



# Switch It!

## Design Document

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EDIT 705  
Fall 2005  
George Mason University

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## **Introduction**

### **Team:**

Anna Evmenova and Emily McKeough are members of Team 5. They are two full time graduate students studying special education at the Department of Education and Human Development at George Mason University. Both Team 5 members are very interested in research and the practical implementation of different devices and strategies to help students with special needs to improve their academia and become more independent in everyday life. Anna and Emily participate on the regular basis in conducting trainings in public schools on different devices and software programs that provide students with disabilities with more independence and greater access to the general education curriculum. As a part of the Instructional Design class, Team 5 is responsible for collaboratively developing the Instructional Design Document that will be used as a plan for developing the prototype of an instructional module.

### **Purpose:**

The purpose of this document is to state the performance problem, to prove that it exists and can be solved through training based on the needs assessment. Then an effective solution to the existing problem will be developed considering all key elements of the instructional design process: learner characteristics, subject content, instructional objectives and strategies, and evaluation instruments. After reading this document you will have an understanding of the problem and the most appropriate interventions to solve this problem.

## I. Problem Identification and Instructional Goal

*Assistive Technology (AT)* is any item, product, device or equipment, whether acquired commercially, modified or customized, that is used to maintain, increase or improve the functional capabilities of individuals with disabilities. AT is represented by hardware/devices or software programs. Assistive technology products can enable people with disabilities to accomplish daily living tasks, assist them in communication, education, work or recreation activities, and in essence to help them achieve greater independence and enhance their quality of life. Successful AT use requires adapting assistive technology to the person's capabilities and temperament.



*Switch* is an input hardware device that allows people with disabilities to access many different items, for example, computers, wheelchairs, augmentative communication devices, and toys. Switches come in many different shapes, sizes, and types. People can touch a button, move an eyebrow, swipe a pad on the table, or move in front of a motion sensor. The Abledata database ([www.abledata.com](http://www.abledata.com)) reports the availability of almost 1800 switches. However, research and best practices show that it is not enough just to take any AT including a switch and give it to a student with a disability. After considering all needed factors and characteristics that can impact the type of switch used, choices available on the market are significantly limited.

### **Problem Statement:**

Students with physical disabilities may need switches to access computers and participate in regular classroom activities. However, many special education teachers, especially in rural area schools, do not know what switches are or how they can help their students with special needs. More than that, the critical point in identifying an appropriate assistive technology device including a switch is to evaluate student's needs and skills that affect AT use. Teachers lack the knowledge on how to choose the appropriate switch based on students' needs. Such absence of knowledge and skills usually results in frustration leading to the abandonment of the assistive devices. Every child with a disability has unique needs. Each child can use a different switch. Choosing the appropriate switch for a child depends on the child's abilities, switch sensitivity, size, feedback, durability, and placement. Each part has to be assessed thoroughly in order to choose the right hardware.

The goal of our instruction is to teach special education teachers what the switch is and how to match their students' needs with the most appropriate assistive switch. Learners will be evaluated at the end of the instruction through open-ended questions and case studies. Blended training with the instructor-led portion as well as the use of videos, hands-on activities, and email will take place in the Assistive Technology Lab at George Mason University during one of the teachers' workdays in August to provide some hands-on experiences. Special education teachers represent the targeted audience for this instruction. The teachers are located in Frederick County, Virginia. Many people will benefit from teachers being knowledgeable about assistive switches and being able to choose one for a student. The student will become able to participate independently in different everyday life and school-wide activities (including participating in related services activities: speech therapy, occupational and physical therapies) and will be prepared for more independent life in the future (which may include independent living and employment). Stakeholders of such instruction include special education teachers, related services professionals, students with physical disabilities and their families.

## II. Needs Assessment

### Introduction

The purpose of the needs analysis is to identify the nature of the learner's needs and the degree to which these needs can be addressed in the training designed by our team. Our major objective is to determine where the learners are today and where they need to be, so that we might isolate and address the corresponding "gap" via instruction. This needs assessment will determine that teachers need a training to learn how to choose the appropriate switch according to their students' special needs which will lead to larger implementation of assistive technology in special education classrooms. The following are the objectives for our needs assessment:

- Collect information on the present condition of AT implementation in regular schools.
- Identify if learners lack knowledge of what a switch is.
- Determine if the targeted audience lacks the skill of choosing the switch.
- Determine the need of learners in training to use switches for their students with special needs.
- Provide training recommendations.

### **Methodology for Gathering Information**

**Planning:** While planning our needs assessment we identified our targeted population: special education teachers in rural Virginia (Frederick County). After discussing it with our SMEs, we determined that larger counties, like Fairfax County, located near major universities have had more opportunities for assistive technology training while rural counties lack such opportunities.

The data will be collected on felt and expressed needs. Many special education teachers currently choose assistive technology devices based on intuition and on what they recently have heard rather than on analyzing their students' characteristics and needs. That establishes a felt need for developing this training for teachers. Moreover, according to state wide Assistive Technology Needs Assessments done by the Training and Technical Assistance Centers (TTAC), there is an expressed need in more assistive technology training and workshops submitted by teachers from different counties in Virginia. It was determined that the largest number of expressed needs for more training in assistive technology came from Fredrick County. In addition, during the planning it was anticipated to see more expressed needs towards training specifically in choosing and working with a switch through our teachers' surveys.

**Collecting Data:** The plan for collecting the current data included:

- (a) Surveys for targeted audience (special education teachers in Frederick County, Virginia);
- (b) Face-to-face interviews with SMEs and experienced individuals who once were members of targeted audience;
- (c) Examination of national reports and AT needs assessments;
- (d) Inspection of requirements for obtaining special education teacher license.

The surveys were sent over the Internet via email to all special education teachers in Frederick County, Virginia. The email addresses were found on the school websites. There are about fifty special education teachers in Frederick County. Since we only expect approximately fifty percent return rate, the anticipated sampling size is twenty – twenty-five participants. Survey questions are available in the Appendix B. The survey as well as a description of the purpose it was serving was sent to teachers on the Tuesday morning, September 27<sup>th</sup>. This was found to be the most appropriate time for surveying teachers. Information gathered from the

answers on the surveys helps us determine the focus of the training and whether a need for such training exists.

SMEs were chosen based on their expertise in the area of assistive technology and based on their availability and location (George Mason University). Additionally, the team has decided to interview two former teachers who currently work in the field of assistive technology supporting public schools and teachers with the needed information in the field. Those former teachers are able to provide the insight on existing situation in public schools in the area of assistive technology because of their former teaching experience and due to the fact that they are currently working with teachers answering their questions about assistive technology. Current teachers are considered only for surveys and not for the interviews because the majority of them are not knowledgeable about the assistive technology field. Meetings were scheduled to conduct face-to-face interviews with former teachers and SMEs:

- SME: Mike Behrmann, professor in assistive technology at George Mason University. Dr. Behrmann began his research with technology in special education in 1979 and had experience in working with students with severe disabilities. He will bring his expertise in the area of choosing the appropriate device according to the students' characteristics.
- SME: Estella Landerous, assistive technology specialist at George Mason University. Mrs. Landerous is especially interested in evaluating, selecting, and using appropriate assistive technology. She will provide our team with the detailed information on the selection process that will help us to design the instruction.
- Former teacher: Kristin Neuber, assistive technology specialist, Helen A. Keller Institute for Human disAbilities. Mrs. Neuber is a former special education teacher. Her teaching experience was primarily with children with physical disabilities. She is currently the director of the Assistive Technology Lab at George Mason University.
- Former teacher: Susan Kenney, assistive technology specialist, public schools, Alexandria, VA. Mrs. Kenney currently working with special education teachers providing them support in the area of assistive technology. She will be able to identify teachers' real knowledge, fears and attitudes towards using assistive technology.

The interview questions were sent to our SMEs and former teachers two days prior the interviews so they had a chance to go over those questions to see the whole picture and provide us with the more valuable feedback. You can find the interview questions in the Appendix B.



The research on current requirements for receiving special education teaching license was conducted by reviewing each teacher education program in the state of Virginia through their websites. Additionally, statewide Assistive Technology Needs Assessments by the Training and Technical Assistance Centers (TTAC) were thoroughly examined to identify the need for more professional training expressed by teachers.

**Analyzing Data:** The importance of the training depends on the answers gathered from:

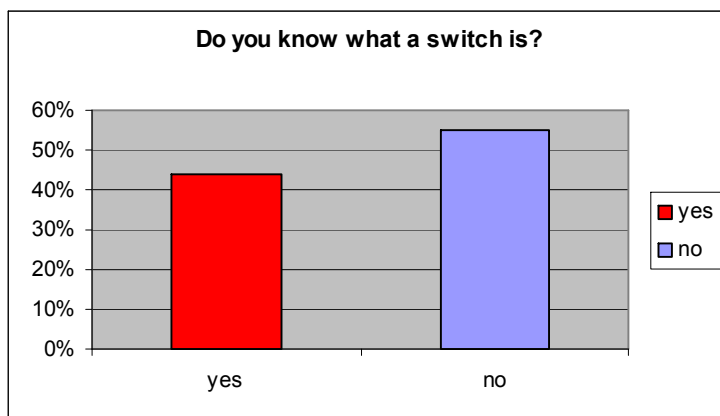
- teachers' surveys,
- interviews with SMEs and former teachers who now work in the field of assistive technology,
- the review of existing special education teacher training programs, and
- examination of a variety of national reports and AT needs assessments.

You will find the report on interviews with SMEs and literature research in the **Data Interpretation** section further in the document.

Surveys from special education teachers present the most important and valuable information for this needs assessment. The frequency count was taken for each of the different questions on the survey. Some of the results of the key survey questions are as follows:

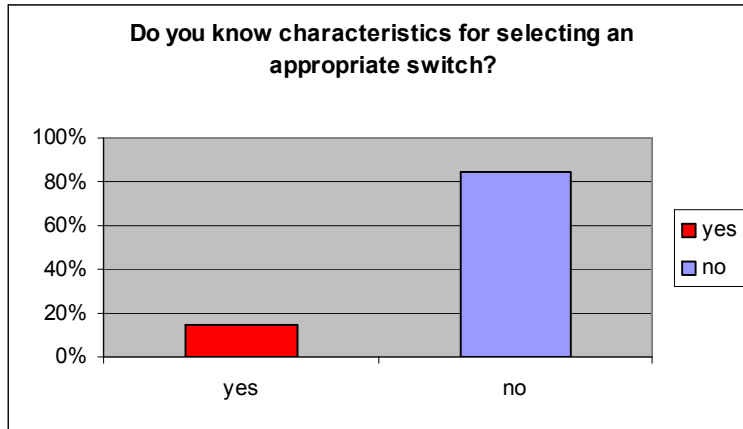
**Question # 2: Do you know what a switch is?** Fifty-five percent of teachers did not know what a switch was as shown on the Figure 2.1.

Figure 2.1



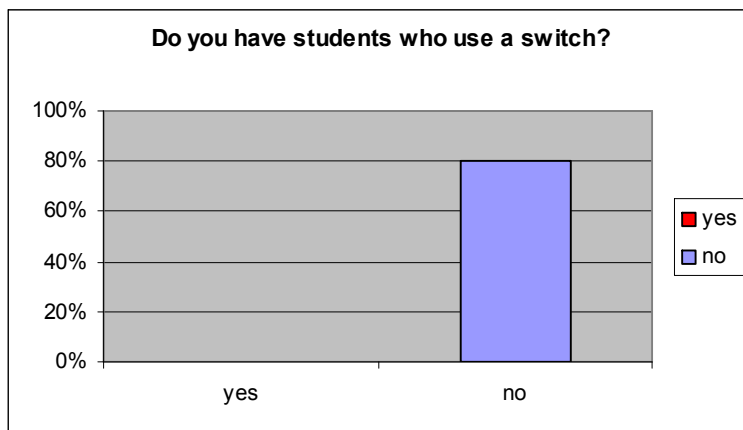
**Question # 3: Do you know the characteristics you have to consider in order to select the appropriate switch for an individual student?** Eighty-five percent of teachers did not know and could not name the characteristics as shown in the Figure 2.2.

Figure 2.2



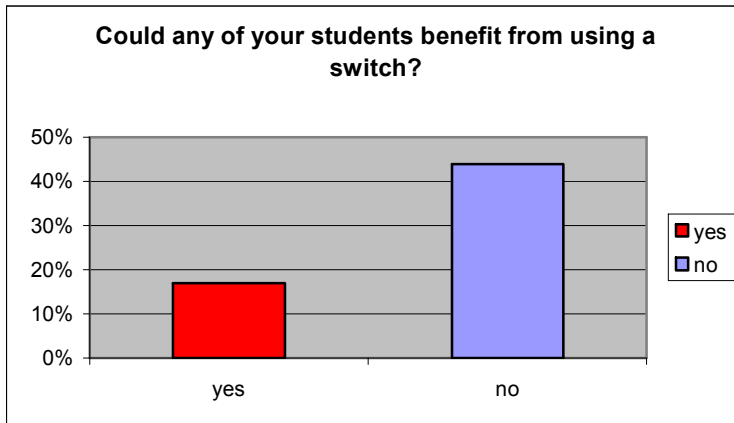
**Question # 5: Do you have students who use the switch in your classroom?** None of the teachers reported using a switch with their students as shown in Figure 2.3.

Figure 2.3



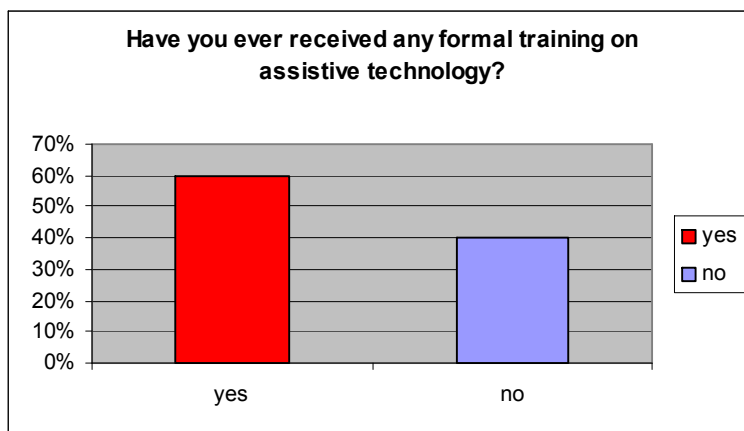
**Question # 7: Could any of your students benefit from using a switch?** Seventeen percent of teachers noted that some of their students could benefit from using a switch as shown in Figure 2.4.

Figure 2.4



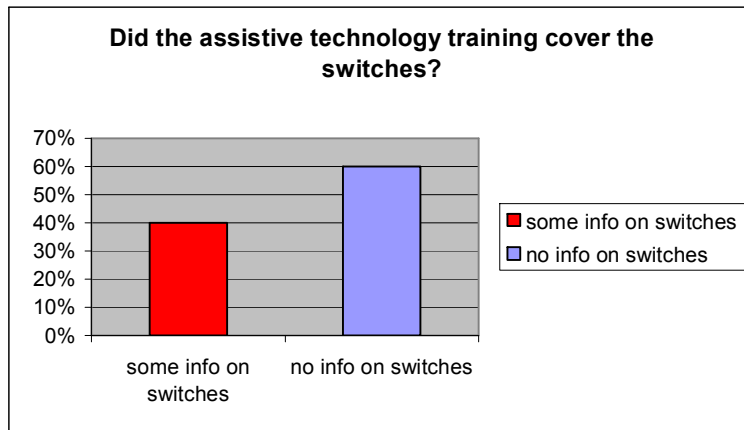
**Question # 10: Have you ever received any formal training on assistive technology services and devices?** Sixty percent of teachers surveyed received some training in the area of assistive technology as show in Figure 2.5.

Figure 2.5



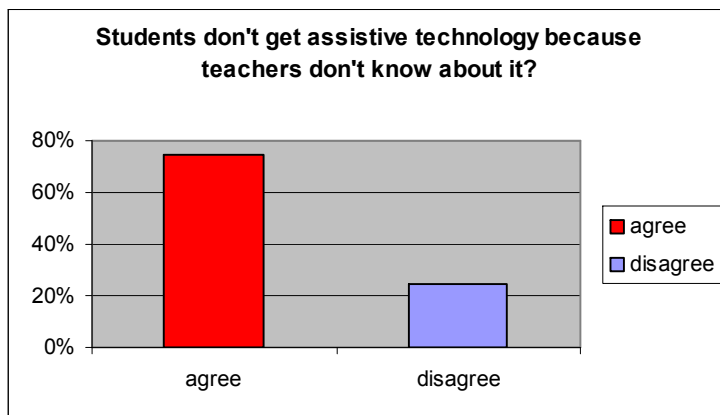
**Question # 11: What part of the training in assistive technology dealt with the using and selecting the switches?** Forty percent of teachers mentioned that there was some information on selecting and using switches during their assistive technology training while sixty percent of teachers received some training in AT stated that it had nothing to do with switches as shown in Figure 2.6.

Figure 2.6



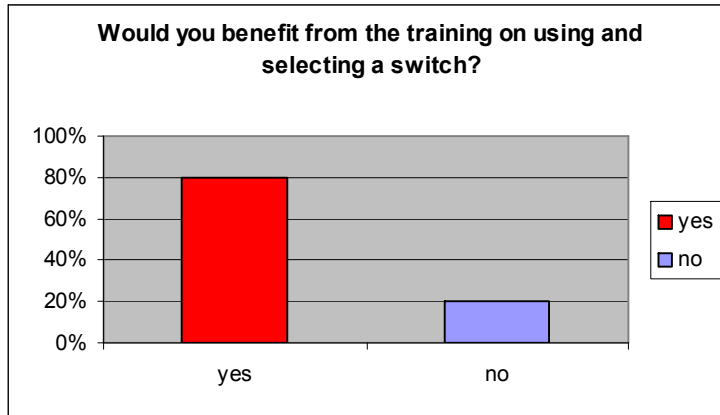
**Question # 12: Would you agree or disagree that some students do not receive assistive technology because the teachers are not knowledgeable about the technology?** Seventy-five percent of teachers agreed with the statement that students usually do not receive assistive technology devices and software only because teachers do not know about it as shown in Figure 2.7.

Figure 2.7



**Question 13: Do you feel that you would benefit from instruction on how to select a switch for students in your class?** Eighty percent of teachers expressed the willingness to participate in the training on selecting and using switches stating that they could definitely benefit from such instruction as shown in Figure 2.8.

Figure 2.8



### **Data Interpretation**

*Findings from literature research:* After researching the existing special education teacher training programs in the state of Virginia, it was determined that none of them require taking assistive technology courses in order to graduate with the Bachelor's or Master's degree in special education and to receive teaching license. While such courses were offered in some universities, they were not mandatory. Those universities that offered assistive technology experiences started them no earlier than 5 years ago. That brings us to a conclusion that many special education teachers may lack knowledge and skills in the area of assistive technology especially those teachers who finished their education prior to the implementation of assistive technology programs.

According to the state wide Assistive Technology Needs Assessments conducted by the Training and Technical Assistance Centers (TTAC) in Virginia, thirty-one of fifty-one respondents (sixty percent) reported a great need for staff development in the area of assistive technology. Thirteen respondents indicated a moderate need for staff development in order to increase the use and effectiveness of assistive technology and services.

*Findings from surveys:* We accurately predicted the number of surveys we were able to receive back: twenty surveys. According to the answers to the survey questions, more than fifty-five percent of the teachers do not know what a switch is (Figure 2.1). The absence of any previous knowledge in the area will greatly influence the design of this instruction. Because of that, we will include modules on the definitions and types of switches, where and how they can be used, and how the students with physical disabilities can benefit from them. Only after teaching this content we will be able to move on to teaching about the process of selecting the most appropriate switch. Among the other forty-four percent who knew what a switch was, only three teachers (fifteen percent) could name the correct characteristics needed to choose the best appropriate switch (Figure 2.2). None of the teachers had students in the classroom that used a switch (Figure 2.3), but seventeen percent stated that they had students who could benefit from using one (Figure 2.4). Of those latter teachers, approximately half did not acquire a switch for their student who could benefit from it either because they needed additional information on switches or because they did not know the steps for selecting a switch. This number could be skewed since many teachers did not know what a switch was and they were not able to judge if their students could benefit from using it. Moreover, just because forty-four percent of teachers have felt that their current students could not benefit from a switch does not imply they do not

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need information on this topic because they could have students in the future who would need a switch.

Our findings show that over sixty percent of the teachers have some training in assistive technology (Figure 2.5), but there was minimal to no information about switches in the training received (Figure 2.6). According to seventy-five percent of the participants, students do not receive assistive technology because their teachers lack knowledge in the subject (Figure 2.7). Eighty percent of the teachers felt that they would benefit from instruction on how to use and select a switch (Figure 2.8).

*Findings from interviews:* From the four interviews with SMEs and former teachers, the following information was gathered:

- The assistive technology field is relatively new. Consequently, many teachers still lack knowledge and skills in this area.
- Teachers who know something about assistive technology rely on intuition and what they have recently heard in choosing assistive technology devices and software for their students.
- Many current teachers come to the lab to get information on assistive technology, particularly on selecting and using switches (according to Kristin Neuber, Director of the Assistive Technology Lab at George Mason University), indicating a general lack of knowledge on the subject.
- The average price range of a switch is \$100-\$200 dollars, so the price should not be an issue. (This is also proved by the teachers' responses on the survey noting that funding was not an issue on why their students did not have a switch).
- All SMEs stated that most switches are considered low tech because they are easy to use, maintain, and repair. This statement rules out a technical support problem. Moreover, all our interviews showed that there is at least one instructional technology specialist in each school to help with technical problems.

The consensus of the SMEs and former teachers is that there is a great lack of knowledge and skills that could be solved by training.

## Conclusions

The design team has reached the following conclusions about the learner's needs to be considered during the design phase of the project:

- There are felt and expressed needs for the training on switches.
- Most of the teachers do not know what a switch is or how it can help their students so more detailed instruction is needed in this area.
- Almost all the surveyed teachers do not know the process of selecting a switch.
- Nearly all teachers agree that students do not receive assistive technology because teachers are not knowledgeable on the subject, not because of the lack of funding or technical support.
- Majority of teachers expressed that they would benefit from training on selecting and using the switches.

## Training Recommendations

Based on the results of the needs assessment, we identified two training problems. First, teachers needed training on what a switch is and how it can assist students with special needs. Second, they needed training on considering appropriate characteristics of a particular student and a switch in order to match them for more effective implementation. Therefore, our training recommendations for the training are to **conduct one-day blended training that will combine instructor-led training as well as the use of videos, hands-on activities, and email during a teacher workday in August in the assistive technology lab at George Mason University, which will cover the following topics:**

- Definition and types of switches
- Purpose and benefits of using the switch for students with physical disabilities
- Process of selecting the switch: consideration of student's abilities required for selecting the most appropriate switch for an individual student
- Process of selecting the switch: switch's characteristics depending on student's abilities required for selecting the most appropriate switch for an individual student



### III. Learner Analysis

#### **Introduction:**

The purpose of the learner's analysis is to identify the most critical characteristics, abilities, and experiences of the learners. This information will affect certain elements in planning our instruction: entry point, level at which the topic is introduced, the choice and sequencing of objectives, the depth of topic treatment, and the variety of learning activities. The learner's analysis looks at general as well as specific characteristics of the learner (target audience), the methodology for gathering data, and a presentation of the data that was collected. These characteristics will help the designer determine and make some more effective choices on how to conduct the training.

By the end of this analysis the reader will understand:

- How the data was collected
- What information was gathered from the data
- General learner characteristics
- Specific learner characteristics

**Methodology for gathering data:**

Our team has included questions for the learner's analysis in the main survey that was sent to fifty special education teachers in Frederick County (see Planning in Needs Assessment section above). The e-mail addresses were found on the schools websites and provided us with the opportunity to examine teachers' personal profiles. The team received twenty responses on the website. Questions for this learner's analysis included:

- Gender (Male, Female)
- Years of teaching experience? (Less than 5, 6 to 10, more than eleven)
- What students do you teach? (Students with emotional disorders, with learning disabilities, with mental retardation, with severe disabilities)
- What is the highest level of your education? (Bachelor's, Master's, other)
- Do you have a teaching license? (Yes, No)
- Do you have a teaching license in the subject and grade that you teach? (Yes, No)
- What grade level do you teach? (Pre-K, elementary, middle, high)
- Is your school located in a (rural setting, urban setting, and suburban setting)?
- Do you have an assistive technology policy in your school? (Yes, No, I don't know)

We will analyze the data and make graphs to depict the findings.

**Collected Data on the Audience:**

The team found that seventy percent of our targeted audience is female and thirty percent of the audience is male, as shown on the Figure 3.1 in the Appendix C. Sixty-seven percent of the teachers have 6 to 10 years of teaching experience (Figure 3.2). The rest were scattered between less than 5 and more than eleven years of experience. On the survey teachers could select as many disability categories they teach as apply because very often there are children with a variety of disabilities in the same classroom: students with learning disabilities represented fifty percent, with emotional disorders – fifteen percent, with mental retardation – twenty percent, and with severe disabilities – fifteen percent (Figure 3.3). Half of the teachers teach in a school that is located in a rural setting, while forty percent teach in a suburban setting and 10 percent teach in an urban setting (Figure 3.4). Fifty percent of the teachers surveyed have a Bachelor's Degree as the highest level of their education, forty-five percent have a Master's Degree and 5 percent put other when asked about their highest level of education (Figure 3.5). Eighty-five percent of those surveyed have a teaching license and of those seventy-five percent have a license in the area they are teaching. Seventy-five percent of the teachers teach in either a middle or high school (Figure 3.6). The majority of the teachers were able to answer the question about the assistive technology policy in their school district.

These findings are very important to how we conduct our training. Although, it may be assumed that the teachers know, in general, what assistive technology is because they were able to answer the question about the AT policy in their school district, the fact that most of them have more than 5 years of teaching experience may suggest that they did not have an opportunity to enroll in detailed AT courses at the college level. The majority of AT college programs were developed no earlier than five years ago. That questions the familiarity of the targeted audience with the content and terms. The level of education that most of the teachers have helps us to determine the reading level (12<sup>th</sup> grade reading level) of the audience and choose the best instruction level. Location of the majority of the teachers in rural schools suggests using certain appropriate examples and providing useful and applicable for rural schools information. The population (type of disability) that these teachers work with and the grade level also provides additional information on what content and examples would be more appropriate.

**Audience Characteristics:**

From the data collected, we can conclude the following about our audience:

**General:** The targeted audience is composed of both male and female special education teachers. Most of the teachers have between five and ten years of teaching experience. Almost all the teachers have either a Bachelor's or Master's degree and most of them have teaching license in the subject (primarily students with learning disabilities or with mental retardation) and grade (mostly middle or high) that they teach. Most of the teachers expressed a willingness to participate in the instruction.

**Specific:** The fact that most of the teachers surveyed have some type higher education degree allows the team to assume a high level of basic literacy skills. We will consider presenting all materials on the 12<sup>th</sup> grade reading level. The target audience is located in Frederick County Virginia. This is a rural county in Northern Virginia (agricultural area, located outside of major cities). The audience is also composed of mostly middle and high school teachers. Teachers participating seem to know a little about assistive technology while many of them do not know about specific devices like switches. Most of the teachers express the readiness to learn more about the subject in order to help their students. This is very important because going through several characteristics to select the appropriate switch may require time and extra effort. These are the prerequisite skills and attitudes that our targeted audience possesses prior to the training.

## IV. Task Analysis

### Introduction

"Task analysis for instructional design is a process of analyzing and articulating the kind of learning that you expect the learners to know how to perform" (Jonassen, Tessmer, & Hannum, 1999, p.3)<sup>1</sup>. It is a collection of procedures for defining the content of an instruction unit. The task analysis is very important for the instructional designer because it

- (a) defines the content,
- (b) reveals the subtle steps involved in the performance, and
- (c) provides insight into effective methods since at this point the designer sees the content from the learner's prospective.

The task analysis ensures that the instructional designer hits the target. If task analysis is not completed, there is a risk for the designer to misinterpret the content and lead the instruction in the wrong direction, which will result in the inability to address the stated performance problem. In this project, it is crucial to provide instruction following these steps, so the learner has all the necessary knowledge and information to choose what switch will be the most appropriate for a student with physical disabilities.

After reading this portion of the instructional design document the reader will:

- understand the tasks/steps required for the training to occur.
- be presented with the sequence of all required actions or behaviors to accomplish our goal of selecting and using an assistive switch.
- be offered the flowchart of the procedural analysis that identifies steps required to complete assessment of student's abilities in order to select the most appropriate switch (that is the flowchart of the Task 3 that will be represented in the prototype).
- see how the learner should go from one step to another, making decisions about what switch to choose according to the student's abilities.

**Representation of the steps needed to complete the task/instruction**

Our team completed this task analysis by using the developer modeling method. We created this analysis, then, modeled the task/instruction to the SME (to check our understanding of the content), and asked the novice learner to demonstrate the steps in one specific task following our flowchart.

This is the outline of the steps needed to complete the task/instruction. Completing these steps, the learner will be able to select and use the most appropriate switch for an individual student.

What do you need to know in order to select and use the most appropriate switch?

**Task 1. Definition of a switch**

- a. A switch as an assistive technology device
- b. Types of switches

**Task 2. Explain the purposes and benefits of using the switch for the student with physical disabilities**

- a. Different purposes of a switch
- b. Identify how using a switch can help a student with physical disabilities

**Task 3. Consider student's abilities**

- a. Indicate possible ways in which the student might activate the switch (what part of the body will the student use).
- b. Identify if the student has limitations in the range of motion.

**Task 4. Consider switch's characteristics**

- a. Determine the amount of pressure required to activate the switch (switch sensitivity depends on child's movements [weak or strong]).
- b. Based on student's ability, determine the size of the surface the student is able to target (switch size).
- c. Consider if the student needs an auditory or tactile feedback.
- d. Take into account the durability of the switch.
- e. Choose the most appropriate placement for the switch depending on the student's reliable body parts and movements.

**Outline of One Specific Task**

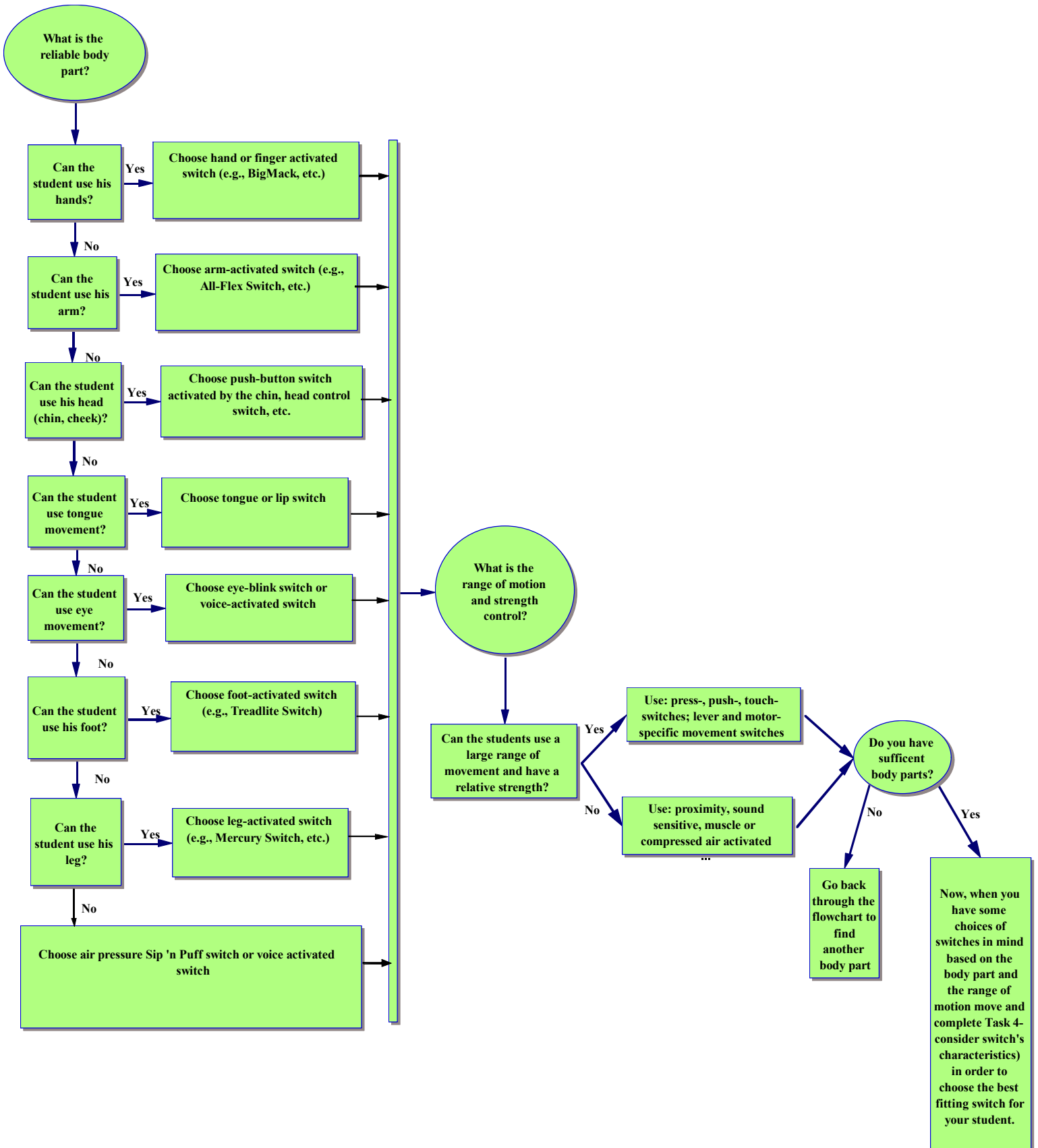
Our team prepared a flowchart that provides a specific sequence of steps the learner must follow to determine student's abilities (Task 3) in order to select the most appropriate switch. This particular task is represented in the flowchart because it will be used in the prototype. Here is the explanation of how this specific task fits the process of selecting and using the most appropriate switch for a student. After the learner understands what the switch is (Task 1) and how the student can benefit from using the switch (Task 2), he/she moves to identifying what will be the most appropriate switch for a student. In order to do that, the learner must consider student's abilities (Task 3). This module will narrow down the possible options from a great variety of available switches. Then those choices thin down even more when the learner considers the switch's characteristics and match them with the student's abilities (Task 4). Completing this process the learner will know how to match the available switches with different characteristics of the student in order to select and use the most appropriate device avoiding frustration and abandoning the device.

**Prerequisites:**

- the student is in the comfortable position
- the student is able to initiate a movement to activate a switch
- the student doesn't have any abnormal reflexes and/or muscle tone
- the student has cognitive skills to activate and use a switch on purpose

*Note:* Some students may have more than one reliable body parts so more than one switch could be used. Make sure to go through the steps as many times as it takes to exhaust the possibilities.

Flow Chart





## V. Instructional Objectives

### Introduction

The instructional objectives are a very important portion of the design document. The main purpose of instructional objectives is to guide the learner during the training session. The learners can use the objectives to focus their attention on the most important parts of the training. Another reason that the instructional objectives are important is that the instructor can use them to structure the training session. There are two types of objectives, terminal and enabling. The terminal objectives are the main objectives for the topic or task at hand. Enabling objectives describe the specific behaviors that must be learned or performed to achieve the terminal objectives. We are writing the enabling objectives only for the terminal objective we are using for the prototype.

By the end of this portion the reader will:

- know all the terminal objectives for this document
- know the enabling objectives for Module 3 because this task will be used in the prototype

**Performance Objective:**

Given the materials from a one-day training on the selecting and using switches and various case studies, the learner will write a justification of choosing a specific switch for a specific student with 95% accuracy based on the rubric.

**Terminal Objective – Module 1**

Using the materials on defining a switch from the training on switches, the learner will correctly define types of switches on written quiz with open-ended questions with 95% accuracy.

**Terminal Objective – Module 2**

Given an access to different types of switches during the training on selecting and using switches, the learner will identify how a student with physical disabilities in their classroom can use a switch generating 3 examples.

**Terminal Objective – Module 3**

Given descriptions of different students with different abilities, the learner will choose a specific type of switch for each student with 95% accuracy.

**Enabling Objectives – Module 3**

- 3.1 Using materials from the student's abilities portion of the training, the learner will correctly write down the definition of the control sites.
- 3.2 Using the method of the control sites process information, the learner will identify reliable body parts of specified students in the correct order with 95% accuracy.
- 3.3 Using the materials about switch types for specific body parts, the learner will identify switch types for various body parts by answering questions with 95% accuracy.
- 3.4 Using the materials about range of motion, learners will correctly write down the definition of the range of motion.
- 3.5 Using the material about switches for different ranges of motion, the learner will identify a switch that corresponds with a specific range of motion with 95% accuracy.

**Terminal Objective – Module 4**

Using the materials about switch characteristics from the training on switches, the learner will describe a specific switch by listing its characteristics and placement for a specific student with 95% accuracy based on the rubric.

## V. Instructional Approach

### Introduction

Designing an instructional approach is a very important part of the instructional design process. The primary goal of any designer is to create an effective and efficient instruction that produces reliable results each time it is presented to the learner. Instead of relying on the effectiveness of instructional methods reinvented by each instructor, the instructional approach presents a single formalized model. While designing the instructional approach, the designer has to find ways to deliver content in a variety of methods that ensure maximum learning and retention.

After reading this section of the instructional design document the reader will understand:

- how the instruction on selecting and using the switches will be organized,
- what will be the format/delivery strategy of the instruction,
- how the content and instruction will be sequenced,
- what will be the instructional strategy for the whole training (macro level) and separate portions of instruction (micro level) covering main terminal objectives,
- how the message of the training will be designed.

### **Organization of Instruction**

After communicating with the teachers it was found that the best way to organize the proposed instruction on selecting and using switches would be to have a one-day blended training at the Assistive Technology Lab at George Mason University (GMU). The training will take place during one of the teachers' workdays in August and/or throughout the year and last from 8:30am till 3:30pm. The blended training will combine the instructor-led portion and the use of videos, hands-on activities, and email. The Assistive Technology Lab is a high-tech computer lab consisting 20 laptop computers, 9 desktop computer stations, projector, TV/VSR/DVD, smartboard, and video conferencing equipment. You can also find many assistive technology hardware and software devices and programs that are available for hands-on activities.

It was found that unfortunately, individually paced web-based instruction is not an option because many of the teachers do not have computers in their classrooms. Moreover, after interviewing former teachers, it was found that most of the teachers do not have time to follow the web-based instruction either during the school day or after school. In view of these factors, the initial decision was made to design a one-day blended training. The other reason supporting that decision was that after interviewing Subject Matter Experts (SMEs) it was decided that learners would need to have access to different types of switches and hands-on activities that would be possible only at the Assistive Technology Lab at GMU. It was mutually determined that any other form of instruction (including work books and web-based instruction) would only provide learners with the theoretical knowledge. This knowledge would prevent better understanding and longer retention of the new skills. Taking into consideration the necessity to provide all instruction in one chunk due to the teachers' time issues and the amount of information that has to be covered during the instruction the one-day blended training was suggested.

**Delivery Strategy**

Due to the fact that the training on selecting and using switches has to be a one-day blended training (see the explanations above), the format of how the training and content will be presented includes lecture/large group and small group experiences. The lecture/large group instruction will include both PowerPoint presentations with handouts and videos. The small group projects will include hands-on activities and peer brainstorming activities and reviews. At the end of the training the learners will be expected to complete the reflection and send it to the instructor via email. So you can see that along with the lecture the learners will have an opportunity to be engaged in interactive learning with hands-on activities. The SMEs, former teachers, and the designers feel that it is very important to have the instructor present during all the parts of the training to provide, help to individual learners, technical support, and explanations to those who may need it. Upon completing the training, the learners will be given access to the job aid as a resource for future reference.

This training is designed to appeal to both experienced and beginning teachers. There are many activities to be designed that cover the same objectives, giving teachers a variety of flexible options. Those teachers familiar with their students who may benefit from using a switch will be able to choose the switch during the training that will best suit those particular students. Those who do not have a specific student in mind will be provided with the student's descriptions/profiles and be asked to choose a switch for those imaginary students.

## **Approach to Instruction**

### **Sequencing:**

The instructional strategy developed for the one-day blended training on selecting and using switches will follow Gagne’s Nine Events of Instruction both on macro and micro levels:

1. Gaining Attention
2. Informing Learner of Instructional Purpose
3. Stimulating Recall of Prior Knowledge
4. Presenting Stimuli
5. Providing Guidance
6. Eliciting the Performance
7. Providing Feedback
8. Assessing Performance
9. Enhancing Retention and Transfer

This instructional strategy was chosen because it is the closest replication of how teachers plan/design their own lessons. Since this training is primarily for the special education teachers, Gagne’s Nine Events of Instruction represent the familiar structured format to them. The details of the instructional strategies both on macro and micro levels are provided in the following section.

Due to the fact that all one-day training will follow the Nine Events (macro level), the “Presenting Stimuli” portion will be divided into four modules (two modules to be covered in the first part of the day and the second two after lunch). Each module corresponds with the 4 tasks as well as 4 terminal objectives and will be presented to the learner in the following sequence:

Module 1: Definition and types of switches (will approximately last 2 hours).

Module 2: Purposes and benefits of using the switch for students with physical disabilities (will approximately last 1 hour).

Module 3: Consideration of student’s abilities required for selecting the most appropriate switch for an individual student (will approximately last 2 hours).

Module 4: Consideration of switch’s characteristics depending on student’s abilities required for selecting the most appropriate switch for an individual student (will approximately last 1 hour).

Although each module will be represented during the “Presenting Stimuli” portion of the Nine Events of Instruction sequencing, each module will follow the same nine events sequencing on the micro level (e.g., each module will include gaining the attention, informing learner of instructional purpose, presenting stimuli, assessing performance, etc. events.)

## Instructional Strategies

The details of the instructional strategies are in the Table 5.1 as follows:

Table 5.1

<p><u>1. Gaining Attention</u></p>	<p>The instructor will pass the Jelly Belly dispenser around the room asking the learners to turn the knob to get the candy without using their fingertips. Regardless of the results (even if somebody comes up with the way to do it) the instructor will ask the learners how they felt completing this task. This activity will focus the learners on the fact that not being able to do something the “regular” way is quite a challenge. Then the instructor will let the learners use the assistive technology device for opening the jar. The instructor will underline the fact that people with disabilities are able to do many more things and be more independent with the help of assistive technology.</p>
<p><u>2. Informing Learner of Instructional Purpose</u></p>	<p>The instructor will inform learners of the purpose of the training at the beginning of it. The learners will be informed that at the end of the training they will be able to select the most appropriate switch for an individual student with physical disabilities based on his/her abilities and switch’s characteristics. The instructor will utilize an advanced organizer to provide the conceptual framework for the training.</p>
<p><u>3. Stimulating Recall of Prior Knowledge</u></p>	<p>The instructor will use the following activity to identify how much prior knowledge on the topic the learners have. One corner of the room will represent “I do not know anything at all about switches”, the other “I know a lot about switches”. The instructor will ask learners to place themselves accordingly on the topic on an imaginary line stretching between the two corners depending on what they know about the topic. Learners who placed themselves in or close to the “I know a lot about switches” corner will be asked to share what they know about switches with the rest of the group. Based on the outcomes of this activity the first module of the training (refer to Presenting Stimuli) can be eliminated (if ALL learners know the definition and types of switches). In that case, the instructor will only recapitulate the definition and different types of switches.</p>
<p><u>*4. Presenting Stimuli</u></p>	<p>The instruction of the new material will be divided into four modules and will follow the previously mentioned sequence based on the terminal objectives. The new information will be presented in the following order:</p> <ul style="list-style-type: none"> <li>Module 1: Definition and types of switches.</li> <li>Module 2: Purposes and benefits of using the switch for students with physical disabilities.</li> <li>Module 3: Consideration of student’s abilities required for selecting the most appropriate switch for a student.</li> <li>Module 4: Switch’s characteristics that impact the choice of the most appropriate switch for an individual student.</li> </ul> <p>Each module will follow Gagne’s Nine Events of Instruction on the micro level. * Please find the detailed description of the initial presentation and generative strategies for each of the modules in the Table 5.2 below.</p>

<p><u>5. Providing Guidance</u></p>	<p><i>(Instructional strategies on the macro level continue)</i></p> <p>Based on the specific instructional strategies described above, the instructor will provide examples on the types and purposes of the switch. The instructor will also show how to apply the procedure of considering student’s abilities and switch’s characteristics by walking the learners through each step. The instructor will ensure that the learners understand each step before continuing with the instruction. The instructor will also assist students while they are doing their exercises: quiz, generating examples, matching activity, and descriptions. All activities will be discussed in small groups so the learners will have an opportunity for peer reviews.</p>
<p><u>6. Eliciting the Performance</u></p>	<p>The instructor will provide learners with practice and complete hands-on activities in the lab using the case studies. Each learner will receive a case study that gives a description of one student and his/her needs. The learners will be responsible for completing the case study by suggesting one switch that will be the perfect fit for the student, explaining how they came up with that suggestion. The learners will present their case studies to the group so that other learners can evaluate the suggestion (agree/disagree proving their opinion).</p>
<p><u>7. Providing Feedback</u></p>	<p>The instructor will provide feedback to students while helping them individually and when they present their case studies, monitoring the understanding of the material. Learners who have difficulties will receive individual help.</p>
<p><u>8. Assessing Performance</u></p>	<p>The performance will be assessed through the presentation of the case studies and participation in the discussion after each module. Each presentation is expected to include the detailed description of how the learner selected the switch including:</p> <ul style="list-style-type: none"> <li>• what student’s abilities they looked at,</li> <li>• what switch’s characteristics they considered based on student’s abilities,</li> <li>• how they are going to use the specific switch to provide more access for the student to general education and make his/her functioning more independent.</li> </ul>
<p><u>9. Enhancing Retention and Transfer</u></p>	<p>At the end of the training, the learners will be asked to recall the steps and procedures they need to go through in order to select the most appropriate switch for an individual student by making a big flowchart in small groups. This activity will reinforce the retention of the newly acquired knowledge and skills. Learners will be asked to transfer the new knowledge to their own classrooms and provide one example of how they are going to follow the selection procedure in their own classroom for one specific student who could benefit from a switch. If currently they do not have any students who could benefit from using a switch in their classrooms, ask them to pick any student they had before or observed in other special education classrooms. This activity will be completed in the form of written reflection and turned in to the instructor by email either at the end of the training or the next day (individual choice of each learner).</p>

In the Table 5.2 you can find a more detailed description of specific instructional strategies used to address each of the modules that correspond with each of the terminal objectives. These modules will be taught during the “Presenting Stimuli” portion of the training (macro level) and each of them will follow the Nine Events of Instruction as well (on micro level). Module 3 contains more details because it will be used in the prototype.



Table 5.2: “Presenting Stimuli” step in the macro level sequence of the one-day training

<p>Module 1. (2 hr.)</p>	<p><u><i>Initial Presentation:</i></u> The instructor will provide the learners with the definition of the switch and demonstrate different types of switches, explaining differences between them.</p>	<p><u><i>Generative Strategy:</i></u> The learners will recall the definition of the switch and generate examples of how different types of switches can be used with different students. The learners will be given a quiz with open-ended questions on this material</p>
<p>Module 2. (1 hr.)</p>	<p><u><i>Initial Presentation:</i></u> The instructor will explain different applications/purposes of the switch showing short video clips on how students with physical disabilities can benefit from using a switch.</p>	<p><u><i>Generative Strategy:</i></u> The learners will generate 5 examples of how the switch can be used by a student with disabilities in their classroom.</p>
<p>Module 3. (2 hr.)</p> <p>*Will be used in the prototype; demonstrates Gagne’s Nine Events of Instruction.</p>	<p><b>1. <i>Gaining Attention:</i></b> Larger control surface areas require larger switches. Try to access multiple switches that are keyboard keys with your heels. It would be very difficult.</p> <p><b>2. <i>Instructional Purpose:</i></b> Explain what the learners are going to learn in this portion of the training and why that is important.</p> <p><b>3. <i>Prior Knowledge:</i></b> “Now you know about different switches, think about your students and their abilities. What do you think you need to consider? In what order?”</p> <p><b>4. <i>Presenting Stimuli</i></b> will include: <u><i>Initial Presentation:</i></u> The instructor will demonstrate the procedure of considering the student’s abilities in the correct order. The learners will watch a video clip where the teacher goes through all the steps with the specific students.</p>	<p><b>4. <i>Presenting Stimuli</i></b> will also include: <u><i>Generative Strategy:</i></u> Using elaboration strategy, the learners will create the diagram to demonstrate the process of assessing abilities of a student. They will complete the matching activity by choosing a specific type of switch for each of the students given the description of their abilities. During the instruction in this module, students will be introduced to different switches to be used with different body parts and different ranges of motion.</p> <p><b>5. <i>Providing Guidance:</i></b> The instructor will demonstrate different switches to learners, explaining how they work and where they can be purchased.</p> <p><b>6. <i>Eliciting:</i></b> The learners will be engaged in the hands-on activities, playing with the switches, generating classroom activities, compare and contrast switches, etc.</p> <p><b>7. <i>Feedback:</i></b> Throughout the module the instructor will provide feedback/help as needed.</p> <p><b>8. <i>Assessing Performance:</i></b> Assessment will include the definition of the control site, the steps, and range of motion; numbering the reliable body parts in order based on student’s description; and selecting a switch for different body parts and range of motion.</p> <p><b><i>Enhance Retention:</i></b> “Close your eyes, think of a person/student with disabilities you know, become that person, think of the abilities that you have (reliable body parts, range of motion), choose the switch (represented in the lab) that will fit you the most, access the switch you chose with your reliable body part.</p>
<p>Module 4. (1 hr.)</p>	<p><u><i>Initial Presentation:</i></u> The instructor will demonstrate the procedure of considering certain switch’s characteristics based on student’s abilities.</p>	<p><u><i>Generative Strategy:</i></u> The learners will paraphrase each step and will describe the most appropriate switch and its characteristics based on a specific description of one student and his/her abilities.</p>

## Messaging

*Preinstructional Strategy:* The preinstructional strategy for this training will take place during the Informing Learner of Instructional Purpose and the Stimulating Recall of Prior Knowledge sections of the sequencing on the macro level when the instructor introduces the whole one-day training. All four Hartley and Davies's<sup>2</sup> methods of preinstructional strategy will be used throughout the training (on the macro level). First, during the Informing Learner of Instructional Purpose section, the instructor will introduce learners to the *performance objectives* so the learners know what behaviors they are expected to master at the end of the training. Then, the instructor will utilize the *advanced organizer* to introduce the learners to the conceptual framework of the training. The third preinstructional strategy, *pretest*; will be used during the Stimulating Recall of Prior Knowledge. However, the pretest will be in the form of the activity rather than a written pretest. The pretest activity will enable the instructor to see how many learners know what the switch is and adjust the instruction based on those findings (include or exclude the instruction on the definition and types of switches – Module 1. Please note that Module 1 can be eliminated only if ALL the learners demonstrate the knowledge of the definition of a switch and types of switches). Finally, the learners will be provided with the *overview* of the job aid and the explanations of how they can use it.

\* Specifically, preinstructional strategies used in the Module 3 that will be represented in the prototype are:

- Objectives
- Advanced organizer (during the Instructional Purpose on the micro level), and
- Overview (overview of the job aid)

*Signaling:* The learner's manual will include several uses of signaling. Different text structures will be used to signal important text for the learner (the ones marked with the asterisk will be used in the prototype):

- \*Lists of items (e.g., lists of the important points that the instructor must remember to tell the learners [\*Instructional Manual]; list of different purposes of a switch [Module 2] that will help the learners to relate the topic to their classroom and start generating the examples of how their students can use the switch and what purpose, etc.);

- \*Comparisons and contrasts (e.g., after having the list of different switches the learners will be asked to compare and contrast different types of switches [Module 1]; after having the list of different switches that can be activated by hand the learners will be asked to compare and contrast their features [\*Module 3 and Instruction Manual], etc.);
- \*Temporal sequences (e.g., the method of control sites [\*Module 3 and Instructional Manual] proving the sequence of steps the learner has to go through to consider the body parts the student can use to activate the switch, etc.);
- Cause and effect structures (e.g., only in the Module 4: the learners will learn about the switch characteristics and will benefit from having the text in the cause and effect structure so they can see the relationship between the switch characteristics and student's abilities, etc.).

Additionally, in each module students will be presented with the \*definitions. The signaling will be supported with the \*pointer words and \*typographical signals, such as headings, different types of font and variations on the font and the color.

Use of Graphics: All modules will include graphics/pictures for different purposes:

- \*for representation (e.g., pictures of different types of switches),
- \*for interpretation (e.g., pictures and descriptions of how a specific switch can be used with students), and
- \*for transformation (e.g., picture of a person where the learners have to number the reliable body parts they consider in order).

These graphics include:

- \*Clip art and other computer generated pictures
- \*Actual pictures of switches
- \*Pictures of students using the different switches

We will enhance our instructional approach by preinstructional strategies, signaling the text's structure, and using the pictures. That will keep the learners attentive and also help them understand abstract ideas and concepts.

\* Items marked with asterisk will be represented in the prototype

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## VII. Evaluation

### Introduction

The evaluation portion of the Design Document is a very important section. This section makes sure that the training is actually doing what it was set out to do. It has to be creative and support the entire document.

The evaluation part here is divided into five different sections:

1. The first section is the **formative evaluation** section. The formative evaluation is done early in the designing phase before valuable time and money are wasted.
2. The second part of the evaluation is the **summative evaluation**. The summative evaluation “is directed toward measuring the degree to which the major outcomes are attained by the end of the course” (Morrison, et al., 2004, p. 243)<sup>3</sup>. This means that it is evaluating whether the training meets the objectives.
3. The third component is the **confirmative evaluation**. This evaluation comes after the summative evaluation and is a continuous one. It makes sure that the training is still effective.
4. The fourth part addresses **Kirkpatrick’s Levels of Evaluation**. Kirkpatrick developed a model of four levels of evaluation to assist in the evaluation process.
5. The last section demonstrates how the evaluation is **linked to the objectives** and provides some **sample evaluation instruments** designed to assess this training.

By the end of this section the reader will know how the training will:

- be evaluated formatively, summatively and confirmatively
- meet the four levels of Kirkpatrick’s levels of evaluation
- meet the instructional objectives

## **Formative Evaluation**

### *SME Review*

The first part of our formative evaluation is meeting with the SME. Our team is going to meet face to face with Estella Landeros. We will go over objectives, the training, and overall design. Our team will entertain comments, questions, and suggestions. This meeting will help us determine if we are planning the most appropriate training. After considering the SME's suggestions we will make changes and adjustments to the document.

### *Targeted Audience Review*

A random sample of the targeted audience will be brought together for a group meeting. The design team will meet with them and show them the prototype and the design document. The participants will go through the training as if they were actually participating. This way we, as designers, will be able to see if the instruction makes sense to the learners and that the learners are actually acquiring the knowledge that the training is supposed to be teaching.

## **Summative Evaluation**

### *Case Study*

A case study will be used to determine if the learners have received the knowledge that the instruction was designed to teach. Each learner will be given a case study/description of a student who needs a switch. The learner will then demonstrate the steps necessary to select the most appropriate switch for the student in the case study. This type of evaluation will show that the learners have an understanding of the material from the training and can use it in their teaching environments. (See Sample Case Study in the Sample of Test Items section further in the document).

The other mean for the summative evaluation of this training is the written reflections. Learners will be asked to transfer the new knowledge to their own classrooms and provide one example of how they are going to follow the selection procedure in their own classroom for one specific student who could benefit from a switch. If they currently do not have any students who could benefit from using a switch in their classroom, they will be asked to pick any student they had before or observed in other special education classrooms. This activity will be completed in the form of written reflection and turned in to the instructor via the email either at the end of the training or the next day (individual choice of each learner).

### *Course Evaluation*

At the conclusion of the training the learners will fill out a course evaluation to help the instructor as well as the designers. The evaluation will let the learners critique the instructor, the training, the relevance of the material being taught, and if they believe the material will be helpful when put into action at the work place. These questions were chosen because they can help the instructors and the designers fix any unforeseen problems that came during the instruction. Here is a sampling of the questions that would be used (in the full evaluation we anticipate having 15 questions).

#### Sample Course Evaluation Questions

*Assignment:* Please circle one that applies.

1. Participants were encouraged to take part in class discussions.

1	2	3	4	5	6	N/A
Strongly disagree				Strongly agree		

2. The instructor was knowledgeable about the subject.

1	2	3	4	5	6	N/A
Strongly disagree				Strongly agree		

3. On-the job application of each objective was discussed during the course.

1	2	3	4	5	6	N/A
Strongly disagree				Strongly agree		

4. The material was organized logically.

1	2	3	4	5	6	N/A
Strongly disagree				Strongly agree		

5. I learned new knowledge and skills from this training.

1	2	3	4	5	6	N/A
Strongly disagree				Strongly agree		

6. I will be able to apply knowledge and skills learned in this training to my job.

1	2	3	4	5	6	N/A
Strongly disagree				Strongly agree		

### **Confirmative Evaluation**

Two months after the training, interviews will be conducted with a random selection of teachers who attended the training in order to complete this part of the evaluation process. The reason for the interviews is to find out if any of the teachers started using switches in their classrooms after the training. If so, the interview questions will include prompts inquiring on why they decided to use a switch, if the training influenced their decision to acquire a switch for their students, and if the training was helpful in the switch selection process.

### **Kirkpatrick's Levels of Evaluation**

All of Kirkpatrick's levels are represented here. Level 4 is difficult to achieve but we are planning on conducting all of them.

- *Level 1: Reactions* - Two evaluations are going to be used for this level of Kirkpatrick's evaluations. First, the instructor is going to ask questions during the training to check the understanding of the material. Questions like "How is everything going?" "Does everyone understand?", "Are there any questions?" Second, a course evaluation is going to be given out at the end of the training for the learners to evaluate the instruction and instructor. (See the sample course evaluation questions above)
- *Level 2: Learning* - This training will utilize a pre and posttest format. The learners will take a pretest at the beginning of the training. The pretest will be in the form of the activity where learners will be encouraged to share their prior knowledge about assistive technology, specifically switches. After the training the students will have a posttest (the case study) to see if they have learned the information from the training.
- *Level 3: Transfer* - This will be met by interviewing the teachers two months after the training. Any teachers who have started using the switches will be asked if the training had an impact on the decision making process. Also, teachers who are not using switches will be asked why they are still not using them.
- *Level 4: Results* - This level will be harder to evaluate and will be conducted 4 to 6 months after the training (giving the teachers time to go through the selection process, ordering the device, having it delivered, and letting the student to get used to it). One way to do this level is to find students who can tell how the new switch has impacted their schooling. Another way is to talk to student's parents to see if they felt that using the switches had a benefit on their student. They will also be asked if they felt that the teacher's outlook on switches changed after the training.

### **Relationship Between the Evaluation and the Objectives**

The broad purpose of evaluation is to determine to what extent the objectives of the instruction are being attained. Therefore, there should be a direct relationship between the evaluation and the objectives. There should be a good match between types of assessment instruments and types of objectives. Because all of the objectives we are hoping to achieve in this training are cognitive, we are going to use the matching assessment instruments to assess knowledge:

- Objective tests (multiple choice, true-false questions, matching items)
- Constructed-response tests (completion questions, short essays)

Below we have listed all the terminal objectives and the enabling objectives that will be used in the prototype. There are sample questions following each objective. ***These are only samples of questions; more will be used for the actual training.***



### Sample Test Items

**To address the Performance Objective:** “Given the materials from a one-day training on the selecting and using switches and various case studies, the learner will write a justification of choosing a specific switch for a specific student with 95% accuracy based on the rubric.”

#### Sample Case Study

*Assignment:* Please read the following case study, identify and describe in a short written essay what would be the most appropriate switch for John and how would he use it in the classroom. (See the rubric attached)

John is just starting middle school. Before that he was home-schooled so he didn't have a lot of experience in moving around big environments by himself. He is very cheerful and sociable. He appears alert, interested in new experiences and activities. He is looking for more independence that could initiate peer interactions. John has a physical disability (cerebral palsy). He has no coordination or control. John also has a visual impairment – peripheral vision – so he has vision only in the lower quadrants of both of his eyes. He has good perception skills and can deal with many objects at the same time as long as he sees them. He has no speech but uses an augmentative communication device, which he accesses by the stick he holds in his mouth. John has contractures in his arms and legs that require an extensive seating and positioning system that prevents him from accessing standard wheelchair controls. John has fluctuating tone, so sometimes his movements are soft but most of the time they are stomping. John is a very strong young man.

**Rubric:** The short essay should include answers to the following aspects with the references to the appropriate places in the case study (maximum 20 points):

Criteria	Full correct answer with explanations (3 points)	Partially answered question/ expl. (2pt.)	Partially answered question/no expl. (1pt.)	No answer (0 pt.)
The purpose of the switch use for John				
The best position of the switch. Explain				
Reliable body parts. Explain				
John's range of motion and the strengths				
Switch size				
The amount of pressure required for activating the switch				
Appropriate switch durability				
Switch feedback if needed				
Summarize/suggest certain type of the switch. Explain				
Research and suggest a specific switch that would follow the characteristics and how John would use it in the classroom. Explain.				
<b>Total Points</b>				

**To address the Terminal Objective 1:** “Using the materials on defining a switch from the training on switches, the learner will correctly define types of switches on written quiz with open-ended questions with 95% accuracy.”

### **Sample Open-ended Questions on Different Types of Switches**

*Assignment:* Please complete the sentence:

1. The touch switch means that the student activates it by \_\_\_\_\_.
2. The difference between push/touch switches and a lever switches is \_\_\_\_\_.
3. If a child is unable to make a pushing movement, the motor-specific switches are designed. Users with focused abilities can use \_\_\_\_\_ (name at least three examples).
4. The leaf and wobble switches are examples of \_\_\_\_\_.
5. A student can benefit from a sensitive stich when he has \_\_\_\_\_ because such switches \_\_\_\_\_.
6. Some examples of sensitive switches are \_\_\_\_\_ (name at least two).
7. How a switch can be used in the activity? Provide one example \_\_\_\_\_.
8. What are other options/types of switches? \_\_\_\_\_ (name at least three).

*Answer Key:*

1. pushing against the surface of the switch.
2. lever switches can be activated by pushing in more than one direction.
3. pull switch, roller switch, grasp or grip switch, pinch switch, chin switch or tongue switch.
4. lever switches.
5. has minimum movement; are activated by the slightest muscle contraction.
6. switches that are activated by moving an eyebrow, smiling, eye blink.
7. use activity switches; when the activity is completed, the switch closure occurs and the toy that it is connected to is operated.
8. switches controlled by sound or voice; a change in air pressure (pneumatic): sipping, blowing or puffing through a tube; movement near the switch; change in moisture.

**To address the Terminal Objective 2:** “Given an access to different types of switches during the training on selecting and using switches, the learner will identify how a switch can be used by a student with physical disabilities in their classroom by generating 3 examples.”

### **Sample Assessment Assignment**

*Assignment:* Please generate 3 examples of how you could use a switch in your classroom for different general curriculum activities in order to provide students with physical disabilities with the inclusive, productive environment.

**To address the Terminal Objective 3:** “Given descriptions of different students with different abilities, the learner will choose a specific type of switch for each student with 95% accuracy.”

### **Sample Descriptions of Students with Different Physical Abilities**

*Assignment:* Please read the following descriptions of different students and their physical abilities and choose a specific type of switch for each student.

1. Eva is 17 years old. She is nonverbal and has no fine motor control. She uses a lightweight manual wheelchair to get around and needs a full-time aide in the classroom. She is quadriplegic so she has paralysis of all four limbs but she seems to be pretty strong. Eva uses a simple laminated alphabet board with a red penlight attached to a baseball cap so she spells out words, sentences, and phrases by nodding. The aide then reads her messages and records test answers in longhand. Eva wants to be more independent in the classroom as well as at home. She would like to be able to surf the web and send and receive emails, as well as write letters and reports.

2. Julie is a 7-year-old spirited girl who just entered the first grade. She has a diagnosis of cerebral palsy that affects mostly her speech. She uses a manual wheelchair to get around and has good motor control of her hands and fingers but has a hard time picking up objects, grasping and holding onto items. Now that Julie is entering the first grade she needs an access device to participate in regular classroom activities.

*Answer Keys:*

1. full range of motion; strength; reliable head movements – use push-button switch activated by the head.
2. large range of motion but difficulty with grasping and/or pushing an object; enough strength (if she is able to use the manual wheelchair); reliable body parts: hands and fingers – use a lever switch, hand or finger activated (a chain switch where a child can make any movement with his hands that causes the chain to move against the metal bar).

**To address the Enabling Objective 3.1:** “Using materials from the student’s abilities portion of the training, the learner will write down correct definition for control sites.”

### Sample Assessment Assignment

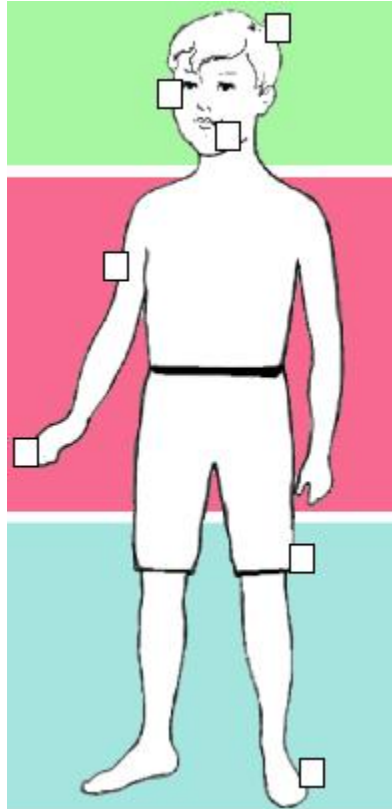
*Assessment:* Please write down the definition of the control sites for assessing a student while selecting a switch.

**To address the Enabling Objective 3.2:** “Using the method of the control sites process information, the learner will identify reliable body parts of specified students in the correct order with 95% accuracy.”

### Sample Assessment Assignment

*Assessment:* Please 1) number the reliable body parts in the correct order. Then, 2) after reading the description of the student, answer True/False question that identifies the most reliable body part and explain your answer.

1. Switch control sites: Assessment checklist



2.

Chad is 11 years old. He has cerebral palsy, manifested in a severe quadriplegia that markedly limited his use of his hands, arms, and legs. He has little control of his head. Chad is highly motivated in using simple communication board that can be activated with a switch. What would be the best control site for Chad to activate the switch?

Chad’s the most reliable body part is foot.

True

False

Explain: \_\_\_\_\_

\_\_\_\_\_

Answer Key: Eyes

**To address the Enabling Objective 3.3:** “Using the materials about switch types for specific body parts, the learner will identify switch types for various body parts by answering different kinds of questions with 95% accuracy.”

**Sample assessment assignment**

*Assignment:* Using the materials, answer the following questions about switch types for various body parts.

1. Please write down one type of switch that can and should be used for the student who has reliable arm movements. \_\_\_\_\_
2. If a student has reliable hand/finger movements, they can use \_\_\_\_\_.
  - a. Push/touch switches
  - b. Lever switches
  - c. Proximity switches
  - d. All of the above
  - e. None of the above
3. Write down one specific switch that can be used by the student with the reliable eye movements. \_\_\_\_\_
4. Please select and circle one particular switch that could be used for a student who only has foot mobility from the list of different pictures of switches. (The names are not used on purpose. By the time of this test, students will know what these switches are, what they are used for, and what their names are.)



*Answer Key:*

1. All-Flex arm-activated Switch; 5 Thread Switch Slot Control
2. d
3. Piezo Switch by Advanced Multimedia Devices Inc.
4. Middle picture – The two button foot switch

**To address the Enabling Objective 3.4:** “Using the materials about range of motion, learners will write down correct definition of the range of motion.”

**Sample Assessment Assignment**

*Assignment:* Using the materials about range of motion, please write down in your own word the definition of range of motion when dealing with switches.

**To address the Enabling Objective 3.5:** “Using the material about switches for different ranges of motion, the learner will identify a switch that corresponds with a specific range of motion with 95% accuracy.”

**Sample Assessment Assignment**

*Assignment:* Using your materials, please list three switch types for each range of motion category.

1. Full

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_

2. Limited

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_

Answer Key

- 1. Bigmack, Two Button Foot switch, Ellipse Switch
- 2. Traction Pads, Sip and Puff, Piezo Switch, Pinch switch, Soft Switch, Pillow Switch

**To address the Terminal Objective 4:** Using the materials about switch characteristics from the training on switches, the learner will describe a specific switch by listing its characteristics and placement for a specific student with 95% accuracy based on the rubric.”

### Sample Student Profiles

*Assignment:* Please list in writing four characteristics of the switch required based on students abilities and the switch use and explain.

1. A student has no limb movements and poor neck reflexes. He is not verbal and has hearing difficulties. He has seizures that make him weak. A student wants to use the switch to move around in the wheelchair.

*Answer Key:*

1. mouth/tongue
2. very sensitive, the student is weak after the seizures
3. not needed because the student has hearing problems and going to use his mouth to activate the switch
4. will be used a lot (has to activate the wheelchair to move around), using the mouth; has to be durable
5. has to be easy for the student to reach the tube

### Rubric:

Criteria	Full correct answer with explanations (3 points)	Partially answered question with explanation (2 pts )	Partially answered question without explanations (1 pt.)	No answer (0 pt.)
1. Body part that will activate the switch:				
2. Switch sensitivity:				
3. Auditory/tactile feedback				
4. Durability				
5. Placement				
<b>Total Points</b>				

**Summary:**

With these evaluation instruments we hope to determine if our training is effective, produces anticipated outcomes, helps teachers in the switch selection process, and encourages them to use switches more often. Based on the results of the different types of evaluation, we will prepare a report of the results for others to read and examine.

Formative evaluation will be used to make sure that the learners are satisfied with the training and outcomes so improvements can be made to the training as needed. Summative evaluation will be used to ensure that the learners acquire the knowledge and skills. And finally, the confirmative evaluation will be used to identify if the learners were able to transfer their new knowledge and skills to their jobs and if they started using or advocating for using switches more often with students with disabilities. All these three types of evaluations fit the Kilpatrick's Levels of Evaluation: formative evaluation = Level 1; summative evaluation = Level 2; and confirmative evaluation = Level 3 and 4. So with the same evaluation instruments we will be able to address those levels as well.



## VIII. Appendix A

### Glossary

**Abnormal reflex** – a response to a stimulus applied to the sensory components of the nervous system. This may take the form of increased, decreased, or absent reflexes.

**Assistive Technology (AT)** - is any item, product, device or equipment, whether acquired commercially, modified or customized, that is used to maintain, increase or improve the functional capabilities of individuals with disabilities.

**Control Site(s)** – the part(s) of the body used to activate switches in order to operate a device.

**Low-tech** – is technology that involves common, simple, readily available, and usually inexpensive components; typically transparent or translucent in use.

**Muscle tone** – the resistance to stretch provided by neural activity, viscoelastic properties of muscles and joints. Normal muscle tone is high enough so that the individual can resist gravity and low enough to allow for movement.

**Range of Motion** – the maximal extent of movement possible.

**Reliable Body Parts** – the body part and movement that he is most consistently able to control.

**Switch** - is an input hardware assistive device that allows people with disabilities access many different items, for example, computers, wheelchairs, augmentative communication devices, and toys.

## IX. Appendix B

### Survey

*This needs survey seeks to determine your needs for professional development in the area of assistive technology, particularly in the area of using and choosing a switch for your students with disabilities who may need it. The term assistive technology refers to a wide range of devices from “low tech” to “high tech”. However, it’s not the matter of choosing the most expensive device, but the most appropriate device (switch in our case) that provides access to general curriculum and lets your students with disabilities achieve greater independence.*

1. What students do you teach?

- Emotional and Behavioral Disorders (EBD)
- Learning Disabilities (LD)
- Mental Retardation (MR)
- Severe Disabilities (SD)
- Other \_\_\_\_\_

2. Do you know what an assistive switch is?

- Yes
- No

3. Do you know characteristics you have to consider in order to select the most appropriate switch for an individual student?

- Yes
- No

4. If yes, name them:

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5. Do you have students in your classroom who use a switch?

- Yes
- No

6. If yes, how did you choose a switch for them?

- I considered all characteristics of the particular student
- I bought the first switch I saw in the catalogue
- Somebody has told me about this particular switch, so I bought it
- Somebody else bought it for me

7. Could any of your students benefit from using a switch?

- Yes  
 No

8. If yes, why does the student not have one?

- Funding is not available to help the student  
 I need additional information on this topic  
 I do not know the steps in selecting a switch  
 Other (please explain)
- 
- 

9. Do you have an assistive technology policy document in your school district?

- Yes  
 No  
 I don't know

10. Have you ever received any formal training on assistive technologies and services?

- Yes  
 No

11. If yes, what part of it dealt with using and selecting the switches?

- It was all about the switches  
 There was some information on switches  
 It had nothing to do with a switch

12. Would you agree or disagree that some students do not receive assistive technology because the teachers are not knowledgeable about the technology.

- Agree  
 Disagree

13. Do you feel that you would benefit from the instruction on how to select a switch for a particular student in your classroom?

- Yes  
 No

14. If no, why do you feel this way?

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15. Is your school located in a:

- Rural setting
- Urban setting
- Suburban setting

16. What is your highest level of your education?

- Bachelor Degree
- Master Degree
- PhD Degree
- Other \_\_\_\_\_

17. Do you have a teaching license?

- Yes
- No

18. Do you have a teaching license in the subject and grade that you teach?

- Yes
- No

19. What grade level do you teach?

- Pre-K
- Elementary
- Middle
- High
- Other \_\_\_\_\_

20. How many years of teaching experience do you have?

- less than 5
- 6 to 10
- more than 11

21. Please indicate your gender.

- Male
- Female

### **Interview Questions for SMEs and Former Teachers**

*This instructional design/needs assessment seeks to determine if special education teachers need more/any instruction on how to correctly select an assistive switch for their students who may benefit from using it. As an expert in the assistive technology field you are able to give a significant and different perspective on the situation. Thank you for taking your time to explain and discuss the following questions with us.*

1. How long have you worked in the assistive technology field? If not very long, what is your background? (for former teachers)
2. Do you work with teachers on the regular basis? If yes, what type of teachers? (regular/special education, serving any specific type of disability)
3. Do you have to explain the basics of assistive technology to teachers? If yes, how often? On the regular basis?
4. Have you ever/recently taught special education classes in public schools?
5. If yes, did you feel then that you had enough training in assistive technology area? Even if you didn't ever/recently teach in public schools, do you feel the same way from the expert point of view?
6. What would be your estimation on how many special education teachers are currently using switches with their students in public schools?
7. Do you think there are more students who could benefit from using a switch but who don't receive it because teachers simply don't know what that is?
8. Do teachers need to know how to select the most appropriate switch for their students?
9. Is it important to consider certain characteristics or is it possible to just choose the first available/cheapest switch from the catalogue?
10. What is the price range for switches? (approximately, considering a great variety of switches currently available)
11. Does using most of the switches require any /special technical support?
12. Do you feel like teachers are lacking knowledge (rather than funding or motivation) about how to select a switch for a particular student?
13. Do you think there is a lack of instruction on assistive technology in the teaching licensure process?

## X. Appendix C

### Data on the Learner's Analysis

Figure 3.1

*Question # 21 (from the survey): Please indicate your gender?*

Seventy percent of the people surveyed were female while only thirty percent were male.

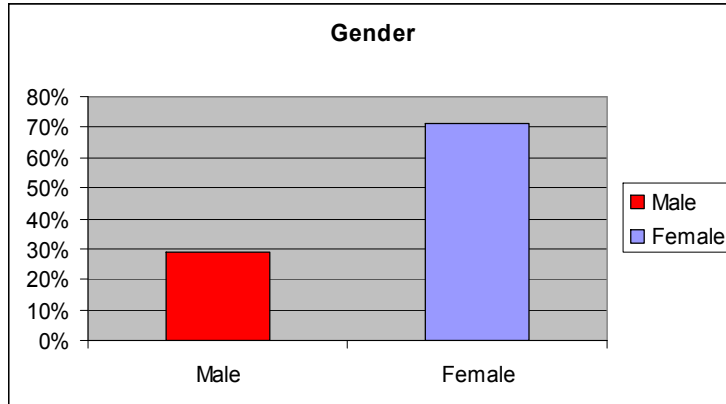


Figure 3.2

*Question # 20: How many years of teaching experience do you have?*

Sixty-seven percent of those surveyed have 6 to 10 years or less of teaching experience, while twenty-eight have 5 years or less experience and 5 percent have more than eleven years of experience.

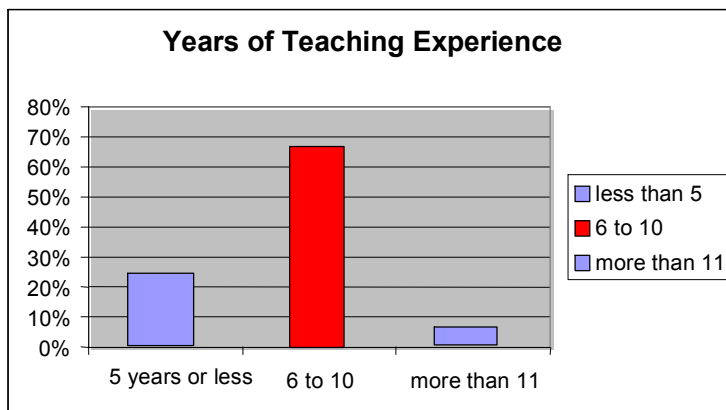


Figure 3.3

**Question # 1: What students do you teach?**

This shows that fifty percent of the teachers teach students with learning disabilities and thirty percent teach students with mental retardation. Both emotional disorders and severe disabilities hold fifteen percent of the responses.

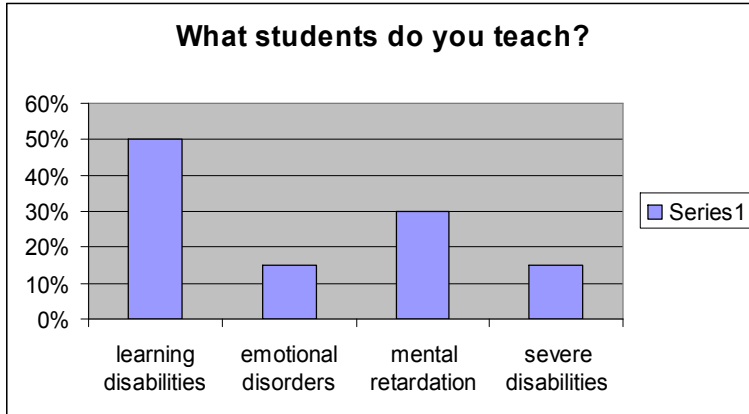


Figure 3.4

**Question 15: Your school is located in ...?**

Fifty percent of those surveyed said they worked in a school located in a rural area. Forty percent are located in a suburban area and 10 percent are located in an urban area.

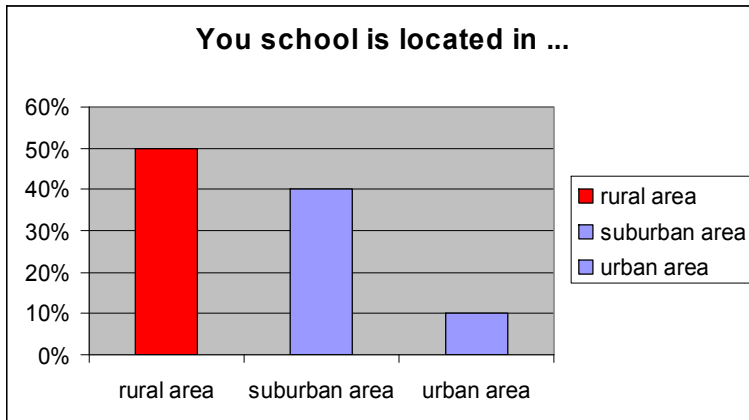


Figure 3.5

**Question 16: What is your highest level of education?**

Fifty percent of those surveyed had a bachelor's degree, while forty-seven percent held a Master's degree and 3 percent had a different type of degree.

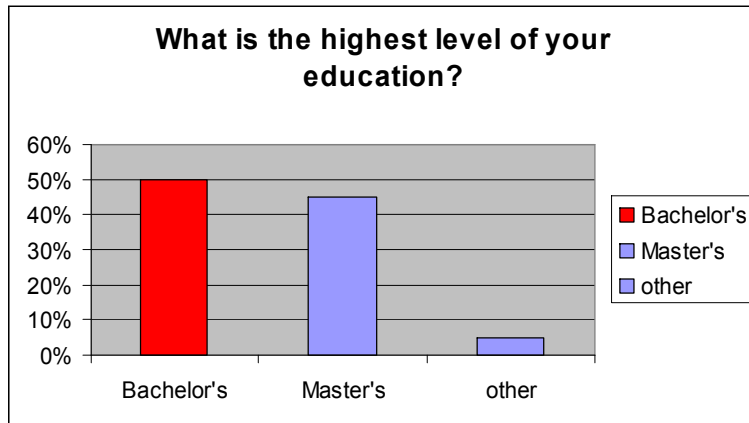
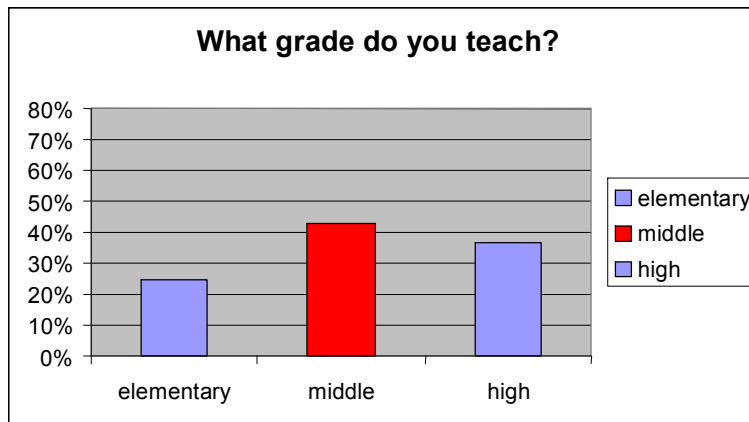


Figure 3.6

**Question 19: What grade do you teach?**

Forty percent of those surveyed teach in a middle school and thirty-five percent of those surveyed teach in a high school. Only twenty-five percent of those surveyed teach in an elementary school.





## References

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- <sup>1</sup> Jonassen, D., Tessmer, M., & Hannum, W. 1999. *Task analysis methods for instructional design*. Mahwah, NJ: Lawrence Erlbaum Associates.
- <sup>2</sup> Hartley, J., & Davies, I. 1976. Preinstructional strategies: The role of pretests, behavioral objectives, overviews, and advanced organizers. *Review of Educational Research* 46: 239-265.
- <sup>3</sup> Morrison, G., Ross, S., & Kemp, J. 2004. *Designing effective instruction*. Hoboken, NJ: John Wiley & Sons, Inc.