Graphic Animation: Innovative Language Learning for Autistic Children

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Abstract—It is difficult for autistic children to mix with and be around with other people. Language difficulties are a problem that affects their social life. A lack of knowledge and ability in language are factors that greatly influence their behavior, and their ability to communicate and interact. Autistic children need to be assisted to improve their language abilities through the use of suitable learning resources. This study is conducted to identify weather graphic animation resources can help autistic children learn and use transitive verbs more effectively. The study was conducted in a rural secondary school in Penang, Malaysia. The research subject comprised of three autistic students ranging in age from 14 years to 16 years. The 14-year-old student is placed in A Class and two 16-year-old students placed in B Class. The class placement of the subjects is based on the diagnostic test results conducted by the teacher and not based on age. Data collection is done through observation and interviews for the duration of five weeks; with the researcher allocating 30 minutes for every learning activity carried out. The research finding shows that the subjects learn transitive verbs better using graphic animation compared to static pictures. It is hoped that this study will give a new perspective towards the learning processes of autistic children.

Keywords—Autistic, graphic animation, language learning, transitive verbs.

I. INTRODUCTION

AUTISTIC children are special individuals who possess different characteristics from the normal children. This is obvious in the aspects of communication, social interactions and behavior. Autistic refers to an individual, who does not understand oneself or others, and an autistic child has different characteristics and thinking from other child, and therefore, it is difficult for autistic children to communicate or interact [6], [15], [23]. Autism is formed from problematic organic brain injuries that cause imbalance development that affects communication and verbal and nonverbal interaction. This results in autism experiencing failure in developing social connection, language deficiency in understanding, repeated language and reverse language [5], [6], [8]. In order to help autistic children to communicate and interact they need to learn more systematic language learning in school. At home, autistic children learn language without proper planning and rather spontaneous, as in [15]. Due to this factor, language

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does not develop and results in difficulties communicating with others in their daily lives. In order to increase their language competencies, autistic children need to receive formal education so that they have the opportunities to learn various skills, in order to overcome their weakness and the difficulties they are experiencing [15].

Studies have proven that most autistic children have difficulties with language [5], [23]. Due to deficiency in cognitive process, autistic children have late developmental in language ability compared to children at same age [20]. Normally, language difficulties are related to language deficiencies, for example, a lack of vocabulary dampens the desire or ability of an individual to speak or chat [1], [21]. For autistic children, the difficulty of using language to speak, affects their learning process. It is a challenge for teachers to deal with autistic children in the classroom [15]. Most autistic children have communication problems and minor strange behavior. Teachers need to make an effort to guide and assist autistic children when learning language, so that they can feel comfortable to speak and chat [6], [8]. The use of suitable teaching aids will facilitate teachers to coach autistic children; especially in learning language more effectively. [3], [5].

Autistic children's ability to speak can be enhanced through formal education in school [15]. In Malaysia, pupils in learning difficulties classes use the Special Education for Learning Difficulties (SELD) Curriculum provided by the Special Education Department [13]. The syllabus provided fulfills the needs of children with learning difficulties. The Malay Language (Bahasa Melayu) subject is a compulsory subject that must be taught in the SELD Program. In the SELD class, the main language teaching and learning objective is to enable pupils to speak, read and write. Teachers need to focus on enriching the vocabulary of autistic pupils, as preparation for them to speak fluently. Nevertheless, in most schools, the lack of suitable teaching aids is a serious problem faced by SELD teachers. Normally teachers use teaching aids such as pictures - concrete and abstract [15]. However, concrete or abstract pictures are not the best teaching aids for coaching autistic pupils because those materials are static. Static pictures are more suitable as an interesting and effective cognitive tool to teach pupils with no learning difficulties. Pupils with learning difficulties need more interesting materials to motivate them to learn.

II. BACKGROUND OF THE STUDY

The SELD Program has supplied computers for teachers to use to assist in teaching students with learning difficulties. This facility enables teachers and students with learning

difficulties to be exposed to various innovative ways of teaching and learning. For example, the use of graphic animation as a medium for interactive teaching is an effort to infuse elements of technology in autistic children's learning. Graphic animations facilitate understanding and recall in learning, communication and making inferences [2]. Graphic animations have also proven to deliver a lot more information and are therefore more effective within teaching activities and in various learning situations compared to static graphics. The use of graphic animation is an innovation in education that is based on information technology application comprising elements such as video, audio, text, graphic and animation, so that learning activities become more interesting and effective [5], [19]. For autistic students, learning using computer software can attract their attention and at the same time motivate them to learn in the classroom. The use of graphic animation through computer applications is one of the methods adapted through SELD and can be applied in teaching autistic students and learning in the SELD classroom.

Learning language for autistic children in Malaysia is emphasized in schools. In learning language, pupils need to be taught frequently used words in daily communication such as nouns, adjectives, verbs, conjunctions, pronouns and types of sentences [1]. To achieve this objective, the SELD program for the teaching and learning of the Malay Language focuses on the aspects of phonology, morphology, semantic, syntactic and pragmatic. In morphological aspect, knowledge on word formation is given the most attention. There are a lot of problems faced by educators teaching transitive verbs, and perhaps using graphic animation is an alternative that teachers can apply in the instruction of autistic children. Graphic animation is not new in the information and technological world. However, it has not been widely used in special needs education in Malaysia.

III. PROBLEM STATEMENT

Autistic children are proven to have difficulty in learning due to deficient language ability. To assist autistic children to learn language more easily, teachers should implement suitable learning approaches. Teaching and intervention must be based on the needs of the children [23]. These students need methodology and materials that can attract and sustain their attention, such as incorporating the element of information technology. Traditional teaching methods encourage students to be passive and create an uninteresting teaching and learning environment. Traditional teaching is a passive methodology and does not motivate a student's minds. This causes students to become easily bored and uninterested in learning, especially in cases where they do not understand the learning content. For autistic children, traditional teaching methodology does is of little benefit in the classroom. Autistic children need student-centered teaching methodology using various strategies, such as real-life situations or interactive modes. For example, the Computer Assisted Learning approach is probably a more suitable alternative [7].

IV. LITERATURE REVIEW

Graphic presentation can be used in the form of static or animation. Graphics convey information using picture code and verbal [2], [18], [19]. The study has proven graphic presentation, whether static or animated, has increased understanding, draws attention and sustains motivation [7], [18]. Graphics cut down the use of words to explain a concept, and in addition, the information in the graphic encourages an inference process and information exploration. The advantage of learning using graphics is the natural characteristic of a graphic that cuts across culture and age because it is a universal representation of actual matter. For example, the concept of plants, human beings, animals, mountains and so forth, are the same to all cultures. Static graphics show the characteristics of the external context; whereas, animations re effective in stating the natural process that involves movement and activities [2], [18]. Animation is used to teach complex systems, such as the human vascular system and human movement. Graphic animation shows information that is not found in a static graphic. Information in graphic animation can be segmented into several parts, while a static graphic cannot be segmented. This results in a graphic animation giving more information than a static graphic. Some information cannot be delivered through static graphics, and in such cases animation must be used to enhance the student's understanding. The popularity of using animations to help learners to understand and remember information has greatly increased since the advent of powerful graphics-oriented computers [2], [5], [7], [18], [19]. This technology allows animations to be produced much more easily and cheaply than ever before. Previously, traditional animation required specialized labor-intensive techniques that were both time-consuming and expensive. In contrast, software is now available that makes it possible for individual educators to author their own animations without the need for specialist expertise. Teachers are no longer limited to relying on static graphics but can readily convert them into educational animations.

Graphic animation gives students the opportunity to see actual movement which fulfills the learning element stimulus as proposed by Pavlov's Classical Conditioning theory that proves learning is more effective if the environment is conducive. The movement found in graphic animation provides significant stimuli to draw and retain a student's attention and focus [19]. Animation is beneficial to students because the element of movement relates to situations of interactive communication which use senses such as sight and hearing. For maximum impact, teaching and learning strategies should involve all students' senses during the information delivery process. Sensory involvement can happen only if various education aids are used in the teaching and learning process. This study proposes to find out to what extent the use of technology can assist students with language difficulties, especially autistic children, to learn more effectively.

The use of suitable media can have a positive impact on a student's ability to learn [19]. The use of teaching media, such as graphic animation that is used in SELD methodology is

suitable to implement because the teaching resources and practice can be repeated without limit. Behaviorist theorists, such as Pavlov, introduced the Classic Conditioning Theory that states anything that is done repeatedly and given positive reinforcement will enhance affirmation. Resources such as newspapers and magazines, reference books and novels, the dictionary, or the Internet, need to be used in teaching and learning [12]. Pictures are suitable to be used as interesting and effective cognitive tools for teaching and learning transitive verbs. The use of graphic animations can assist autistic students to remember words that they have learnt because graphic animations give students the see and visualize actual movement. Teaching media that was once known as teaching aids, is the channel to deliver messages from sender to receiver until the mind, emotion, focus and motivation of the student is stimulated and thus promotes learning [3], [10]. Research shows that the ability of students with autism spectrum disorder (ASD) to identify and comprehend text at varies across age level and severity of disability [16]. Results indicate that the teacher-led and technology-aided components were effective for improving participants' word identification abilities [16]. Findings show that children with autism were able to learn how to read the majority of the unknown words after instruction using the teacher-led and technology-aided components.

The use of graphic animation is an effective way to engage a student's attention in learning and has the potential to make learning more interesting and fun. In addition, graphic animation is able to provide concrete graphic information about movement and current changes. Graphic animation also provides additional information compared to a static graphic. The use of graphic animation to deliver information is the 'learning through sight' approach because it combines graphic and text to enhance the mind [7], [18]. Graphic animation is not something new in the information and communications technology (ICT) world. The first graphic animation film was introduced by Mike Jittlov in his short film, Animato: Fashionation (1977). Graphic animation today is easier to produce because there are many sophisticated software packages available. Graphic animation is a new transformation in technology and is used not only for entertainment purposes, but is now widely used in education. As an interactive teaching media, students are not only exposed to knowledge but also an experience in ICT. Graphic animation can be produced manually using animation camera or photo. The animation photo can be prepared as static or moving based on suitability. Graphic animation presentation can be done in two or three dimensions depending on the objective of using this medium.

The use of animation to teach language to autistic children is relevant, as well-designed animations may help students learn faster and easier. They are also an excellent aid for teachers, especially when it comes to explaining difficult subjects. Suitable approach and teaching methodology can guarantee effective learning [22]. Animations may lack educational effectiveness if the target learners cannot process the presented information adequately. For autistic children, learning language must be based on the type of problem they are facing and the approach used must consider the cognitive, emotional, social and behavioral [3], [4], [6], [11]. Autistic individuals experience emotional problems and repeated behaviors such as playing with fingers, shaking their bodies, and stiff body movement [11], [23]. Unexpected behavior can cause disturbance in the classroom. Some autistic children who experience difficulties in interacting can constitute major challenges to educators in teaching. Therefore, teachers need to be creative and innovative in planning suitable teaching aids to achieve the teaching objective. Children with learning problems need resources that can attract their attention and sustain their focus on the content being taught [3], [5], [21], [22].

In language, knowledge about word form enables a person to communicate. Without words in mind it will be difficult for a person to communicate. For autistic children, difficulty in communication is the result of limited vocabulary, which therefore, makes it difficult for them to interact with people [6], [8], [23]. To increase language knowledge, autistic children must learn more systematically using suitable stimuli. Children with learning difficulties must be taught literacy skills, such as communication skills, reading and writing, so that they can communicate better [4], [5], [10], [16]. On the aspect of word form, knowledge of nouns and verbs must be delivered to students, as these are frequently used in the daily communication. However, nouns are much easier to learn than verbs, because nouns can be taught using concrete words, while verbs are better understood through action, as in [1]. Verbs re comprised of transitive and non-transitive verbs. The teaching and learning of verbs must be supported with suitable teaching aids to allow students to understand better and faster. To autistic children, understanding the transitive verb is quite problematic. Children with high-functioning autism (HFA) exhibited lower competence in metonymy comprehension than in metaphor comprehension because semantic knowledge was correlated with the comprehension of metaphor rather than that of metonymy, as in [17]. The static knowledge of the receptive vocabulary of autistic children cannot fully and effectively predict their performance on metaphor tasks, presumably because they represent semantic knowledge and process information.

V. RESEARCH OBJECTIVE

This study will focus on use of graphic animation as an interactive medium in teaching transitive verbs for autistic children. The three objectives are based on:
1) Identify the ability to name the transitive verbs using graphic animation;
2) Identify the ability to read the transitive verbs using graphic animation; and,
3) Identify the ability to write the transitive verbs using graphic animation.

VI. RESEARCH QUESTION

This study is based on three research questions:

1) Can autistic pupils name transitive verbs orally based on animated pictures?
2) Can autistic pupils read transitive verbs guided by animated pictures?
3) Can autistic pupils complete a phrase with transitive verbs based on animated pictures?

VII. Methodology

A. Study Sample

The sample comprised autistic pupils from a secondary school in a district of Penang. The subject is put into an Integration Program for Learning Difficulties. Three subjects are chosen for the study based on information provided by the participant's teacher. The three research subjects have basic skills in speaking, reading and writing, as well as basic computer skills. The background of the research subjects are as follows:

S1: Chinese descendent, age 14 years. Can speak in the Malay language, Mandarin and a little English. Can read and write fluently. Has basic counting and numerical skills. Can mix socially and likes to help friends and teachers. Hardworking, likes to smile, but rather quiet. Likes to study. He participates in the program part time. Motivated and has basic computer skills. His parents confirm that he spends most of his time playing computer games at home. He is identified with low functioning skills in language and is placed in A Class. He experiences speech problems; especially in understanding and producing speech, and is not able to correctly use transitive verbs in conversation.

S2: In the SELD program since primary school (ages 6 to 12), he is quiet and does not talk much. He does not like to mix socially with friends. He is hardworking, but rather slow in movement. He is shy and likes to be alone. He has satisfactory skills in counting, for example, he can remember and write multiplication tables one to 12 without referring to a book. He has average functioning skills in language and is placed in B Class. He has basic computer skills, and is identified as having problems in reading transitive verbs, and especially understanding their meaning.

S3: Malay descent, aged 16 years. He Joined the SELD program at the age of 15 after transferring from the mainstream school system. He can speak fluently, as well as read, write and count competently. His behavior is slightly childish. He has difficulties focusing during learning and slightly slow at completing a task. He likes to mix social, tease and joke with friends, and likes to help friends and teachers. He has basic computer skills and is identified as having problems in writing transitive verbs in sentences.

1. Design of Study

This study adopts the qualitative study method using case study. The researcher used observation, interview and document analysis to collect data. The study was conducted to identify the use of graphic animation to assist autistic students to name, read, and complete sentences using transitive verbs more easily. This study was conducted over five weeks. The observation was conducted while the subject was being taught transitive verbs informally, which involves a naming activity, and reading and constructing sentences. Interviews were also conducted to collect data in naming activities, reading, and completing transitive verbs using graphic animation. Duration of the interview session is set by the researcher at 10 minutes for every subject. Interviews were conducted after a teaching and learning session. Every day, one subject was interviewed.

B. Procedure and Data Collection

This study was conducted for a period of five weeks. Every week five transitive verbs are taught to the subjects in naming, reading and completing transitive verb activities. An interview was carried out every week relating to the transitive verbs learned. Throughout the five weeks, each participant learned 25 words. The time taken for learning activities was set at 30 minutes, and each participant was allocated 10 minutes to learn five transitive verbs. The checklist was used in the observation together with a video camera to record the learning activities. As part of the learning activities, 25 set graphic animation pictures are shown through PowerPoint slides on a laptop, and which involved three tasks. They are: Naming transitive verbs (oral), read words and phrases that contain transitive verbs, and complete transitive verbs (oral) based on the images shown. The three activities were:

- Naming transitive verbs: subject names verbs and action in graphic animation shown.
- Read transitive verbs: subject reads transitive verbs shown by teacher.
- Write transitive verbs: subject writes transitive verbs listed by teacher.

After viewing all the PowerPoint slides, the process was repeated, for a total of three where the student was taught in each transitive verb. The student was then evaluated on his/her ability to name, read and write the transitive words using the three activities previously mentioned. The list of transitive verbs used in the study is as follows:

Week 1: Theme: housework – dry clothes, wash plates, cook porridge, wipe the table, sweep the floor;

Week 2: Theme: hobby – read newspaper, sew clothes, play guitar, go fishing, play football;

Week 3: Theme: vehicles – ride motorcycle, drive car, go on a bus, ride a bicycle, paddle a boat;

Week 4: Theme: gardening – plant trees, dig soil, trim leaves, spray fertilizer, pluck fruits;

Week 5: Theme: jobs- send letters, check patient, put out a fire, catch a thief, type a letter.

VIII. Research Findings

The findings of study proved that graphic animation can assist students in learning transitive verbs in naming, reading and completing transitive verbs activities. It was found that autistic pupils can learn the Malay language, specifically transitive verbs, with the help of interactive resources to

stimulate their understanding.

A. Can the Participant Name Transitive Verbs Orally with a Graphic Animation as a Guide?

The researcher used graphic animation to facilitate the participant's ability to learn transitive verbs. The researcher showed graphic animation slides and each participant and named the movement or action shown. Only five words are taught to each participant per week. The teaching and learning took about 10 minutes for each participant and the researcher used a one-to-one approach when conducting the activity. The ability of the participants to name the transitive verbs over the five week test period is shown in Fig. 1.
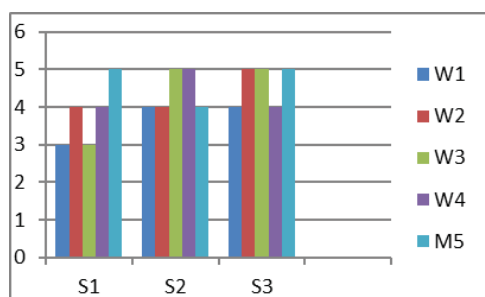

Fig. 1 Naming transitive verbs

Fig. 1 shows that overall total number of transitive verbs named by each participant successfully. Observations revealed that out of the 25 words, Subject S1 could name 19 words, Subject S2 could name 22 words and Subject S3 could name 23 words. From the total achievement, it was found that Subject S1 scored 29.7 %, Subject S2 scored 34.4 % and Subject S3 scored 35.9 %. Whereas interview data found that Subject S1 could name 12 words spontaneously, Subject S2 could name 16 words, and Subject S3 could name 20 words. During the interview Subject S1 did not talk much and was slow at answering questions. Several transitive verbs did not match the animated pictures shown. Subject S2 had difficulty in recognizing the activities shown and needed help from the researcher; while Subject S3 could name the activity more accurately during the interview.

B. Can the Participant Read Transitive Verbs with Animation Pictures as a Guide?

The finding shows that the participants could read transitive verbs correctly. The researcher showed graphic animations with words using PowerPoint slides. The reading activity was conducted weekly, with each participant given 10 minutes to complete the task. Participants were expected to read 25 transitive words for the duration of five weeks. The researcher applied the individual approach during the reading activity. Each participant's ability to read the transitive verbs is shown in Fig. 2.

Fig. 2 shows Subject S1 can read phrases with 24 words from the computer screen. Subject S2 read a total of 13 phrases and Subject 3 read a total of 23 words. In regard to overall achievement, it was found that Subject S1 scored 40.0

%, Subject S2 scored 21.7 % and Subject S3 scored 38.3 %. Observation showed that Subject S2 was less successful in reading the words shown on screen with the graphic animation. The researcher showed each participant the written word before showing the animated picture. This method was employed to avoid participants guessing the words from the picture rather than reading the words.
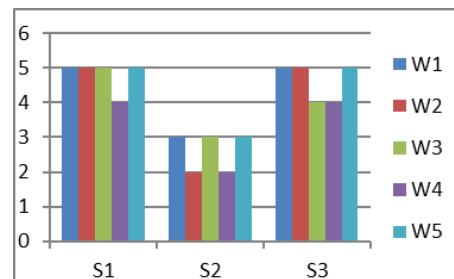

Fig. 2 Reading Transitive Verbs

C. Can the Participant Complete Phrases with Transitive Verbs Orally with Guided Animated Pictures?

The finding shows that the participants could complete phrases with suitable transitive verbs based on the prepared animated pictures. For this activity, the researcher showed animation slides that show actions performed by a character. Each participant was asked to complete prepared phrases. For the duration of five weeks, a total of 25 words were completed. The transitive verbs are the same as those learned in the oral and reading activities. The ability of each participant to complete the transitive verbs in phrases is shown in Fig. 3.
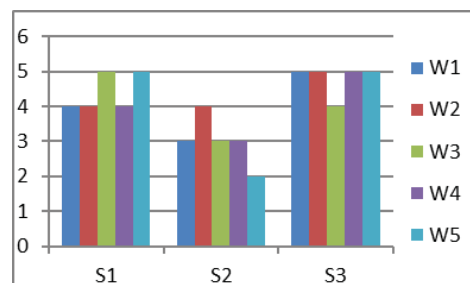

Fig. 3 Completing Transitive Verbs

Fig. 3 shows that Subject S1 can complete 22 transitive verbs in phrases, Subject S2 completed a total of 15 words and Subject S3 a total of 24 words. Overall analysis shows that S1 scored 36.1 %, S2 scored 24.6 % and S3 scored 39.3 %. Data analysis shows that S2 scored the lowest because he did not pay full attention to the animation slides shown by researcher. Subject S2 and S3 were able to complete a phrase correctly within less than 10 minutes. On the whole, all participants were found able to complete phrases with suitable transitive verbs faster and more correctly using graphic animation compared to static pictures.

Overall, the three research questions in this study have proven that graphic animation can assist autistic pupils in

learning transitive verbs more easily. Over the five-week period, the naming activity scored the highest percentage at 34.6 %, reading activity 32.4 %, and completing phrases with transitive verbs activity 33.0 %. The naming transitive verb activity was assumed to be easier because animated pictures were shown as a stimulus before each participant named the movement depicted. The reading activity was found to be more difficult because during the activity, the participant was only given stimulus in word form, and was required to spell and read the words before being shown the animated depiction. For completing phrases with transitive verbs in the oral activity, participants scored 33 % higher than in the reading activity. It is assumed that each participant received suitable stimulus to complete the transitive verbs activity. That is, animation pictures and words to be completed, for example: ____(plant) a tree. The stimulus in completing activity is assumed to be clearer compared to the stimulus in the reading activity.

IX. DISCUSSION

The findings reveal that graphic animation is successfully in engaging the interest of pupils, which makes learning more effective. Pupils could identify problems easier by using electronic circuit using graphic animation than static graphic. Graphic animation shows movement process and flow but static graphic only shows visual information. In this study, graphic animation could help autistic children learn transitive verbs more effectively compared to static graphics. In language learning, the use of suitable teaching aids can assist students to increase their proficiency and literacy skills [5], [7], [21]. In order to use graphic animation as a teaching aid, teachers need to prepare their own resources, as there are very limited sources for graphic animation in Malaysia. In addition, there are not many special education teachers in Malaysia who have skills in preparing and developing graphic animation resources. Complexity of the subject matter may not be the only reason for difficulties that learners sometimes have with the animations. The study showed that problems can also arise from the perceptual effects of such presentations. In a poorly designed animation, the information that learners notice most readily in the animation may not be the information that is of the greatest importance. Conversely, information that is relatively inconspicuous may be very important.

Use of suitable and clear teaching media can have a positive impact on a pupil's ability to learn [5], [19]. Multimedia computer-assisted instruction was effective for improving and maintaining student's alphabet recognition skills [5]. Reference [3] shows that children need suitable teaching resources to enable them overcome their learning. Nevertheless, teaching and learning of the Malay language in the classroom still lacks dynamic and interactive teaching aids [12]. Even though the Ministry of Education in Malaysia encourages teachers to use ICT in teaching and learning it is still difficult to implement. Within the program, teachers are facing difficulties to vary the techniques and methodology based on ICT. Interviews conducted with several teachers showed that they are interested in using ICT in teaching;

however, the lack of suitable software caused them to lose interest. Teachers instructing the Malay language subject hoped that if graphic animation software is provided, then ICT would be much simpler to use in teaching and learning. This is because not all teachers are skilled to develop their own materials and use computer applications. The teachers are aware that the use of graphic animation in is an effective tool in teaching autistic pupils. This research was supported earlier studies which indicate that students were able to learn how to read the majority of the unknown words after instruction using the teacher-led and the technology-aided components [7], [16].

Most autistic children experience language problems because they are unable to remember words, which causes difficulties in talking and a failure to communicate. Children with learning difficulties, including autistic children, have problems in finding and using suitable words when talking and writing [10], [14], [23]. The cause of this difficulty to communicate is that no words come to mind when they want to speak. In order to increase vocabulary, it is important to make them understand and use words correctly [1], [21]. It is advised that teachers use suitable teaching aids and customize them to suit the individual needs and types of problems faced in teaching and learning [14], [23]. This study revealed that the use of graphic animation in the form of a PowerPoint presentation could help autistic pupils to learn and understand the use of transitive verbs more effectively. The findings are also in line with earlier studies that found that animations increased a pupil's overall understanding, as the visual resources facilitated their ability to recall the information learned [2]. The finding also shows that use of graphic animation slides is more helpful and can be repeated for a number of learning sessions. Graphic animation is suitable in autistic children's learning process because the software used shows elements of graphic, text and animation and participants can repeat the slideshow for the words that are difficult to understand.

The findings have proven that all three participants can name the transitive verbs they were required to learn with the help of graphic animation slides. Participants were also able to read the words shown in the slides repeatedly. The movement or actions shown facilitated the participants' understanding of the meaning of each transitive verb learned. Animation graphic is an effective way to engage attention [9]. Animation graphics can also provide concrete pictorial information about movement and object change over time and has the potential to make learning more interesting and fun. Animation graphics deliver more information compared to static graphics, as seen in the 'learning through seeing' approach, which has been proven to strengthen an individual's memory [2], [19].

For the second research question, the finding shows that autistic pupils can read transitive verbs with the help of a graphic animation. The list of words was read by each pupil, the researcher then asked each participant to read the text on each slide, which was clearer to read because of the bigger font size. Pupils could spell and read words written more clearly and quickly, and they were also able to repeatedly read the words shown on the slides. Based on Pavlov's Classic

Conditioning theory, anything that is done and given positive reinforcement will be consolidated. Therefore, the use of teaching aids, such as animation pictures with SELD approach, is considered effective. Students are able to provide the correct answers because the animations used refer specifically to the intended words. Autistic pupils who have difficulties in focusing during learning would benefit more from the use dynamic learning resources, than the use of static pictures. Pupils tend to be more engaged and attentive if the resources used in teaching engage their senses [9]. For the third research question, the findings also show that the participants could complete a phrase faster with the help of a graphic animation, as the picture shown gives the clues to the answer needed. Pupils could match the action with the noun that completes the phrase shown.

X. CONCLUSION

The use of learning electronic resources is not a new concept in the education field. But for autistic pupils, using graphic animation, especially in learning transitive verbs, is an innovation that can be further explored. The preparation of graphic animation slides is more cost benefit as teachers just need to import graphic animation from existing websites and show it through PowerPoint slides. No operational costs are required to produce graphic animations, since they can be downloaded free to be used in teaching and learning. The use of graphic animations can save teacher's time in the classroom, since they do not have to repeat orally or use actions to explain meaning. Teachers can repeatedly show the slides depending on the pupils' receptive level in learning. Teachers can also use this medium for the quick and easy revision of topics that are difficult to understand.

Based on the results of study, the use of animation pictures in learning transitive verbs for autistic pupils was shown to have a positive impact, and revealed an increase in the learning of transitive verbs through oral and reading activities. The use of animation pictures was found to be positive and helped in overcoming the difficulties of learning transitive verbs for autistic pupils. The use of animation pictures also helps autistic pupils to focus during learning. The researcher found that the use of animation pictures, as one a teaching medium, helps autistic pupils to increase their ability to use transitive verbs in their daily conversations, which enables them to create a better social link through fluent communication. Reference [10] shows that having knowledge of transitive verbs enables autistic pupils to use language more effectively, especially when communicating and interacting with others. However, the use of animation graphic animation does not minimize cognitive development. This is because the animation only portrays visual presentation based on the concept of things being learned. The study also revealed that cognitive development is limited in visual situation change [2]. As in [14], the use of graphics must be in line with the structure and learning content. But some graphic animation is less relevant to learning. In contrast with static pictures, animations can show temporal change directly rather than having to indicate it indirectly using auxiliary markings such

as arrows and motion lines [19]. Using animation instead of static graphics removes the need for these added markings, and as such, images can be not only simpler and less cluttered, they can also more vivid, engaging, and more intuitively comprehended. In addition, the learner does not have to interpret the auxiliary markings and try to infer the changes that they summarize. Such interpretation and inference may demand a level of graphic skills that the learner does not possess. With animated depictions, information about the changes involved is available to be read straight from the display without the learner needing to perform mental animation [2], [19]. To do this, teachers need to choose suitable animation materials in line with the concept being taught. For this study, the findings show that the use of graphic animation is suitable and effective in learning transitive verbs.

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