Jelen tanulmány célja egy saját fejlesztésű, érintőképernyős mobil eszközön (táblagép) futó alkalmazás kivizsgálása volt, mely a gyermeki intelligenciaprofil (Gardner 1983, 1999, 2006) feltérképezésére szolgál a vajdasági óvodások körében. Az alkalmazás a Mindenki Másképp Intelligens (MIMI) óvodai nevelési módszer (Sándor-Schmidt 2016, 2019, 2022) digitalizált megvalósítása. A MIMI módszer a gyermeki intelligenciaprofil feltérképezésére és a Többszörös Intelligenciák (Gardner 1983) mozgósítására szolgál óvodai nevelési környezetben (Krechevsky 1994; Gyarmathy – Herskovits 1999; Sándor–Schmidt 2019), mely metodika a harvardi Projekt Spektrum koncepción (Gardner, Feldman, & Krechevsky, 1998) alapul, de attól számos ponton eltérő önálló adaptációra épül (Sándor–Schmidt, 2022). Kutatásomban arra a kérdésre keresem a választ, hogy megvalósulhat-e az óvodáskorú gyermekek gardneri intelligenciaprofiljának vizsgálata a digitális térben. Pilot kutatásomat a magyarkanizsai (Vajdaság) Gyöngyszemeink Iskoláskor Előtti Intézmény egy magyar tannyelvű óvodai csoportjában végeztem 10 nagycsoportos (5-6 éves) óvodás, szüleik (10 fő) bevonásával 2023 tavaszán. A vizsgált gyermekek előzetes digitális kompetenciáinak felmérésére ugyanekkor történt, hazai és nemzetközi kérdőívekből összeállított (Nikolopoulou et al 2010, Konok et al 2020) IKT-eszközhasználati szokásokat felmérő kérdőívet töltettem ki az érintett gyermekek szüleivel. A vizsgálat során beigazolódott, hogy az alkalmazás animált, mozgatható, hangot kiadó grafikus elemeinek, videóinak és képeinek köszönhetően az applikáció újszerűnek hat, fenntartja a gyermeki figyelmet és a motivációt a feladatvégzésre vonatkozóan. A vizsgált óvodások különféle interakciókba léptek az alkalmazással, mely műveleteket többségében könnyedén végrehajtották. A MIMI módszer tevékenységeinek digitális környezetbe helyezése alkalmazhatónak bizonyultak a gyermeki intelligenciaprofilok vizsgálatára.
Kulcsszavak: intelligenciaprofil, digitális környezet, óvodai nevelés

Cilj predstavljene studije bio je istražiti samostalno razvijenu aplikaciju koja se izvodi na mobilnom uređaju s ekranom osetljivim na dodir (tablet) kako bi se ispitivali profil inteligencije (Gardner 1983, 1999, 2006) predškolaca u Vojvodini. Aplikacija je digitalizovana implementacija metoda obrazovanja u vrtiću pod nazivom „Svi smo inteligentni na različite načine" (SIRN) (Sándor–Schmidt 2016, 2019, 2022). SIRN je metodologija koja se koristi za ispitivanje profila inteligencije kod dece i razvoj višestrukih inteligencija (Gardner 1983, 1999, 2006) u obrazovnom okruženju vrtića (Krechevsky 1994; Gyarmathy – Herskovits 1999; Sándor–Schmidt 2019). Zasnova se na nezavisnoj adaptaciji koncepta Projektnog spektra (Gardner, Feldman, & Krechevsky, 1998), ali se razlikuje od njega na mnogo načina (Sándor–Schmidt, 2022).

Istraživanje ima za cilj pružiti odgovor na pitanje da li je moguće ispitivati Gardnerove profile inteligencije predškolske dece u digitalnom prostoru. Pilot istraživanje sproveo sam u mađarskoj jezičkoj grupi vrtića Naši biseri u Kanjiži (Vojvodina), uključujući 10 dece (5-6 godina) i njihovih roditelja (10 osoba) u proleće 2023. godine. Da bih procenio početne digitalne kompetencije dece, sproveo sam anketu među njihovim roditeljima, koja je sastavljena na osnovu domaćih i međunarodnih istraživanja (Nikolopoulou et al. 2010, Konok et al 2020) kako bi se ocenile navike korišćenja informaciono-komunikacionih tehnologija (IKT). U rezimeu, može se konstatovati da animirani, interaktivni, grafički elementi, video snimci i slike doprinose novitetu aplikacije, održavajući pažnju i motivaciju dece za izvršavanje zadataka. Ispitana deca su ušla u različite interakcije s aplikacijom, izvršavajući većinu operacija s lakoćom. Postavljanje aktivnosti SIRN metode u digitalno okruženje pokazalo se primenjivim za ispitivanje inteligencijalnih profila dece.
Ključne reči: inteligencijalni profil, digitalno okruženje, predškolsko obrazovanje

The aim of the study presented here was to investigate a self-developed application running on a touchscreen mobile device (tablet) to examine the intelligence profiles (Gardner 1983, 1999, 2006) of kindergarteners in Vojvodina. The application is a digitalised implementation of the Everybody Is Intelligent in Different Ways (EIDW) kindergarten education method (Sándor–Schmidt 2016, 2019, 2022). EIDW is a methodology used to examine children's intelligence profiles and develop Multiple Intelligences (Gardner 1983, 1999, 2006) in kindergarten educational environments (Krechevsky 1994; Gyarmathy – Herskovits 1999; Sándor–Schmidt 2019). It is based on an independent adaptation of the Project Spectrum concept (Gardner, Feldman, & Krechevsky, 1998), but differs from it in many ways (Sándor–Schmidt, 2022).

In this research, I aimed to answer the question of whether it is possible to examine Gardner's intelligence profiles of kindergarten children in the digital space. During the study, I conducted a pilot research project in a Hungarian-language kindergarten group at the Naši biseri Kindergarten in Kanjiža (Vojvodina), involving 10 kindergarteners (5-6 years old) and their parents (10 persons) in the spring of 2023. To assess the children's initial digital competencies, I administered a questionnaire to their parents, which was compiled from domestic and international surveys (Nikolopoulou et al. 2010, Konok et al. 2020) to assess ICT (Information and Communication Technology) usage habits. In summary, it can be stated that the application's animated, interactive, graphical elements, videos, sounds and images contribute to its novelty and effectively maintain the attention and motivation of users. Most of the activities of the EIDW method are applicable to the examination of Multiple Intelligences in a digital environment.
Keywords: *intelligence profile, digital environment, kindergarten education*

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EXAMINING KINDERGARTENERS' INTELLIGENCE PROFILES WITH A SELF-DEVELOPED DIGITAL APPLICATION IN VOJVODINA

Istraživanje inteligencijskih profila vrtića sa samorazvijenom digitalnom aplikacijom u Vojvodini

Vajdasági óvodások intelligenciaprofiljának vizsgálata saját fejlesztésű digitális alkalmazással

Ábrahám Gréta
University of Pécs Faculty of Humanities and Social Sciences, Education and Society Doctoral School of Education, Pécs, Hungary
gretabraham00@gmail.com

1. INTRODUCTION

The children of the present era are growing up in a world where Information and Communication Technology (ICT) constitutes an integral part of their daily lives, shaping, and influencing their activities. Numerous studies confirm that from birth, it can be observed that young children engage in screen-based communication, such as video calls with distant grandparents, using touchscreen mobile (smartphones, tablets) devices (McClure, Chentsova-Dutton, Holochwost, Parrott, & Barr, 2018). Even before their first birthday, they are capable of interacting with user interfaces through swiping and touch gestures (O'Connor, 2017).

Harrison and McTavish (2018) pointed out that, even before the age of three, children are capable of independently viewing photos and videos on smartphones and tablets, navigating YouTube, and playing age-appropriate applications. These studies also suggest that children's technological skills begin to develop at a very young age, mostly within their home environment, by observing and imitating the digital device usage of their parents and older siblings (Chaudron, Di Gioia, & Gemo, 2018).

According to Chaudron et al. (2018) crucial factors in the development of young children's digital skills and their mastery of interacting with digital technology - which can vary significantly from family to family and from child to child - include the types of digital devices and content they can access, the child's interests and needs, and the support and involvement provided by parents. In interactions with digital technology, parental support and involvement (such as being open and permissive, restrictive and controlling, supportive, and demanding) depend on parents' knowledge and experience of digital technology and the prevalence and level of acceptance of digital technology in the society in which they live. The more positively a parent evaluates digital technology, the more inclined they are to actively support their child's digital activities.

The play and learning environments of young children have also transformed (Arnott, 2017). The accessibility of digital devices provides them with the opportunity to engage in new and diverse learning environments and to connect with other children in a global community. The utilization of technological possibilities has modified the available dataset regarding the phenomenon of learning. These qualitative and quantitative changes have resulted in the evolution, modification, and development of new theories and methods beyond earlier paradigms. Digital education now goes beyond the digitalisation of teaching methods, increasingly involving the supplementation, enrichment, and rethinking of the process through the integration of digital devices. The contemporary challenge to be addressed is how technology can enhance learning efficiency, support differentiated instruction, increase student perseverance, enhance attention, and sustain motivation (Molnár, Turcsányi-Szabó, & Kárpáti, 2020).

2. AIM OF THE RESEARCH

The aim of the current research is to examine the "Everybody is Intelligent in Different Ways" (EIDW) kindergarten educational method, which serves the purpose of mapping children's intelligence profiles, in a digital environment. The subject of the research is a self-developed tablet-based application, which represents the digital implementation of the EIDW method. The idea of the digitalisation of the EIDW method occurred because I wanted to keep up with current trends of the time by creating a toolkit that aligns with the characteristics of the digital childhood. Compared to elaborating complex play tools, the application enables significant time savings, as it only requires the installation of a single app on the tablet. Furthermore, due to the application's global accessibility and user-friendliness, it may offer a more efficient solution for mapping intelligence profiles. My current research seeks to answer the following questions: Can the examination of children's intelligence profiles be realized in the digital space? How does a kindergarten child relate to the device and the application? Can the child operate the application, and what challenges arise during its use?

3. THEORETICAL FRAMEWORK

Gardner's (1983) theory of Multiple Intelligences breaks with the singularist notion that there is a general intelligence, and that the g-factor, which is at the top of the hierarchy of partial abilities, may define all our intellectual abilities (Dezső, 2012; 2020; 2022). Gardner uses the concept of intelligence in the plural, as he distinguishes between linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, intrapersonal, and naturalist intelligences as eight independent units. In his perception of the intelligences he describes, each person reaches a certain level, the differences may be traced exclusively in the extent and pattern of the levels (Gardner, 2009; Dezső, 2021; 2022)

4. EVERYBODY IS INTELLIGENT IN DIFFERENT WAYS METHOD

The EIDW method, created by Dr. Barbara Sándor-Schmidt (Sándor-Schmidt, 2016; 2019; 2022) is an independent adaptation of the Project Spectrum kindergarten education methodology based on Multiple Intelligences (Gardner, 1983) and Nonuniversal Development (Feldman, 1980) theories. According to the Project Spectrum approach, every child has a unique and individually identifiable intelligence profile. Using these profiles, individualized educational programs can be developed for the children (Gardner, Feldman, & Krechevsky, 1998). The validation of the EIDW method took place in Hungarian-speaking kindergarten environments in the Carpathian Basin between 2015 and 2022. The EIDW method is associated with seven domains of knowledge. These are language, math, music, art, social understanding, science, and movement. The domains of knowledge are closely related to the eight intelligences formulated by Gardner. The domains of knowledge and intelligences are connected to each other as follows: the movement domains of knowledge is connected to bodily-kinesthetic intelligence, language is for linguistic intelligence, math is for logical-mathematical intelligence, science is for naturalist intelligence, social understanding is for intrapersonal and interpersonal intelligence, art is for spatial intelligence, and music is for musical intelligence (Gardner, Feldman, & Krechevsky, 1998; Sándor-Schmidt, 2019). Different activities belong to these domains of knowledge, with which the investigation is conducted. The activities of the EIDW method include predefined game accessories, methodological procedures, game descriptions, and measurement and evaluation strategies.

5. DIGITALISATION

The process of digitalising the method began with the analysis of EIDW method activities, game descriptions, and methodological procedures. The goal was to determine which methods and techniques could be transferred to the digital environment, that is, what is required for the implementation of a software solution. Additionally, an analysis was conducted on the existing software possibilities to explore the available audio-visual features. Furthermore, research was conducted to identify the most suitable mobile devices for conducting the study within the examined age groups (kindergarteners).

Touchscreen mobile devices have become widely popular among young children because of their screen size, portability, ease of use, and intuitive touchscreen interfaces. The software features of these devices allow for various representations of information (images, videos, and animations), diverse task difficulty levels, feedback on tasks, and the possibility of repetition. Through these capabilities, young children can actively guide their learning in an individualized environment (Outhwaite, Gulliford, & Pitchford, 2017).

Aziz's study (2013) reveals that at the age of 2, children still struggle with performing multi-touch gestures (flick, slide, drag and drop, rotate, pinch, and spread). Similar challenges arise in the case of rotate, pinch, and spread involving multiple touches in 3-year-olds. The underlying factor is the development of fine motor skills, which remain in the early stages of learning at this age. However, between the ages of 4 and 12, the children successfully executed all 7 major finger movements, including tap, drag/slide, free rotate, drag and drop, pinch, flick, and spread. Considering the information provided above, I concluded that an application running on a tablet is the most suitable choice for digitalising activities related to Gardner's intelligences.

Following the feasibility analysis, software functionality was determined in collaboration with a university student, Bence Győri, who was responsible for programming the application (Győri, 2023). My part of the process involved planning the transfer of activities into the digital space, including describing the operation of the application, creating media elements for the app, and designing the user interface.

6. APPLICATION

Among these activities, I considered games that explore logical-mathematical, naturalist, musical, linguistic, and spatial intelligences to be more easily adaptable to the digital space. Therefore, I focused on these and transformed a total of eleven games into an application. The activity that explores interpersonal and intrapersonal intelligences was transferred to the digital environment in a previous study, which is not the subject of the current research. The activities that are examining the bodily-kinesthetic intelligence will be implemented later, because they are more complex and require further research due to their physical nature.

The application contains animated, movable, and graphical elements, videos, images, sounds, and simulated physics for certain objects. As a result, the examined child engages in various interactions, such as tapping, flicking, dragging and dropping). The examiner, who must be present throughout the entire examination, explains the tasks and how to use the application at the beginning of the activity and monitors the child's progress.

6.1. Examples of the techniques used in the application and their interactions

The Swim or Sink game (see Figure 1) - which examines natural intelligence - aims to map the relationships between estimates and variations, and to generate and test hypotheses through simple experiments. The task for children are to predict which objects will sink in water and which ones will float, and to test the predictions they formulate and establish hypotheses (Schmidt, 2022). Kindergartens can drop various objects into water, predicting beforehand whether the given item will float or sink. In the application, objects sink or float on water in the same way as in real life. Objects can be stacked or placed inside each other (e.g., by placing coins in a plastic box and gravel). To sink or float objects, users can tap, drag, and release their respective elements into the aquarium. In this game, the technique of drag and drop and the simulated physics of objects gave the possibility to adapt the original activity.

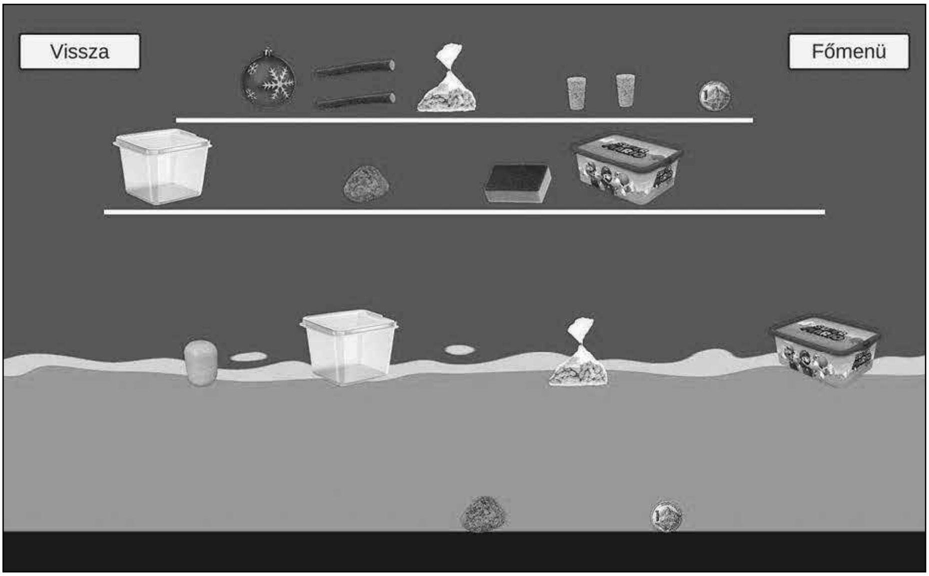

Figure 1: Swim or Sink game

Four game activities explore musical intelligence (see Figure 2). This includes examining musical perception activities, which serve to recognize and differentiate pitch in various situations (Schmidt, 2022). In these activities, tapping on elements, moving them, dragging them on top of each other, and playing sounds are the dominant techniques. In these games, children have to recognize and match individual sounds and familiar melodies.

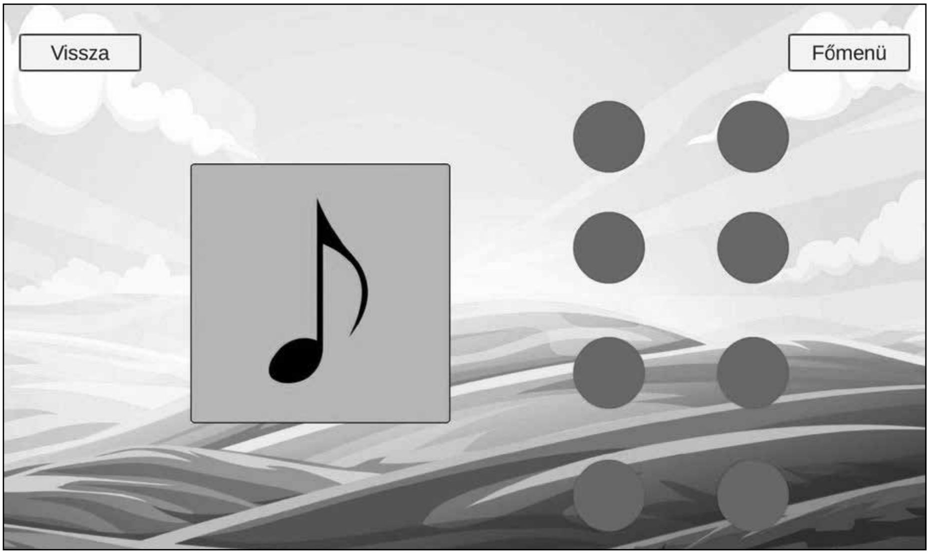

Figure 2: Listen and match game

We also used the drag and drop technique in the Storyboard game (see Figure 3) that examines linguistic intelligence. The game serves to assess the complexity of the vocabulary, sentence structure, narrative language use, and dialogues presented in the story, as well as thematic connections and expressiveness of the spoken story. During the activity, the child's task is to tell a story using various predetermined elements In this activity, different figures have to be placed on the storyboard, from which the kindergartners have to create a fictional story (Schmidt, 2022).

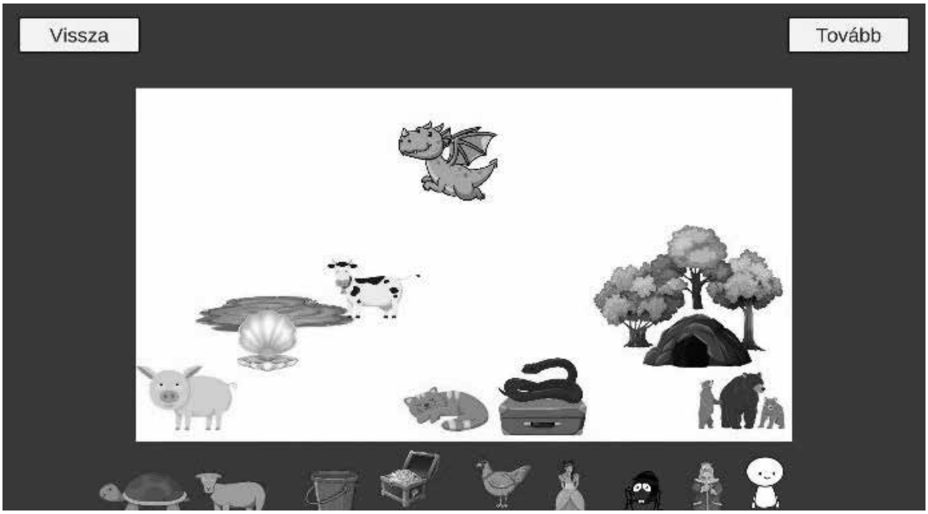

Figure 3: Storyboard game

In the Bus game (see Figure 4), that examines logical-mathematical intelligence. This game examines logical problem-solving skills. The objective of the game is to examine children's ability to explain concepts, perform mental calculations, and organize information for one or more variables. The bus transports passengers from one stop to another using pre-animated software technology. The player's task is to mentally track the number of boarding, alighting, and waiting passengers (Schmidt, 2022)..

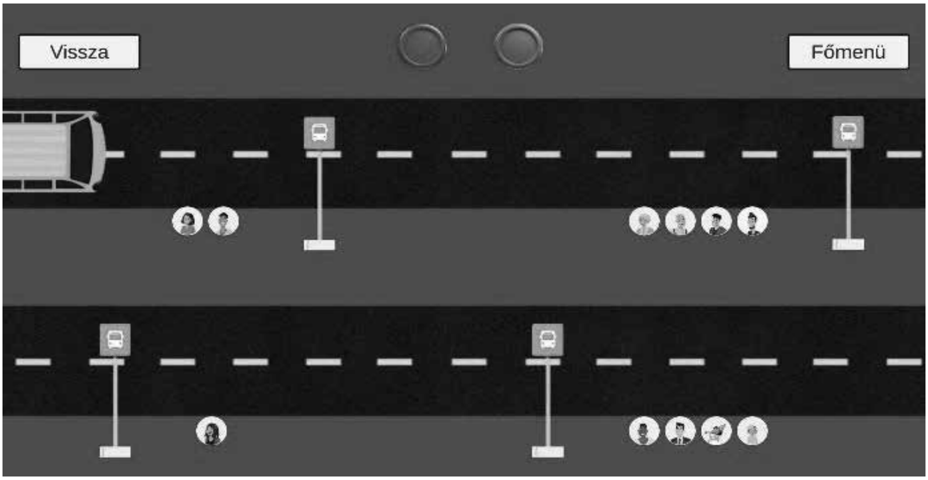

Figure 4: Bus game

7. RESEARCH METHODOLOGY

During the study, I conducted a pilot research project in a Hungarian-language kindergarten group at Naši Biseri Kindergarten in Kanjiža (Vojvodina) involving 10 kindergarteners (5-6 years old) and 10 parents, in the spring of 2023. During the study, I administered a usability testing (Dumas & Redish, 1999) to kindergarten children, and the parents of the children completed a questionnaire (Nikolopoulou, Gialamas, & Batsouta, 2010; Konok, és mtsai., 2020).

7.1. Questionnaire

To assess the children's initial digital competencies, I administered a questionnaire to the parents of the children, which was compiled from domestic and international surveys (Nikolopoulou, Gialamas, & Batsouta, 2010; Konok, és mtsai., 2020) to assess ICT (Information and Communication Technology) usage habits. The purpose of the questionnaire in the pilot study was to examine the access to and usage of ICT by kindergartners who participated. The questionnaire consisted of 16 closed-ended and 4 open-ended questions, focusing on the ICT devices available in the child's home, how children use touchscreen mobile devices at home, the time spent on them, and their proficiency in single and multi-touch gestures. Furthermore, the questions also addressed the activities that children engage in using these devices. In households, the most common ICT device was the smartphone. In 10 households, a total of 4 tablets were available (see Figure 5). None of the 10 children examined had their own smartphone or tablet.

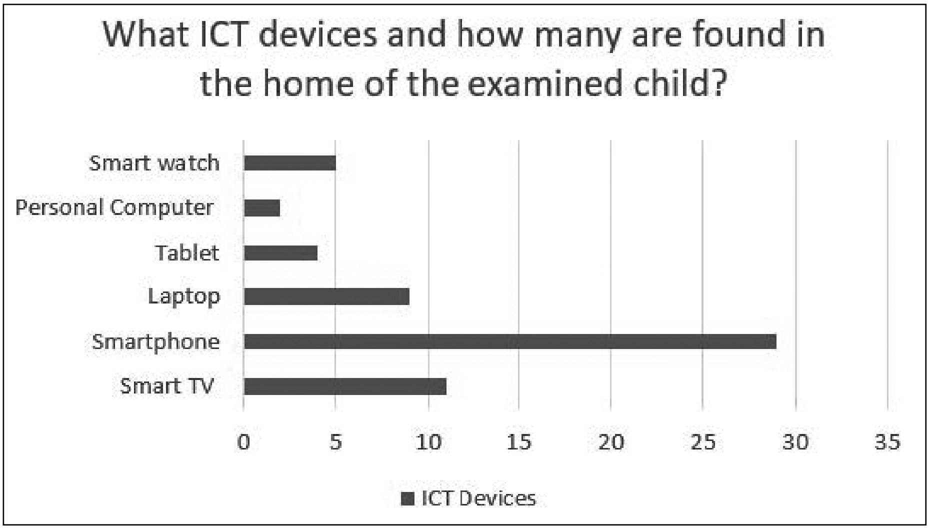

Figure 5: ICT devices in the households

With the exception of one of the examined children, they actively used touchscreen devices. They independently turned them on, searched, tapped, selected, etc. One child, on the other hand, used them passively and did not select content, search, but only watched images and listened to videos that were set up for him. The majority of the examined children first used touchscreen mobile devices at the age of five, with the earliest age mentioned being two years.

Regarding the question about learning single- and multi-touch gestures, it was revealed that all of the kindergartners applied the tapping gesture when using touchscreen devices. Furthermore, the majority of them also used dragging, pinching, spreading, dragging and dropping gestures. Only two children used the multi-touch gesture of rotation (see Figure 6).

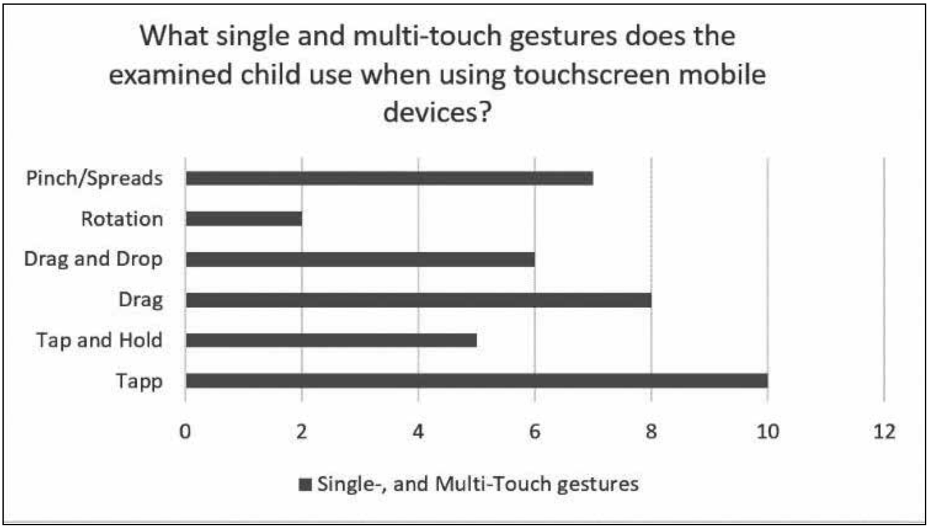

Figure 6: Single- and multi-touch gestures used by the children

According to the parents, tapping, dragging, and tapping and holding gestures were the ones that kindergartners had mostly mastered, while rotation was the one, they had used the least (see Figure 7).

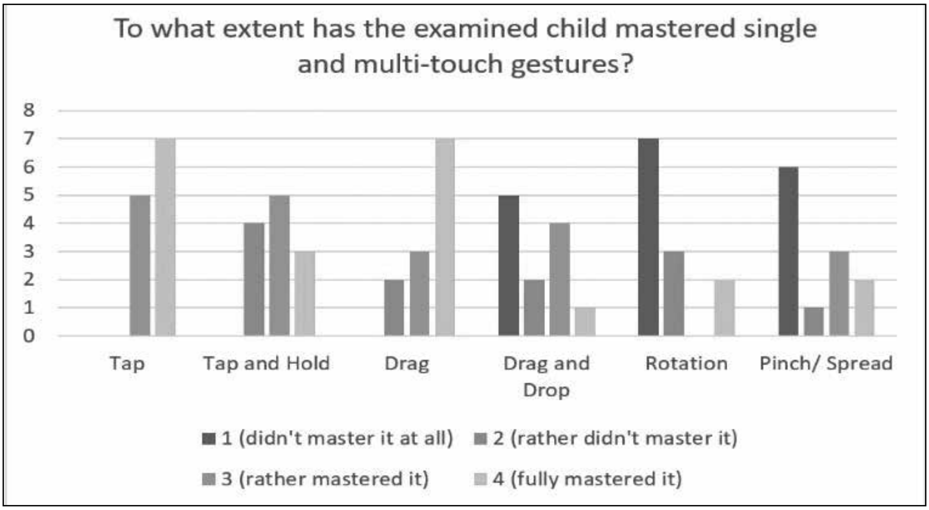

Figure 7: Mastery of single- and multi-touch gestures

The majority of children typically engage with these devices for about 1-2 hours per day. They mostly watch cartoons, movies, listen to music and play with the applications on the device (see Figure 8).

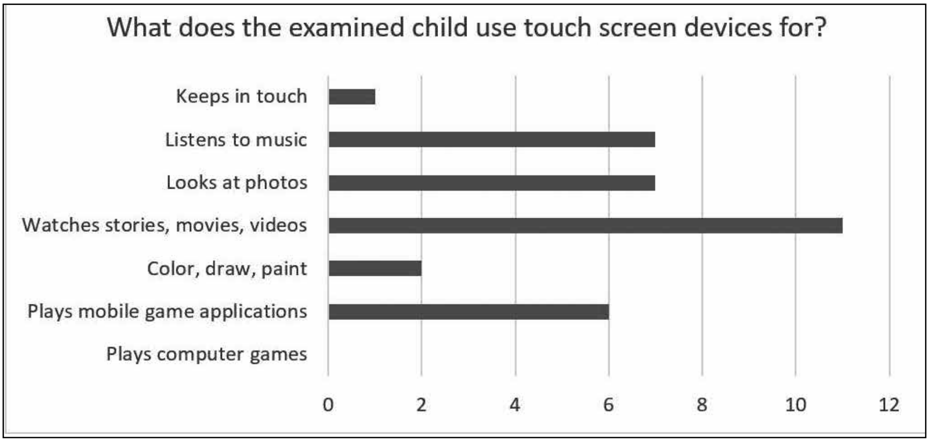

Figure 8: The use of the touch screen devices by the child

7.2. Usability testing

The primary purpose of usability testing is to identify and address issues related to the user interface and overall user experience, ensuring that the product is intuitive, user-friendly, and meets the needs of the target audience (Dumas & Redish, 1999).

I conducted the pilot study with the participation of 6 kindergarten girls and 4 boys to test the usability of the software. Usability testing was performed individually with each child in a quiet room at the kindergarten, lasting approximately 15-20 minutes, with me being present throughout the assessment. During the test, the children tried out all 11 games of the application. During the usability testing, I applied the observation method, taking into consideration the following criteria from Jakob Nielsen's (1994) usability principles: understandable appropriate content, easy handling, visual elements and design, sound and music, user experience.

At the beginning of the assessment, the kindergartners received the tablet, and I asked them questions regarding their previous experience using tablets: whether they own one themselves, and what they typically do on a tablet. Based on the questionnaires, although only four households had tablets, every child was familiar with and had used such devices before, even though none of them owned one.

After the short introduction, the children played with the games of the application. At the beginning of each game, I explained how to use it and the objective of the game. During the assessment, I recorded if there were any issues that arose while using the application, noted the children's reactions and comments, and evaluated the usability of the individual games based on the above mentioned usability principles. The following conclusions were drawn from this study.

7.2.1. Understandable, appropriate content

After the introduction of games, all children understood the given game tasks. The content of the application matched the age and interests of the children, as the content of the application was entirely in line with the EIDW method.

7.2.2. Easy handling

All the children were familiar with and used single-touch gestures, such as tap, drag and drop, hold, effectively and intuitively during the games, as well as the functional buttons when using the application.

Detected errors: In the spatial intelligence drawing game, two children experienced a situation where, while drawing on the screen, they made contact with the display not only with the tips of their fingers but also with the sides of their palms. The application detected this and drew lines randomly where it shouldn't have.

7.2.3. Visual Elements and Design

The visual appearance and design of the application are vivid, colourful, and playful. The interface features child-friendly characters and fairy tale elements that most kindergartners easily recognize and identify with. The clean and easily navigable layout of the interface allowed users to navigate the application easily and quickly find the desired features and content. The visual appearance and design of the application, therefore, offered a user-friendly and attractive experience.

7.2.4. Sound and Music

Out of the 11 games, 4 of the musical intelligence games contained sound, and 1 of the linguistic intelligence games had audio-visual elements. The sound effects were not disruptive to the player, were audible and served their purpose. Detected error: In the "Recognizing errors" game, with 4 different songs, where one is correct and the others contain errors, none of the 10 examined children noticed the difference. This suggests that more significant errors should be made in the song.

7.2.5. User experience

The games of the application resulted in a positive emotional reaction. The app was able to engage and hold the attention of the children, and they enjoyed using it. Kindergarteners were motivated to try all the games. Frustration did not show up in any of the games.

8. CONCLUSION

Howard Gardner's theory of Multiple Intelligences (1983) distinguishes eight different intelligences: linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, intrapersonal, and naturalist intelligences.

The Everybody is Intelligent in Different Ways (EIDW) is a methodology created for assessing and developing the Gardnerian intelligence profile in kindergarten. The EIDW is an independent adaptation (Schmidt, 2022) based on the method developed by the Harvard Project Spectrum research group (Gardner, Feldman, & Krechevsky, 1998). In this research, I investigated the use of the EIDW method in a digital environment by testing the usability of a self-developed application running on a tablet. In the usability testing (Dumas & Redish, 1999), 10 children participated and tried 11 games belonging to linguistic, logical-mathematical, spatial, musical, and naturalist intelligences. During the testing, I used the observation method taking into account the following criteria (based on the principles of Jakob Nielsen (1994): understandable appropriate content, easy handling, visual elements and design, sound and music, user experience).

In summary, it can be stated that the application's animated, interactive, graphical elements, images, videos and sounds contribute to its novelty and effectively maintain the attention and motivation of the children. The examined kindergarteners engaged in various interactions with the application, most of which they executed easily. Based on the examination, the EIDW method is applicable in the digital environment, and the majority of the game activities can be transferred to the digital space.

9. REFERENCES

Arnott, L. (Ed.). (2017). *Digital technologies and learning in the early years.* London: SAGE Publications Ltd ISBN:9781412962438.

Aziz, N. A. (2013). Children's interaction with tablet applications: Gestures and interface design. *Children, 2*(3), 447-450.

Chaudron, S., Di Gioia, R., & Gemo, M. (2018). *Young children (0-8) and digital technology, a qualitative study across Europe, EUR 29070 EN.* Luxembourg: Publications Office of the European Union, ISBN: 978-92-79-77766-0.

Dezső, R. A. (2012). Többszörös intelligenciák - utópia a magyar közoktatásban? In B. D. Á. Bálint (Ed.). Pécs, Magyarország: Pécsi Tudományegyetem Bölcsészettudományi Kar Neveléstudományi Intézet.

Dezső, R. A. (2015). A diverzitás lehetséges elméleti keretei a neveléstudományokban. *Autonómia és Felelősség, 1*(1), 32-44.

Dezső, R. A. (2020). Többszörös intelligenciák – egy elmélet születése nyomában. *Autonómia és Felelősség, 5*(1- 4), 41-53.

Dezső, R. A. (2021). Intelligenciáink gardneri interpretációi. *SCIENTIA PANNONICA, 8*(1), 7-36.

Dezső, R. A. (2022). *Intelligenciák - más-kép(p).* Budapest: Gondolat Kiadó.

Dumas, J. S., & Redish, J. C. (1999). *A Practical Guide to Usability Testing.* Bristol, England: Intellect Ltd. ISBN: 978-1841500201.

Feldman, D. H. (1980). *Beyond Universals in Cognitive Development* . New York: Ablex Publishing .

Gardner, H. (1983). *Frames of Mind: The Theory of Multiple Intelligences.* New York: Basic Books.

Gardner, H. (1999). *Intelligence Reframed: Multiple Intelligences for the 21st Century.* New York: Basic Books ISBN 978-0-465-02611-1.

Gardner, H. (2006). *Multiple intelligences: New horizons in theory and practice.* New York: Perseus Books.

Gardner, H. (2009). Multiple approaches to understanding. In K. Illeris, *Contemporary Theories of Learning* (pp. 69-89.). London – New York: Routledge.

Gardner, H., Feldman, D. H., & Krechevsky, M. (1998). *Building on Children's Strengths: The Experience of Project Spectrum (Project Zero Frameworks for Early Childhood Education, Vol 1).* TC Press: US.

Gyarmathy, É., & Herskovits, M. (1999). Képességek vizsgálata az érdeklődés térképének segítségével. *Pszichológia*, 19 (4), 43-458.

Győri, B. Z. (2023). *Gardner-féle Többszörös Intelligenciákat vizsgáló applikáció fejlesztése Unity játékmotor alkalmazásával.* Dunaújváros: BSc szakdolgozat, Dunaújvárosi egyetem.

Harrison, E., & McTavish, M. (2018). 'i'Babies: Infants' and toddlers' emergent language and literacy in a digital culture of iDevices. *Journal of Early Childhood Literacy, 18*(2), 163-188. https://doi.org/10.1177/1468798416653175.

Konok, V., Peres, K., Ferdinandy, B., Jurányi, Z., Bunford, N., Ujfalussy, D. J., . . . Miklósi, Á. (2020). Hogyan hat a mobileszköz-használat az óvodások figyelmére és társas-kognitív készségeire? *Gyermeknevelés Tudományos Folyóirat, 8*(2), 13-31. DOI: 10.31074/gyntf.2020.2.13.31.

Krechevsky, M. (1994). *Project spectrum: Preschool assessment handbook.* Cambridge, MA: President and Fellows of Harvard College.

Marsh, J., Plowman, L., Yamada-Rice, D., Bishop, J., & Scott, F. (2016). Digital play: a new classification. *Early Years An International Research Journal, 36*(3), 242-253. DOI:10.1080/09575146.2016.1167675.

McClure, E. R., Chentsova-Dutton, Y. E., Holochwost, S. J., Parrott, W. G., & Barr, R. (2018). Look At That! Video Chat and Joint Visual Attention Development Among Babies and Toddlers. *Child Development, 89*(1), 27-36.

Molnár, G., Turcsányi-Szabó, M., & Kárpáti, A. (2020). Digitális forradalom az oktatásban – perspektívák és dilemmák. *Magyar Tudomány, 181* (1), 56–67 DOI: 10.1556/2065.181.2020.1.6.

Nielsen, J. (1994). Heuristic evaluation. In J. Nielsen, & R. Mack, *Usability Inspection Methods.* New York, NY.: John Wiley & Sons.

Nikolopoulou, K., Gialamas, V., & Batsouta, M. (2010). Young children's access to and use of ICT at home. *Laboratory of Didactics of Sciences, Mathematics and ICT, Department of Educational Sciences and Early Childhood Education, 4*(1), https://doi.org/10.26220/rev.133.

O'Connor, J. (2017). Under 3s and technology. In L. Arnott, *Digital technologies and learning in the early years* (pp. 87-98). London: SAGE.

Outhwaite, L. A., Gulliford, A., & Pitchford, N. J. (2017). Closing the gap: Efficacy of a tablet intervention to support the development of early mathematical skills in UK primary school children. *Computers & Education, 108*, 43-58. doi: 10.1016/j.compedu.2017.01.011.

Sándor-Schmidt, B. (2016). Az intelligenciák Spektrumai – Az óvodás korú gyermekek többszörös intelligenciájának feltérképezése. *Innovatív módszerek a pedagógiai-pszichológiai gyakorlatban Ukrajna európai integrációja tükrében*, 421-429.

Sándor-Schmidt, B. (2019). Diverzitás és individuális értékek óvodás korban: a MIMI (Mindenki Másképp Intelligens) módszer beválás-vizsgálata. *Magiszter, 17*(2), 45-56.

Schmidt, B. (2022). A „Mindenki Másképp Intelligens” (MIMI) óvodai nevelési módszer bevezetésének lehetősége. Pécs, Magyarország: PTE BTK “Oktatás és Társadalom” Neveléstudományi Doktori Iskola.