distracting and at times annoying, which supports the findings of the AAUW (1998) and Baker (2002). The girls became more confident in their ability; this was evident in the comment of one student who stated that she now volunteers to read her reports aloud, something she had never done in the past.

It was obvious at the beginning of the study that the girls were comfortable asking questions during a crystal growing experiment; the all female class wanted to know "what if" we put hot water back in the cup with the crystals that had formed. The class set up the experiment again and we were all amazed at the results of bigger crystals. They have continued to ask "what if" questions as they seek to gain a greater understanding of the science explorations. The girls enjoyed using technology, but needed assistance from each other and the teacher until they gained confidence in their ability to set up and work the equipment. At the beginning of the study they would frequently ask if it was okay to attach the probe or if it was okay to hot sync. The girls were reluctant to troubleshoot technology related problems without assistance from the teacher. By the end of the study the girls were comfortable setting up the equipment and troubleshooting technology problems.

The boys in the all male class also loved to talk and share their experiences related to the lessons, supporting the findings of Baker (2002), Davis (2003), and Stockman (2004). Comments frequently had to be limited to allow time to cover the lesson material; no matter what the topic, several boys had a personal experience to share. The boys preferred doing their assignments at their desks. Several of the boys felt more comfortable without the girls; they felt they could

express themselves without getting embarrassed. One student commented that he liked being in the all male class better than any other class in which he had been. Another student said it was just fun being in a class of all boys; when he is having fun he learns better and more easily. Several of the boys did admit they missed not having the girls in class, which was also a finding by Baker (2002). One student commented that the all male class was a little boring without girls. The students who indicated that they would have preferred placement in a class with girls also commented they enjoyed the freedom to express themselves in the male class.

When the classes started using Palms and probes, the males were quick to grasp the setup of the new technology and helped each other with using the equipment. They attempted to troubleshoot technology problems with little guidance from the teacher. The male class enjoyed technology challenges and looked for ways to extend the activities. They did not hesitate to conduct additional experiments to answer their "what if" questions. This required close supervision with some equipment because they would have the experiment set up and going without permission from the teacher.

Students in the mixed-gender class also loved to talk and share experiences related to the lessons. Some students preferred to complete their assignments at their desks while others sat on the carpet. The majority of students in this class wanted to be in the mixed-gender class, although seven of the girls would have preferred to be in the all girl class. One student stated that boys and girls think differently and they can learn from each other. Several of the boys felt they would be easily distracted by being in an all boy class because they would talk to their friends instead of paying attention to the lesson.

When students began to use Palms and probes for data collection, male students tended to set up and operate the equipment while females tended to perform the hot sync and organize the data for analysis. During the first observation of the students using technology, one female had

the Palm, but did not know how to operate it, so she handed it to one of the boys instead of asking someone to help her. After several lessons, more of the females began to take an active role in operating the equipment.

The classes had obvious differences in how they interacted with technology at the beginning of the study. Students in the single-gender classes took turns setting up the equipment, being first, collecting data, and performing the hot sync. In the mixed-gender class, males tended to be the first to get the equipment, set it up, and start data collection, while females observed, handing the equipment to the males, instead of figuring out how to operate it themselves or with the assistance of a member of their group. Students in the all female class worked together and showed each other how to operate the equipment, while students in the male and mixed classes tended to take the equipment and do the assignment without showing the others how to operate the equipment. This study found that gender classes benefited both male and female students; however, more females indicated a greater level of satisfaction. Both genders benefited from the safe environment that develops in a single-gender class where students feel free to express themselves, ask questions, and make comments without fear of being made fun of by members of the opposite gender. This was especially true for students that tend to be quiet and/or shy.

Implications

Findings of this study indicate that although there were no differences in attitudes toward technology based on gender grouping, some participants indicated they felt they were better students in a single-gender class because there were fewer distractions, which they felt resulted in better grades. Although this was not true for the majority of the students, educators need to be aware of the students who do feel this way and provide opportunities for them to succeed in an environment in which they are more comfortable. This needs to be examined further by educators to identify students that will benefit the most from placement in single-gender classes.

Educators need to note that in this study, the majority of the females and males in the single-gender classes reported they would select a single-gender class if given the choice. It was interesting to observe that having not experienced the single-gender class, the majority of males in the mixed-gender class indicated they preferred the mixed class because they felt there would be more distractions in an all male class. As noted by the males in the single-gender class, this was not the case.

Recommendations

Additional studies might include longitudinal studies to determine the impact of gender grouping on differences in the attitudes, perceptions, and uses of technology; identifying ways to encourage more females to consider technological career fields; examining what has the greatest influence on increasing the confidence level of computer ability among females; examining the use of instant messengers and/or chat rooms for instructional purposes; examining the influence of new technological toys, such as iPods, Palm Pilots, and Gameboys, on student attitudes, perceptions, and uses of technology; longitudinal studies to examine the long term effect of gender classes; and examining different grade levels to identify which grades benefit the most from separate gender classes.

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