The Effects of Digital Technology on Early Childhood and Preschool Children's Vocabulary Development in EFL

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SUMMARY

This final thesis provides an insight into the impact of digital technology on vocabulary development of early childhood and preschool-aged children, more specifically, those learning English as a foreign language (EFL). The main objective of this thesis is to highlight both the potential benefits, and the challenges associated with incorporating digital tools into very early language education.

The thesis starts with an overview of some types of digital tools and platforms such as videoconferencing software, digital picturebooks, educational toys, and robots, among many others.

The thesis next touches on vocabulary development and its phases from preverbal to verbal periods. An insight into the topic of second or foreign language acquisition is given, as well as some definitions and an account of vocabulary development through early childhood and preschool age.

Furthermore, the impact of digital technologies on vocabulary development in EFL is analyzed, with examples of some positive influences, such as gamification and Bee Bots, which can be used in the EFL learning process. The author also gives an insight into some potential risks that may occur when implementing digital technologies into EFL learning processes; some of which include too much screen time and digital content that may not be appropriate for younger viewers. The thesis further sheds light on the teachers' EFL competences, as well as their digital competences, and their basic skills and knowledge needed for teaching English as a foreign language.

Finally, the thesis offers a summary of the key insights and conclusions drawn from the analyzed literature.

This thesis serves as a foundation for encouraging teachers and parents to integrate digital technologies as a helping tool for acquiring the mother tongue as well as an additional language whenever an opportunity presents itself.

Keywords: digital technologies, digital tools, early childhood and preschool children, English as a foreign language, vocabulary acquisition.

UTJECAJ DIGITALNE TEHNOLOGIJE NA RAZVOJ VOKABULARA DJECE RANE I PREDŠKOLSKE DOBI NA ENGLESKOM JEZIKU

SAŽETAK

Ovaj završni rad daje uvid u utjecaj digitalne tehnologije na razvoj vokabulara djece rane i predškolske dobi, točnije one koja uče engleski kao strani jezik (SJ). Glavni cilj ovoga rada je istaknuti potencijalne koristi i izazove povezane s uključivanjem digitalnih alata u vrlo rano jezično obrazovanje.

Završni rad započinje predstavljanjem različitih vrsta digitalnih alata i platformi, poput softvera za videokonferencije, digitalnih slikovnica, edukativnih igračaka i robota. U nastavku će biti riječi o razvoju vokabulara prema razvojnim fazama od predjezičnog do jezičnog razdoblja. Također se govori o usvajanju drugoga ili stranoga jezika te se daje definicija i prikaz ovladavanja vokabularom kroz rano djetinjstvo i predškolsku dob.

Nadalje, analizira se utjecaj digitalnih tehnologija na razvoj vokabulara u SJ-u, navode se pozitivni utjecaji, kao što su *gamifikacija* i *Bee Botovi*, koji se mogu koristiti u procesu ovladavanja engleskim kao stranim jezikom. U radu se također daje uvid u neke potencijalne rizike koji se mogu pojaviti kada se digitalne tehnologije uključe u procese ovladavanja engleskim kao stranim jezikom; neki od rizika uključuju previše vremena ispred ekrana i digitalne sadržaje koji možda nisu prikladni za mlađe gledatelje.

U radu se također spominju kompetencije poučavatelja engleskoga kao stranoga jezika, kao i njihove digitalne kompetencije, te njihove osnovne vještine i znanja potrebna za poučavanje engleskoga kao stranoga jezika.

Na samom kraju, u završnom promišljanju, sažete su ključne spoznaje i zaključci izvedeni na temelju prikazane literature.

Ovaj završni rad služi kao temelj za poticanje nastavnika i roditelja da integriraju digitalne tehnologije kao pomoć pri ovladavanju materinskim, ali i stranim jezikom kad god im se pruži prilika.

Ključne riječi: digitalni alati, digitalne tehnologije, djeca rane i predškolske dobi, engleski kao strani jezik, usvajanje vokabulara.

1. INTRODUCTION

The modern world is often characterized, among other things, by the fast development of technology, primarily digital and communication technologies (Vuić et al., 2015). Consequently, today “children are growing up in a rapidly changing digital age that is far different from that of their parents and grandparents” (National Association for the Education of Young Children & Fred Rogers Center, 2012, p. 1). In other words, digital technology influences modern individuals from an early age. Children enter a home that is, to varying degrees, filled with digital technology used by both adults and children (Ilišin et al., 2003), i.e., most environments where a child is growing up and developing are intertwined with digital technology. Therefore, its influence on all aspects of a child's development is undeniable (Vuić et al., 2015). The National Curriculum for Early Childhood and Preschool Education (MZOS, 2015) emphasizes the importance of digital technology literacy for young children. Digital competence is one of the eight essential skills for lifelong learning. Encouraging digital competence in young children involves introducing them to information and communication technology and its various applications (MZOS, 2015, p. 28). There are many different definitions for digital technology in the literature, but for the purpose of this thesis digital technology will be used in accordance with the definition proposed by Plowman (2016), who conceptualizes it as digital devices like computers, tablets, and play consoles and products or outputs (e.g., applications, websites, and games) viewed, played, read, or formed by children on different digital devices.

Parents play a crucial role in introducing children to digital technologies, as their involvement and guidance can significantly shape the child's digital experiences and overall development. Given the increasing prevalence of digital technologies globally, many parents are now introducing their children to these tools at an early age, and numerous authors have emphasized the potential benefits of digital technology in supporting children's development. Researchers such as Gettys et al. (2001) have highlighted the widespread use of technology to enhance vocabulary development and reading comprehension. Additionally, Vuić et al. (2015) have drawn upon a number of sources and contemporary research to make two critical conclusions about the impact of digital technologies on children and their development. They assert that the influence of digital technologies on young children’s vocabulary development, particularly in early childhood education, is not inherently negative or positive but depends on the interaction between the child and the adults, as well as on the perspective of adults, especially parents and teachers. Moreover,

they emphasize the necessity of early and systematic exposure to digital technologies to promote literacy, vital for effective communication and societal understanding. The authors stress that knowledge and digital technology literacy, encompassing both content and technology, are essential for comprehending the world we live in. Finally, preschool teachers should take comfort in the fact that when used effectively, digital technology can significantly enhance children's mother tongue literacy skills but also their FL skills, providing them with a solid foundation for future language learning.

This thesis focuses on the effects of digital technologies on children's language development. The second chapter gives insight into different digital technology types and platforms, i.e., how they can be used and what for. In the third chapter, some data about the amount of children's screen time usage and exposure to digital technologies are presented. In the fourth chapter, the thesis briefly describes children's vocabulary development, and second language acquisition process. In the fifth chapter, the impact of digital technology on children's EFL vocabulary is analyzed, where insight into how much technology actually affects language development is given as well as examples of different ways to introduce technologies to children such as gamification. The sixth chapter deals with teachers' FL and digital competences, and in the end, a conclusion to the whole thesis is given.

2. DIGITAL TECHNOLOGY TYPES AND PLATFORMS

As mentioned earlier, digital technology encompasses software programs interacting with users and physical hardware like computers, calculators, and mobile devices (Clark - Wilson et al., 2011 as cited in Freiman, 2014). Another way to look at technology is to perceive it as a tool (Vygotsky, 1978 as cited in Bruner, 1987). Whether symbolic or practical, tools are first 'external', meaning they are employed externally in the environment or social interactions and they have an impact on their users. For example, initially used as a communication tool, language may eventually mold people's brains (Bruner, 1987, p. 11).

Blackwell et al. (2014) mention that classroom technology use still needs to be improved despite greater access to computers and mobile devices, particularly in early childhood education. When utilized, technology often supports traditional, didactic practices rather than meaningful, children-focused methods. A Project Tomorrow (2011) survey of 35,525 K-12 teachers found that technology was most frequently used for homework and practice (58%). Furthermore, Eteokleous (2008 as cited in Blackwell et al., 2014) likened this limited use to 'fancy chalkboards,' substituting for traditional tools rather than enhancing the curriculum. Additionally, research indicates that teachers primarily use technology for parent communication or lesson preparation (Russell et al., 2003 and Zhao et al., 2002 as cited in Blackwell et al., 2014).

Mayer (2009 as cited in Rogulj, 2022) divided types of digital tools into three categories: 1. tools in multimedia, 2. tools for communication and collaboration, and 3. tools for creating digital content, especially interactive ones. The development of various tools is focused on meeting the diverse interests of specific user groups. Communication tools are particularly emphasized, offering numerous applications that facilitate faster and more efficient communication while reducing costs. A key area to highlight is using these tools in education, where their selection is based on the users' needs, interests, and skills. Typically, free tools are utilized, including those integrated into systems like CARNet, which provides services to Croatian users with an AAl@EduHr identity. The Agency for Mobility and EU Programs (Rogulj, 2022) has provided a table of online and digital tools for use in education with a clear definition of the severity of use, possible number of participants, purpose, and price (Table 1).

Table 1

Online and digital tools for use in education (The Agency for Mobility and EU Programs as cited in Rogulj, 2022)

VIDEO CONTENT CREATION					
PowToon	Biteable	YouTube	Adobe Premiere	Clideo	Animoto
GRAPHIC CONTENT CREATION					
Canva	Adobe tools	Visme	Big huge labs	Piktochart	Flipsnack
INTERACTIVE CONTENT PRESENTATION					
Prezi	Mentimeter	Jamboard	Kahoot	Padlet	Zoho Show
CONTENT PRESENTATION AND TEACHING					
Zoom	Google Classroom	Socrative	WebEx	Blackboard	Microsoft teams
ACTIVE PARTICIPANT INVOLVEMENT ONLINE AND OFFLINE					
Actionbound	Emoji Scavenger Hunt	Plickers	Makey Makey	Scratch	Microbit
COMMUNICATION					
Trello	Slack	Yammer	Asana		

In addition, Rogulj (2022) emphasizes the significance of the Competence Network project which was undertaken from 2013 to 2015. During that time, four academic institutions of the University of Zagreb engaged in collaborative efforts to conceive and refine an array of applications tailored to meet the complex communication requirements of individuals. One of these applications useful for working with young children is the Communicator application, available for download on Google Play, which enables users to organize and display symbols linked to soundtracks or text. These symbols correspond to various categories, such as body parts, animals, and food, and can be customized with additional symbols tailored to the user's specific needs. The communicator is

crucial in early childhood education because it fosters functional communication, enhances language comprehension, and enriches vocabulary.

Rogulj (2022) also mentions the importance of digital tools, particularly in the context of working with individuals with autism spectrum disorders (ASD). Integrating information and communication technology, which facilitates access to multimedia applications capable of conveying messages through a combination of images, audio, or video, significantly enhances the quality of therapeutic interventions (Kuhar et al., 2016). The use of tablets, smartphones, and similar devices not only increases the appeal of these activities but also boosts motivation and the willingness to engage in them. According to Pasnik (2007 as cited in Mikulec & Rogulj, 2023), one of the useful devices are iPods, designed as audio and video players, but also used as storage for music, audio files, photographs, and videos. By connecting the iPod to iTunes, iMovie HD, iPhoto, iDVD, iWeb and other software for organizing and playing media content, each individual personalizes the available content and uses it to expand their knowledge. In addition to using the content downloaded from the Internet, the content that an individual can create independently is even more valuable. In this way, a passive user becomes an active digital content creator. By exploring the possibilities of iPod, iTunes and iLife, according to Pasnik (2007 as cited in Mikulec & Rogulj, 2023), one can develop self-expression and creativity skills, support the creation of individual portfolios, and promote communication. This is an example of dynamic and contemporary use of digital tools in each individual's professional development. Additionally, the ability to incorporate personal photographs featuring familiar and engaging objects from a child’s environment further stimulates children with autism spectrum disorder (ASD) as well as their neurotypical peers. A specific example of this application given by Rogulj (2022) is the use of tablets to create digital puzzles, wherein users can upload personal photos to generate customized puzzles. This is important as it provides a personalized and interactive experience.

2.1. Videoconferencing software

In view of the rapid development of digital technologies, Allen and Blake (2010 as cited in Purnell, 2019) emphasize that the education sector must continuously evaluate and update its practices. However, integrating new technologies into education is an ongoing and complex challenge. Purnell (2019) explains videoconferencing as a digital tool that enables communication through visual and audio connections over the internet. It is increasingly used for various purposes, from

facilitating meetings across locations to helping families stay connected despite physical distances. This technology supports community building and communication, offering opportunities for interaction that would otherwise be impossible, all while participants remain physically remote from each other. Videoconferencing can be conducted using many different platforms (Table 2).

Table 2

Some videoconferencing platforms (Awasthi & Singh, 2020)

Videoconferencing platforms				
Zoom	Google meet	Microsoft Teams	Cisco WebEx Teams	GoToMeetings

Currently, only a few studies have focused on preschool children using videoconferencing. In a study by Kelly (2013 as cited in Purnell, 2019), the researcher observed her interactions with her two young grandchildren who lived abroad. She noted that the younger child would often forget that actions not performed in front of the camera were invisible to those on the other side of the video call. This aligns with Piaget's theory, which suggests that young children struggle to grasp that others do not share their perspectives, knowledge, or experiences. As a result, children may find it difficult to understand that what they experience in their environment might not be perceived by those participating in the videoconferencing interaction. Kelly (2013 as cited in Purnell, 2019) also discovered that the younger child in the study was more inclined to attempt physical interaction with the person on the other side of the camera, while the older child recognized the limitations of the virtual interaction.

In addition, there is not much research on videoconferencing in early childhood educators' professional development. One emerging application is videoconferencing to enhance teachers' skills and knowledge. For example, in one study, consultants provided verbal instructions, modeled early intervention techniques, and gave feedback to teachers via videoconferencing (Gibson et al., 2010). Another study found that videoconferencing helped ease transitions to school by allowing children to see their future classrooms and meet their teachers and peers virtually (Hatherly et al., 2009). Despite these examples, literature on videoconferencing in early childhood settings remains

sparse, with most studies focusing broadly on digital technology's philosophical and pedagogical aspects rather than its specific application in early education (Purnell, 2019).

2.2. Digital educational toys

The evolution of digital technology has significantly impacted the children's toy industry, prompting numerous studies on digital toys, which play a crucial role in child development (Mikulec & Rogulj, 2023). As society becomes more digitized, traditional toys are increasingly enhanced with technology, making them more engaging for children by optimizing their interaction (Komis et al., 2021 as cited in Mikulec & Rogulj, 2023). Newer digital toys now offer advanced functions compared to earlier versions. For instance, Curtain and Dahlberg (2016 as cited in Mikulec & Rogulj, 2023) highlighted wind-up toys, which are considered digitized toys, as effective tools for teaching foreign languages to preschool children. These toys are ideal for introducing new vocabulary through culturally authentic songs and stories. Resnick (2017 as cited in Mikulec & Rogulj, 2023), an early advocate for the educational value of digital toys, equated play with learning and led research at MIT that produced educational tools named ‘digital manipulatives’, combining traditional toys with technology and thus creating the first smart toys.

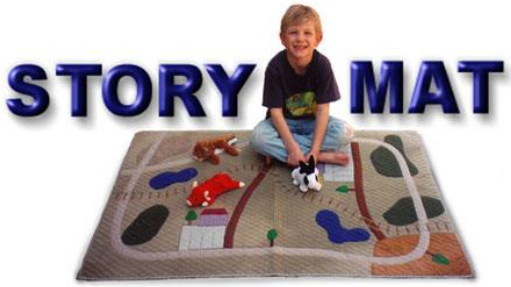
The literature defines ‘smart toys’ as toys enhanced with software or sensors (Kara et al., 2013 and Yilmaz, 2016 as cited in Mikulec and Rogulj 2023). These technological upgrades provide more interactive experiences between the toy and the child, fostering cognitive, social, and behavioral development (Cagiltay et al., 2014 as cited in Mikulec & Rogulj, 2023). Goldstein et al. (2004 as cited in Mikulec & Rogulj, 2023) describe smart toys as those incorporating microcontrollers and connectivity to computers. They also include tangible components combined with electronic elements such as sensors and accelerometers, which enable two-way interactions and provide feedback through voice, visuals, or kinesthetic responses.

However, not every digital toy qualifies as an innovative toy. For instance, a toy phone that emits sound when a button is pressed lacks the educational purpose and interactive complexity needed to be considered an innovative toy. Effective digital educational toys are designed to enhance learning by integrating multimedia content into traditional toys, such as interactive plush dolls or educational laptops. Kara et al. (2013) created a toy to encourage storytelling and assess children's creativity and language skills. This toy has shown positive effects on developing speaking abilities and is helpful for language acquisition. Additionally, in 1999, MIT's Multimedia Laboratory, led

by Ryokai and Cassel, developed StoryMat (Figure 1), a collaborative digital storytelling system. StoryMat records and integrates children's stories with their movements, allowing them to see and hear the narratives they create or those shared by peers in an interactive environment. Using StoryMat, children can manipulate real-world objects, interact with them virtually, and create intricate stories that bridge the gap between the real and digital worlds (Ryokai & Cassel, 1999 as cited in Mikulec & Rogulj, 2023).

Figure 1

StoryMat (MIT Media Lab, Ryokai & Cassel, 1999 as cited in Mikulec & Rogulj, 2023)



Another category of smart toys developed at MIT is explicitly designed for educational purposes to aid in mastering various content areas. For example, Mikulec and Rogulj (2023) mention Curlybot, which was created to assist children aged four and older in understanding fundamental mathematical concepts such as geometry and computation. This toy also supports vocabulary development in the child's native language and can be utilized to learn concepts and terms in a foreign language (Agarwal & Tripathi, 2015 as cited in Mikulec & Rogulj 2023).

In addition, the Siftables platform, developed by David Merrill and Jeevan Kalanithi (2007 as cited in Mikulec & Rogulj, 2023), represents another innovative educational tool. The Siftables system (Figure 2) consists of electronic cubes that are wirelessly connected to a graphical display. Children can create their content by interacting with these cubes, solving simple math problems, and constructing sentences and stories. This interactive play helps children reinforce familiar foreign words but also aids in learning new vocabulary, including terms related to movement and directions. This hands-on approach enhances their engagement with both familiar and new language concepts.

Figure 2

Siftables (MIT Media Lab recource: https://news.mit.edu/2015/sifteo-cubes-to-consumer-drones-0217)

2.3. Digital picturebooks

Because of excessive screen time, many parents and teachers have been prompted to reconsider using digital picturebooks. Mikulec and Rogulj (2023) say this raises the question whether printed picturebook is superior to a digital one. The response to this largely depends on individual perspectives and knowledge. The authors state that both printed and digital picturebooks have their respective advantages and disadvantages.

Furthermore, Kucirkova (2019) highlights the unique value that digital picturebooks bring to bilingual education, encouraging reading and especially being a resource for children with specific educational needs. Additionally, they offer accessibility to families with lower literacy levels and provide the convenience of digital materials, assuming there is internet access and the necessary digital devices. Unlike printed picturebooks, digital versions offer interactivity through multimedia features such as sound, music, voices, illustrations, photographs, text, and videos. This range of possibilities enables children to engage deeply with the content of the story, fostering greater autonomy, enjoyment, and active participation in content consumption. Kucirkova (2019) also highlights the role of algorithms in creating a personalized reading experience (automatic personalization), along with the reader's involvement in content creation. The interactive and personalized multimedia features allow the child to act as a collaborator, narrator, or even author of the story, enhancing the overall reading experience.

The internet offers a vast selection of digital picturebooks, both purchasable and freely accessible, which can be downloaded onto personal computers or other digital devices, allowing the creation of a personalized digital library that is available anytime, anywhere. In addition to pre-existing digital picturebooks, Mikulec and Rogulj (2023) mention that children have the opportunity to create their own digital picturebooks with guidance from adults or peers using either free or purchased applications. One common tool for this purpose is PowerPoint, which allows users to input text and images, animate them, and enhance the presentation with an accompanying soundtrack - either downloaded or independently recorded. This method enables the integration of storytelling with simultaneous visual and auditory experiences. The authors also mention other online platforms where users can download applications specifically designed for creating digital picturebooks. For instance, *Book Creator* requires users to register and create profiles to access multimedia tools for digital book creation. These applications facilitate the incorporation of text, images, photographs, drawings, videos, and diverse sound recordings. Another accessible tool is *My Storybook*, which offers a straightforward interface for creating content using text, photos, and drawing tools directly within the program. This platform not only allows for the creation of digital picturebooks but also provides instructional resources on how to write and design them. Once the content is created, it can be either published or printed. In contrast to the previously mentioned tools, *Storyboarder* offers simplified animation capabilities for drawings, enabling content creation without the need for complex or technologically demanding tools. Additionally, *Storyjumper* emphasizes collaborative content creation by bringing together authors and readers who interact for the purpose of generating new materials. Aimed at connecting children, parents, teachers, and authors from across the globe, *Storyjumper* fosters the sharing and development of digital content. The platform also hosts a library of digital picturebooks available in eight languages - Spanish, Chinese, French, German, Italian, Greek, Turkish, and English - with content categorized into themes such as pets, family, friends, Roblox, and Minecraft (Mikulec & Rogulj, 2023).

2.4. Educational robots

In addition to conventional partially digitized toys, autonomous robots have functionality that relies on user programming (Collado, 2017). Bers (2008 as cited in Mikulec & Rogulj, 2023) elaborates on integrating contemporary toys, emphasizing the application of robotics from an early age to foster technological literacy and facilitate learning in mathematics and natural sciences through engaging play-based activities. The author developed robot kits for young children,

conceptualizing robots as interactive tools that promote acquiring new knowledge and skills, including vocabulary expansion, critical thinking, and collaborative abilities.

In the contemporary society, robots and robotics are widely implemented in various aspects of daily life, stressing the importance of preparing children to navigate and utilize digital technology effectively. Educational robots are pivotal in modern learning environments as they lay the groundwork for technological literacy, which is crucial for future occupational and educational pursuits. During early childhood, robots are used to develop problem-solving skills, stimulate creativity, encourage teamwork, and foster proactive behaviors. They are designed with specific age groups in mind, aiming to introduce foundational concepts in robotics, programming, algorithmic thinking, and other technological competences (Mikulec & Rogulj, 2023).

Mikulec and Rogulj (2023) give several examples of educational robots. One such example is the ROYBI Robot, specifically designed for children aged three and above. Its primary objective is to motivate young learners to acquire foreign languages such as English, Spanish, French, and Chinese. Through interaction with the ROYBI Robot, children can expand their vocabulary and enhance their spoken language skills within the contexts of science, technology, and mathematics. Moreover, the ROYBI Robot is equipped with a usage time limit to protect children from excessive exposure to digital technology. The robot also features Bluetooth connectivity, allowing it to interface with smartphones, thus expanding its functionality.

Another noteworthy example is the Ruko 1088 Smart Robot, intended for children aged four and older. The Ruko 1088 can be independently programmed or operated via a mobile application through Bluetooth connectivity. It comes with a memory that includes ten musical compositions and 200 programmable functions which can be adjusted according to specific commands. Additionally, the robot is pre-programmed with 24 hand movements, 14 body movements, and 10 facial expressions. With the ability to display various emotions and respond to voice commands, the Ruko 1088 encourages children to engage in physical exercise, communication, storytelling, dancing, and listening to music. Children can further interact with the Ruko 1088 by programming its movements in spaces with obstacles. The robot can also function as a speaker when connected to a phone via Bluetooth. With its extensive capabilities, the Ruko 1088 serves as an exceptional companion.

Vector 2.0 (Figure 3) is designed for children aged five and older, functioning as an intelligent companion that recognizes a child's voice and face through an integrated sound sensor and camera. Interaction with the child primarily occurs through dance, although the robot can also make phone calls and provide weather forecasts via voice commands. While Vector 2.0 does not support programmability, it serves as an entertaining companion that can amuse and engage children. Its primary function is to introduce children to computer science fundamentals and facilitate the use of the English language in giving instructions.

Figure 3

Vector 2.0 (Digital Dream Labs resource: https://ddlbots.com/products/vector-robot)

Pepper is recognized as the first humanoid robot. Standing 120 cm tall, Pepper is programmed to recognize faces and basic human emotions. The robot's advanced modular perception system aids recognition and interaction, utilizing touch-sensitive sensors, LEDs, and microphones. Additionally, Pepper features a touch-sensitive screen that enhances interaction, contributing to its popularity in educational and corporate settings, as it is employed in over 2,000 schools and companies as an assistant for guiding individuals in specific tasks. Pepper's significant environmental awareness allows it to initiate conversations upon detecting a person nearby. The robot is available in 15 languages, which is why it is widely used across the globe. Its dynamic movement capabilities, including mobility in different directions and autonomous navigation, are enabled by infrared sensors, bumpers, 2D and 3D cameras, and sonar.

Karabin (2023) gave an overview of educational robots in teaching, with a special focus on the effectiveness of robots in teaching EFL and students' motivation for EFL when robots are used. Although the research was conducted with early primary children, some of the robots may be useful in preschool as well.

3. CHILDREN'S EXPOSURE TO DIGITAL TECHNOLOGY

This chapter explores the growing use of digital technology in the lives of young children, looking at both the advantages and disadvantages. Their widespread usage by children, the parental role in encouraging screen time, and the developmental effects, including advantages like improved learning oportunities and issues like digital addiction will be examined. Finally, the ways in which children's interactions with technology affect their social and cognitive growth are considered, emphasizing the value of carefully integrating digital tools into early childhood education.

Children growing up in the contemporary world are exposed to varied types of digital technologies from very early on in their lives (Ficken, 2013 and Yelland, 2007; Parette et al., 2009 as cited in Purnell, 2019). Studies have revealed that 41% of parents give their children a tablet or handheld device to use in a restaurant, and 78% of parents endorse their children's use of technological devices and report that this usage has not led to any issues (Nielsen 2012 and Wartella et al., 2013 as cited in Sharkins et al., 2015). A national survey conducted in the USA by Common Sense Media in 2011 found that 38% of children under the age of two had used a mobile device for digital technology consumption. Just as communication and creative expression lay the groundwork for literacy, digital technologies such as computers, mobile phones, educational toys, and games play a significant role in developing young children's operational skills, knowledge, and broader understanding of the world (Devine, 2012 and Geist, 2012 as cited in Sharkins et al., 2015; McPake et al., 2013). Research indicates that young children show a strong interest in technology, and their observations of how siblings, parents, and older children interact with technology help them explore content areas like reading. In this way, technology is seen as a tool that enhances comprehension and meaning through the use of symbols, images, and videos (McPake et al., 2013). Studies have shown that children as young as two naturally interact with touch screens in a manner similar to how they instinctively engage with new toys (Sharkins et al., 2015).

Research conducted by Chaudron et al. (2015) indicated that the limited use of digital technology specifically for learning or educational purposes is notable. Additionally, children who own digital educational devices often neglect and quickly forget about them, viewing them as childish and restrictive. In contrast, older children tend to use tablets primarily for gaming, while younger children and preschoolers use them differently.

Research by Wolf et al. (2018) shows that over 50% of parents whose children use screen media believe that it supports their child's learning. Some studies have demonstrated the benefits of high-quality educational programs designed to teach academic skills, but these benefits are observed only in children older than two years (Wolf et al., 2018).

Figure 4a

Screen Media Use, by Platform, 2011 vs. 2017. Resource: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.commonsensemedia.org/sites/default/files/research/report/csm_zerotoeight_fullreport_release_2.pdf

Average time spent daily (hours:minutes)

Device	All	Child's age		
	0 to 8	Under 2	2 to 4	5 to 8
Television set	:58	:29[a]	1:09[b]	1:04[b]
DVD/videotape	:17	:06[a]	:23[b]	:18[b]
Mobile device	:48	:07[a]	:58[b]	1:02[b]
Computer	:10	*[a]	:05[b]	:20[c]
Video game device	:06	*[a]	:04[b]	:12[c]
Total screen media	**2:19**	**:42[a]**	**2:39[b]**	**2:56[b]**

*Less than one minute but more than zero.

Figure 4b

Mobile Devices in the Home, 2011-2017. Resource: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.commonsensemedia.org/sites/default/files/research/report/csm_zerotoeight_fullreport_release_2.pdf

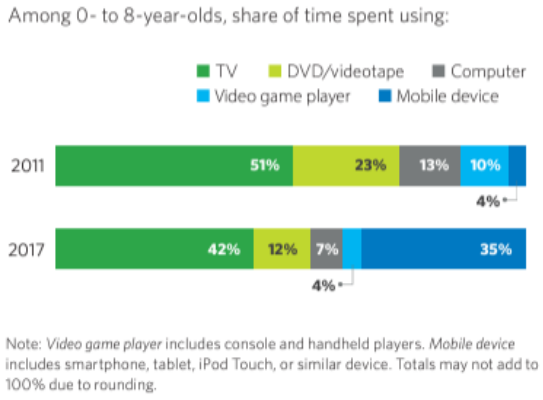
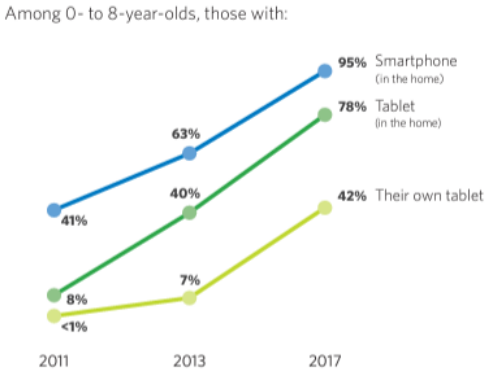


Figure 4c

Screen Media use, by Device and Age, 2017. Resource: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.commonsensemedia.org/sites/default/files/research/report/csm_zerotoeight_fullreport_release_2.pdf



Since 2011, the incidence of television viewing among children of all ages has slightly declined (Figure 4a), mainly due to the increase in the number and variety of mobile devices, which have significantly changed digital technology consumption habits (Wolf et al., 2018). While the overall screen time has remained relatively stable since 2011, mobile media usage among children aged 0–8 years has experienced a dramatic increase, tripling from 5 minutes per day in 2011 to 15 minutes in 2013 and again tripling to 48 minutes per day by 2017 (Figure 4b). At the time of the research (2018), the average two-year-old engaged with a mobile device on a daily basis.

Additionally, children across all age groups were more likely to co-view television with adults or others, as opposed to using tablets or smartphones independently. Notably, for children aged 0–8 years, mobile devices now accounted for 33% of their total screen time (Figure 4c).

The internet and digital technology provide a multitude of opportunities that can enhance children's creativity and problem-solving abilities while also fully engaging them with their appealing content. However, there is a growing concern regarding the development of digital addiction among children, often referred to as ‘screen addiction’, which can be exacerbated by prolonged exposure to potentially harmful content, such as destructive video games (Rogulj, 2022).

Rogulj (2022) mentions empirical research conducted in Spain, England, and the United States by Qustodio (2020), which indicates that children between the ages of four and fifteen spend, on average, approximately one hour per day playing video games. Rogulj (2022) also states that

during the complete shutdown due to the coronavirus pandemic, video gaming became increasingly popular among both sexes. When considering the proper and high-quality selection of age-appropriate video games, several positive aspects of gaming may be highlighted: increased resistance to stress and enhanced concentration, particularly in action video games; the development of motor skills; opportunities for meeting new people with similar interests; learning teamwork; exposure to different cultures and languages; the development of logical thinking and quick problem-solving abilities; learning sportsmanship through victories and defeats; support for educational processes; and serving as a source of entertainment (Ciboci et al., 2018, p. 71 as cited in Rogulj, 2022).

Typically, digital devices during early childhood and preschool years are primarily associated with watching short movies or gaming, often with the goal of progressing to higher levels within a game. However, it is important to recognize that digital technology in the entertainment domain offers a wide array of possibilities. By integrating real-life activities with digital technology, interactions can be created that contribute to more complex and meaningful activities. For example, a tablet equipped with a camera allows a child to document their activity, which is then saved in a digital photo album. The child can later retrieve the desired photo and use a coloring application to create a new activity. By selecting a digital pencil for coloring, the child strengthens their pencil grip and enhances their fine motor skills. Moreover, there are numerous applications that engage the entire locomotor system, ranging from various sports to dance activities. In addition, children sometimes transform the stationary nature of digital devices into dynamic sources of activity through their creativity (Rogulj, 2022, pp. 127-128).

A study by ChildWise (2015 as cited in Rogulj, 2022) revealed that the usage of tablets among children under the age of five increased from 23% in 2012 to 73% in 2015. The author emphasizes the scarcity of research focusing on children's perspectives on digital technology during early childhood despite their status as the primary users in a rapidly evolving technological landscape. Understanding children's views on the role of information and communication technology (ICT) in their development is vital, especially as the field of early childhood education still struggles with integrating digital technologies into teaching practices. As Livingstone (2014) contends, true progress cannot be achieved if children are overlooked in research and educational policy formulation.

4. EARLY CHILDHOOD AND PRESCHOOL CHILDREN'S VOCABULARY DEVELOPMENT

Speech constitutes the fundamental medium of human communication and plays a crucial role in a child's development. The emergence of spoken language often represents a significant milestone and source of profound joy in early childhood (Velički & Katarinčić, 2011). A preschool teacher plays a crucial role in creating a stimulating environment for the child's overall development, including their speech. To foster speech, it is essential for children to engage in verbal interactions in small groups, pairs, and in front of the entire group. Surrounding children with high-quality linguistic content and facilitating their exposure to effective, mediated speech is the key to achieving success. Children lack such content in their experience unless previously exposed to it, and this stimulation can be considered part of the environment beyond merely its material aspects (Velički, 2009).

Table 3

Children's Vocabulary Growth Scale (Posokhova, 1999, p. 26)

Age Range	Minimum number of words	Maximum number of words
12-14 months	3	58
15-17 months	4	232
18-20 months	44	383
21-23 months	67	707
27-30 months	171	1509
3 – 4 years	598	2346

Velički (2009) highlighted a child's attempts to imitate information from their environment using all their senses, thereby shaping their speech. Effective speech development relies on the basic predispositions, which include good hearing, speech motor skills, voice recognition, normal intelligence, sound discrimination, and language abilities. Just as children learn to run, walk, or draw based on their physical and mental capacities, they acquire fundamental language elements. The capacity to master language evolves from the child's inherent need to communicate and comprehend the surrounding world. Posokhova (1999) mentions a famous linguist, Buller, who provided data for a growth scale of children's vocabulary (Table 3).

4.1. Key stages in vocabulary acquisition

Starc et al. (2004) state that the development of speech begins with a newborn's initial cry. During the first few months, all the sounds produced by the infant are spontaneous and a reflex response, representing the child's physiological state, whether of pleasure or discomfort.

Posokhova (1999) highlights that the sensitive period for speech development occurs during the ’early childhood’ phase, spanning from birth to approximately three years of age. By the end of the first year, the child typically utters their first word. However, this initial conscious word is preceded by a complex preparatory period during which the foundational elements of speech development are established. According to Jelaska (2007), the acquisition of the first language (L1)[1] involves the interplay of innate linguistic capacities and exposure to language within the environment. Posokhova (1999) divides the development of speech into two primary periods and every child is expected to progress through all stages within these periods. The first period, known as the *preverbal period*, extends from birth until the child articulates their first meaningful word. This period is further categorized into four distinct phases, and each of them will be briefly explained in the next section. The emergence of the first meaningful words generally occurs around the child's first year of life. The second period, termed the *verbal development period*, is subdivided into two phases, each representing a stage in the development of verbal speech, which will also be mentioned and explained below.

4.1.1. Preverbal period

Physiological cries and reflex vocalizations mark the first phase of the preverbal period. These sounds are spontaneous and help regulate the infant's physiological and emotional needs. This phase is crucial for overall speech development, and it lasts from birth until about the eighth week of life (the second month). During this time, the baby produces various sounds, such as sighs, grunts, coughs, and cries, in response to hunger or discomfort. Additionally, the infant makes numerous involuntary movements with the arms, hands, and fingers, which also engage the speech organs - such as the tongue, lips, lower jaw, and vocal cords. The cries during this phase primarily

[1] According to Jelaska (2007), in Croatian, *materinski jezik* (mother tongue) and *prvi jezik* (first language) are often used interchangeably, though they do not always align perfectly. While *materinski jezik* typically refers to the language acquired in early childhood, *prvi jezik* can encompass the language learned first but not necessarily acquired as the mother tongue. Terminological concepts such as "language acquisition" and "language development" in both Croatian and English illustrate the nuanced differences between acquiring and developing a language.

consist of vowel-like sounds with a slight nasality (Posokhova, 1999). In addition, the formation of fundamental sensorimotor neural connections essential for speech begins and the child starts to master the control of sound production and auditory processing. This process continues throughout the preparatory period (Posokhova, 1999).

Posokhova (1999) states that the second phase of preverbal development extends from the eighth week of a child's life (approximately two months of age) until the twentieth week (or the fifth month). During this period, the infant's crying becomes more varied and sophisticated, with the emergence of laughter and cooing. The child begins to grasp the basic elements of human speech, such as intonation. By around three months, the quality and intonation of the cry start to evolve, reflecting the child's changing emotional states. The baby begins to use vocalizations to signal needs such as hunger, discomfort, or a wet diaper. In response to parental speech, the baby initially produces short sounds that mimic adult intonation. Over time, these vocalizations become more rhythmic and complex in intonation. It is essential to foster rich emotional communication during this phase. As the frequency of crying decreases, cooing begins to emerge around the twelfth week. This cooing results from the baby's reaction to the smiles, verbal interactions, and emotional engagement from parents during activities like tickling, hugging, and conversation. This shift marks a transition from spontaneous to communicative vocalizations. Notably, healthy infants tend to coo more actively in the presence of adults. By the fourth month, cooing primarily consists of vowel sounds, though some consonants may also appear (Posokhova, 1999).

The third phase of preverbal development extends from approximately 16 to 30 weeks of age or between 4 and 7.5 months. During this period, the infant begins to engage in vocal play and babbling. The increased spatial capacity within the oral cavity facilitates more complex tongue movements, leading to the production of a wider range of consonant sounds. Initial syllabic vocalizations emerge, which subsequently develop into syllabic babbling, characterized by repetitive sequences of syllables such as 'baaa', and 'maaa'. This phase is significant in speech development, as it represents the integration of discrete sounds into sound sequences. This foundational process is instrumental in the subsequent development of coherent speech (Pihler Brumen, 2023; Posokhova, 1999).

The fourth and final stage of preverbal speech development, active syllabic babbling, occurs from approximately 20 to 50 weeks of age, or between 5 and 12.5 months. During this phase, the infant's

vocalizations begin to resemble the sounds of the native language. The repetition of syllables becomes more controlled, with sequences such as ‘ba-ba’, and ‘ma-ma’ emerging. This stage marks a period of increased social interaction. The infant actively engages in vocal play with adults, using babbling to attract attention, offer objects, and attentively listen to human speech (Pihler Brumen, 2023; Posokhova, 1999).

Posokhova (1999) states that significant advancements in speech comprehension occur during this phase. By the end of the first year, the child begins to recognize and respond to their own name, the word "No!” and simple commands such as "Give me the ball." The child also starts to direct their gaze toward named individuals and objects, their memory expands, and they react more vividly to environmental changes and unfamiliar people. Notably, the child’s response to separation from the mother becomes pronounced. Fostering meaningful communication through engaging and colorful toys or objects during this period is essential. These serve as indicators of the child's healthy and dynamic responses to new stimuli. The child's varying reactions to different objects highlight their individual responses and developmental progress.

This stage is particularly sensitive for speech development, as the child becomes highly receptive to acquiring elements of the mother tongue. Speech development advances through the enhancement of conscious auditory perception and not solely through imitation, leading to the gradual and deliberate formation of the auditory, speech and motor system (Posokhova, 1999).

4.1.2. Verbal development period

According to Posokhova (1999), a child typically begins to articulate meaningful words at approximately 12 months of age, marking the onset of the verbal stage of language development. However, it is challenging to precisely identify the transitional phase from the non-verbal to the verbal period, as this progression varies among individuals. Each child is unique, much like each human being, which means that there should not be a rigidly defined threshold for the emergence of meaningful speech and the beginning of the verbal stage.

Furthermore, tracking every word a child utters throughout the day presents significant difficulties, making it challenging to accurately assess the child's vocabulary development and current linguistic state. Initially, a child acquires words from their immediate environment, primarily from interactions with familiar individuals and exposure to the speech of others. It is only after a period

of familiarization that the child begins to incorporate these words into their own speech (Posokhova, 1999).

Each child possesses two types of vocabularies: passive and active. The passive vocabulary includes words that the child recognizes but does not yet use in their own speech. These are often more complex ‘adult’ words that are not fully accessible to the child at this stage. The active vocabulary, which consists of words the child both uses in speech and comprehends fully, is particularly significant. The size and development of this active vocabulary are frequently used as indicators of the child's cognitive development (Posokhova, 1999).

In the first half of the second year of life, a child's speech primarily consists of single words, typically nouns and verbs adopted from the language of those around them, particularly adults. These words include common terms such as ‘mom,’ ‘dad,’ ‘grandma,’ ‘grandpa,’ ‘car,’ and ‘bear’ (as in teddy bear), as well as onomatopoeic expressions, e.g., in Croatian ‘am-am,’ ‘ku-ku,’ and ‘bi-bi’ (Posokhova, 1999).

During the second half of the second year, the child begins to link two words together, forming simple sentences and according to Posokhova (1999) a significant leap in comprehension occurs during this period. Consequently, many two-year-olds are able to understand far more than they can express verbally. At this stage, the child's first sentences emerge, often reflecting daily routines, familiar objects, or people in their immediate surroundings. Common examples include sentences like "Give me the car," "Don't eat," and "Where's mom?" (Posokhova, 1999). According to Posokhova (1999), children's speech continues to develop rapidly until the age of six.

The majority of linguists agree that explaining vocabulary development is challenging, and despite extensive research, our understanding of the processes involved in vocabulary acquisition remains limited. One widely accepted perspective is that vocabulary development occurs along a continuum, where learners advance as they deepen their knowledge of a word. According to some linguists, receptive and productive vocabulary occupy opposite ends of this continuum, with receptive knowledge preceding productive knowledge (Daskalovska, 2020).

On the other hand, some researchers remind that providing precise definitions for these concepts proves challenging. Moreover, Meara (2002) critiques the continuum model, arguing that it oversimplifies the complexities of vocabulary acquisition. He suggests that the linear progression

implied by the continuum does not adequately capture the nuanced differences between passive and active vocabulary.

4.2. Second/foreign language acquisition

Jelaska (2007) discusses the complexity and challenges in defining terminology in the field of language acquisition, especially between Croatian and English. She points out the distinction between terms such as *ovladavanje jezikom* (language mastery/language acquisition), *usvajanje* (acquisition), and *učenje* (learning), and highlights that Croatian terms are often more specific, whereas English terms tend to have broader meanings. Language learning (Cro. *učenje*) is defined as a "conscious process occurring in structured settings aimed at achieving accurate command of a foreign language" (Jelaska, 2007, p. 92), whereas language acquisition (Cro. *usvajanje*) is a "spontaneous mastery of the language in natural contexts, without direct teaching, where children acquire language unconsciously from before birth and afterward, based on their innate abilities" (Jelaska, 2007, p. 90). The Croatian term *ovladavanje jezikom* (mastery, acquisition) serves as a superordinate term used when it is not essential or known whether a language has been learned or acquired (Jelaska, 2007, p. 93), i.e., it encompasses both processes, providing a broader conceptual framework.

In contrast to the acquisition of the first language, the terms second (Cro. *drugi jezik*) and foreign (Cro. *strani jezik*) language involve distinct conceptualizations in Croatian and English. The term ‘foreign language’ refers to a language spoken outside the immediate linguistic environment of the speaker, with terms such as ‘foreign language acquisition’ and ‘foreign language learning’ indicating specific aspects of this process. Conversely, a ‘second language’ is typically the dominant or majority language in the surrounding environment, and terms for second language acquisition and second language learning in Croatian highlight these distinctions (Jelaska, 2007).

Furthermore, the Croatian term *ini* (another, additional) is suggested as a general term for both second and foreign languages. This term offers greater flexibility and comprehensively covers various types of language learning, encompassing both second and foreign language learning and acquisition. This comparative analysis of terminology reveals how different languages frame and differentiate concepts related to language acquisition, providing a richer understanding of the processes involved (Jelaska, 2007).

For the purpose of this thesis, the term ‘language acquisition’ will be used when talking about early childhood and preschool children’s EFL development. Namely, young learners acquire language through a subconscious process in which they are not consciously aware of grammatical rules. To successfully acquire a language, they need a source of natural communication, typically provided by their mother, father, or caregiver (Hoque, 2019). In other words, the emphasis is on the incidental nature of acquisition at this stage as suggested by some authors (Jelaska, 2007; Mikulec & Rogulj, 2023; Prebeg-Vilke, 1991).

These topics are mainly dealt with within the field of second language acquisition (SLA). Miao (2015) introduces this field as a subject of fascination for scholars throughout history, but states that it was not until the 1960s that second language acquisition (SLA) emerged as a distinct research field. Unlike earlier researchers who focused on teaching methods, SLA scholars are dedicated to understanding the nature and processes involved in learning additional language, i.e., they focus on how individuals acquire or learn another language and the factors that influence varying rates of learning and levels of success (Miao, 2015). Since its beginning, SLA has been an interdisciplinary field, integrating theories and findings from disciplines such as linguistics, psychology, education, sociology, and anthropology (Miao, 2015). One of the topics SLA deals with is the age of onset in foreign or second language learning or acquisition.

Linguistic diversity, which involves learning and acquiring multiple languages, typically includes a) institutional and organized foreign language instruction, b) acquiring another language through bilingual education programs, and c) bilingual education (Murphy, 2014 as cited in Mikulec & Rogulj, 2023). The impact of early bilingualism on children's language and cognitive development has long been a topic of concern for parents and teachers. In the early 20th century, it was widely believed that learning two languages from a young age could confuse children and hinder their cognitive development and educational success (Bialystok, 2017). This view was challenged by a study by Peal and Lambert, which demonstrated that bilingual children often outperformed monolinguals on various intelligence tests and school achievement measures (Bialystok, 2017). Some other studies have shown that while bilingual children excel in certain areas, bilingualism does not uniformly impact all aspects of their development (Bialystok, 2017).

Similarly, contrasting views have been expressed regarding early foreign language acquisition/learning. According to the European Commission document (2011), exposure to

foreign languages in early childhood environments can help children achieve competences in both their native and foreign languages that are comparable or at least approximate. On the other hand, despite the European Commission's recommendations and the documented benefits of early foreign language acquisition, some scholars argue that these advantages are minimal or nonexistent. This chapter will address some of these opposing viewpoints and research findings.

At the onset of discussions regarding the optimal age for the acquisition/learning a foreign language, some information about the Critical Period Hypothesis (CPH) needs to be provided. This hypothesis posits that there is an optimal period during which the brain is particularly predisposed for successful language acquisition (Mihaljević Djigunović, 2013). Initial neurological research supporting the CPH was conducted by Penfield and Roberts (1959) and Lenneberg (1967), who proposed that the brain's lateralization process, where specific brain regions specialize in particular functions, ends around puberty (Mihaljević Djigunović, 2013). This suggests that language learning abilities might decline after the critical period, making later acquisition potentially less effective than if begun earlier. However, recent perspectives have moderated this view, indicating that while there is a sensitive period for language learning, it is not strictly critical. The optimal age range for effective foreign language acquisition is now considered to be more flexible, typically spanning from age five to fifteen (Josipović, 1999 and Murphy, 2014 as cited in Mikulec and Rogulj, 2023). In addition, according to Erk and Ručević (2021, pp. 143-144), some studies have shown that "the brain retains plasticity throughout life" and "Singleton and Pfenninger (2018a) conclude that the assumed critical period and specialization of the hemispheres cannot explain outcomes of earlier or later SLA".

In support of early foreign language acquisition/learning, Brumen et al. (2017 as cited in Mikulec & Rogulj, 2023) outlined several advantages of an early start defined on the basis of previous research, and these are listed in the following text. Children who begin learning a foreign language at a young age often achieve pronunciation that is similar to that of native speakers (DeKeyser & Larson-Hall, 2005; Uylings, 2006). Next, early exposure is also associated with enhanced cognitive abilities, including improved mental flexibility, creativity, and divergent thinking, and early language learners typically perform better on academic tests, including those in reading, language, art, and mathematics (Stewart, 2005). Furthermore, their comprehension skills are more developed (Milloy & Fischer, 2002) and early language acquisition fosters cultural pluralism as

well as a deeper understanding and appreciation of other cultures (Byram, 2008). Children who learn a foreign language early are generally more motivated to advance their language skills and show greater interest in the language beyond the classroom, and this early learning experience positively impacts their social interactions, both among peers and with adults (Brumen et al., 2017).

Among the identified benefits of early foreign language acquisition, notable positive effects include enhancements in the acquisition of the mother tongue and the development of favorable attitudes towards additional languages and cultures (European Commission, 2002). Hidaka et al. (2012 as cited in Mikulec & Rogulj, 2023) further substantiate these benefits with the results obtained through functional magnetic resonance imaging (fMRI). Their research indicates that bilingual children exposed to a foreign language shortly after birth demonstrated no significant differences in grammatical processing between their first and second languages. Conversely, children who began learning a foreign language after the age of six exhibited a greater cognitive effort when engaging in grammatical tasks, highlighting the potential advantages of early second/foreign language exposure. Hidaka et al. (2012) drew their conclusions from the results of an investigation into brain activity in Japanese children aged four and five while they listened to auditory stimuli in their native language (Japanese) accompanied by visual cues (pictures corresponding to the text), as well as in their second language (English), to which they had been exposed more extensively, and a foreign language (Chinese), which they encountered less frequently and for shorter periods. The study revealed no significant differences in brain activity between languages among the four-year-olds who had been exposed to English for nearly a year. However, the results of five-year-olds who had been exposed to English for approximately 15 minutes per day during the first year and around 4 hours per week in the second year, showed notably increased bilateral frontal brain activity during exposure to both Japanese and English, compared to Chinese (Hidaka et al., 2012 as cited in Mikulec & Rogulj, 2023). These findings led the authors to conclude that early exposure to a foreign language can significantly influence brain activity in young children. The researchers also observed that patterns of brain activity in children were comparable to those found in adult studies. This suggests that the neurological foundations for processing a foreign language can be established from an early age (between three and five years old) provided that the child receives consistent exposure to the additional language over a

substantial period, such as nearly two years (Hidaka et al., 2012 as cited in Mikulec & Rogulj, 2023).

The debate over the optimal age for beginning foreign language acquisition reveals diverse opinions. While some argue that starting early leads to higher proficiency in the long term, even if the initial progress is slower (Nikolov & Mihaljević Djigunović, 2006), it is generally recommended that foreign language acquisition commence as early as possible, but not before the child has sufficiently developed their native language, namely the pronunciation system (Prebeg-Vilke, 1991, p. 185). However, it is crucial to note that an early start alone is not a definitive predictor of success. Although younger children may acquire languages relatively quickly, their ultimate success depends on a variety of internal and external factors (Murphy, 2014 and New & Cochran, 2007 and Nikolov & Mihaljević Djigunović, 2006 as cited in Mikulec & Rogulj, 2023), and age is only one of them.

5. THE IMPACT OF DIGITAL TECHNOLOGY ON VOCABULARY DEVELOPMENT IN EFL

People often see technology as fast-paced, constantly evolving, and challenging to keep up with. The technology used in second language instruction, assessment, language analysis, and many other aspects of language use has seen significant modifications. However, although technological advancements substantially impact professional practices, there are still many important issues about technology-based language learning that need to be considered. Some of these are related to the ways in which technology facilitates learning in conjunction with language education methods; the ways design of technology-based language learning can be informed by studies on language acquisition; and the manner in which the educational work done with technology can be assessed (Chapelle, 2003).

Vulchanova et al. (2017), in an editorial on language development in the digital age, say that during the late 1970s, there was a surge of interest in studying the impact of mass media on language development. Researchers questioned whether the language used in mass media, such as movies, radio, and television, differed significantly from more traditional forms of communication, like books or oral interaction. McLuhan (1964) and Willie (1979) as cited in Vulchanova et al. (2017) suggested that the new mass media introduced unique languages with grammar distinct from human-to-human communication. One key difference was related to the multimodal nature of media, which combines visual, auditory, and oral language (Willie, 1979). Furthermore, Vulchanova et al. (2017) highlight that it is necessary to consider children's level of comprehension of the TV content they are watching to understand the influence of mass media on their language development. Research indicates that comprehension improves with age, i.e. only 20% of four-year-olds comprehended what they were watching, which means that language acquisition through digital technology depends on children's verbal and visual cognitive abilities (Vulchanova et al., 2017). For learning to be successful, digital technology must be matched to a child's cognitive and language ability. Willie (1979) offers an insight into the effects of television on language development by contrasting reading with television watching. The process of reading entails converting letters into sounds that create words which have meanings that are acquired through spoken language. Due to the 'reading images', as the author calls them, this process is stimulated in our minds based on individual experiences (Willie, 1979); people will see different things when they hear the same word. On the other hand, television offers pre-made images that do not need

complicated mental decoding or symbolic transformation. This distinction raises the question of whether children need help adapting to non-visual activities, such as story time. The author mentions another essential aspect to consider in the difference between television viewing and reading: how much faster watching television is compared to reading. Considering this, Willie (1979) says reading is more individualized because the reader explicitly determines how quickly they will read. On the other hand, television mainly consists of a succession of one-time, flashing images that are rarely repeated. The viewer usually does not influence the speed of the television experience. Another essential distinction between reading and watching television is how familiar readers and viewers are with the crucial components of each medium. A child learns the basics of writing when learning to read. Their ability to write as a communication tool unavoidably influences and deepens their understanding of what they read and their thoughts about it. When young children watch television, they are frequently exposed to content outside their comprehension and control. As a result, their actions are much more helpless and uneducated in front of the TV than in front of a book. The reason is that reading requires a sophisticated mental exercise that improves focus, creativity, visualization, and imagination skills, and is therefore more beneficial for children's development than the media.

McCarrick and Li (2007) emphasized the increasing demands of work and family. Authors say parents find it challenging to remain as involved with their children's development as they would like, which leads to a greater reliance on digital technology to fill the gap. Consequently, children tend to spend more time in front of screens, which may endanger their language development and acquisition. It has been proposed that this excessive screen time limits children's exposure to visual speech from adults, opportunities to practice their language skills, and the two-way communication necessary for healthy interaction. Additionally, communication technology diminishes children's face-to-face interactions with friends and family, potentially leading to social isolation and impacting their language development, particularly regarding social communication skills.

Dore et al. (2020) researched the associations between children's digital technology use and their language and literacy skills in the United States of America. The sample included 879 third-grade pupils and their parents and 704 kindergarten children. The aim was to understand how media and technology influence children's speech and language. The first research question focused on how children use media and technology. According to parental responses, it was discovered that about

35% of kindergarten children had from 0-1 hours of screen time on a typical weekday, over 50% got 2-3 hours of screen time, and around 10% spent more than 4 hours using media or technology. Moreover, around 42% of preschool children had 0-1 hours of screen time on a regular weekday, around 50% had 2-3 hours, and about 10% got more than 4 hours of screen time.

Surprisingly, out of the entire sample of children in the research, only 4.8% of children reported not using any media on a typical school day/ regular weekday. The analysis revealed significant associations between children's media use and maternal education level. Specifically, children whose mothers had lower levels of education were more likely to engage in 2–3 hours or more of media consumption on a typical school day/ regular weekday. Furthermore, media use patterns differed by race. White children were more likely to use media for 2–3 hours per day (54%) and 0–1 hour (38%). In contrast, non-white children exhibited a more balanced distribution between these categories (47% for 2–3 hours and 43% for 0–1 hour). Gender also influenced media use, with boys being more likely to use media for 2–3 hours (56%) compared to 0–1 hour (35%). Conversely, girls' media use was more evenly distributed between 2–3 hours (49%) and 0–1 hour (44%). Additionally, the number of adults in the household was associated with media use. Children residing in households with a larger number of adults were more likely to have 2–3 hours of media per day.

The second study question examined the link between digital technology use and children's language and literacy skills. These results apply to the entire sample, not only preschool and kindergarten children. The authors found no significant relationship between digital technology use and language development. However, the results did show that using digital technology for more than four hours daily was associated with significantly lower literacy development. Finally, the authors noted that the types of media, the context in which they are used, and how they are used are significant factors which were not included in this study but can significantly impact a child's development and should be considered in future research.

The authors offer two explanations for these results. The first is that the lack of other important activities, such as reading, unstructured play, interactions with peers and adults, and physical exercise, may have negative effects on language and communication development. The second explanation emphasizes the quality of media content, suggesting that some types of media and technology may support language and literacy development more effectively than others. The

authors also highlight that adults must consider usage patterns and the significance of digital technology in a child's upbringing and language development to understand the impact of technology and media. Only when media and technology do not restrict a child's social contacts and activities, and when activities like reading and playing are already part of the child's routine, can we view their influence as positive (Dore et al., 2020).

Since digital technology pervades every aspect of a child's development, it makes sense to incorporate it when teaching children, including teaching foreign languages. Implementation of digital technology has the potential to inspire additional advancements in foreign language communication, and understanding this procedure is crucial when evaluating the numerous advantages and disadvantages of technology in initial language acquisition.

Mair (2016) says that the study of early childhood second or foreign language acquisition has attracted significant attention recently, especially as many researchers highlight the benefits of bilingual education, urging parents to enroll their children in private language classes, bilingual preschools, or nurseries. Researchers focusing on the challenges and advantages of early second or foreign language acquisition have increasingly focused on children under the age of six. Mair (2016) also highlights a growing demand for family-based language learning, prompting many daycare centers and schools to launch their programs despite it not being mandatory in many European nations.

Vocabulary acquisition, a critical component of second (L2) or foreign language (FL) learning, has been notably influenced by the advent of new technologies. Namely, it has been suggested that technological tools can enhance learners' engagement and provide increased exposure to both verbal and multimedia content in the target language, offering more opportunities for interaction through various digital devices. The impact of technology on L2 and FL vocabulary learning can be observed in subtle ways, such as the use of computers or mobile phones to extend learning beyond the classroom (Li et al., 2017; Stockwell, 2011). This technological integration is especially significant in English as a foreign language (EFL) contexts, which are the primary focus of this study, where daily exposure to the target language may be limited (Hao et al., 2021).

5.1. Positive influences

Digital technology has become integral to various aspects of child development, including L2 or FL acquisition. It has been suggested that the use of digital technology not only enhances motivation but may also foster improved proficiency in foreign languages (Mikulec & Rogulj, 2023), hence, it should be incorporated into the L2 or FL teaching process. The interdisciplinary nature of the language acquisition process is evident in the development of digital applications designed to enhance language acquisition, as exemplified by Computer Applications in Second Language Acquisition (CASLA). Chapelle (2001) defines CASLA as a framework that uses computer capabilities to enrich FL instruction and acknowledges its evolution alongside advancements in Computer Assisted Language Learning (CALL). CALL, which originated in the 1950s, represents a significant approach to language teaching, marked by a proliferation of projects exploring computer applications in higher education. The early 1980s saw further evolution in CALL programs, driven by diverse developmental ideas and professional debates (Chapelle, 2001). The advancement of digital technology, particularly in audio and video resolution due to increased computer memory capacity, emphasizes CALL's foundational role in educational technology. CALL and its related terms, such as Technology-Enhanced Language Learning, Computer-Assisted Language Instruction, and Computer-Aided Language Learning, refer to instructional approaches that utilize interactive digital resources, including the internet, to facilitate foreign language learning. Despite variations in terminology, these approaches share a common goal of employing digital tools to enhance language education (Chapelle, 2001 as cited in Mikulec & Rogulj, 2023). Computer-Assisted Language Learning (CALL) is designed not only to support independent language study but also to use information and communication technology, software, and internet resources to complement traditional face-to-face instruction rather than replace it (Levy & Stockwell, 2006 as cited in Mikulec & Rogulj, 2023). While the term CALL may seem outdated, it continues to reflect a vital component of contemporary language education (Thorne & Smith, 2011 as cited in Mikulec& Rogulj, 2023).

Nowadays, it is a common practice for publishers to provide digital versions of materials in addition to traditional print textbooks, either as supplementary resources or as standalone educational tools. The significance of independent and incidental learning facilitated through communication technologies is highlighted, such as engaging with foreign language videos and participating in digital games. For example, chat applications can significantly aid vocabulary

acquisition by exposing learners to new terms, while videoconferencing promotes authentic communication by incorporating visual cues alongside verbal interaction, thereby enhancing the authenticity and effectiveness of language learning (Mikulec & Rogulj, 2023).

Meyer and Rose (2000), for example, contend that new technologies can invigorate reading instruction, making it more pertinent to the lives of children growing up in the digital age. This view is supported by Bruce and Peyton (1999), who note that technology-based approaches to literacy instruction can enhance authentic reading and writing experiences, foster collaboration, and support children-centered learning. These approaches also facilitate writing across the curriculum and enable the creation of dynamic and engaging classroom activities.

5.1.1. The impact of the verbal content of cartoons on preschool children's language development

The verbal content of cartoons has the potential to significantly impact the language development of preschool children, influencing lexical and semantic, phonological, and syntactic aspects of their language skills. To investigate this influence, a series of methodologically designed activities were conducted at Petrinjčica Kindergarten between April and November 2014, involving 86 children aged 6 to 7 years (Vuić et al., 2015).

The analysis of audio recorded activities in which children discussed the speech characteristics of various cartoon characters indicated that exposure to cartoon dialogue aids in raising children's awareness of speech variations, such as differences between local idioms and standard language. Additionally, the verbal content of cartoons contributes to vocabulary enrichment by expanding the semantic layers of specific lexemes. This suggests that cartoons can serve as a valuable tool for enhancing young children's language development through both exposure to diverse speech patterns and vocabulary expansion (Vuić et al., 2015). While this research concentrated on the mother tongue, a similar approach could be used to enhance children's foreign language skills.

5.1.2. Gamification

In the 21st century, the integration of games into learning has gained significant popularity among both adults and young learners, drawing considerable attention from academics, educators, and practitioners. In contemporary contexts, gamification usually refers to the integration of video game elements into non-gaming systems to achieve purposes beyond entertainment, such as in

education, psychological simulations, health research, and therapy (Sudarmilah & Arbain, 2019); it has also emerged as a promising approach to enhancing EFL learning and acquisition through engaging and innovative activities. Research on gamification has demonstrated that it can increase child's motivation and enthusiasm for improving their English language skills (Handayani Redjeki et al., 2021).

Video games have emerged as essential tools in psychological science, addressing the needs of psychologists and professionals across various fields. A study by Sudarmilah & Arbain (2019) aimed to evaluate whether a specifically designed video game prototype can enhance the cognitive abilities of preschool children, employing expert judgment for validation and implementation.

The research involved the design and development of a computer game prototype named "Rhino Hero," intended to stimulate cognitive development in preschoolers. The prototype's effectiveness was assessed through expert validation and practical implementation, and the results indicated that "Rhino Hero" significantly improved children's cognitive competences, as evidenced by enhanced scores in Verbal IQ, Performance IQ, and Full-Scale IQ.

One of the primary objectives of gamification in education is to capture children's attention and motivate them to engage more deeply in learning activities (Deterding et al., 2011 and Zichermann & Cunningham, 2011 as cited in Xezonaki, 2022). Gamification employs fundamental reinforcement techniques, such as competition and collaboration (Andrade & Law, 2018 as cited in Xezonaki, 2022). Competition involves the user striving to excel by optimizing their performance to achieve a goal, rather than merely obstructing an opponent. In contrast, collaboration entails working together to reach shared objectives (Andrade & Law, 2018 as cited in Xezonaki, 2022).

It is crucial to distinguish gamification from games or Game-Based Learning, as gamification is not centered on fun but rather on enhancing learning through game-like elements and mechanisms (Deterding et al., 2011 as cited in Xezonaki, 2022). The aim of gamification is to motivate children through external rewards, such as medals and badges, thereby fostering positive learning outcomes (Kapp, 2012 as cited in Xezonaki, 2022).

Moreover, the process of co-designing, where preschool teachers and children collaboratively select and implement gamification elements, has proven beneficial (Xezonaki, 2022). This

participatory approach makes children feel involved in shaping their learning experiences, thereby enhancing their engagement and improving the child-teacher relationship (Ramos-Vega et al., 2021 as cited in Xezonaki, 2022). This is especially important because the National Curriculum for Early Childhood and Preschool Education promotes the importance of giving children a chance to participate in the shaping of their own learning process. Teachers benefit from this system by effectively guiding children, recognizing their efforts, and providing feedback that encourages progress rather than focusing on failure (Hamari et al., 2014 as cited in Xezonaki, 2022).

Overall, integrating these elements into the learning process boosts children's motivation and cognitive engagement, leading to improved learning outcomes (Kapp, 2012 and Lee & Hammer, 2011 as cited in Xezonaki, 2022). In conclusion, in many cases, children exhibit greater and more active participation in gamified lessons compared to traditional ones, finding these lessons more exciting and engaging (Xezonaki, 2022).

5.1.3. Bee-bot

The Bee-Bot is an effective tool in educational settings, offering a platform for various activities and games (TTS, 2018 as cited in Rogulj & Lolić, 2022). Designed to resemble a bee, it appeals to children due to its familiarity and approachable appearance. This floor robot is user-friendly, featuring seven buttons on its upper side, which control its movements (forward, backward, left, and right). By combining these buttons, users can input up to 40 different commands. The robot moves in 15-cm increments and can rotate up to 90 degrees, with each command sequence initiated by pressing the green "GO" button, which is accompanied by sound and light signals to confirm the action (Rogulj, 2022).

The Bee-Bot emerges as a powerful motivator when effectively integrated into the process of acquiring a foreign language, such as English. Its successful implementation in educational activities requires preschool teachers to be adequately educated in this area. A study by Schina et al. (2021 as cited in Mikulec & Rogulj, 2023) was conducted in Greece and focused on the informal education of English language teachers, examining their attitudes toward incorporating the Bee-Bot into the learning process. The findings revealed that the training of teachers in how to use the robot positively impacted the teachers' self-confidence and increased their willingness to use the Bee-Bots in their teaching (Mikulec & Rogulj, 2023).

Engaging with the Bee-Bot allows children to explore the basics of robotics while simultaneously developing cognitive and motor skills. It also helps them learn to direct, evaluate, and resolve problem situations. Bee-Bot's features and capabilities make it suitable for integration into a wide range of educational activities, from storytelling and mathematics to art, depending on the creativity of preschool teachers and children (Rogulj & Lolić, 2022).

Mikulec and Rogulj (2023) described an example of the Bee-bot being used in second language acquisition. In the Malešnica kindergarten in Zagreb, preschool teachers and children have used the Bee-Bot as a motivator for learning new English words and for facilitating communication among children during play. In addition to guided activities led by the preschool teachers, self-initiated play by the children has also been observed and is considered important because during these moments, children communicated with each other using a mix of Croatian and English according to their own language skills. The use of the Bee-Bot has contributed to noticeable peer learning, mutual assistance, and support in solving specific tasks. Moreover, preschool teachers installed the game on the mobile phone, which provided additional motivation for the children to engage with the robot in the classroom.

5.2. Potential risks

The integration of digital technology into children's lives brings both opportunities and risks. This section will deal with some of the potential risks. The American Academy of Pediatrics (2016) recommends that children under 18 months of age should not be exposed to digital technology, as research indicates potential adverse effects on cognitive development, language acquisition, and vocabulary growth (Rogulj, 2022). However, despite the inherent risks, it is not advisable to completely exclude digital technology from children's lives in an attempt to avoid negative outcomes (Rogulj, 2022). A restrictive approach can hinder the development of essential skills that children can gain through active engagement with digital tools. Livingstone (2014 as cited in Rogulj, 2022) emphasized that minimizing digital risks should not come at the expense of learning opportunities.

When incorporating digital technology into early childhood and preschool settings, it is crucial to prioritize content selection, ensure regular physical activity, foster social interactions with peers and family, encourage participation in various hobbies, and maintain proper sleep hygiene

(Livingstone, 2016 as cited in Rogulj, 2022). Provided these factors are adequately addressed, concerns about the time spent using digital technology become less pressing (Rogulj, 2022).

Educating both parents and preschool teachers about the benefits and risks associated with information and communication technology (ICT) is vital for fostering responsible digital citizenship in children and reducing negative influences. Strengthening preschool teachers' abilities to identify and manage the risks associated with ICT, alongside promoting zero tolerance for harmful behaviors in the digital space, is a proactive strategy to prevent inappropriate conduct among children online (Burms & Gottschalk, 2019 as cited in Rogulj, 2022).

Television content that may be potentially harmful is required to be clearly labeled with age-specific warnings in the upper corner of the screen, marked with the numbers 12, 15, or 18. For instance, green '12' indicates that the content is not suitable for children under 12, accompanied by an audible warning stating, "The following program is not suitable for persons under the age of 12." (Rogulj, 2022).

In addition to television, video games are also subject to age ratings, though these have not yet been formally regulated in Croatia. The adoption of the Pan European Game Information (PEGI) system is recommended, which categorizes games by age appropriateness with labels of 3, 7, 12, 16, and 18. These age ratings, displayed on the game packaging, assist parents in selecting appropriate games for their children. Additionally, these labels are often accompanied by graphic symbols that provide a more detailed understanding of the game's content (Figure 5).

Figure 5
Age marks PEGI (Rogulj, 2022, p. 104)

Some concerns about whether computer use might inhibit language development among young children may be found in literature. Several studies provide insights into this issue. Kelly and

Schorger (2001) examined language use among 25 children in various areas of a preschool classroom, including a computer center. They found that 21 children exhibited no significant difference in the amount of language used at the computer center compared to other traditional learning centers. Of the three children for whom differences were observed, one used significantly more language at the computer center, while two used less. The authors concluded that using computers in a preschool classroom does not significantly inhibit or encourage language use, suggesting that computers provide a language-enriching environment similar to traditional learning centers.

The study by Bhargava and Escobedo (1997) focused on the type of language used by four preschool children observed playing on the computer in pairs. The researchers found that language use was almost always related to computer activities and was rarely off-task. Initially, self-talk was the primary form of language as children became comfortable with the new experience. Over time, language use became more common and complex, evolving to include problem-solving and anticipating cause and effect. The authors concluded that if placed in the classroom to be accessible to children, computers could foster language use and social interactions among children.

Another study involved 93 Head Start children who were assigned to one of three treatment conditions: a language-enhanced computer activity with an active instructor, a similar activity with a passive instructor, and a control group without computer access that participated in regular language-enrichment activities (Schetz, 1994). Although children in the computer-assisted environments showed gains in language development over time, these gains were not significantly more expressed than those experienced by children in the traditional language-enriched setting. The authors noted that a larger sample size or fewer classroom difficulties such as high teacher turnover and technical issues, might have yielded different results. Based on the present findings, they concluded that computer-assisted language instruction was not more beneficial than traditional methods.

In summary, while these studies indicated that computers may not significantly enhance language development, they provided an environment where children use a substantial amount of language, similar to other classroom areas. Nevertheless, these results should be interpreted cautiously due to the small sample sizes and limited use of control groups in the studies.

6. EFL TEACHERS AND DIGITAL TECHNOLOGY

In the Republic of Croatia, teaching and learning foreign languages at early childhood and preschool age are not specifically mandated by regulatory documents. However, their significance is acknowledged in some key national documents, including the Croatian National Curriculum for Early Childhood and Preschool Education (MZOS, 2015). Furthermore, the 'Strategy for Education, Science and Technology' issued by the Croatian Ministry of Education and Science (2017) strongly emphasizes the importance of promoting foreign language acquisition from early childhood. This strategy outlines educational guidelines and goals at all levels, emphasizing the vital role of early language learning in a child's development and reflecting Croatia's longstanding educational policy that values multilingualism as a crucial competence for global citizenship (Mikulec & Rogulj, 2023).

6.1. Teachers' knowledge of digital technology and its didactic use

Jordan (2010) emphasizes the extensive body of research on preparing teachers to effectively incorporate technology into classroom instruction, which provides valuable insights into the broader context of teacher education. For example, multiple studies have indicated that teacher preparation programs often fail to adequately equip preschool teachers with the skills necessary to integrate technology into their teaching practices (e.g., Jordan (2009) named the following studies: Doering et al., 2003; Panel on Educational Technology, 1997; U.S. Congress, 1995). This inadequacy is reflected in the high levels of anxiety novice teachers experience when using technology in the classroom, despite their personal familiarity with these tools (Laffey & Musser, 1998 as cited in Jordan, 2009). This issue is particularly significant as teachers must navigate the various technologies available and determine how to integrate them into their daily instructional activities (McKenzie, 2001). The difficulty of incorporating technology into teaching may also extend to its use as a mentoring tool, suggesting potential challenges in this area as well (Jordan, 2009).

Preschool teachers are continuously faced with evolving educational practices, necessitating the development of new and increasingly specialized range of skills and competences to effectively navigate the complexities of contemporary education. The 2016 review of the ICT Competency Framework for Teachers (CFT), originally developed in 2011, emphasizes the framework's significant influence on several key areas, including the integration of ICT in educational policies,

the establishment of national standards for children and teachers, and the criteria for assessing digital literacy among both teachers and learners (UNESCO, 2018, p. 49). This framework also plays a crucial role in shaping curricula and professional development programs (Rogulj, 2022).

Table 4

UNESCO's digital competence framework for preschool teachers (Rogulj, 2022, p. 75)

UNESCO's Digital Competence Framework for Teachers	**Knowledge Acquisition**	**Knowledge Deepening**	**Knowledge Creation**
Understanding ICT in Education	Policy Understanding	Policy Application	Policy Innovation
Curriculum and Assessment	Basic Knowledge	Knowledge Application	Knowledge Society Skills
Pedagogy	ICT-enhanced Teaching	Complex Problem-solving	Self-management
Organization and Administration	Standard Classroom	Collaborative Groups	Learning Organizations
Teacher Professional Learning	Digital Literacy	Networking	Teachers as Innovators
Application of Digital Skills	Application	Infusion	Transformation

UNESCO (2018) introduced this updated competence framework (Table 4) in response to advancements in educational technology, aiming to foster inclusivity, equitable access to information, and gender equality within technology-supported education. The framework is structured to address all aspects of integrating ICT into education, from foundational knowledge acquisition to the components necessary for its successful implementation. The initial element emphasized is the recognition of the importance of ICT in education, especially since educational policy, which shapes national curricula, mandates the integration of innovative technologies and their associated learning outcomes into the educational process (Rogulj, 2022).

Rogulj (2022) states that competence framework is designed to build upon the principles and skills acquired at each level, enabling teachers to advance professionally. It emphasizes that the development of ICT competences should be viewed as an ongoing process, i.e., lifelong learning rather than as isolated professional development activities. This framework highlights the need to integrate subject-specific knowledge, interdisciplinary expertise, and pedagogical strategies that stress the significance of information and communication technology (ICT) in both teaching and learning processes. As digital technology continues to evolve, it is essential for teachers to engage in ongoing professional development that keeps pace with these advancements (Rogulj, 2022).

The implementation of innovative programs also highlights the importance of collaboration with the broader local community. A notable example of such collaboration is the partnership between Microsoft and UNESCO. In 2012, Microsoft introduced the ‘Teaching with Technology’ program, an educational initiative designed to align with UNESCO's digital competence standards, further supporting preschool teachers in enhancing their digital literacy and pedagogical effectiveness (Rogulj, 2022). The program has been conducted across several countries, such as Egypt, Russia, South Africa, and Tunisia, with activities customized to meet the specific needs and characteristics of each region. Participants who successfully complete the program receive the Microsoft Certified Educator (MCE) credential. From 2015 to 2016, 40,000 educators across 24 countries earned this certification (UNESCO, 2018 as cited in Rogulj, 2022).

In Croatia, the Ministry of Science and Education emphasizes the significance of professional development for preschool teachers, as outlined in the National Curriculum for Early Childhood and Preschool Education (MZOS, 2015). This curriculum highlights the need for skills in research and reflective practice. To support preschool teachers in adopting new professional learning

methods and integrating information and communication technology (ICT) into their teaching, it is essential to motivate them to embrace these advancements. Enhancing digital competences will be a logical step in their professional development (Rogulj, 2022).

Training programs are designed for individuals who possess a range of personal, professional, and technical competences, along with motivation and work experience. Preschool teachers' personal attributes significantly influence their selection and use of digital technologies, necessitating a commitment to ongoing learning and professional growth. Rončević (2011, p. 126 as cited in Rogulj, 2022) noted: "Personal competences are complemented by professional ones, as the teacher's personality evolves alongside their professionalism."

Rončević (2011 as cited in Rogulj, 2022) categorized preschool teacher competences into three dimensions:

1. **Professional Competence**: This encompasses general knowledge, the ability to plan and execute tasks, participation in projects, self-assessment, and ongoing professional development.
2. **Pedagogical Competence**: This involves the ability to plan, program, and address educational challenges, as well as to develop and implement effective teaching strategies.
3. **Work Competence**: This includes teamwork, collaboration, a sense of responsibility, and proficiency in information and communication technology.

Digital competences within the European Framework are grounded in the scientific understanding of their significance for educators across all educational levels. This framework offers foundational guidance to help preschool teachers in Europe develop the digital skills essential for their roles (Redecker, 2017 as cited in Rogulj, 2022). Preschool teachers, serving as role models for future generations, must cultivate these digital competences to actively engage in the digital society, both personally and professionally (Rogulj, 2022).

In addition to serving as role models, preschool teachers are expected to lead in acquiring new skills. They need to demonstrate their digital proficiency effectively and impart their knowledge to children in an engaging manner, fostering critical thinking about digital technology use. The integration of digital technology into professional practices has a number of benefits, such as

enhancing the dignity of the teaching profession, interacting with children, colleagues, and parents, and continually innovating educational methods.

6.2. Competences of EFL teachers of early childhood and preschool-aged children

According to Murphy et al. (2016 as cited in Mikulec & Rogulj, 2023), there are significant inconsistencies in the initial qualifications and professional development opportunities for preschool teachers across the European Union and Europe, particularly concerning early childhood education for children under three years of age. These differences often manifest in the qualifications of individuals responsible for teaching foreign languages to this age group (Murphy & Evangelou, 2016 as cited in Mikulec & Rogulj, 2023). A primary factor contributing to these inconsistencies is the lack of systematic training programs for foreign languages teachers at the early childhood and preschool levels (Mikulec & Rogulj, 2023). Consequently, foreign language instruction for young children is frequently conducted by native speakers or fluent individuals who, despite their language proficiency, may lack the necessary competences in teaching methodology, and early childhood education. Alternatively, foreign languages in pre-primary education may also be taught by pre-service elementary foreign language teachers, elementary school foreign language teachers, or preschool teachers who have attained a certain proficiency level in a foreign language school, have participated in relevant courses or seminars, or have lived in the country whose language they are teaching (Cindrić & Mikulec, 2019 and Mourão, 2020 as cited in Mikulec & Rogulj 2023).

Thieme et al. (2022 as cited in Mikulec & Rogulj, 2023), analyzed research studies about preschool FL teaching and found that many preschool teachers lacked the experience or competence to effectively teach this age group, adversely affecting the outcomes of foreign language programs for young children. However, there are some countries that have established education programs for teachers. One such example is the Czech Republic with an accredited program for foreign language teachers in early childhood and preschool education (Edelenbos et al., 2006 as cited in Mikulec & Rogulj, 2023). Similarly, in the Netherlands, preschool teachers can obtain qualifications for teaching English to young children (European Union, 2011), and Portugal and France provide short-term teacher education programs focused on teaching foreign languages to this age group (Ellis, 2016 and Mourão & Ferreirinha, 2016 as cited in Mikulec & Rogulj, 2023).

The Council of Europe, more specifically, the European Centre for Modern Languages (ECML), provides a range of professional development opportunities for foreign language teachers, including workshops, seminars, collaborative projects, and publications. Among the various resources and materials developed through the collaboration of experts from several European countries under the ECML, two projects stand out. The first is the "Inspiring Language Learning in the Early Years" project, which was conducted from 2016 to 2019. The second is the project titled "Young Children's Language Learning Pathways: Making Early Language Learning Visible," which lasted from 2020 to 2023. Both projects are dedicated to exploring and enhancing methods for teaching foreign languages to young children (Mikulec & Rogulj, 2023).

In the Republic of Croatia, there is still a lack of systematic training programs for preschool teachers who wish to teach foreign languages at the pre-primary level despite the critical importance of well-qualified teachers competent in both the language and teaching methodology. The available educational opportunities for these preschool teachers in Croatia are largely inconsistent and are typically organized by private language schools (Mikulec & Rogulj, 2023). However, a significant advancement occurred in 2022 when the Faculty of Teacher Education at the University of Zagreb received approval to offer a graduate-level program in Early childhood and preschool education, with a specialization in English. This program is specifically designed to prepare preschool teachers for teaching foreign languages to young children.

Alexiou (2020) and Pokrivčáková (2020) as cited in Mikulec and Rogulj (2023) highlighted a common misconception that a minimal level of language proficiency is sufficient for teaching foreign languages at an early age. Moreover, specialists in early childhood education and foreign language instruction emphasize the crucial role of the teacher in this context, particularly when working with young children. Vilke (1997 as cited in Mikulec & Rogulj, 2023) further stresses the importance of considering children's cognitive abilities and their native language when teaching, advocating for a pedagogical focus on language acquisition rather than merely instructional delivery.

It is, therefore, crucial to emphasize the importance of supporting teachers in their pursuit of the highest levels of competence (Mikulec & Rogulj, 2023). Addressing the specific needs of each child demands that teachers possess not only extensive knowledge and skills but also self-confidence, belief in their ability to develop innovative teaching methods, and flexibility in their

approach (Baïdak et al., 2017, p. 21 as cited in Mikulec & Rogulj, 2023). Additionally, it is essential to encourage preschool teachers to pursue continuous professional development and enhance their linguistic and teaching methodology competences. In today's educational landscape, a variety of training opportunities are available, including conferences, symposia, seminars, and workshops. Modern technologies have further expanded access to these forms of professional development, making many of them available in electronic formats, such as webinars, online or hybrid conferences, and virtual workshops (Mikulec & Rogulj, 2023).

In addition to the previously mentioned forms of professional development, it is essential to promote self-reflection and self-evaluation among all preschool teachers, as well as those who teach foreign languages. Reflection involves a process in which preschool teachers recall specific teaching experiences, critically analyze them and assess their effectiveness. This reflective process enables teachers to plan and implement subsequent instructional strategies with the necessary adjustments based on their evaluations (Richards, 1991 as cited in Mikulec & Rogulj, 2023). Reflective practitioners can employ various tools and methods for self-evaluation and reflection, including teaching journals, teaching reports, audio and video recordings, observations by a critical friend, and action research (Richards & Lockhart, 1996 as cited in Mikulec & Rogulj, 2023). These practices help teachers to continuously refine their teaching methods and enhance their professional growth (Mikulec & Rogulj, 2023)

7. CONCLUSION

Using digital technology in early childhood and preschool education, especially for teaching English as a foreign language (EFL), comes with both benefits and challenges. This thesis explores the role of digital tools in helping young learners build their foreign language vocabulary, showing the potential to greatly enhance language learning.

Digital resources like robotic devices, educational toys, virtual picturebooks and stories, and videoconferencing can introduce new ways to boost children's vocabulary and language skills. These tools allow for personalized and flexible learning experiences that not only cater to the unique developmental needs of young children but also keep them engaged and interested in learning.

However, there are potential downsides to relying on these technologies. Excessive screen time and exposure to inappropriate content can hinder development, highlighting the need for careful supervision and thoughtful guidance from both teachers and parents. It is essential to strike a balance between using digital tools and traditional teaching methods to ensure that technology supports, rather than replaces, important face-to-face interactions and hands-on learning.

The thesis also emphasizes the crucial role teachers play in integrating digital tools into the classroom. The success of using modern technologies in education largely depends on teachers' skills and comfort with these tools. Continuous support and professional development are essential to equipping preschool teachers with the knowledge they need to use digital resources effectively in their teaching.

In conclusion, while digital technology offers promising opportunities to enhance vocabulary learning in EFL settings, its success depends on how thoughtfully and effectively these tools are used. Teachers and parents must focus on maximizing the benefits of digital learning while minimizing its risks to ensure that young learners fully benefit from these technological advancements in their language development.

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Izjava o izvornosti završnog rada

Izjavljujem da je moj završni rad izvorni rezultat mojeg rada te da se u izradi istoga nisam koristila drugim izvorima osim onih koji su u njemu navedeni.

(vlastoručni potpis studenta)