CHAPTER I
INTRODUCTION

1.1 Introduction

Young generation plays an important role in nation-building. One of the best solutions to create a high-quality and potential future generation of a nation is through education and maximizing each child's self-potential (D'Alessio, 2011; Spandagou, 2021). A key component of enabling the next generation to influence the course of their country is inclusive education (Carrington, 2017; Syrjämäki et al, 2023). This strategy enhances their contributions to nation-building by fostering social cohesiveness and a nurturing atmosphere for their full potential (Marimuthu & Cheong, 2015). The relationship between young people and inclusive education is expanding as a result of the empowerment and engagement it provides in efforts to create the country (Westling & Zappaterra, 2019; Wilson, 2002). Inclusive education may lessen inequities, inspire empathy, and promote social cohesion, ultimately establishing the groundwork for a more just and successful country by providing young people with the knowledge, skills, and attitudes required to actively participate in nation-building processes (Kemdikbudristek, 2022).

Indonesian Deputy of the Child Special Protection Department of the Women's Empowerment and Child Protection Ministry (KemenPPPA), Nahar (2022) insisted that every child including children with disabilities., regardless of the limitations they have, must be equipped with the capabilities,

to be able to play a maximum role. According to Nahar (2022), children with disabilities also have the same right to access education as other children, both through the special education system and inclusive education system. 'The implementation of children with disabilities' rights is still facing obstacles, but the government continues to take steps to bring about a child-friendly education for all children, including children with a disability. With the realization of these rights, children with disabilities will have the same opportunity to be equal with other human beings and no longer be marginalized (Nahar, 2022). He also revealed that the existence of autistic students in the world of education has been regulated in legislation where autistic children are also entitled to a decent educational service like other normal children. This means that the government is obliged to facilitate the educational and academic needs of autistic children to fulfill their rights.

Following previous statements, the Indonesian Health Ministry also reported an increasing number of children diagnosed with Autistic Spectrum Disorder (ASD) year by year. There were 5,530 cases of developmental disorders in children, including autism spectrum disorders with 500 cases per year (Kemenkes, 2022). Besides, the World Health Organization (WHO) estimated that worldwide about 1 in 100 children has autism. This number is an average because reported cases vary widely between studies. However, several comprehensive investigations have revealed significantly higher numbers. Yet, many low- and middle-income nations remain unaware of autism cases. WHO and its partners are aware of the need to improve

nations' capacities to support the best health and well-being of all individuals with autism. The WHO's *Comprehensive Mental Health Action Plan 2013–2030* covers some points: (1) increasing the commitment of governments to take action in improving the people with autism life quality; (2) providing guidance on policies and action plans that address autism within the broader framework of health, mental and brain health and disabilities; (3) contributing to strengthening the ability of the health workforce to provide appropriate and effective care and promote optimal standards of health and well-being for people with autism; and (4) promoting inclusive and enabling environments for people with autism and other developmental disabilities and providing support to their caregivers. It means that ASD cases have been a global issue for years.

By having this high number of ASD cases in Indonesia and based on ASD children's parents' preferences to have inclusive regular schools for their children, then the constitution of the Republic of Indonesia (UUD 1945) guarantees the right to education for all citizens, without discrimination. It emphasizes the importance of inclusive education and equal opportunities for students with disabilities or special needs. Besides, Ministerial Regulation No. 70/2009 on Inclusive Education issued by the Ministry of National Education (now the Ministry of Education and Culture) provides guidelines for the implementation of inclusive education (Kemdikbudristek, 2022). It emphasizes the inclusion of students with disabilities or special needs in regular schools, the adaptation of teaching methods, and the provision of

support services and facilities to facilitate their learning. These regulations clearly stated that inclusive education aims to provide equal educational opportunities for all students, including those with Autism Spectrum Disorder (ASD). It aims to create an inclusive and supportive learning environment that respects and values the diversity of students, promotes their academic and social development, and prepares them for active participation in society (Kemdikbudristek, 2022; Padmadewi et al., 2021).

Children with autism spectrum disorders (ASD) have communication and social skills that are impaired, are repetitive and exhibit typical behavior patterns, reject environmental changes or changes in daily routines, and exhibit excessive sensory sensitivity (Abdullah et al., 2022; Galligan et al., 2021; Vlachou & Drigas, 2017). Children with ASD also exhibit traits that point to interpersonal communication challenges and exhibit very early literacy skills (Hughes et al, 2021; Varlamov, 2020). ASD is differentiated from neurotypical children's behavior by a number of behavioral indicators (Vlachou & Drigas, 2017). It is defined as having impairments in interpersonal interaction and communication as well as restricted and recurrent behaviors, hobbies, or activities (Hammel & Hourigan, 2020). Less often than their neurotypical peers, students with autism spectrum disorder (ASD) struggle to initiate conversations, respond appropriately when the subject shifts, and comprehend the meaning and impact of language (Amsbary et al, 2020; Bolourian et al, 2019; Erasmus et al, 2019). Children with autism frequently struggle to read others' emotions as well as to convey

their own feelings through facial expressions. Understanding difficulties are common in autistic children.

Students with ASD often have sensory sensitivities or preferences. Many students with Autism Spectrum Disorder (ASD) often have sensory sensitivities or preferences (Fardani & Sayatman, 2020; Hammel & Hourigan, 2020; Padmadewi et al, 2021). Sensory sensitivities refer to unusual responses to sensory stimuli, while sensory preferences refer to a strong liking for certain sensory experiences (Hill et al., 2014; Meeks, 2017). These sensitivities and preferences can significantly impact a student's ability to learn and interact with their environment. It is important for educators and caregivers to understand and accommodate these sensory needs (Hammel & Hourigan, 2020; Putri et al, 2022). Here are some common examples: some students with ASD may be hypersensitive to sounds. They may find common classroom noises overwhelming or distressing. Besides, bright or flickering lights, busy visual displays, or excessive visual clutter can be distressing for some students with ASD. Creating a visually calm and organized classroom environment can help. Some students may also be hypersensitive to touch, textures, or clothing (Qurrotul Aini, H., & Tresnawati, 2019; Rahmayanti, 2021). Some of them may have heightened sensitivities to taste and smell. Some students may seek or avoid certain types of movement or pressure (Hammel & Hourigan, 2020; Hornby, 2014; Meeks, 2017). These sensory sensitivities and preferences can vary widely from one individual with ASD to another. It is essential to understand that these sensory differences can

significantly affect how students with ASD experience and interact with their environment (Amsbary et al., 2020; Bolourian et al., 2019; Erasmus et al., 2019;). Educators, caregivers, and therapists need to be aware of these sensitivities and preferences and, when necessary, make accommodations to create a more comfortable and supportive learning environment for these students (Hughes, 2021). This might include providing sensory tools, creating sensory-friendly spaces, or using strategies that consider the individual's sensory needs

Students with Autism Spectrum Disorder (ASD) characteristics can greatly benefit from the use of digital interactive media for learning basic English literacy and communication (Jackson & Hanline, 2019; Kurniawan, 2021; Mintz, 2014). Many students with ASD are visual learners and respond well to visual stimuli (Fleury et al, 2021; Hampshire & Hourcade, 2014; National Institute of Mental Health, 2018; Padmadewi et al, 2021). Digital interactive media can provide a wide range of visual support, including images, videos, and animations, to enhance their understanding of English literacy concepts (Mintz, 2013; Pavlov, 2014). Its interactive elements, such as clickable buttons, drag-and-drop activities, and games, can actively engage students and make learning more enjoyable (Amsbary et al, 2020; Bolourian et al, 2019; Putri et al, 2022). It also can be tailored to meet the specific needs and preferences of students with ASD (Fardani & Sayatman, 2020). Besides, the personalization features allow educators to adapt the learning content, pace, and level of challenge to suit each student's abilities. This individualized

approach promotes active participation and encourages students to progress at their own pace. Digital interactive media can incorporate multiple sensory modalities, such as visual, auditory, and tactile elements (Pratama et al, 2019; Sinaga et al, 2022). For instance, they can include audio instructions, sound effects, and touch-sensitive activities. By catering to different sensory needs, these tools can create a more inclusive learning environment. Many students with ASD benefit from repetitive learning experiences (Padmadewi et al, 2021; Unlu & Diken, 2022). Digital interactive media can provide opportunities for repeated practice of basic English literacy skills in a structured and engaging manner.

Besides, interactive exercises and games can offer immediate feedback, reinforcing correct responses and allowing for remediation when needed. Some students with ASD face challenges in social interactions and emotional regulation (Galligan et al, 2021; Padmadewi et al, 2021). Digital interactive media can create a safe and non-judgmental space for learning, reducing anxiety and promoting engagement (Fleury et al, 2021; Hampshire & Hourcade, 2014; Mintz, 2014). Its online platforms may also facilitate social interaction and collaboration with peers, allowing students to practice communication skills and build relationships in a less intimidating setting. Not only that, but digital interactive media also often include built-in assessment tools that track students' progress and collect data on their performance (Aditya et al, 2022; Pavlov, 2014; Utami & Laksono, 2023). This data can help educators identify areas of strength and areas that require

further support. By analyzing this information, educators can tailor instruction to address individual learning needs effectively.

Talking about learning needs in this 21st century era, Padmadewi et al (2019) stated that basic literacy and communication in English play an important role for students' global interactions. The ability to read and write in English is a fundamental skill needed in the workplace and for navigating life in general in this twenty-first century. English language teaching should be given as early as possible because early introduction can improve mastery. English language competency is very necessary to prepare students in this global society (Padmadewi & Artini, 2017). It would be very good if more people understood the importance of introducing English at an early age so that foreign language acquisition can be achieved quickly Ratminingsih (2018). According to Bland in Cahyati et al., (2019) learning a foreign language has several benefits for children, including improving English communication skills, promoting learning of other cultures, improving cognitive skills, increasing awareness of metalinguistic concepts, increasing motivation to encourage learning, increasing interculturalism, fostering awareness and a sense of global citizenship, as well as fostering values that respect diversity. Thus, English language learning for inclusive students must be flexible in order to differentiate between the needs of students with special needs and other normal students (Carrington, 2017; Kemdikbudristek, 2022; Padmadewi et al, 2019). In addition to provide academically relevant learning materials, teachers must also provide practical life skills to their students.

The emergence of an inclusive school in North Bali has given new hope for students with ASD to have a better academic journey. They are given chances to join regular classes and interact with normal students. Some basic courses are scheduled well under IEPs treatment including Basic English course. Basic English course was taught interactively with differentiated instruction at this school (Padmadewi & Artini, 2017). English courses for young learners with Autism Spectrum Disorder (ASD) who participate in academic classes hold several significant benefits. English courses provide a structured platform for developing and enhancing communication skills, which is particularly important for individuals with ASD who may face challenges in language and social communication. English courses focus on practical communication skills, helping young learners with ASD develop language abilities that are not only academically relevant but also applicable in everyday life situations (Gersten et al., 2007). By acquiring English language skills early on, young learners with ASD are better prepared for future educational and vocational opportunities that may require English proficiency (Padmadewi & Artini, 2017). English courses for young learners with ASD in academic settings play a crucial role in fostering communication skills, promoting social interaction, and preparing them for a more inclusive and independent educational experience. The benefits extend beyond the English language itself, positively impacting various aspects of their academic and personal development.

Looking at cases that students with ASD could continue their education to the university level, meaning that there is any possibility for them to develop their academic achievement under the right inclusive education, treatments, and the right support from parents, teachers, and governments. It indicates that inclusive education institutions need to provide suitable teaching and learning strategies completed by many kinds of learning media that suit students with ASD learning characteristics and preferences. Based on the preliminary research conducted in an inclusive elementary school in North Bali by using Stufflebean and Coryn's (2014) CIPP evaluation model (Dewi et al, 2025), the researcher found a unique phenomenon from the observation result where students with ASD in North Bali Bilingual School (an inclusive school in North Bali) were having the best learning experiences in this school. Students were taught by using two languages, English and Indonesian Language based on the student's characteristics. The teaching and learning process were assisted by complete learning media such as interactive visual media, Social stories media (big book), shape poems, visual posters, and visual worksheets. During the teaching and learning process, shadow teachers (special teachers for students with ASD) combine the use of different kinds of media to boost students' learning experiences. Other than visual media usage, this school also provided online activities for the students through the use of digital painting applications and online video streaming applications. This fact was surprising when people separated ASD students with digital tools and gadgets but this school managed to have it under strict

control. There were only fifteen minutes of screen time available each day before the going-home-time period. Based on the result of the interview with 3 shadow teachers who teach ASD students, it was found that most of the ASD students in that school were actively using smartphones at home. It was also supported by parents' and caregivers' statements that they felt hard to separate their ASD kids from smartphones. The same situation also happened to two schools in Malaysia. It means that ASD students also need proper knowledge and adaptation to smartphones. However, teachers and caregivers should find a way to make it effective by controlling the screen time and the apps used and installed on the smartphone itself. By the existence of these facts, the researcher found a possibility to insert the use of digital interactive media to fulfill ASD students' needs of appropriate activities during the screen time both at home and school specially to teach the students about basic English literacy and communication. Therefore, the use of both printed visual and digital media could give better learning experiences for students with ASD. To meet students with ASD learning characteristics there is a need to conduct research and development, especially in developing Digital Interactive media for teaching basic English literacy for students with ASD.

Moreover, digital interactive media can be accessed anytime and anywhere, providing flexibility for students with ASD who may require a more personalized learning environment. These tools can be used in various settings, including classrooms, homes, or therapy sessions (Corriawan et al., 2019; Hill & Flores, 2014; Meeks, 2017). Additionally, they can be adjusted

to accommodate accessibility features, such as text-to-speech options or alternative input methods, making them accessible to students with diverse abilities (Alzrayer & Banda, 2017; Bartamole & Zapirain, 2014). When implementing digital interactive media for students with ASD, it is essential to consider individual preferences and needs (Gallardo-Montes et al., 2021). Collaboration between educators, special education professionals, and families is crucial to ensure that the chosen tools align with the students' goals and provide meaningful learning experiences. Therefore, there is a strong reason for developing digital interactive media to teach basic English literacy for students with ASD to give them new interesting experiences in learning. There have been several researches conducted in the area of using mobile devices (iPad, Android and web application tablets, and smartphones) and augmented reality based on PECS (Picture exchange communication system) to teach students with ASD by Alzrayer & Banda, 2017; Bartamole & Zapirain, 2014; Corriawan et al.,2019; Hill & Flores 2014; Meeks, 2017; Rahmayanti, 2021; Taryadi, 2018. From those previous researches, it was found that Augmented reality, Smartphone, tablets and Low-tech picture-based Picture Exchange Communication System are truly able to be accepted by children with autism while also having a positive impact on them, as well as being able to create a learning environment that is more enjoyable both for children with autism and for teachers. It's possible that an ASD child can develop better if trained regularly. Because children with autism tend to love visual learning patterns, images in the digital interactive media application

will facilitate the child's ability to understand and enhance his/her abilities (Corriawan et al., 2019). After that, research on developing learning media for students with ASD has also been conducted by Agustin and Martinez, 2022 who developed a Mobile Application to Assess the Severity of Repetitive Behavior in Autism. Then, Fardani and Sayatman (2020) developed a learning media-based Android and web application Application to support the cognitive learning of students with ASD. Meanwhile, Putri et al in 2022 developed an Education Game-based *Scratch* for students with ASD in school for special needs. However, it only contains vocabulary games including fruit names, animals and surrounding nouns. It is limited only to giving vocabulary games without having interactive modes for practising basic literacy and communication needed for social interactions.

Based on those previous researches it is clear that no research has been conducted in developing digital interactive media for teaching Basic English Literacy and Communication. Therefore, by conducting preliminary research on the need for digital interactive media that can be used during screen time at the inclusive school and at home to assist parents in educating children with ASD, it can be concluded that it is urgent to conduct research and develop a digital interactive media to teach basic English Literacy and communication for young learners with ASD. It is also supported by the lack of research in this field and the theory of digital interactive media that can support their learning characteristics. Thus, the product of this research could be used to

improve the teaching and learning process in inclusive schools as well as helping parents at home to serve appropriate screen activities to their children.

1.2 Problem Identification

Based on the preliminary research conducted at an inclusive elementary school in the north part of Bali, Indonesia and two schools in Kuala Lumpur, Malaysia, the researcher found a unique phenomenon where students with ASD were having interesting learning experiences at these schools. Depending on the qualities of each student, two languages English and Indonesian, English and Melayu (Malaysian Language) were used to teach them. Complete learning resources like interactive visuals, social stories (large books), shape poems, visual posters, and visual workbooks aided in the teaching and learning process. In order to improve the educational experiences of their students, 'shadow teachers' special educators who teach the students with autism spectrum disorders at schools, incorporate different media into their lessons. This school allowed students to use digital multimedia in addition to online video streaming services and digital painting for online participation. There was fifteen minutes of screen time every day until it was time to head home. The researcher found that because of this screen time, there is a chance to teach the children basic English reading and communication skills while also incorporating the use of digital interactive media. Because of this, giving ASD kids access to both digital and printed interactive media could enhance their educational experiences. To meet students with ASD learning characteristics there is a need to do research and

development, especially in producing Digital Interactive media for teaching Basic English Literacy and Communication for students with ASD.

a. There was no digital interactive media-based mobile application covering five basic topics to teach Basic English Literacy and Communication for Young Learners with ASD.
b. There was no digital interactive media-based mobile application specifically designed to teach basic English literacy and communication to young learners with ASD at school by shadow teachers and at home by parents.

1.3 Research Limitation

This research focused on developing digital interactive media to teach Basic English Literacy and communication to students with ASD. It was limited to developing digital interactive activities by integrating these five main topics; (1) My Body, (2) My Hobby, (3) My Family, (4) My Environment, and (5) My Habits into a mobile android and web application application. These five topics were chosen based on the IEPs of the schools under investigation. These topics can also be considered universally needed by young learners because they are also taught widely in special schools for students with ASD or Autistic Centers in Malaysia and Indonesia. By developing digital interactive media with these topics' integration, the developed media can also be used in Malaysia and other Asian Countries.

The developed media was used to teach students with ASD who were joining academic classes. There were some requirements to join academic

classes for children with ASD. They must pass the behavior and communication treatments first. Thus, these students who can join academic classes already have controlled behavior and high-functioning conditions. Besides, they have been through a lot of teaching and learning activities that involved English along the way. Therefore, teaching Basic English Literacy and Communication by using Digital Interactive media was possible to be applied in this context.

1.4 Research Questions

a. What are the specifications of the digital interactive media needed for teaching basic English literacy and communication to young learners with ASD?
b. What is the prototype of digital interactive media developed for teaching basic English literacy and communication for young learners with ASD?
c. How is the quality of digital interactive media for teaching basic English literacy and communication for young learners with ASD?
d. How is the effectiveness of digital interactive media for teaching basic English literacy and communication for young learners with ASD?

1.5 Research Objectives

a. To identify the specifications needed to develop the digital interactive media for teaching basic English literacy and communication to students with ASD.
b. To design the prototype of digital interactive media for teaching basic English literacy and communication to students with ASD.

c. To investigate the quality of digital interactive media for teaching basic English literacy and communication to students with ASD at an Inclusive School in North Bali, Indonesia and Kuala Lumpur, Malaysia.

d. To examine the effectiveness of digital interactive media for teaching basic English literacy and communication to students with ASD.

1.6 Research Significance

It is expected that the current study can give significant contributions theoretically and practically to teachers, students, and other researchers.

1.6.1. Theoretical Significance

This research can contribute to inclusive education pedagogy, especially in teaching basic English literacy and communication in inclusive education for students with ASD by implementing an assisted language learning strategy through the use of digital interactive media.

1.6.2. Practical Significance

a. For Teachers

The result of this research can be used as a reference on how to consider students with ASD needs in learning. Since the digital interactive media was developed by considering the characteristics of students with ASD both their sensory sensitivities and preferences. It also can assist shadow teachers and parents in teaching Basic English Literacy and communication to students with ASD both in school and at home. Therefore, the teaching and learning process could be more effective because digital interactive media can be used in different contexts.

b. For Inclusive Institutions

It also could be used to increase the quality of teaching basic English literacy and communication in Inclusive Education, especially inclusive education for students with ASD by implementing a Mobile Assisted Language Learning Strategy through the use of Digital Interactive Media. Besides, it can be used during screen time programs or in class by combining the use of other interactive visual media. Therefore, students with ASD are able to have better learning experiences.

c. For Government

Furthermore, the result of this research could be a reference for the policy maker who will plan further policy for inclusive education especially education programs related to students with ASD, and plan further SDGs (Quality Education) for students with ASD. Since inclusive education has become a central concern nowadays, the government needs to take real action to improve the quality of human resources and inclusive institutions with suitable pedagogical skills to teach students with ASD, up-to-date programs, media, and technical support. Otherwise, private institutions will take over all parents' trust in their special children's education.

d. For Ganesha University of Education

Since this university is the closest public higher education institution from the setting of the research, this research can be used as a source to consider further inclusive programs to fulfil the government demands on providing appropriate services of inclusive education specifically adding an inclusive program for students with disability especially students with ASD

who are going to take higher study to tertiary level and a program for producing undergraduate teachers on inclusive education.

1.7 Product Specification

The Digital Interactive Media developed in this study is a Digital Interactive Media Application for Android and web application. This digital interactive media was used to teach basic English literacy and communication to students with ASD in an inclusive school in Singaraja. Digital Interactive Media was developed to fulfill the needs of interactive technology that can assist their learning both at home and school. Vocabulary drilling and matching activities were provided in developing the Digital Interactive Media. The involvement of pictures, audio, English words, and simple English sentences in its design fit the characteristics of ASD students' learning needs. Tasks in developed Digital Interactive Media was designed based on five topics for ASD students from the inclusive school in North Singaraja, Bali) covering; (1) My Body, (2) My Hobby, (3) My Family, (4) My Environment, and (5) My Habits. The exercises that were developed in this Digital Interactive Media provided the exploration of some vocabulary related to each topic. Then, followed by matching exercises and other basic conversations. Developed Digital Interactive Media was designed in the form of an Android and web application that can be accessed worldwide.

1.8 The Importance of Development

It is urgent to develop such a digital interactive media that is suitable for the characteristics of young learners with ASD as well as matching with

the English language topics and themes that are used in the school. Since, there is no learning media that provides such a thing mentioned previously, it is really important to develop an appropriate digital interactive media covering those needs above. The development of Digital Interactive Media is important to be done to provide proper learning multimedia that helps ASD students in learning basic English literacy and communication. This Digital Interactive Media also can be used as early intervention media to develop ASD students' communication skills. Moreover, by providing appropriate Digital Interactive Media that can be used at home and schools, ASD students will have more interesting learning experiences to improve their Basic English Literacy and communication. As we know, people rely too much on smartphones nowadays, and so do ASD students. They have a high interest in smartphones. Additionally, providing digital interactive media that could assist ASD students in learning, will be beneficial for their growth as long as teachers and caregivers can manage and control their screen time well. In this case, the digital interactive media is designed specifically for students with ASD who are taking academic classes. It means those high-functioning students with ASD who have passed behaviour, and oral treatments as well as having recommendations from psychologists.

1.9 Assumptions and Limitations of Development

Developing Digital Interactive Media for ASD students is to provide appropriate learning multimedia to be used by ASD students during their screen time both at home and in school. The developed digital interactive

media is specifically used to teach basic English literacy and communication involving; reading, writing and speaking. Since, there are supported facilities provided by the school including digital devices (smartphones, tablets and computer) and internet access, it means this digital interactive media has a very high possibility in its implementation and utilization. By designing this digital interactive media, it helps students to experience flexible and explorative learning by having some English vocabulary, simple sentences, and expressions that are combined with attractive pictures and audio about; (1) My Body, (2) My Hobby, (3) My Family, (4) My Environment, and (5) My Habits, it is assumed that ASD students will have additional learning experiences. Having the combination of traditional learning and digital learning experiences is believed could give better improvement in their growth. Since ASD students nowadays are familiar with using smartphones in their daily lives, providing only digital interactive media on smartphones will keep their imagination and focus only on something beneficial for their academic growth. Thus, they will be feeling the real world and be aware of life responsibilities for future independence.

The digital interactive media is specifically developed to meet the needs and characteristics of those students with ASD who are taking academic classes in the school. It is limited on their basic cognitive development level, learning preferences and the IEPs' English topics. Those who are entering academic classes are categorized as high-functioning ASD. Young learners with Autism Spectrum Disorder (ASD) who have high-functioning abilities

typically exhibit characteristics associated with ASD, but they may show less severe impairments in certain areas compared to individuals with more significant challenges. High-functioning autism is not an official diagnostic term but is often used to describe individuals with ASD who have average or above-average intellectual abilities.

1.10 Definition of Key Terms

1.10.1. Conceptual Definition

A. Developing Digital Interactive Media

Developing digital interactive media means to produce a digital interactive media by conducting research and development study under the implementation of ADDIE developmental model (Branch, 2019; Tu et al., 2021).

B. Autism Spectrum Disorder (ASD) Students

ASD stands for Autism Spectrum Disorder. It is a neurodevelopmental disorder that affects the way a person communicates, interacts with others, and experiences the world around them (Abdullah et al., 2022; Galligan et al, 2021; Vlachou & Drigas, 2017). Autism is characterized by a wide range of symptoms and behaviors, referred to as a ‘spectrum’ disorder (Hughes et al, 2021; Varlamov, 2020).

C. Basic Literacy and Communication in English as a Foreign Language

Basic English literacy communication refers to the foundational skills necessary to read, write and speak by using the English language at a basic level. It includes the ability to recognize and pronounce letters, understand

basic vocabulary, and construct simple sentences (Garton & Prat, 1998; Grabe & Kaplan, 1992; Ocak, & Karakuş, 2018; Ocak & Karakuş, 2019; Okumuş & Atilgan, 2021)

1.10.2. Operational Definition

A. Developing Digital Interactive Media refers to all the processes following ADDIE model of development to produce Digital Interactive Media for assisting ASD students in learning five topics; (1) My Body, (2) My Hobby, (3) My Family, (4) My Environment, and (5) My Habits

B. Students with ASD here are those who are joining academic classes who are categorized as high-functioning ASD and have passed behavior, and oral treatments as well as having recommendations from psychologists.

C. Basic Literacy and Communication in English as a Foreign Language

Basic literacy and communication here refer to basic skills of reading, writing and speaking simple words and language expressions that are used mostly in students' daily lives that match with the topics of the investigated school's English Course and IEPs. The content of the digital interactive media was limited to vocabularies, simple sentences and language expressions of these topics only: (1) My Body, (2) My Hobby, (3) My Family, (4) My Environment, and (5) My Habits (these topics were global topics and being taught in the setting of the study).

1.11 Novelty of The Research

There are several novelties of the developed digital interactive media:

a. Fit to students with ASD characteristics. The future digital interactive media was designed in a one-tone- soft colour background suitable for students with ASD vision sensitivity. Besides, each topic has simple exercises with limited vocabulary introduction that fit students with ASD academic level. It also provides very simple audios of the vocabularies, simple sentences and simple dialogue which have to be completed by related pictures to meet their 'visual learners characteristics' needs.
b. Accessible. The digital interactive media can be accessed anywhere and anytime. It will be designed as a software-based *Android* system *and web application also* available for windows that can be easily found and downloaded from *Google Play Store*. It means this software can be installed to Android and web application-based smartphones, tablets, and laptops. Therefore, students with ASD can use it both at school and at home. They can use it repeatedly since one characteristic of students with ASD is doing things repeatedly. The objective of this research is to develop digital interactive media that fit students with ASD characteristics of learning.
c. Give more time to review the English material. The digital interactive media was developed based on five specific topics of Basic English Literacy covering (1) My Body, (2) My Hobby, (3) My Family, (4) My Environment, and (5) My Habits based on the IEPs of the investigated school. Therefore, the students can have more time out of the school to learn and review the same material that they get at school.

The digital interactive media is applicable in a variety of contexts, such as homes, schools, and therapy sessions (Hill & Flores, 2014; Meeks, 2017). Individual preferences and needs must be considered when using digital interactive media for students with ASD (Hammel & Hourigan, 2020; Hill et al, 2014; Taryadi, 2018). Working together, educators, special education specialists, and families can guarantee that the media used will support students' learning objectives and offer fulfilling educational opportunities. Thus, to provide students with ASD with fresh, engaging learning experiences that can fit their learning preferences and sensory sensitivities, there is a strong reason for creating digital interactive media to teach Basic English Literacy and Communication. Numerous studies have been carried out on the topic of teaching students with ASD with augmented reality based on PECS (Picture Exchange Communication System) and mobile devices (iPAD, Android and web application tablets, and smartphones) by Hill & Flores, 2014; Meeks, 2017; Taryadi, 2018; Rahmayanti, 2021. Previous studies had indicated the necessity of defining the learning subjects in line with the curriculum that is appropriate for young children with ASD in each school. After that, Agustin & Martinez, 2022, who created a mobile application to assess the severity of repetitive behavior in autism, performed research on creating learning materials for students with ASD. Then, in 2020, Fardani & Sayatman created an Android and web application application based on learning media to assist students with ASD in their cognitive learning. Besides, Putri et al. created an educational game called Scratch in 2022

specifically for students with ASD who were receiving special education instruction. These earlier studies indicate that no research has been conducted on developing digital interactive media to educate literacy and communication in Basic English for students with ASD, specifically covering five topics that are used widely both in special schools and inclusive schools; (1) My Body, (2) My Hobby, (3) My Family, (4) My Environment, and (5) My Habits.