THE DESIGN OF TEXT-TO-VOICE TRANSMISSION SYSTEM FOR PHYSICALLY & VISUALLY IMPAIRED STUDENTS IN NIGERIA

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ABSTRACT:
Over the years the visually and physically impede students have increased tremendously in Nigerian schools for academic pursuit. The challenge is that the architectural designs of most of the institutions where the education of these students with disabilities took place did not take into consideration, the disability nature of these people as such many of them find it very difficult having access to the facilities in school which make them experience far less career success than their nondisabled peers. It is based on this that necessitated this research work to find an alternative method of teaching for these impede students by designing an application that fosters text-to-voice transmission system for these students to exclusively listen rather than conventional reading or writing. To achieve this, the researcher studies five schools methods of teaching, took samples and also presented questionnaires, the responses were analysed and consequently, the proposed system was presented graphically before final development to graphical interface using the Visual Basic 2008 platform.

Keywords: Voice, Text, Transmission, Disabilities, Students, Teaching,

1.0 Introduction: Disability is the consequence of an impairment that may be physical, cognitive, mental, sensory, emotional, developmental, or some combination of these. A disability may be present from birth, or occur during a person’s lifetime. A disability is an umbrella term, covering impairments, activity limitations, and participation restrictions. Impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations. Thus, disability is a complex phenomenon, reflecting an interaction between features of a person’s body and features of the society in which he or she lives. When most people think of the word “disability” they immediately picture someone in a wheelchair. But there are many different types of disability. People with a disability may include:

- people who are blind or partially sighted
- people with learning or intellectual disabilities
- people who are deaf or hearing impaired
- people with a physical disability
- people with long term illnesses
- people with mental health or psychological difficulties
- people with an acquired brain injury

According to Osakwe (2010) in his paper states that the school systems now face increasing pressure to raise standards, develop social and personal skills, broaden curricula, pay greater attention to equal educational opportunities and prepare young people for rapidly changing world. Invariably, the modern trend all over the world is shifting towards addressing the educational plights of students with one form of disabilities or the other so as to better their lives. The rationale behind this, is contingent upon the fact that people with disabilities too have invaluable roles to play in national development, and to be able to do this effectively and meaningfully, their education needs to be given proper attention. The question now is; how can these goals be achieved without working system that empowers these students with disabilities to learn faster, easily and comfortably? That is what this Research work is designed to address and to achieve these set goals, the research viewed all the various problems faced by these
disabled students and designed a workable system.

2.0 Problems face by physically and impaired students in Nigeria: The problems face by the physically and visually impaired students in Nigeria cannot be easily quantified by few lines of statements because access to and support in school remains problematic issues for the physically and impaired students in Nigerian schools. Worse still is the fact that some of these students who are fortunate to graduate from secondary schools education hardly ever proceed to tertiary institutions. This is because the physically challenged students are often experience exclusion, discrimination and segregation from mainstream education as a result of their disabilities. Another most obvious problem of these disabilities students is that architectural designs of most of the institutions where the education of students with disabilities take place did not take into consideration, the disability nature of these people as such many of these students find it very difficult having access to the facilities in school which make them experience far less career success than their nondisabled peers. Students with visually impairment have a very low academic performance due to the problem of seeing especially in the written board or data in the computer during lectures.

3.0 Purpose of the Study: This work is primarily carried out to examine the various problems face by the physically challenge especially the visually impaired students in Nigeria as a result of disabilities ranging from difficulties in taking note during class activities results from physical handicap, disabilities to see in far range or lecture boards during lectures and language difficulties, etc. and design a suitable system that transmits text data to voice sound which in turn helps these students with disabilities. The system also aids individual with difficulties in long alphabet pronunciation or reading disabilities especially documents with long reading capacity to read.

4.0 The Methods and Analysis of the Present System:

This section deals specifically with the details explanation of methods adopted for the Study, Design and Development of the system. System design and development has some procedures that must be followed during system development; it was on this note, the researcher adopted the most suitable method putting into consideration the five acceptable stages of System Development Life Cycle (SDLC). SDLC is the workflow for developing and maintaining information technology solutions. It can also be referred to as a process used by a systems analyst to develop an information system, training, and user (stakeholder) ownership (E. Osuagwu, 2006)

5.0 Feasibility Studies: The major objectives of the Feasibility Studies were to evaluate the current performance of the existing education system of the physically challenged and the visually impaired students in Nigerian schools using five samples cases for this study namely: University of Calabar, Federal University of Technology, Owerri, Federal College of Education Obudu, Community Secondary School, Anong and College of Education Akamkpa

6.0 Data Collection and Analysis: Data Collection is an important aspect of any research study especially that which requires an existing system evaluation. Inaccurate data collection can have negative impacts on the results of a study and which can ultimately lead to invalid results.

Data collection methods for impact evaluation vary along a continuum. At the one end of this continuum are quantitative methods and at the other end of the continuum are Qualitative methods for data collection. There are two sources of data. Primary data collection uses surveys, experiments or direct observations. Secondary data collection may be conducted by collecting information from a diverse source of documents or electronically stored information. This research work adopted the two cardinal methods of data collections – from the primary source which included issuing of questionnaire and secondary – sourcing data from other authors and textbooks.

6.1 Questionnaires
Paper-pencil-questionnaires: can be sent to a large number of people and saves the researcher time and money. People are more truthful while responding to the questionnaires regarding controversial issues in particular due to the fact that their responses are anonymous. But they also have drawbacks. Majority of the people who receive questionnaires don't return them and those who do, might not be representative of the originally selected sample. The Researcher issued 600 questionnaires to enable him find out the opinion over the existing existence in Nigerian schools. Out of the 600 copies of questionnaires issued, 500 copies were returned, while 100 remains unreturned among which 200 were male while 300 were female. The table below gives the summary of the questionnaires issued:

<table>
<thead>
<tr>
<th>Question</th>
<th>Male</th>
<th>Female</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex:</td>
<td>200</td>
<td>300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The method of current teaching of physically challenge in schools is considered the best.</td>
<td>280</td>
<td>100</td>
<td>55</td>
<td>65</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The teaching equipment for disabilities in the Nigerian schools is not adequate.</td>
<td>110</td>
<td>60</td>
<td>100</td>
<td>240</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The location of school greatly affects the academic performance of the physically challenge students in Nigeria.</td>
<td>35</td>
<td>72</td>
<td>115</td>
<td>278</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The structure of most textbooks in Nigerian schools does not favour the visual impaired and physical challenge students.</td>
<td>150</td>
<td>50</td>
<td>62</td>
<td>238</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The academic planners don’t put the disable students in consideration while setting teaching hours.</td>
<td>85</td>
<td>105</td>
<td>110</td>
<td>200</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The visually impaired and physically challenged students should always be considered first during information distribution process in Nigerian schools</td>
<td>100</td>
<td>125</td>
<td>105</td>
<td>170</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visually impaired and physically challenge students are restricted from accessing some facilities in Nigerian schools</td>
<td>106</td>
<td>102</td>
<td>137</td>
<td>155</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disabilities can prevent students from going to library especially the far ones.</td>
<td>105</td>
<td>112</td>
<td>132</td>
<td>151</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most of the failures in schools are as a result of one form of disabilities or the other.</td>
<td>101</td>
<td>121</td>
<td>134</td>
<td>144</td>
<td>500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Interpretation of Results on Table (a): The above table gives the summary of the questionnaires issued to the five selected schools in Nigeria to ascertain the current system in practice as per disabilities and physically challenge students.

Question 1: The method of current teaching of physically challenge in schools is considered the best. 280 persons ticked 'strongly disagree', 100 ticked 'disagree', 55 ticked 'agree' and 65 ticked 'strongly agree'. Going by the result, the current teaching method of physically challenge is not the best.

Question 2: The teaching equipment for disabilities in the Nigerian schools is not adequate. 110 persons ‘strongly disagree’, 60 persons ‘disagree’, 100 persons ‘Agree’ and 240 ‘Strongly Agree’. Judging from the figures, the Researcher observed that though they are teaching equipment but they are adequate.

Question 3: The location of school greatly affects the academic performance of the physically challenge students in Nigeria. In this case, 35...
‘Strongly Disagree’, 72 ‘Disagree’ to the opinion, 115 ‘Agree’ while 278 ‘Strongly Agree’ which means the location of school greatly affects the academic performance of disable students.

**Question 4:** The structure of most textbooks in Nigerian schools does not favour the visual impaired and physical challenge students. In this question, 150 person ‘**strongly disagree**’, 50 persons ‘**disagree**’, 62 persons ‘**Agree**’ and 238 ‘**Strongly Agree**’, it is obvious opinion that structured of most textbooks do not favour the physically challenged and impaired students.

**Question 5:** The academic planners don’t put the disable students in consideration while setting teaching hours. 85 persons ‘**strongly disagree**’, 105 persons ‘**disagree**’, 110 persons ‘**Agree**’ and 200 ‘**Strongly Agree**’. The planning of academic calendar is very important and when the hour are set favourably, the performance of students seem to be better because students will have sufficient hours to study and learn. In the case of the visual impaired and physically challenge, it is very important for learning hours to be organized in such a way that they are inclusive.

**Question 6:** The visually impaired and physically challenged students should always be considered first during information distribution process in Nigerian schools. 100 persons ‘**strongly disagree**’, 125 persons ‘**disagree**’, 105 persons ‘**Agree**’ and 170 ‘**Strongly Agree**’. Information distribution schools are very important to students, therefore, the disable students should be reached for reason of their disabilities.

**Question 7:** Visually impaired and physically challenge students are restricted from accessing some facilities in Nigerian schools. 106 persons ‘**Strongly disagree**’, 102 persons ‘**disagree**’, 125 persons ‘**Agree**’ and 137 persons ‘**Strongly Agree**’. In this question, the strongly agree and strongly disagree differences are very little. Though, there is indication that visually impaired and physically challenge students are restricted from accessing some facilities in some schools in Nigeria.

**Question 8:** Disabilities can prevent students from going to library especially the far ones. 105 persons ‘**Strongly disagree**’, 112 persons ‘**disagree**’, 132 persons ‘**Agree**’ and 151 ‘**Strongly Agree**’. The indication of this result is to enable the researcher know the impacts of disabilities in the academic activities of the disable students.

**Question 9:** Most of the failures in Schools are as a result of one form of disabilities or the other. 101 ‘**Strongly disagree**’, 121 persons ‘**disagree**’, 134 persons ‘**Agree**’ and 144 ‘**Strongly Agree**’.

This can be further illustrated graphical as follows:

![Graphical representation of questions and responses](image-url)
5.0 Analysis of the Existing System in practice

The existing system in Nigerian schools using five feasibility reports - University of Calabar, Federal University of Technology, Owerri, Federal College of Education Obudu, Community Secondary School, Anong and College of Education Akamkpa, all these schools practiced physical method of notes dictation to students or writing in the board except in some exceptional cases where the computer base teaching were adopted such as projecting. In this method, physically challenges are given little or no attention as concern whether they can be able to write or see at the board. The greatest challenge now is that the visually impaired students may not be able to even write or see the teacher who is teaching especially in situation where there is total blindness.

Diagram (a)

The diagram (a) gives the illustration of existing system in Nigerian schools, the method of teaching and teacher to student dictation system where the teacher reads out for students. Though, this method may be considered good but it does not effectively cover the students with physical disabilities.

Diagram (b)

The diagram (b) gives the illustration of another existing system in Nigerian schools, the method where the teacher writes on the board for the students to copy. This method is greatly disadvantage to students with partial or total blindness, while the physically handicap are not exempted to this method of teaching as many could not write.

6.0 A High Level Model of the Proposed System

According to Hoberman (2009), "A data model is a way finding tool for both business and IT professionals, which uses a set of symbols and text to precisely explain a subset of real information to improve communication within the organization and thereby lead to a more flexible and stable application environment. The key to a high level data model is simplicity. The system should be designed in such a way that a nontechnical person can comprehend the formation of the proposed system. The purpose of the high level data model in this paper is to describe the complex information in a simplest way by using a concise description. It is based on this; the researcher drew the design of the new system by sketching out all the various modules and components that formed the Text-to-Voice system."
In diagram (c), the detailed design of the proposed Text-to-Voice transmission Software system. The first module is the Title menu that contains the heading of the software which gives in-depth meaning to the system and enables the users know the type of software in use. Next is the menu bar, the menu bar contains the File, Edit, Transmission and Help modules, each of the modules has sub-menu for example the File Menu contains the New, Open, Save As, Print and Exit while the Edit Menu contains the Undo, Redo, Copy, Cut, Paste and Select All. The Transmission Menu contains the Font, Background and Transmit, while under the Font there is a sub-menu with color and style of font options and under the Background there sub-menu for color. Help Menu contains two sub-menu: How-to-Use and Read Me gives the details on how the software can be used by the user and other instructions.

7.0 The Data Flow Diagram

The diagram below shows how data flows around each of the units to the Document Environment before being transmitted into sound by the transmission module. Starting from the Save As - this is in charge of saving in the Document Environment, New opens fresh page of data environment while Open is in charge of opening an existing file, Print sends data to the printing dialogue box, Select All is in charge of selecting the existing data, Undo return action that has been performed, Redo performed the action again, Cut performs the usual work of removing data from document environment while paste brings it back, background and colour perform the function of font colour, Transmit performs the function of sending the data as sound to the output devices from the Document Environment. How to Use is usually gives the details of direction on how the software can be used by user while Read Me gives details of developers.
8.0 **System Design:** One of the most interesting, and most difficult, of the tasks that we may undertake as engineers or computer scientists is the design of an entire system. A system is a set of interacting parts, generally too large to be built by a single person, created for some particular purpose. We work with systems all the time. The operating systems that control our machines are systems. The layers of hardware and software that allow the programs on these machines to interact with each other over a network are systems (Jim Waldo, *On System Design*, Published by Sun Labs, December 2006). Therefore, system design gives the overview of the structure of a system. Below is the systematic design of the Test-to-Voice system with various components listed on them.
9.0  
**System Implementation Process:** After the system analysis process has been concluded, the next phase is the system implementation. System implementation is the construction of the new system and the delivery of that system into production (that is, the day-to-day business or organization operation). In this phase, the Researcher transformed the system design into real world implementation process. Therefore, this section deals specifically with the transformation system model in section 8.0 into real life. The system contains four menu has shown below:

![Diagram (f)](image)

The File, Edit, Transmission and the Help. Each of the menus contains other sub-systems with specific task to carry out.

i) **File Menu** contains New, Open, Save As, Print and Exit. New- opens a new document environment for the data to be typed and pasted. Open- does the functions of bringing into the document environment a saved file or typed data which has already be save.

![Diagram (g)](image)

a) **Open:** Open does the functions of bringing into the document environment a saved file or typed data which has already be saved.

![Diagram (h)](image)
b) **Save As**: Save As performs the functions saving the data in the Document Environment into the hard disk. Below is the dialog box of Save As. This display as soon as the Save As is click.

![Save As Dialog Box]

![Diagram (i)]

![Diagram (j)]

c) **Print**: the print performs the function of printing the data in the Document Environment. Below is the Printing Dialog Box, indicating a selected printer.

![Printing Dialog Box]

**Edit Menu** - contains Undo, Redo, Cut, Copy, Paste, Select All and Clear. **New** - opens a new document

![Edit Menu Diagram]

Diagram (l)
The Undo as the implies it undo any action, while Redo repeats the action. Cut removes a selected data from the data environment. Copy does the function of duplication while the Paste brings into existence that which is cut or copied from the data environment. Select All highlights data from the document while Clear erase data completely from document environment.

**Transmission Menu:** contains the Font, Background and the Transmit.

(i) **Font:** the Font contains two other sub-system namely the Style and Color

(ii a) **Style:** the style gives the data in the document environment different font faces, which the system user is expected to select. Below is the dialog box for Style.

(iib) **Color:** the color Dialog box is used in changing the color face of the font. The user is also expected to select the color type.
i) **Background:** That background contains only one background color which the user is also expected to select from.

![Diagram (p)](image)

ii) **Transmit:** The Transmit is very essential for this research work. It is on the transmit module that data are sent to the output device such as speaker using the sound card in the computer system. In this case, the user is expected to select the transmit module and automatically the robot will start reading the text word from first word to the last word.

![Diagram (q)](image)

iv) **Help Menu:** The Help contain two subsystems namely: How-to-Use and Read Me

![Diagram (r)](image)

a) **How to Use:** In this module, the details of how the use is to be used is provided, it is in form of a guide to the new user. For the purpose of demonstration, the researcher only provides a demo here and not full information in full.
b) **Read Me:** Read Me gives information about the Researcher and developer of the software. For this purpose, the developer only provide for only few details.

Diagram (s)

10. **Conclusion:** Within the context of utilisation this application system can be of tremendous help in solving the problem earlier identified in Nigerian schools. A study which the researcher critically underwent putting into consideration the challenges face by the impaired and physically challenged students. The limitation, problems and efficiency of the existing system were also looked upon. The system analysis of the various stages after this were carried out before the researcher considered it necessary to design the new system of different modules including the data flow diagram for full implementation. The software developed was test-run on different platforms and the researcher makes sure that the program solves the existing program. The areas were the researcher saw could pose problem to the user were also resolved. The samples of the output were also printed for future references.

**REFERENCES**


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