

## **Meridian Middle School Computer Technologies Journal**

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#### **Junior Seahawk Academy: Working with 21st Century Technology Tools**

**Angelia Reid-Griffin and Kelli Slaten**

**Volume 12, Issue 1, 2009**

View Online

<http://www.ncsu.edu/meridian/winter2009/Griffin/index.htm>

#### **Abstract**

In an effort to alleviate some of the challenges middle school students experience when learning how to use new tools in the classroom, we provided a technology training session during our summer academy for middle school students, Junior Seahawk. Students registered for the summer academy participated in a day long technology training session using two innovative tools, TI-Nspire and InspireData. This manuscript explains how the tools were presented to a group of middle school students to help them develop an interest in science, mathematics, and technology. The technology training sessions are one of many techniques of teaching the Junior Seahawk participants how to use technology as a tool as well as providing resources to prepare them for the 21st century.

#### **Introduction**

Many middle school students appear to be well versed on all of the latest gadgets and games. But, when it comes to using educational tools to learn mathematics, science and technology concepts they seem to face many difficulties with connecting the technology to learning those concepts. Data analysis and the use of graphs are two concepts that middle school students struggle with understanding and interpreting (Konold & Higgins, 2003; Capraro, Kulm, & Capraro, 2005). The use of technology has been shown to help improve student success in mathematics and science, but learning to effectively use the technology can be a further hindrance to their learning (Kaput, 1992). To help the participants in a middle grades summer program, instructors introduced them to two innovative products, TI-Nspire and InspireData, during a mini-workshop. Even though these products have similar names, the two are very different tools. However, both can be used to help middle school students learn how to apply data analysis and graphing skills and become proficient at using technologies as tools for learning.

Previous research indicates that middle level learners have difficulty gaining conceptual understanding of the meaning of data found in databases and graphical representations (Wu & Wong, 2007). According to Brasell (1990), many students are exposed to limited types of graphs, tend to misunderstand their purpose as related to the data, and are unable to communicate their meanings. The two technologies, TI-Nspire and InspireData seem to be a good start to address these issues due to their abilities to dynamically link different representations of data. We were familiar with the use of the tools by classroom teachers and sought to determine how they could help further develop middle school students graphing and data analysis skills. Our overarching goal for using these technologies was to enhance these middle school students' critical thinking, data literacy, and graphing skills. We began our study by formally introducing the tools to the students during a technology-training segment during our summer day camp. Future sessions of the camp are scheduled to allow students to use the technologies to complete projects and further develop their mathematical and data analysis skills.

### **Junior Seahawk Academy**

A mathematics, science, and technology day camp for middle school children, ranging in ages 11-14, is offered by the Watson School of Education at the University of North Carolina Wilmington. The annual summer camp “seeks to improve the mathematics and science skills of middle school students from underrepresented groups while engaging them in activities that will help motivate them to be successful in school” (Junior Seahawk Academy, 2008, p. 1). Junior Seahawk Academy participants are from diverse ethnic and cultural communities that have low literacy rates and rarely attend college or enter in jobs that require advanced mathematics and science skills. The participants often do not perform well in their mathematics and science classes and rarely participate in academic summer camps. Through the efforts of this program, participants are able to engage in hands-on activities using resources to prepare them for the 21 st century workforce. One of the main goals of the camp is to increase participants' academic achievement which will hopefully encourage them to attend college and select careers in mathematics, science, or technology.

A special technology session was held during the camp to introduce students to technologies to help them better understand the principles of graphing and data analysis. During the summer of 2008, camp participants were introduced to two innovative technologies: TI-Nspire and InspireData. The TI-Nspire is a newly developed mathematics and science handheld learning device from Texas Instruments and InspireData is a software program developed by Inspiration, INC. These tools were presented to the Junior Seahawk participants during the technology training session of the academy. The goal for the technology segment was to spark the students' interest in using the technologies and to also expose them to a new way of learning mathematics and science. To determine the impact of the training on students' interest in these technologies and its usefulness in helping them develop graphing and data literacy skills we chose to have students complete a brief survey about their experiences using the tools. Observations and informal conversations provided additional information on the

students' thoughts and views regarding the use of the tools and their impact on their learning about graphs and databases.



## **Innovative Technologies**

### ***TI-Nspire by Texas Instruments***

The TI-Nspire mathematics and science learning handheld technology empowers students to learn mathematical concepts across five dynamically linked visual representations. When students can see mathematics in different ways, they are able to broaden their critical thinking skills and discover meaningful real-world connections. The TI-Nspire allows students to see and explore algebraic, graphical, geometric, numeric and written representations of the same problem. Moreover, any change made in one representation shows the related change in the other representations.

The TI-Nspire has several unique features, including the Grab-and-Move feature which allows students to make changes to a graph or data in real time and observe mathematical relationships and the impact of those changes. Research has shown vast improvements in middle grades students' knowledge occurs when students work in a dynamic, technology-based environment (Ellington, 2003; Rochelle et al., 2000). In a dynamic environment, less emphasis is placed on the symbolic, procedural aspects of mathematics and more emphasis is placed on the interaction between varieties of representations that focus on the conceptual aspects. Students are more interactive with the mathematics in dynamic environments as opposed to being told the knowledge they are expected to obtain. These environments provide them the opportunities to be able to see how the change in one representation affects another and to make connections between various mathematical representations.

The ability of the TI-Nspire to provide students with real-time visual modeling allows not only for interactive feedback, but also increases student motivation to use the technology (SRI International, 2006). Student motivation is also increased due to the

“document” capability of the technology. Students can work within a document containing multiple screens of mathematics that can be saved, shared, and edited. Furthermore, the platform of the TI-Nspire more closely resembles a PC platform with pull-down menus, file and folder storage, and a NavPad, which is similar to the functional capabilities of modern cell phones and media players. The NavPad allows students to navigate the technology with relative ease.

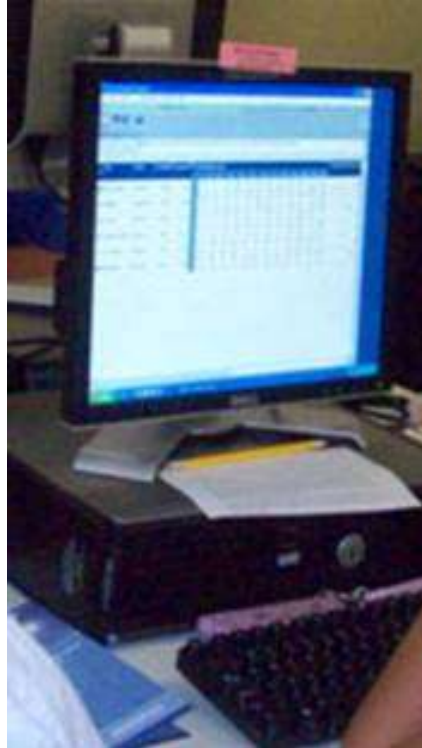
### ***InspireData by Inspiration Software, Inc.***

InspireData is a software program that allows users to look at data from a new visual standpoint: database table and plot/graphs. The database table and plot/graph view provide students two unique methods to analyze, interpret and draw conclusions about data. The dynamic features for creating graphing plots (bar, stack, pie, and axis) and Venn diagrams allow students to think critically about interpreting and analyzing data. The program is preloaded with sample lessons, projects, and over 100 databases. Students can create their own database or explore one of the pre-loaded databases. The active slideshow features enable users to capture images of their graphs and present their conclusions about the data to an audience.

The software program was originally developed by the non-profit organization, Technical Education Research Centers (TERC) under a National Science Foundation grant (Preview Electronic Education Report, 2006). Inspiration Software redesigned the program to provide quality data tools for students to analyze and interpret. InspireData is targeted for grades 4-12 and adults.

InspireData aids in the development of data literacy skills. Students are able to enhance their “inquiry skills by collecting, analyzing, and interpreting data in science, math and social studies” (Courtnage, Cuff, & Reynolds, 2007, p. 4). The software tool makes it easier for students to identify patterns and trends in data. InspireData offers users a better understanding of the data and how to use it to make decisions. As Gunter (2007) stated in a review of this tool it indeed helps students to become data-literate by allowing them to “access, assess, manipulate, summarize, and present data” (p. 1).

Currently, InspireData addresses only the standards and learning of three content areas: science, mathematics, and social studies. It enables users to perform statistical data analysis as they conduct investigations and make informed decisions as they learn to think about data from a global perspective. InspireData provides a platform for students to see beyond the data and become informed global citizens ready for the 21st century workplace.



## Technology Training Sessions

During the TI-Nspire technology training session, participants were each given a TI-Nspire handheld to use. The beginning of the session was spent familiarizing the participants with the functionality and capabilities of the handheld device. Participants were shown key navigational strategies such as how to use the NavPad, how to get to the Home screen, and how to access files and applications. The participants were first guided to open a new “Graphs and Geometry” page and shown how to create a circle. The participants were guided on how to change the size of the circle using the Grab-and-Move function. Although this was a simple activity, the students had difficulties learning how to use the features of the TI-Nspire. Due to the nature of the new TI-Nspire platform, the majority of the session was spent learning how to navigate through the features of the handheld device and learning how to use the unique features, such as the Grab-and-Move function, the pull-down menus, and accessing and saving documents.

Rather than being provided with a strictly guided activity, participants were given minimal directions and allowed to explore the technology pursuing their own curiosities and interests. Several participants became frustrated with the new environment, which is to be expected when learning new technology. However, most participants enjoyed “playing around” with the new technology and expressed excitement with the unique features of the technology such as the Grab-and-Move function and NavPad feature (See [Appendix A](#) for images of technology). Students were further guided on an individual basis on how to create a graph, how to create a table, and how to see the changes between the two representations when the graph was dynamically altered with

the Grab-and Move function. The end of the session was spent discussing the technology and what the participants liked or disliked about the technology. Most students were very excited about the new technology and were not discouraged by the learning curve required to master the innovative features of the handheld device.

InspireData training took place in a computer lab with the program preloaded on all of the computers. The participants were divided into three groups based on their grade levels: sixth, seventh and eighth/ninth. Each of the grade levels received an hour of training using the tool. Every participant had access to a computer installed with the software.

At the beginning of the training session, the presenter provided a brief overview of the software and asked students to discuss how they use data in their daily lives. After the discussion, a step-by-step tutorial of the software was presented. Afterwards, the participants worked with the City Climate data, which is preloaded in the InspireData, and answered questions. The activity was purposefully selected to allow the continuation of discussions and possible project ideas on the camp's theme: global awareness. Time was allotted for them to discuss their answers and share their graphs with their peers using the slideshow feature of the program. The academy participants were allowed time to create their own data set and graph using this database. At the end of the training session participants shared comments on how changing and adding new data to the preloaded database changed the patterns and trends of the database, plots and graphs (See Appendix B for Training activity questions and sample graphs). Students commented on how seeing the data in the databases made the issues seem "more real."

Both presentation approaches were designed to maximize the amount of time students were able to use the technologies. The students were pleased with the amount of time they had to explore the tools and commented on how they wish they could use them at their own schools. The brief survey administered to students about their experiences revealed positive results. A majority of the students supported the use of the technologies in future sessions of the camp. Overall, the middle school students felt the tools were helpful in learning about graphs and databases. We were pleased with the survey results and student comments. This helped to reassure our feelings towards using the technologies in the future.

We believe the technologies address the needs of the students of this camp. Through the technology session, we were able to observe students take a non-traditional approach to learning about graphs and databases. As described earlier in this article, many of the students in the camp have difficulty in comprehending graphs and data. These technology tools provided students a unique approach of creating, manipulating, and interpreting visual representations as they engaged in activities about graphs and databases. The middle school students participating in the technology session will take the knowledge and skills learned and share them with their peers and family. The Junior Seahawk staff members that are employed as middle school teachers in the surrounding counties will also share the technologies with their classes during the

academic school year. The user-friendliness of the tools makes it ideal for middle school students. The technologies can be used with all middle school students and its ease of use and visual representations opened up new opportunities for students to use their creativity in learning about graphs and databases.

## **Next Steps**

At the end of the technology training sessions each of the academy participants were provided with sample resources and information about the TI-Nspire and a free 30 day downloadable CD for the Inspiration tool InspireData. The academy will use these resources in the future to teach participants about working with graphs and data. The tools will be used in developing learning products and conducting experiments during the program. Additional technology training sessions will be added to the schedule to provide participants more opportunities to use the technologies. This is so that when participants enter the classroom they do not feel intimidated by new technology tools. These two tools, TI-Nspire and InspireData are powerful tools that can serve the students throughout their education. They both provide groundwork for critical thinking and data literacy. Furthermore, as shown by the opinions of the academy participants, the tools motivated students because they enjoyed using technology. The importance of increased student motivation cannot be overemphasized. We hope the students will continue to be motivated to learn and that these technology tools will be a factor in their success such that the students will apply these tools to more specific problem-solving activities in science and mathematics.

The positive comments from the participants and survey data indicate that the technology sessions were a “hit.” The students enjoyed working with the technologies and indicated that they wanted to use the tools again. Future plans are scheduled to provide additional sessions using the tools and to have each participant use the tools in their final math-science- technology project. One possible implication of using these technologies is that they present an innovative approach to keep students thinking creatively while they learn how to create, transform, and interpret graphs and data. TI-Nspire and InspireData are “cutting edge” technologies that will help train our future mathematicians and scientists.

## About the Authors



Angelia Reid-Griffin is an Assistant Professor at the University of North Carolina-Wilmington. Her research interests include using technology as a tool in science and mathematics and minority teacher shortage. She also serves as the director of the Watson School of Education Junior Seahawk Academy.

[Email Angelia Reid-Griffin](#)



Kelli Slaten is an Assistant Professor at the University of North Carolina-Wilmington in the Mathematics and Statistics Department. Her research interests include the use of multiple representations in student learning and increasing student interest in careers in math and science.

[Email Kelli Slaten](#)

## References

Brasell, H. M. (1990). Graphs, graphing, and graphers. In B.M. Rowe (Ed.), *The process of knowing*. Washington, DC: National Science Teachers Association.

Capraro, M., Kulm, G., & Capraro, R. (2005). Middle grades : Misconceptions in statistical thinking. *School Science and Mathematics*. 105 (4), 165–175.

Courtnage, M., Cuff, C., & Reynolds, R. (2007). Developing Data Literacy with InspireData TM Inspiration Software, Inc. Beaverton, OR.

Electronic Education Report. (2006) Inspiration Launches InspireData For Data Analysis by Students. *13* (13), 5-6.

Ellington, A. J. (2003). A meta-analysis of the effects of calculators on students' achievement and attitude levels in pre-college mathematics classes. *Journal for Research in Mathematics Education*. *34* (5), 433-463.

Gunter, G. (2007). Building student data literacy: An essential critical thinking skill for the 21st century. *MultiMedia & Internet@Schools*, *14* (3), 24-28.

Inspiration Software, INC (2007). InspireData TM . Retrieved October 12, 2008, from <http://www.inspiration.com/productinfo/inspiredata/index.cfm> .

Kaput, J. (1992). Technology and mathematics education. In D. A. Grouws (Ed.), *Handbook of Research on Mathematics Teaching and Learning* (pp. 515-556). Reston, VA: National Council of Teachers of Mathematics.

Konold, C., & Higgins, T. (2003). Reasoning about data. In J. Kilpatrick, W. G. Martin, & D. Schifter (Eds.), *A research companion to principles and standards for school mathematics* (pp. 193-215). Reston, VA: National Council of Teachers of Mathematics.

Rochelle, J., Pea, R., Hoadley, C., Gordin, D., & Means, B. (2000). Changing how and what children learn in school with computer-based technologies. *The Future of Children* , *10* (2), 76-101.

SRI International (2006). TI-Nspire math and science learning handhelds: What research says and what educators can do. Retrieved July 20, 2007, from [http://education.ti.com/sites/US/downloads/pdf/research\\_nspire\\_handhelds.pdf](http://education.ti.com/sites/US/downloads/pdf/research_nspire_handhelds.pdf)

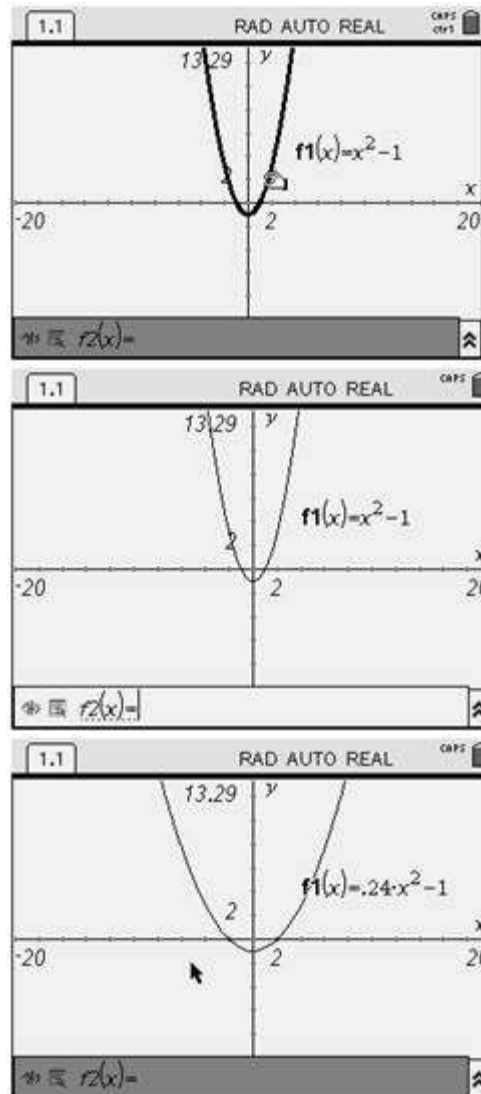
Junior Seahawk Academy (2008). Watson School of Education Junior Seahawk Academy website. Retrieved October 20, 2008, from: <http://www.uncw.edu/ed/jrseahawk>

Wu, Y. & Wong, K. (2007). Impact of a spreadsheet exploration on secondary school students' understanding of statistical graphs. *Journal of Computers in Mathematics and Science Teaching*, *26* (4), 355-385.

## **Appendix A: TI –Nspire images shared during technology session**

TI-Nspire

Example of Grab-and-Move Feature



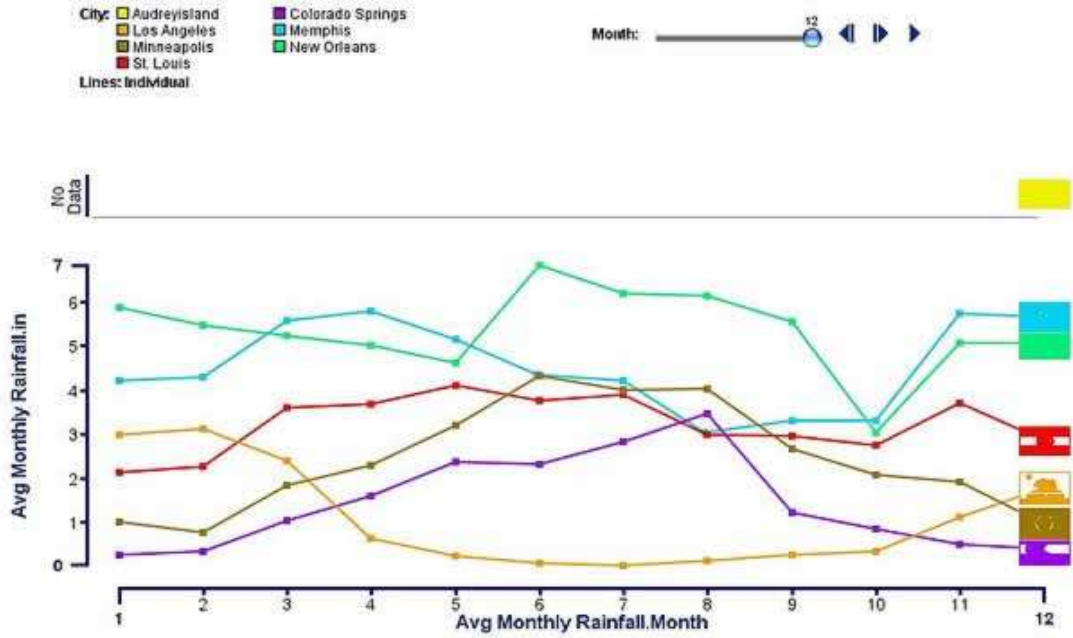
## Appendix B: Inspire Data Lesson

Question 1: How can we use InspireData to interpret temperature variations among cities in different geographic locations?

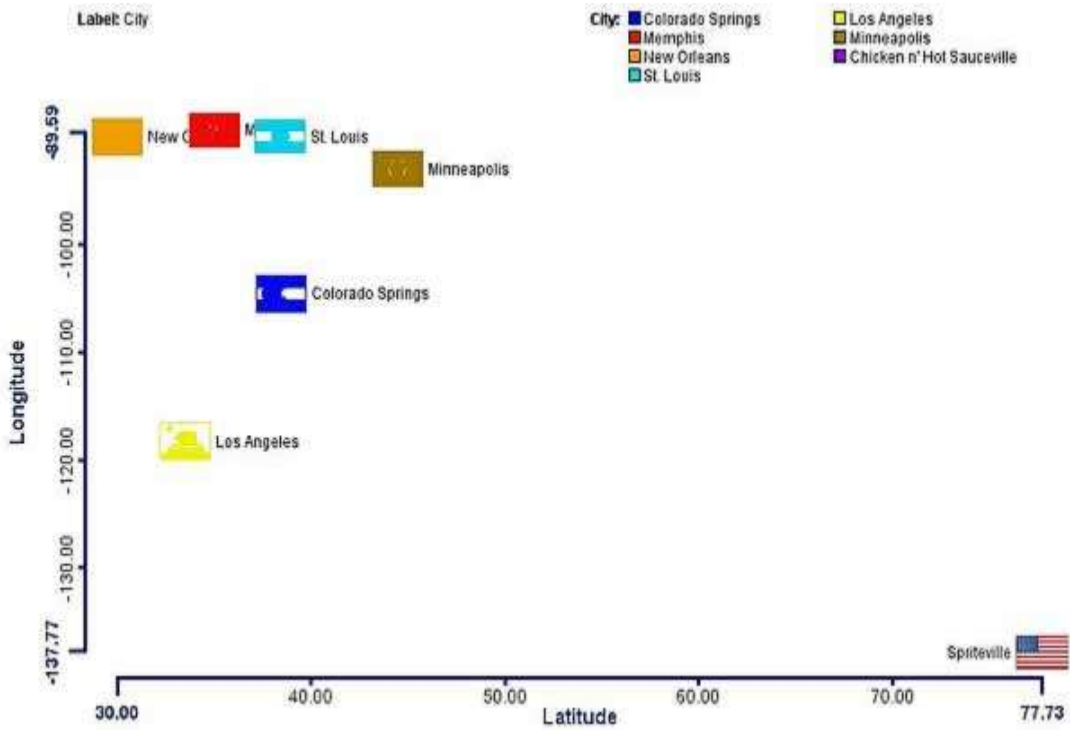
Question 2: Using the U.S. Cities Climate database, the average monthly rainfall can be compared for all 6 US cities. How do the average monthly rainfall amounts for U.S. Cities compare to one another?

Questions 3: Are there surprising patterns? What geographic or climatic factors might explain the patterns in this data?

*City Climates Student Example*



*City Climates Picture*



## Appendix C: Survey Tool

# InspireData™

## e-Survey

### Fill in this survey for New Database 1:

Click the **Submit** button at the end when you finish.

Gender

Birth Year

Technologies help me to learn

I like using technology to learn about global issues

I am comfortable using this technology to analyze databases

I feel the technology did benefit my understanding of databases

I did not benefit from using the technology.

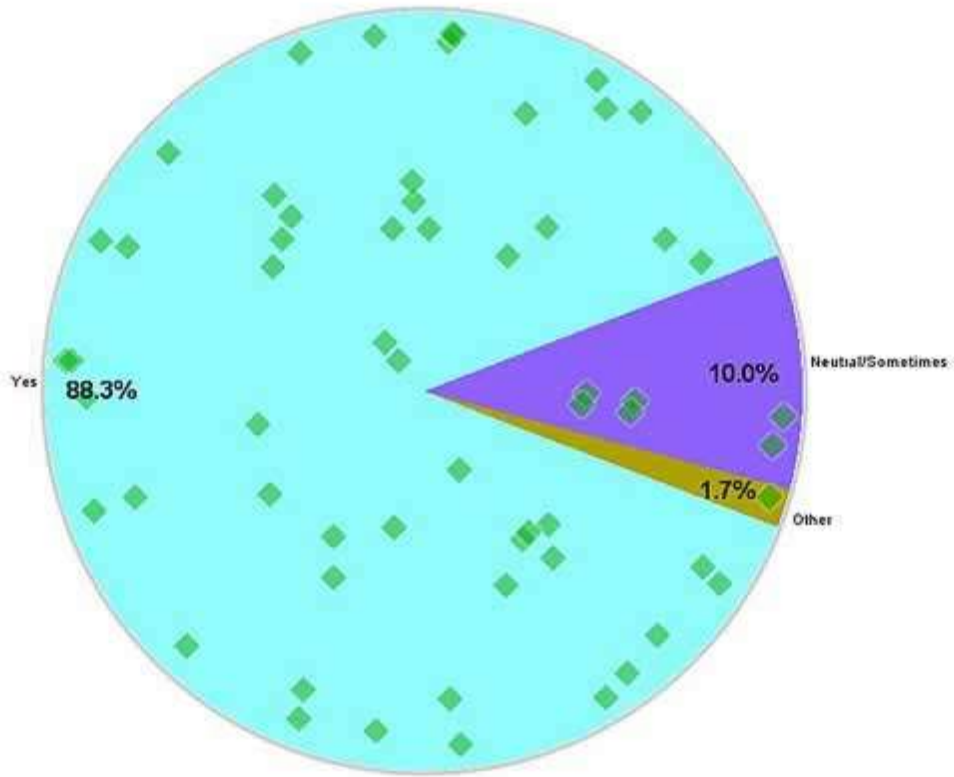
I am interested in using the technology again

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## Appendix D: Survey Results

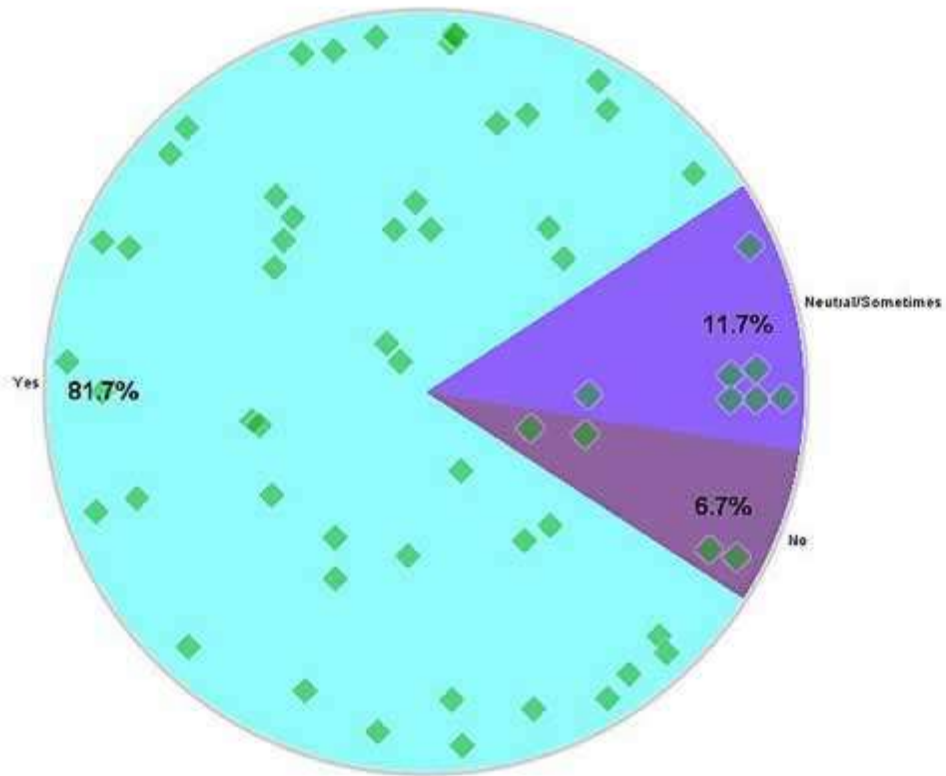
Item 1

**Technologies help me to learn**



*Item 2*

I am comfortable using this technology to analyze databases



Item 3

I am interested in using the technology again

