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The IT habits and mathematical experience base of the „alpha generation" in Hungary

Some results of an online questionnaire survey

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Abstract

In this article, I present some previously unpublished results of a research conducted in 2014-2019. The research consisted of two parts. The theoretical part is based on international and Hungarian literature. In this section, I investigated whether the conditions set forth in Károly (Karl) Mannheim's generational theory are fulfilled in the case of children born in 2010 and after. The second part is an empirical part, in which I collected data about the IT device usage habits of the children in the indicated age group and their mathematical experience base before going to school. The method of data collection was a questionnaire survey. The first, pilot survey was a paper-based questionnaire that I posted to several kindergartens in Budapest in 2015. The questionnaire was voluntarily filled out anonymously by the relatives of 95 children. The answers highlighted that it is worth researching the topic. That is why I created an improved online questionnaire in 2018. The questionnaire was available nationwide, and it was filled out anonymously and voluntarily by the relatives of 345 Hungarian children.

Keywords: alpha generation, use of IT tools, mathematical experience base, complex mathematics teaching

Introduction

In 2015, I started working full-time at the Mathematics Department of ELTE TÓK. As a staff member of the Mathematics Department, I visited kindergarten mathematics sessions and elementary school mathematics classes. The "changes" in children's behavior experienced in educational institutions and in everyday life compared to earlier years turned my research interest towards the alpha generation.

I was interested in whether Hungarian children born after 2010 show generational traits in their cultural environment and in their experience base that is important for learning mathematics. What characteristics do they have in common in the use of Information Technology (IT) devices? Are there

detectable differences between the children based on their age, gender, family structure and income situation, their parents' education, the size and location of their residence, their habits of using IT devices, and their ownership of IT devices? Does the technical and socio-cultural change have an effect on the traditional developmental games that are important in terms of Tamás Varga's complex math teaching? Can a relationship between the digital device usage and the device usage for mathematical development be demonstrated? Will the games that traditionally represent a mathematical knowledge base and develop concrete, manipulative mathematical competence disappears or be replaced by the use of IT tools?

To answer these questions, I conducted my first research in 2015 and the second in 2018.

In this article, I will show why, during my theoretical research, I came to the conclusion that it cannot be ruled out that we can consider those born after 01.01.2010 as an independent generation.

I will show the online questionnaire from 2018–2019 and the circumstances of its creation. Descriptive statistical analysis of the data obtained from the 345 children's questionnaires will also be provided.

The correlation analysis between the data covered the following: the independence of tool usage habits and the frequency of tool usage from gender, place of residence, and parent's educational level. Playing at home with traditional mathematical developmental games is also independent from those listed. Traditional developmental games are not supplanted or replaced by games played on IT devices; there is no trade-off between them. I present all these connections in another article (Pintér, 2024).

Of course, I am not examining the existence of the generation with the knowledge and accuracy of a scientific researcher of society. On one hand, because it is not my area of expertise, and on the other hand, because it is not my goal to prove that the generation exists. My goal is to prove that the generation can exist and could not have started earlier than 2010. And I am investigating all this just to get to know the children's math learning habits, knowledge acquisition patterns and socio-cultural environment better. I intend to use this knowledge to bring the Hungarian mathematics education based on the complex mathematics teaching tradition into the 21st century.

Theoretical research

Question: Can Hungarian children born after 2010 show generational characteristics?

The social condition for the existence of the Alpha generation

Nagy, Á. & Kölcsey, A (2017, p. 6) wrote in their study: "So what are the common characteristics of the »Alphas«, what makes this generation different from the

digitally fully integrated generation Z? There are surprisingly few answers to these questions. Most of the writings dealing with the Alpha Generation practically only got as far as giving a name or its clichéd, superficial explanation, perhaps meditating on a few possible characteristics that, according to the definition, the age group of those born after 2010 has and will have."

Since that time the generation research specialists were not able to answer the question, my goal – especially in the absence of scientific research expertise in society – is only to show that it cannot be proven that the generation does not exist.

We attribute the name "Alpha generation" to the Australian demographer McCrindle (McCrindle, 2010). To characterize the generation, Mark McCrindle in his book (2018, p. 222) writes: "Those born globally from 2010–2024 we have labelled as Generation Alpha. If we look at Strauss and Howe's generational theory, the next generation is predicted to spend its childhood during a high. We are currently living through the crisis period of terrorism, the global recession and climate change. By the time Generation Alpha are all born and moving through their formative years, these threats, among others, may have subsided. If that happens then this generation will begin their lives at a new stage, a global generation beginning in a new reality."

The essence of the generational theory is that we are most sensitive during our teenage and young adult years, when our value system stabilizes, and how we relate to the world around us is formed. The environment, the cultural milieu, and the zeitgeist in which we grow up determine our worldview.

On what basis can we think that a new (Alpha) generation will appear? What is it that they differ from their immediate predecessors (Generation Z) and that creates a new generation?

According to Karl Mannheim (Mannheim, 1969), two things are necessary for people of the same age to develop generational awareness and to start talking about generations:

– crisis situation,
– rapid social and technical changes.

However, the crisis is a matter of interpretation since it would be difficult to find a time when one could not refer to some kind of crisis. It is possible that we run into crises simply because we want to run into them. For example, one view of history says that the recent past has resulted in an unprecedented series of crises, while another says that we have lived in a true golden age because there has never been such a long period of peace in most societies, and we have lived in such a high standard of living that we have never had. Yet another says that history effectively ended with the end of the Cold War and the establishment of global democracy. If we look at it from an ecological point of view, we are rushing to our loss, so we are happy to cause a crisis for ourselves. Due to the variety of interpretations, it can be arbitrary to link the generational theory to this.

However, following Mannheim's opinion, I have collected – without claiming to be complete – a few world events that, in my opinion, can be considered as a crisis in the period 2010–2021: *Arab Spring*: Demonstrations broke out in Tunisia, resulting in the resignation of the government. As a result of the events, movements are swept through the Arab world; *Syrian civil war*: Hundreds of thousands of Syrians sought refuge abroad from the worsening conflict. The refugees' primary destination was Turkey, Jordan, Lebanon, and Northern Iraq. In October 2012, the number of refugees was estimated to be at least 470,000; *Yeonpyeong Island incident*; *Kyrgyzstan revolution*; *Tōhoku earthquake and tsunami*; *Fukushima nuclear power plant accident*; *Ukrainian revolution*:

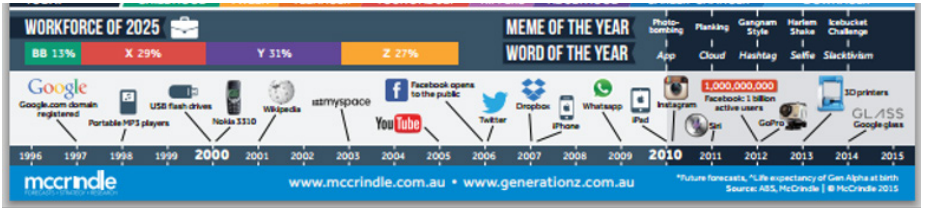
The Russian annexation of the Crimean Peninsula and the beginning of the war in Eastern Ukraine, Approximately one million asylum seekers arrived in Europe. Many of them became stateless because of the Syrian civil war; The *Covid 19 epidemic* has swept the entire world: Due to the restrictions – worldwide – people born after January 1, 2010 "went" to kindergarten online, and they started and continued their studies in elementary school online.

The Covid 19 epidemic forced the transition to "digital education" worldwide. Which brought about a significant change in young children's learning to read, write and count. This "new kind of learning" significantly distinguishes this generation from their immediate predecessors (Generation Z).

Technological conditions for the existence of the Alpha generation, i.e. the technical development of the 2000s

Figure 1

Technical development of the 2000s
Source: www.mccrindle.com (from 2016)



In 2007, the LG Prada and the iPhone appeared on the market, which can be considered the first smartphones with an easy-to-use touchscreen. Although some manufacturers started marketing their tablets in the early 2000s, they were not widely distributed. It took until 2010, when the iPhone4 was released, for the touchscreen technology to become widespread. In the same year, Apple's first tablet, the iPad, and Samsung's Galaxy Tab were also released.

Figure 2

Smartphone Market 2011
Source: Business Wire

Top Five Mobile Phone Vendors, Shipments, and Market Share Calendar Year 2011 (Units in Millions)

Vendor	FY 2011 Shipment Volumes	FY 2011 Market Share	FY 2010 Shipment Volumes	FY 2010 Market Share	Year Over Year Change
Samsung	94.0	19.1%	22.9	7.5%	310.5%
Apple	93.2	19.0%	47.5	15.6%	96.2%
Nokia	77.3	15.7%	100.1	32.9%	-22.8%
Research In Motion	51.1	10.4%	48.8	16.0%	4.7%
HTC	43.5	8.9%	21.7	7.1%	100.5%
Others	132.3	26.9%	63.7	20.9%	107.7%
Total	**491.4**	**100.0%**	**304.7**	**100.0%**	**61.3%**

Source: IDC Worldwide Mobile Phone Tracker, February 6, 2012
Note: Vendor shipments are branded shipments and exclude OEM sales for all vendors.

In 2010-2011, in addition to 796.1 million smartphones, 81.247 million tablets were sold worldwide. However, this was only the beginning of the popularity of tablets, as evidenced by the fact that people bought more tablets in 2012 than in the previous two years together. By 2012, sales had increased by nearly 63%, and the sales figure for 2015 surpassed even that. The popularity of tablets is clearly demonstrated by the fact that in 2015, the turnover of tablets worldwide (326.304 million) was greater than the number of smartphones sold by the 5 major manufacturers in 2010.

Figure 3

Worldwide Sales of Tablets 2010–2015
Source: appleinsider.com

Worldwide Sales of Media Tablets to End Users by OS (Thousands of Units)				
OS	**2010**	**2011**	**2012**	**2015**
Android	2,512	11,020	22,875	116,444
iOS	14,685	46,697	69,025	148,674
MeeGo	179	476	490	197
Microsoft	0	0	4,348	34,435
QNX	0	3,016	6,274	26,123
WebOS	0	2,053	0	0
Other OSes	235	375	467	431
Total	**17,610**	**63,637**	**103,479**	**326,304**

However, in order for the devices to appear in more and more households and at the same time to be in the hands of small children, in addition to

the appearance and spread of the devices, the appearance of 4G network technology was also necessary. Obviously, it is useless to have a good device if the service is not, or only barely affordable, and the bandwidth is not enough for experiential content consumption. In Hungary, the service was launched for the first time in the fall of 2011 on the network of Magyar Telekom and became commercially available in 2012 (Origo, 2012).

So, the development of technology, i.e. the easy-to-use touch interface and the spread of broadband internet made it possible for children to start using smart devices as early as possible. This changed the cultural environment, knowledge acquisition habits, form of communication and communication environment of the growing children.

In my opinion, the basis of McCrindle's opinion is that this age group does not know the world without the Internet, most of them used smart devices at a very young age, and YouTube and Instagram have a greater influence on them than television. As a result, their learning habits also change, which would require new teaching methods, since due to their cultural environment, they are used to obtaining information quickly, and multitasking is also a basic skill for them (McCrindle 2016).

Figure 4

Characteristics of generations from Builders to the Alpha generation
Source: www.mccrindle.com (from 2016)

Changes like the spectacular change in information technology have rarely occurred in history: such change was the appearance of writing, printing, and then computing, which radically transformed our cultural environment. We lived through (are living through) the last one, and maybe that's why we treat it with a finer resolution and designate a new generation every few years.

Probably all over the world, but certainly in our country, during the digital transition, teachers and instructors used large enterprise collaboration platforms – such as Google Classroom, Microsoft Teams, Zoom, Webex, etc. – to hold their classes. Before 2019, either the necessary resources were not available for this purpose, or the systems have not been able to be scaled properly. Without that, hundreds of schools and hundreds of their students could not have been capable convey voice and image at the same time. The servers operating in the background of the online video conferences were not available to the extent that could have served this need. In view of the pandemic, large companies released their systems for free to use. It is likely that without the pandemic, multinational companies would not have been so generous with their intellectual products, and without the pandemic, these products would not have entered the field of public education for years.

An important limiting factor of the generation theory described above is that e.g. the basis of McCrindle's theories is a spectacular generalization of the white, North American culture. Today, we know that, for example, the spread and use of mobile phones and smartphones is significantly different in African areas, meaning that the processes there are different.

However, since my goal is not to prove the existence of the generation, or to investigate the generation in social science, in my opinion, none of this makes it impossible to use the theory to investigate the Hungarian conditions as well. I leave everything else to the researchers of the generation, who have more knowledge on the subject than I do.

Empirical research, questionnaire surveys

Questions: Does the technical and sociocultural change affect the habits of the alpha generation? What experiences do they have with traditional developmental games that are important in terms of Tamás Varga's complex mathematics teaching?

I conducted the first pilot-type survey in 2015, and the results were published in 2016 (Pintér, 2016).

Improving the questionnaire

The evaluation of the 2015 questionnaire pointed out shortcomings and unnecessary questions. Thus, the new, improved online questionnaire was completed in 2018, titled „Device usage habits of the alpha generation".

The parents of 345 children participated in the research by voluntarily completing it. Since the questionnaire was only available online, it could only be completed by relatives who had internet access, a computer, adequate knowledge, and intention to fill out the questionnaire, so the sampling was not representative. Although a significant part of Hungary's population was left out of the survey, I still think that it would be a shame to give up on the data and its examination, since it can provide a kind of clue about the habits and knowledge of the examined age group.

Presentation of the questionnaire used

The 2018 questionnaire contains many new questions compared to the 2015 one. The new questions: I/3.; I/4.; I/5.; I/8; II/1.; II/5.; II/8.

Omitted questions: the gender of the person filling in and their relationship with the child; the number of the children in the family, and their date of birth; the older siblings IT device using habits; what is the difference in their habits compared to their older, younger siblings? I considered the omitted questions listed above as not providing essential information from the point of view of the research.

I. Sociodemographic data

I/1. Please enter your child's date of birth.
I/2. Please enter your child's gender.
I/3. What institution does the child currently attend? Please select one of the listed options! He/she doesn't go anywhere, To daycare, To kindergarten, To school.
I/4. Please enter your place of residence. Please select one of the following options: Capital (Budapest); County seat; Medium-sized or small town (less than 100,000 people); A village (less than 5,000 people); Other.
I/5. Which family structure is the most characteristic of your family? Please select one of the listed options. Two parents with child(ren); Father with child(ren); Mother with child(ren), Guardian with child(ren); Large family (several generations live together); Other.
I/6. The mother's highest education: Please select one of the listed options. Finished 8 school years or less; Vocational certificate/ high school diploma/ secondary education OKJ (Hungarian state-recognized training course); University/ college/ higher education OKJ; Other.
I/7. Father's (or guardian's) highest educational qualification: Please select one of the below options. Finished 8 school years or less; Vocational certificate/ high school diploma/ secondary education OKJ; University/ college/ higher education OKJ; Other.
I/8. Net income per capita of the household (The answer is not mandatory.)

II. Data on the used IT device

II/1. What kind of IT device is in your household? Select one or more of the ones listed! Smart phone; Tablet; Portable computer (laptop, notebook, netbook, etc.); Personal computer; Game console (Xbox, PlayStation, Wii, etc.); Smart TV.

II/2. Does the child use (can use) any IT devices? Yes; No.

II/3. Which of the listed devices does the child use? Select one or more of the ones listed! Smart phone; Tablet; Portable computer (laptop, notebook, netbook, etc.); Personal computer; Game console (Xbox, PlayStation, Wii, etc.); Smart TV.

II/4. Approximately at what age did the child start using IT device(s)? Please select one of the listed options. Before the age of 1; Between 1 and 2; Between 2 and 3; Between 3 and 4; Between 4 and 5; Between 5 and 6; After the age of 6.

II/5. Does the child have their own device, and if so, what kind of? Select one or more of the following options: The child does not have his/her own device; They have Smart phone; Tablet; Portable computer (laptop, notebook, netbook, etc.); Personal computer; Game console (Xbox, PlayStation, Wii, etc.); Smart TV.

II/6. How often does the child use the IT device? Please select one of the listed options. Several times a day; On a daily basis; A few times a week; Weekly; Less often.

II/7. How long does the child use the device on one occasion? Please select one of the listed options. A quarter of an hour or less; About half an hour; About 1 hour; About an hour and a half; 2 hours or more.

II/8. Typically, how often does the child use IT devices in the following ways?
Possible usage: Viewing/creating pictures, Watching movies/cartoons / videos; Listening to music; Calling/video calling; Drawing/coloring/other creative activities; Gaming.
Selectable frequencies: Never; Occasionally; Per month; Weekly; Several times a week; Daily or more often.

II/9. When the child plays on the IT device, how often do they play the following types of games?
Options: Skill/sports game; Strategy game; Puzzle game; Role play; Native language skills development game; Foreign language learning game; Math skills development game
Selectable frequencies: Never; Sometimes; Per month; Weekly; Many times a week; Daily or more often.

III. Questions about traditional games

How often does the child typically play with the following type of games?

Games: Memory game; Board game that use token money (e.g. Monopoly); Board game with rolling dice; Construction toys (Lego, Geomag;

etc.); Strategic game (chess, Go, etc.); Puzzle; Coloring book/coloring; Card game (Peter the Black, Cards of cars, Uno, etc.); Games based on shape or dimensional identity (shape thrower, Matryoshka doll, dominoes, etc.).

Selectable frequencies: Never; Occasionally; Per month; Weekly; Several times a week; Daily or more often.

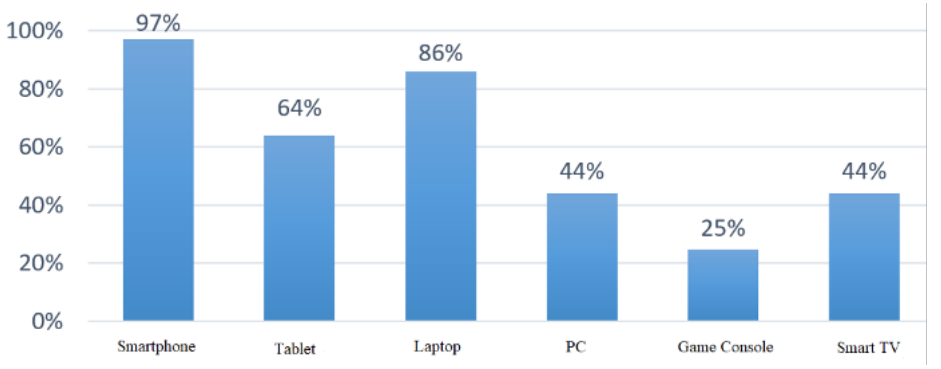
Presentation of the main characteristics of the answers with descriptive analysis tools

According to their place of residence, the respondents came from Budapest (39%), other big cities (18%), towns (23%) and villages (18%). This was important to me because if we want to say that the examined relationships are generational phenomena, they must be independent from the place of residence. Characterize it as well the children growing up in the smallest villages as those who were born and grew up in the capital.

Furthermore, it would be necessary that the trait considered generational should not be related to the education of the parents. The data confirmed this, but the presentation of this result is out of the scope of this article. The technical development could be traced in the IT devices appearing in the households. While in the 2015 questionnaire, there were hardly any families who owned a smart television, in the 2018 survey, 44% of the surveyed families already had a Smart TV. In the first study, roughly a third of the participants had a laptop, and this ratio doubled by 2018. The ratio of tablet owners showed a smaller increase. Over the past 3 years, this percentage has increased by a total of 7%, which means that approximately 7 out of 10 families have at least one tablet. In addition to smart televisions, the number of smartphones also showed a significant increase; this value jumped from the previous 68% to 97%. In other words, there is hardly any examined family that does not have a smartphone.

Figure 5

Digital devices in the surveyed household (2018)

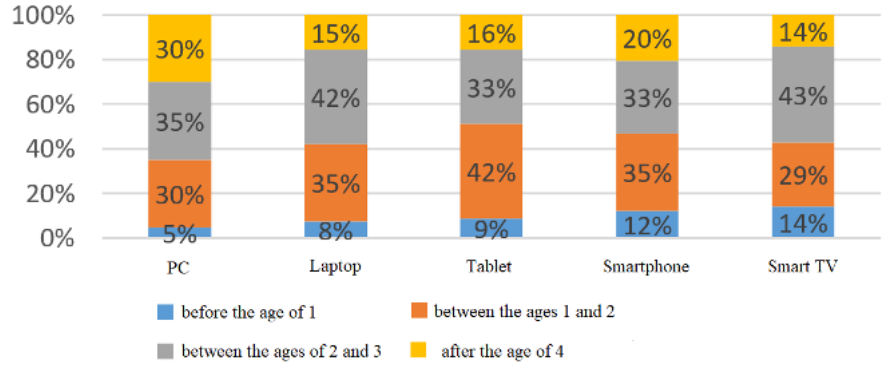


The beginning of device usage was a question in both studies.

In 2015, no more than 30% of the examined children did not use IT devices before entering kindergarten.

Figure 6

Children's age when they start using IT devices (2015)



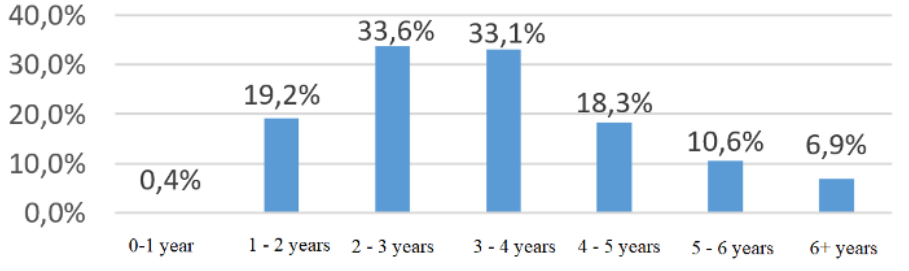
It could be seen that the easier a device is to hold and use, the earlier it gets into the hands of children. That is why, in the 2018 study, I no longer investigated this question because I assumed that the user-friendliness of the device still affects how early it gets into children's hands.

Instead of that, I was interested in when they started using one of the devices, and whether the child has their own devices.

During the visits to kindergartens and schools, the tendency for children to have their own devices became evident. 86.3% of the 345 children examined in 2018 had already used or were regularly using IT devices before starting kindergarten.

Figure 7

Children's age when they start using IT devices (2018)

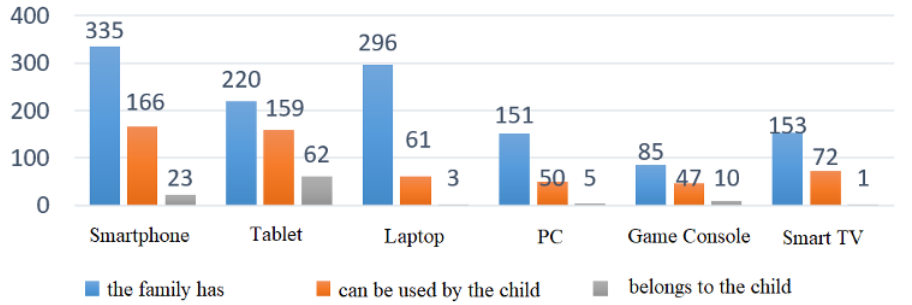


According to Suhana (Suhana, 2017), „One effect of gadget usage on children is self isolated from social life and lack of emotional management. It is resulted in lack of interaction and communication. Child become introvert and impatient, interpersonal problem and lack of interpersonal communication skill and keep them away from nature and surrounding environment." And we have not even mentioned the impact of early device usage on the development of the nervous system yet. That is why it is not surprising that the WHO recommendation (2019) states that the time spent in front of a screen by children under the age of 1 should be 0 minutes. Between the ages of 1 and 4, a maximum of 1 hour of daily screen time is recommended, which includes both passive (e.g. watching television and videos) and active screen time. So, when, regardless of the content, an average of 9 out of 10 children use some kind of smart device before they reach preschool age, it strongly goes against the WHO recommendation and has an impact on their social, emotional, mental, and neurological development.

The graph below shows the number of smart devices in the households participating in the study, as well as whether the child can use the given device, and whether the device used is the child's own.

Figure 8

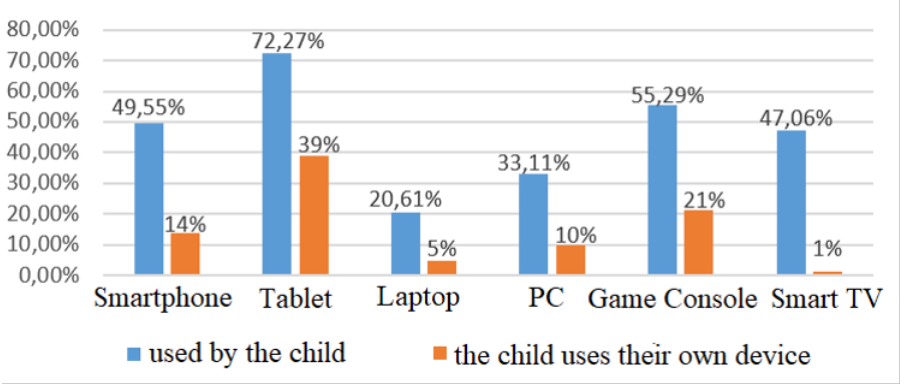
IT device ownership and use (2018)



In addition to the number of devices, it is also worth observing the distribution; on one hand, the percentage of children allowed to use the device in the households that have the device. And on the other hand, where the child can use the given type of IT device, in what proportion do they use their own device. The first distribution is indicated by the blue columns in the following diagram (Figure 9), while the second one by the orange columns.

Figure 9

Devices used by kids (2018)

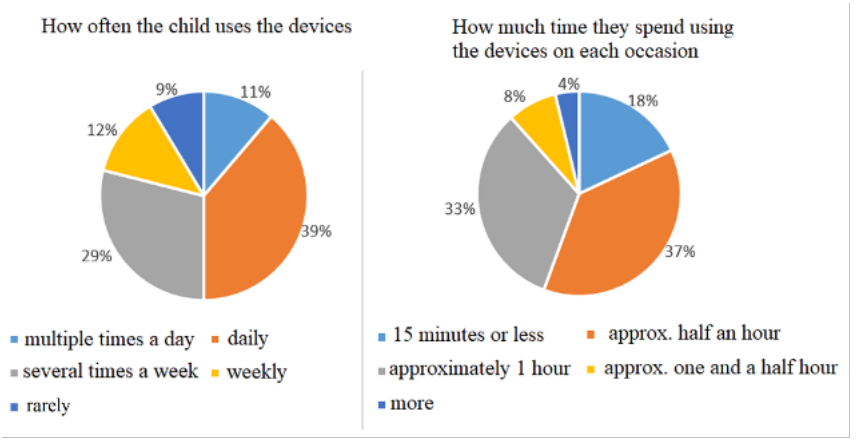


The results show that a significant proportion of households allow children to use devices. What is even more surprising, however, is the significant proportion of children who own IT devices independently.

The significance of this result lies in the fact that it is more difficult for a less technically proficient parent to monitor what, when and for how long the child uses the given device if the child uses their own devices. That is why I was also curious, in both surveys, that according to the parent's knowledge how often the child uses the device and how much time they spend using the device on each occasion.

Figure 10

Frequency of device usage and time spent using it (2018)



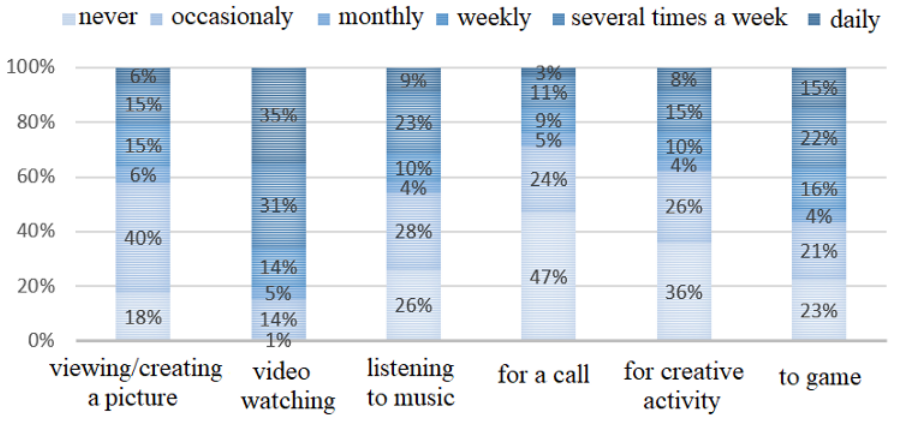
The diagrams clearly show that the frequency of device usage is high; half of the children participating in the study use the devices daily or several times

a day. I know from the stories of kindergarten teachers that a significant proportion of children who travel by car to kindergarten already watch fairy tales or other videos on their phones or tablets during the trip. According to the study, children use the devices several times a day, for approximately 45 minutes at a time. The effect of watching videos/films on native language development has been investigated by several people. Opinions differ on its effect on vocabulary development. Alloway et al. stated that educational television had a positive correlation with higher scores on vocabulary assessments whereas noneducational television was associated with low vocabulary scores. The survey that was conducted found that children who had poor academic performance at the age of 3 sought out more adult programs and cartoons, both of which had fewer learning opportunities in their content compared to educational programs designed for children (Alloway et al., 2014).

Considering children's daily routines raises interesting questions about the amount of time spent using devices at one time because the frequency and time spent using the device are closely related to the time they could spend on traditional games and activities. Since applications that would be suitable for developing mathematical competence are also being developed for IT devices, I was curious in 2018 about what kind of apps the children were using on the digital devices.

Figure 11

The frequency of each activity (2018)



It can be clearly seen in the diagram (Figure 11) that the area where the light colors almost disappear in the bar chart is movie watching, playing games, listening to music, and viewing pictures. As expected, the gaming as an

activity on the digital device was high-ranking, and it was worth looking at what type of games the children who participated in the study played.

Although traditional tools and digital tools do not necessary develop the same skill areas, and not to the same extent, well-chosen digital games are also suitable for development. For example, during a classic board game with dice, the child gains experience about the dice – number of sides, "squareness", rolling ability, etc. While moving the puppet, the muscles of their hand develop, which will help them hold a pencil, they eye-hand coordination develops – when they move the puppet in the tiny fields –, their sense of number develops, as well as their concept of numbers along relations of the same number (value thrown, number of fields stepped). In addition, their social competences develop as they learn to wait for their turn, they learn to remember who is on before them and who goes after them. They learn to win and lose and learn to follow the rules. During a well-chosen digital game, hand-eye coordination develops significantly more dominantly, concentration is much more intense, and reaction time decreases. As a result of all this, the need for immediate feedback increases dramatically, they do not learn to lose against their peers, and they gain their experience by mapping the 3D world into a 2D one. In one study, screen media was found to be beneficial if two key factors were taken into consideration: content and context. Barr and Lerner testified that learning from screen media can take place if the content is interactive and provides contingent responses to a child's actions. Another key factor is to ensure screen time is a positively shared experience where parents or caregivers can extend the learning from the screen and apply it to their child's real-life experiences (Barr & Lerner, 2014).

What Neumann and Neumann (2014) noted in this study was that literacy apps should include:

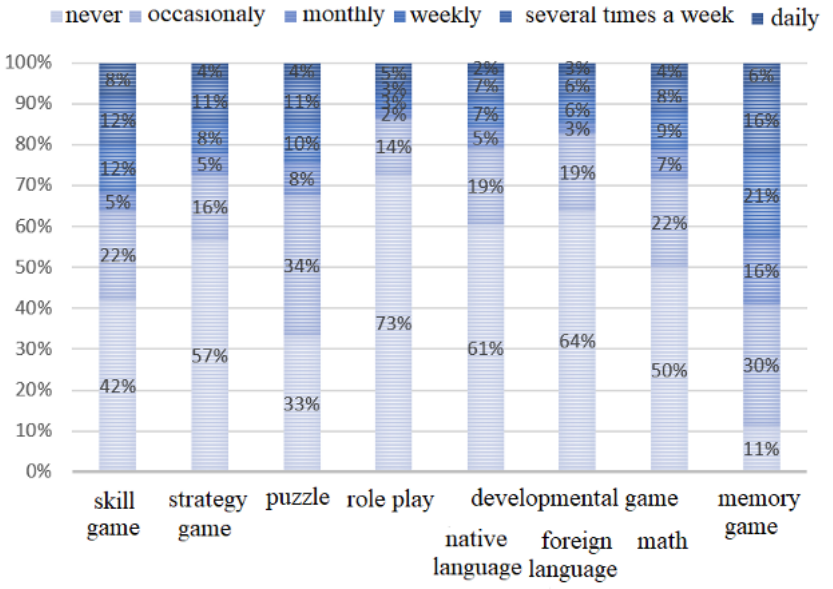
1. the use of multimedia features to support and enhance the text on the screen,
2. allowing children to read or listen independently, and
3. being designed to focus attention on highlighted printed words in the text while being read aloud to increase vocabulary and word recognition. It was also noted that literacy apps that children use should be age-appropriate, have a high level of interactivity that stimulates all senses, build on previous knowledge, encourage creativity, problem-solving and critical thinking, and provide feedback to the child as they are engaging with the application.

Among the types of digital games listed on the questionnaire, the 3 areas which I was most interested in were games for native language education, math competence, and games that develop memory. The development of the native language is included in my focal point because, on one hand, it is not possible to talk about mathematical development without it, and on

the other hand, under the age of 3, cognitive development and development of the native language cannot be separated from each other. It was a sad experience, although not surprising, that there is very little interest in these 3 areas. A really surprising experience was, however, the low popularity of foreign language development games, which are considered so important these days. It also did not surprise me that children preferred skill games as they have the most exciting graphics and story, and they seem to be the most fun for children.

Figure 12

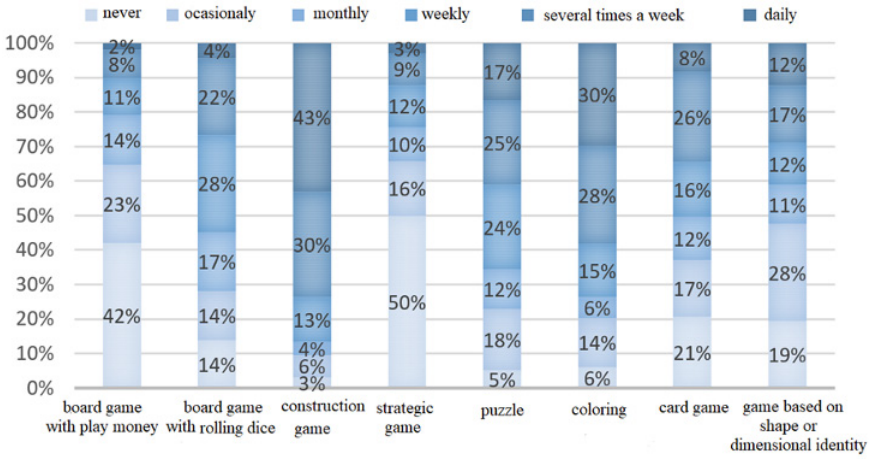
The type and frequency of the games played (2018)



So, the question arises, if not on digital devices, will the child get the desired experiences through traditional games? That is why I repeated the questions I asked about traditional games in 2015. Knowing the previous data, my expectations were not too high here. Taking the daily schedule of an average Hungarian kindergarten child into account (on average, 8 hours from starting kindergarten to going home, but in certain cases it can even be 10 hours), in the remaining time, if the child spends the previously indicated amount of time with IT devices, at home there is hardly any time left to play with traditional games. That is why the fact that, in contrast to the previous charts (Figure 12), light colors dominate the bar charts here was not at all surprising. In other words, the developmental games considered important by me are never, rarely, or occasionally played by the children, rather than weekly, several times a week, or daily. Construction toys are an exception to this.

Figure 13

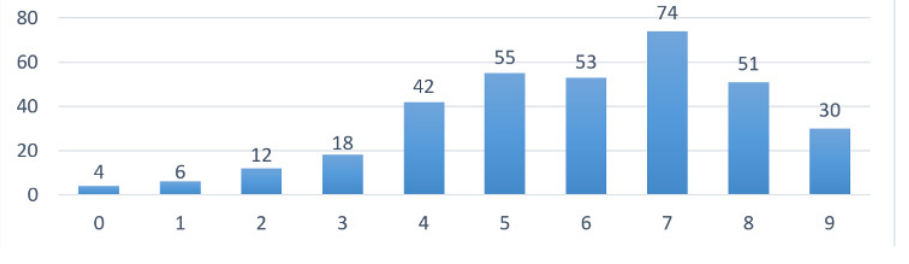
The frequency of each traditional game (2018)



Based on the above, it can be said that the 345 children participating in the study gain little experience on digital devices from the games that are considered necessary in Hungarian mathematics education based on the tradition of Tamás Varga. While at the time of the 2015 survey, the children involved in the survey were not of school age, in 2018, 60.3% of the children were of school age. (In Hungary, starting school is compulsory from the age of 6.)

Figure 14

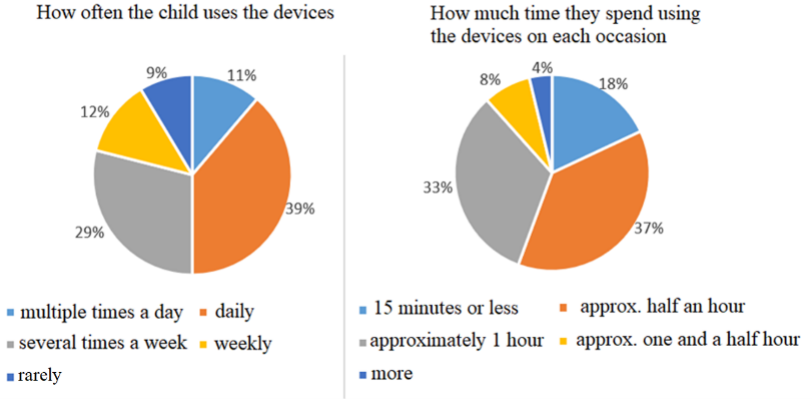
Child's age (in years) in 2018/19



This data becomes really important when, in response to the question of what kind of educational institution the child attends, only 26% of the respondents answered that they go to school.

Figure 15

Frequency of device usage and time spend using it (2018)



This means that 118 children were involved in the survey who, although they were of school age, did not start their school studies. It would be worth investigating the reason why nearly half of the school-age children attend to the last year of the Kindergarden or repeating the last year instead of school. Is there any connection between retention, failure to develop and "generational symptoms"?

In other words, if we are aware of children's changed cultural environment and its effects, and we consider it necessary for children to have the previously mentioned experiences through games and activities before starting school, then kindergarten teachers should place more emphasis on those planned and free activities which are suitable for development. Considering the role of mathematics education described in ÓNOAP (National basic program of preschool education), as well as the lack of development in the examined area, even more emphasis should be placed on the relationship between reality and mathematics in the elementary school.

Conclusion

The theoretical research proved that the social and technical conditions necessary for the creation of the new generation are fulfilled, so it cannot be ruled out that children born after 01.01.2010 will form a new generation. The statistical analysis of the data obtained from the questionnaire survey confirmed that the children participating in the study really grow up with smart devices in their hands. Many children not only use their parents' devices, but also have their own ones. Traditional games that are important for mathematical development are not among the games preferred by families. Among digital games, children do not play with games suitable for mathematical development

either. Therefore, more emphasis should be placed on games that traditionally develop mathematical ability both at home and during mathematics education in kindergarten and elementary school.

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A magyarországi alfageneráció matematikai tapasztalati háttere és informatikai eszközhasználata, avagy egy online kérdőíves felmérés néhány eredménye

A tanulmányban egy 2014–19-ben végzett kutatás néhány, korábban nem publikált eredményét mutatom be. A kutatás két részből állt. Az elméleti rész a nemzetközi és a magyar szakirodalomra épül. Ebben a részben azt vizsgáltam, hogy a 2010-ben és azt követően született gyermekek esetében teljesülnek-e a Mannheim Károly generációs elméletében megfogalmazott feltételek. A második rész egy empirikus rész, amelyben adatokat gyűjtöttem a megjelölt korcsoportba tartozó gyerekek iskolába lépés előtti informatikai eszközhasználati szokásairól és matematikai tapasztalatbázisukról. Az adatgyűjtés módszere kérdőíves felmérés volt. Az első, kísérleti felmérés egy papíralapú kérdőív volt, amelyet 2015-ben több budapesti óvodában helyeztem el. A kérdőívet 95 gyermek hozzátartozói töltötték ki önként, névtelenül. A válaszok rávilágítottak arra, hogy érdemes kutatni a témában. Ezért készítettem 2018-ban egy továbbfejlesztett online kérdőívet. A kérdőív országszerte elérhető volt, 345 magyar gyermek hozzátartozói töltötték ki névtelenül és önkéntesen.

Kulcsszavak: alfageneráció, informatikai eszközök használata, matematikai tapasztalatbázis, komplex matematikatanítás

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