Problem
The organization that I am currently employed with, a public school system in central North Carolina, utilizes an online system to assist end users troubleshoot technology issues on their own. Contained within a knowledgebase are suggested resolutions that can be queried using keywords describing the problem. Utilizing these recommended solutions, an end user has the opportunity to resolve a problem without submitting it to a member of the technology department. If no resolutions are available in the knowledgebase for an issue, or if the returned results do not work, the system offers a means to report problems to the technology department through the submission of an online work order.

However, over the past six months customer satisfaction has decreased in regards to how technology problems are addressed and my department has received extremely high number of end user complaints. From research and customer feedback, it has been decided that the existing system does not have the design and functionality to adequately assist the customer’s with technology issues without typically involving submission of work orders to technicians. If this process is continued, the time of resolution will continue to increase, customer satisfaction will remain low or continue to decrease and technology assets will not be utilized to their full value in classrooms and offices.

Question
Would a redesign of the existing system and knowledgebase, taking into consideration the end users current needs, provide the necessary functionality and service levels to the customer?

Hypothesis
A redesign of the user interface and the system’s database structure, along with modifications to the process of inputting knowledgebase data, would provide a 25% increase in the number of issues customers can resolve on their own without escalation to a technician.

Defining Terms
At this point I feel some additional information is needed to explain the hypothesis. The redesign of the web interface would be intended to help the end user access additional resources for solutions and
enhance the capability to define search parameters. One possibility is the website would offer general troubleshooting suggestions to the user that can be attempted before submitting a search for resolutions. Another option is the addition of links to vendor websites or forums that the end user can utilize for additional information. The current system doesn’t contain either of these features.

The second portion of the hypothesis refers to modifying the database structure. Such a modification would ensure the integrity of the logical database components to provide streamlined information to the user. For example, the content of the database would be inspected to ensure that it pertains to the rules of normalization and doesn’t contain duplicate or overlapping information.

The final section of the hypothesis involves the input of knowledgebase information. Currently, any member of the technology department is able to add data based upon problems and resolutions they encounter in the environment. However, this process would be modified toward a more centralized approach that would fall to one or two members of the department. These team members would be solely responsible for adding new content, to ensure that a standard format for the data is followed and it would also provide a more structured approach to allow data entry in a timelier manner.

**Independent Variables**

- The primary independent variable for this research is the end user. The end users have various skill levels of technology use and any modifications to the user interface and database structure would need to take all of those levels into consideration.

- A second independent variable includes technology assets located in each of the schools. There are various models of workstations and Macintosh computers throughout the district and it is not uncommon to find a school with a large population of older machines. Because of a number of factors (age, component failure, warranty replacement plans), the type and quantity of certain computer assets in a school will influence whether users can resolve issues on their own or submit the problem to a technician. Older computers usually equate to more problems, with many that are non-repairable.

- The final independent variable consists of the student population at each school. In reviewing school grade levels, (elementary, middle and high), we have discovered that there is a pattern as to how the student population can contribute to computer problems. Typically, the elementary schools have well supervised classes and the students are restricted to certain times of use on the computers along with what they are able to do. The next grade level, middle school, will find
students that are more involved with technology and the supervision in both classrooms and labs decreases.

Because of these variables, the number of calls potentially increases for a middle school compared to an elementary school of equal size. Finally, the high school grade level presents the largest section of computer related problems. These students are even more progressive in how they utilize technology and they take advantage of the latest software and hardware currently on the market. Students also have more autonomy for the use of technology (they are monitored even less than the middle schools) and the lack of supervision can lead to additional problems from vandalism, installation of unauthorized software, or just overuse of the asset.

**Dependent Variables**

The first dependent variable is the existing logical database structure, which would be modified to provide a more streamlined approach to providing query results for an end user. For example, all resolutions within the database that pertain to the information the user is seeking would be displayed, instead of just one result. Users would then be able to select various items that may provide assistance, even if their query didn’t contain appropriately detailed information of the problem.

The second dependent variable is the way content is added by members of the technology department. In an effort to ensure integrity of the data being entered, it would be necessary to reduce the number of personnel responsible for entry of the data. A standard format for content entry would also be needed, one that provides all of the details for a resolution that an end user can search for.

**Outcomes Expected**

Modifying the current user interface, combined with a restructuring of the perpetual database model, would provide the user with the capability to query the knowledgebase more effectively. The benefits of this streamlined approach would provide a 25% increase in the number of technology problems users would resolve on their own without having to escalate the problem to a district technician. The time saved on the reduction of onsite work by the technicians will allow them to concentrate on projects and additional assignments.
The design for this study will involve two treatments, the current system and the revised system. The approach will primarily be quantitative with some qualitative aspects included. Once the database modifications are made, each of the treatments will need to be tested under similar conditions.

To test for the effects of a modified user interface and restructured database, a usability test will be performed for each treatment. Each test will be comprised of ten end users chosen randomly from each of the grade levels, with possible overlap from the same schools. These end users will be contacted via e-mail with a request to take part in the test. If they respond that they are willing to take part, a second e-mail will be forwarded to them specifying the time and location of the test. They will also receive a follow up e-mail message one day before the test as a reminder. If the invitation is declined or something occurs to prevent the user from attending the testing session, another end user will be randomly chosen.

Technology department personnel will choose proctors for each test from among school personnel. These selections will include two faculty members from each grade level for each of the treatments, which will provide a total of six proctors for each test including two from the elementary, middle and high school levels. Using school personnel would avoid having technology personnel proctor the tests, a situation that may be problematic because of their roles. If the selected personnel agree to help with the test, each will be trained on the treatment that they will be administering to. In addition they will be provided with an observation form to fill out for each of the end users involved with their respective test.

At the beginning of the test I will provide all of the end users with the same instructions as to how the test will be conducted. Each user will be provided with a letter indicating the purpose of the test, a series of forms explaining five problem scenarios that they will need to search for resolutions on within their respective treatment, and a survey that will be filled out at the end of the session. The content of the scenario forms will include objectively scored questions and the final survey will contain open-ended responses. Note that the scenarios are fictitious but would resemble problems experienced by end users throughout each of the grade levels.

The overall test will be a timed event but there will be no set limit for each of the scenarios; if the end user encounters problems searching for a resolution, they will be encouraged to move on to the next scenario and come back to the problem later. Once the test is complete, the end users will be asked to fill out the survey to indicate their opinion of the effectiveness of each treatment and provide suggestions for
improvement to the system itself or the overall process. Finally each of the users will be thanked for their
time and assistance and will be provided with a letter of appreciation.

During the test the observers will fill out one form for each user as they progress through the five
scenarios. This form will record any issues that the end user may have and indicate how effectively they
are working through the problems. If the user encounters a problem, the proctor will recommend moving
on to the next problem and returning to the existing one later. However, the proctors will not be able to
offer suggestions on how to define the end users query or answer questions concerning the functionality
of the system.

Once each of the tests is completed I will collect the results and the data will then be analyzed. The
primary analysis will involve the end user variable (nominal) as it relates to the database variable (also
nominal). This analysis will be performed using a Chi Square analysis and will determine how the revised
treatment compares with the original in the number of issues resolved by the end user.

Once the analysis is complete, a final determination will be made as to whether there was an increase in
the quantity of problems users found resolutions for using the modified knowledgebase. In addition, their
evaluations will be reviewed to determine if an overall improvement to the user interface of the modified
knowledgebase exists, compared to the current system. These results will then be presented to the
Director of Technology for the school system who will make a determination if we will move forward
with the project.