

## Exploring Media and Information Literacy in Early Childhood with a Digital App

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### ABSTRACT

To assess the current role of digital media in early childhood and to learn more about digital information literacy of young children, we designed and conducted an extensive survey with children from three to six years, their parents and their kindergarten teachers. After visiting 12 kindergartens in North Rhine-Westphalia, Germany, in this work, we will describe our methods and summarize first results of the survey. We will describe how our participants interacted with the interview app and how their media use is described by them and their parents. Furthermore, we will talk about the infrastructure in kindergartens and about the parent's opinion concerning media education in kindergarten.

**Keywords:** Information Literacy, Media Literacy, Digital Literacy, Kindergarten, Early Childhood, New Media, Digital Natives, Digital Technology.

### 1. Introduction

Today, digital technologies are an integral part of our society. The rapid development and transformation of information and communication technology (ICT) has not only been transforming how we work, but also interspersed with our private lives in almost every aspect and action of the day (Stock, 2013). It has changed our economy, how we communicate, learn and play. In everyday life, while shopping or in a restaurant, we can already observe even the smallest children playing with their parents' mobile phones, swiping pictures back and forth on digital cameras or using a tablet computer to play games. Digitalisation has already reached even the youngest of us.

This digitalisation of our work and private activities has brought many opportunities for the improvement of our lives but also a demand for certain competences to be able to fully participate. These skills are often summarised under the term media literacy, information literacy, or digital literacy, also conflated to digital information literacy (Bawden, 2001) or media and information literacy (UNESCO, 2017). Information literacy, for example, is not only defined as an essential skill set for every individual living in the information society, but also as a tool of empowerment and a catalyst for equality (IFLA, 2014). Among scholars it is widely accepted that digital competence combined with media and information literacy is needed and necessary for lifelong learning and participation. Therefore, it is necessary for and also a right

of every person, regardless of origin, circumstances or age. But when and where should we start to instruct children?

In most countries, media and information literacy education, if at all, starts somewhere in school. But children are influenced by media content and digital technologies earlier than that, so it might be appropriate to start before school, in kindergarten. In early childhood, digital information literacy is not primarily needed for participation in our society in the same contexts as with older generations. But media and technology are already omnipresent in the everyday lives of young children, voluntarily or involuntarily. It is important to observe, improve and evaluate how media content and technology use influence the lives, wellbeing and development of our children.

In 2017, over 93% of all German children three to five years of age went to kindergarten or publicly funded day care (Destatis, 2017). Implementing educational programs in kindergarten therefore means providing media and information literacy education to the majority of children. Even though many parents do not like the idea of their children playing with tablets or at the computer, in reality it has already become part of their lives. Media contents and technology use of peers and adults are closely monitored by children. Especially in early childhood it is only natural to want to try out what parents and other family members are doing with their gadgets and be part of these kinds of activities (Bostelmann, 2018, p. 179). This is why it is important to address topics such as new media and their contents in kindergarten together with the children. Even pre-school children can already be taught rudimentary skills such as handling and evaluating content from the internet, radio and television and the basic usage of technology. The aim here is not to promote extensive media use in early childhood, but to work preventively and to positively influence the children's information behaviour from the beginning.

Before any recommendations can be made on media and information literacy education in kindergarten, we need to learn about the current status of digital media in kindergarten. What does the infrastructure in kindergartens look like? Are kindergarten teachers already working with tablets and computers, and did they receive any formal media literacy education? To get a better idea of the whole picture, the situation at home is also important: How do parents handle their own and their children's digital media use? What opinions, practices and challenges do families with young children have concerning new media devices and contents?

To assess the current role of digital media in early childhood and to learn more about digital information literacy of young children, we designed and conducted an extensive survey with children from three to six years, their parents and their kindergarten teachers. After visiting 12 kindergartens in North Rhine-Westphalia, Germany, in this work, we will describe our methods and summarize first results of the survey. We will describe how our participants interacted with the interview app and how their media use is described by them and their parents. Furthermore,

we will talk about the infrastructure in kindergartens and about the parent's opinion concerning media education in kindergarten.

## 2. Methods

As the main goal of this study was to get a holistic view of digital media practices of and with young children, it was important for us to interview not just parents and kindergarten teachers, but also and mainly the children themselves. The children's parents and their nursery nurses are important as well, but we know that there is often a different perception between child and adult – about what was understood and meant by the child and what adults think and understand (Scott, 1997). Young children already have a life of their own, which perhaps remains unnoticed by the parents (Lipski, 1998). Furthermore, when working with very young children, scientific methods have to be selected accordingly. On the one hand, linguistic expression, motor skills, etc. are not yet fully developed and children might have difficulty with time and quantity information. On the other hand, we want to protect our young interviewees from frustration or anxiety due to self-consciousness around the researchers or other factors. Of course, as with grown-up subjects, there is also the possibility of social desirability bias (Weise, 2008). To minimize difficulties and get the most out of our time with the children, we decided to develop a tablet computer application to interview the children in a playful way while collecting data through observation and in the background of the application. We expected that not all children who took part in the study were familiar with this type of medium, but we cherished the opportunity to also learn how quickly children get used to handling unknown digital devices and media.

### 2.1 Description of the Interview-Application

The application was developed to make use of the convenience and benefit of technology to combine the research interest from our side with a fun factor for the children. It consists of six different games, each available in two difficulty levels: one for children aged three to four and a more difficult one for children aged five to six and preschool children. Young children undergo enormous physical and mental development (Hille, Evanschitzky, & Bauer, 2013) which is why we decided to incorporate two different difficulty levels so that younger participants would not be overwhelmed and at the same time older children would not get bored because of mental underload.

The six games were developed with existing information literacy models, for grown-ups and for children, in mind. For example, Beutelspacher (2014) divides information literacy skills into seven competency areas. On the basis of the information literacy skills Beutelspacher describes, we carved out which aspects were to be estimated interesting and realistic for young children. Many abilities that are considered to be important for adults, had to be dismissed since they require reading and writing skills. In earlier publications we go into detail on media and

information literacy for young children (Gust von Loh & Henkel, 2015; Gust von Loh & Henkel, 2016). From our point of view, the three and four-year-old children should be able to recognize an information need. Here we have to distinguish between their own (subjective) information need and an (objective) information need. It is being assumed that for small children their own information need is the most important. The second aspect for this group of children is searching for information. They are able to look for specific information, e.g. in relation to a given topic, but also for information regarding their own interest or to satisfy their subjective /objective information need. The youngest ones already have own ideas about their favourite things, as for example certain animals, cars, figures and so on.

The third area for our younger children is the use of information. This area is defined very broadly. Almost all actions – executed both by children and adults – can be interpreted as information use.

For the five and six-year-old children we add two more aspects to these mentioned above. Older children and preschool pupils should be able to evaluate information. They need not analyse and judge information the way adults do, so their evaluation can be different than how adults might expect, because adults do not have the same point of view. This has to be considered when estimating the child's evaluation. The fifth aspect is the communication of information. The three and four-year-olds can communicate information as well but the communication of the five- and six-year-old is much more target-oriented and differentiated. For this reason, we chose this competency area only for the older children. With these different areas of information literacy in mind, we developed the application especially for young children and for this study. In the following, each game will be described.



*Figure 1: The Hungry Squirrel.*

*The Hungry Squirrel (1)*

In the first game the screen shows a sad squirrel sitting on the grass (Fig. 1). The child has to recognize the need for information at this point because we want to know why the squirrel is sad. By touching the squirrel, we learn: The squirrel is hungry and asks for food. Three items (four for the five- and six-year olds) are being shown. The task is now to choose the correct food and feed (drag) it to the squirrel. If the selection is incorrect, the squirrel will ask to try again. If the selection is correct (nut), the squirrel will eat it.



*Figure 2: Helping the Beaver.*

### *Helping the Beaver (2)*

In this game, a beaver asks for help with building a dam (Fig. 2). It explains that to build the dam, the logs have to be placed along the red line. In the higher difficulty version, the logs have to be placed in a certain order. Here, the child uses the information provided by the beaver to successfully complete the task.

### *Finding a Place to Sleep (3)*

At the beginning of this game an owl appears in the forest. When the owl is touched by the child, it starts talking and explains to the child where different animals are sleeping. If the child assigns an animal to the wrong sleeping place, the owl reminds the child to consider again what she has previously communicated to the child (Fig. 3). If an animal is allocated the correct sleeping place, the information was used successfully. In the advanced version, there are more animals and sleeping places.



Figure 3: Finding a Place to Sleep.



Figure 4: Water for the Fish.

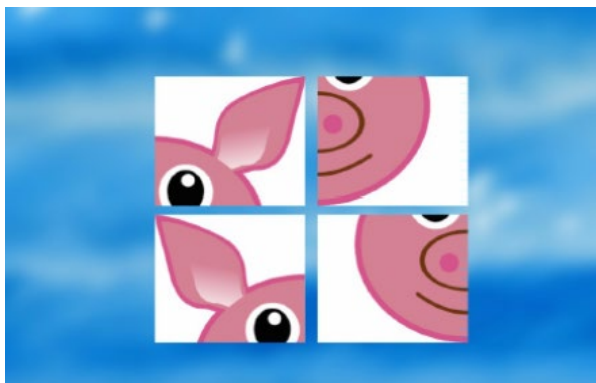


Figure 5: Puzzle.

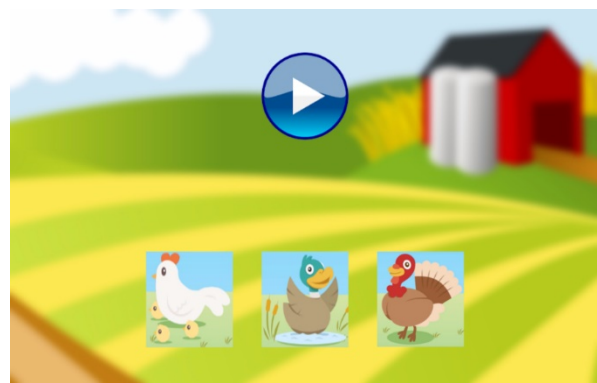


Figure 6: Animal Song.

#### *Water for the Fish (4)*

At the beginning of this game, a river full of fish is displayed. The middle part of the river disappears and the child is supposed to rebuild it. Different parts of the route (river parts, parts of the meadow, road parts, etc.) are displayed alternately (Fig. 4). The child now has to judge which parts are the right ones. Only when the child taps a correct river part does the river rebuild itself. If a wrong choice is made, the fish will alert the child. The difficulty level is differentiated by the number of parts needed to rebuild the river.

#### *Puzzle (5)*

A fox appears and tells the child that everything is mixed up and asks for help. The task in this game is to put the parts of an image or story in the right position. The shifting of the parts is not possible by a dragging or swiping movement this time. Instead, the parts should be swapped must be tapped. Here, it will be interesting how quickly our interviewees can adapt to the different mechanism. When all parts have been placed in the right place, the child has solved the game correctly. For three- to four-year-olds this is a four-part image puzzle that reveals the face of a piglet (Fig. 5). For the five- and six-year-olds the puzzle is a picture story of the departure and landing of an aircraft.

#### *Animal Song (6)*

In the last game, named “Animal Song”, the child will see a video player, similar to online videos on the web. The interviewer will ask questions regarding the video at this point (e.g., “Do you know what this is?”, “Do you know how to start the video?”, “Can you pause the video?”). Hereby we try to find out about the child’s experiences. The video itself is a song that shows different animals in turn, which make their respective sounds. After the video, a play button is shown, which plays an animal sound known from the video when touched. The task is to assign the right animal to the sound from a selection of animals (Fig. 6). The three- and four-year-olds get so select from significantly different animals, while the five- and six-year-olds see animals that are more similar, for example, a chicken, a turkey and a duck. By correctly assigning the animals, the child shows that it has used the information previously obtained.

*Table 1: What can we learn during the app interviews?*

<b>Development</b>	<b>Information Behaviour</b>	<b>Other Factors</b>	<b>Saved Data</b>
Linguistic Expression	Information experience	Interest	Age
Motor Skills	Information understanding	Attention	Gender
Understanding	Information gathering	Self-Consciousness	Institution
	Information handling		Favourite medium
	Information reflection		Game duration
	Information communication		Attempts

In Table 1 is shown what aspects we can observe and gather during the interviews. Working with the app will demonstrate how the children are able to work with the tablet as a medium and also their information behaviour. We want to know how many children already have experience with or how quickly they adapt to the use of modern digital technology. Maybe there will be cases where children cannot work with the medium at all. Also, how will they solve the tasks in the game? By inquiry or trial and error? At the same time, the app saves the time stamps and number of wrong attempts for every game, which allows us to evaluate the data, additionally to information gained by observation and interview.

## **2.2 Study Procedure**

In 2015, we distributed letters to 190 kindergartens, located in a major city in North Rhine-Westphalia, Germany, inviting them to participate in our study. After receiving responses with expressions of interest from several kindergartens, we met with them personally to discuss our research interests, study structure and process as well as answering questions and receiving feedback from the kindergarten teachers. Overall, we conducted the study in 12 institutions. In each institution, we asked the teachers to select a maximum of 20 children of different age and from different social backgrounds to participate. Parents received materials provided by us

including information regarding our study, a detailed description of the app and a consent form. We received consent forms from a total of 150 children (8-20 from each institution). In some kindergartens we planned an informal visit prior to the interviews, so that we could introduce ourselves and get acquainted with the children by joining playing activities.

The actual interviews were conducted from June 2015 to February 2016 and in a well-known environment for the children – their kindergarten. In some cases, a kindergarten teacher was present as well. Before playing the app, every child was involved in a dialogue regarding their interests, experiences and preferences with media and technology to lead into the topic. Then the child would play the 6 games, described earlier, together with a researcher as pictured in Figure 7. After playing the games, we reviewed the process together with the child. We wanted the children to feel safe and be comfortable at all times during the process so there was no pressure to participate or finish the games entirely nor a score where they could feel as if they would be competing with other children. At least one more researcher observed the interviews and took notes. Sessions took from 15 to 45 minutes and a total of 129 children completed the interviews.



*Figure 7: A researcher is playing the app with a child. (Image Credit: Sonja Gust von Loh)*

After the interviews, every child received a letter with a thank you note and a little book. The letter also included a questionnaire for the parents asking about the children's media behaviour. We received 60 of those questionnaires for evaluation. Instead of filling in the questionnaire, parents were also invited to participate in personal interviews. The basis was still the



questionnaire, but here, parents had the opportunity to ask questions and explain in more detail. We conducted 14 parent interviews which took from 15 to 120 minutes in duration.

While working with the kindergarten teachers, unstructured interviews and a further questionnaire helped to assess the current situation and infrastructure in their respective institutions. Of the 12 questionnaires we distributed in the kindergartens, 11 were filled in. The survey ended in May 2016.

### 3. Results

We collected 129 datasets of children, 70 boys and 59 girls, who played the app with us. The boys were 4.5 years old and the girls 4.25 years old on average. 29 children were three years old, 46 were four years old, 44 children were five years old and ten children were six years old (Fig. 8). In the following, we will present some of the first results of the survey: We will describe how our participants interacted with the interview app and how their media use is described by them and their parents. Furthermore, we will talk about the infrastructure and practice in kindergarten and about the parent's opinion concerning media education in kindergarten.

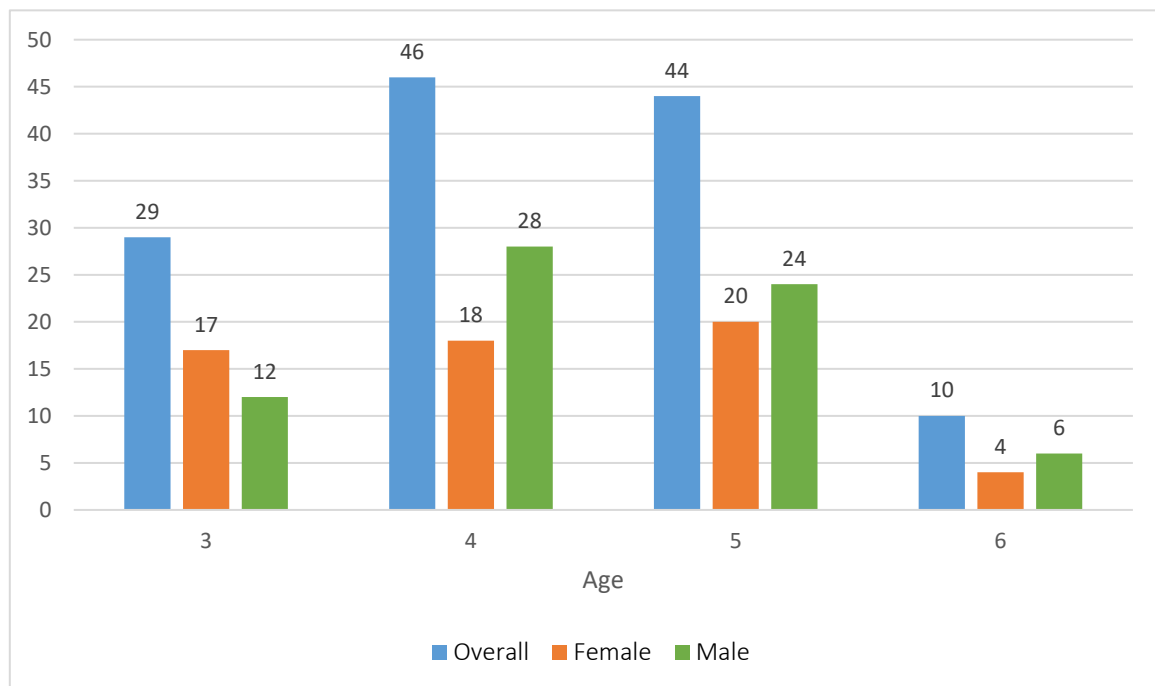


Figure 8: Age (in years) and gender of participating children (N=129).

#### 3.1 How Children Interacted with the App

During the app-supported interviews we not only collected qualitative data regarding the children's media preferences, which will be discussed in the next chapter, but also quantitative data measured by the app in the background. Additionally, a researcher would observe and take notes during the whole session. These session protocols were digitalized, structured and analysed thematically. Table 2 shows observed behaviours sorted by frequency of occurrences.

*Table 2: Observed behaviours from the session protocols, sorted by frequency (f).*

Observation	F
talks to the animals or nods ins response	21
does not listen (until the end)	18
needs a lot of help	16
hesitant/shy (at first)	12
taps randomly	9
trial and error	9
unfocused/impatient	6
uses whole hand or fist	5
presses harder if nothing happens	2

As previously mentioned, all children participated in the interview on a voluntary basis and were able to abort at any time. Many children took to the animal theme very quickly and recited knowledge they had about the animals shows. Often, they responded to them verbally (“What can I do for you?”) or nodded when an animal asked for help. There were also children, however, who did not seem to listen to what was said at the beginning of games. They often completed tasks by trial and error or we had to explain to them what was asked. While some children seemed to be very concentrated and careful in their interaction with the games, some preferred trying things out, playing around with the game’s elements and just “touching” things. One participant did not care so much for the tasks presented and used their own fantasy to create a story with the animals in the game.

Especially younger children needed a lot of assistance during the beginning or during games that were different/harder than others. This was not a problem, since the idea was that children would play the app together with a grown-up and accompanied by the dialogue about the game’s contents and about media in general. It could be observed that many did not have any prior experience with a touch-screen device and tried to use their whole hand or fist to interact with the game. Some children tried to “pick up” elements from the screen (for example the strawberry, to give it to the squirrel). Some children were so hesitant to touch the screen for the first time that they eventually did it together with their teacher or with one of the researchers. Indeed, many were a little shy at the beginning, but once they started to play the app, they quickly got used to it up to finishing the last games with only little or no assistance.

Children who already used a tablet before did the typical swipe and tipping movements more easily, but did not necessarily perform better with the tasks. Apart from that, many recognized the typical video player in the last game (“Animal Song”) and were able to start, pause or maximize the video. After playing the games, we took a few minutes to reflect on the games together. Many children wanted to play a certain game again or told us about their favourite

animals. Out of 131 children who participated in the study, two did not finish their interview. These datasets were not included in the evaluation. Sessions took from 15 to 45 minutes.

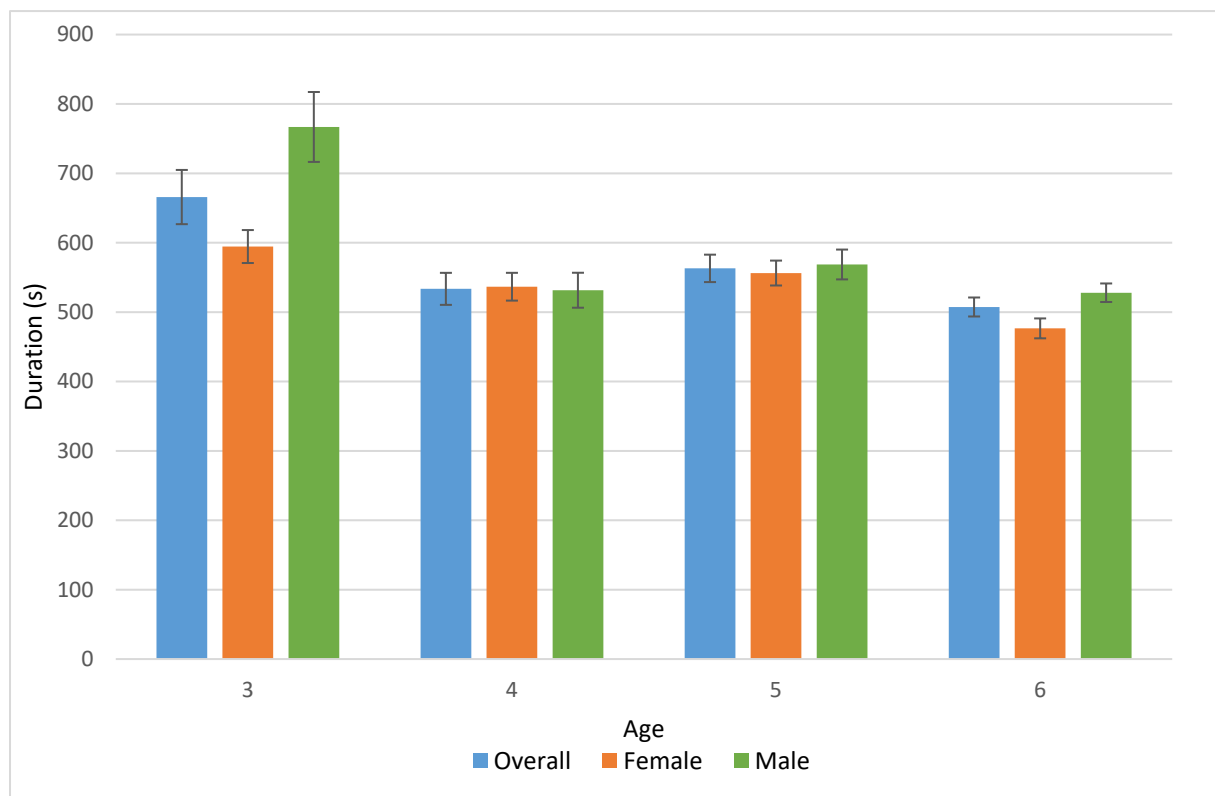


Figure 9: Duration (in seconds) needed to solve the 6 tasks from the interview-application (arithmetic mean, standard deviation).

Figure 9 shows the time (arithmetic mean, standard deviation) children needed to complete the games 1-6 and Figure 10 shows how many attempts they needed for the tasks, sorted by age and gender. As can be seen, 3-year-old boys needed longer to finish the games than 3-year-old girls. In the other age groups, boys and girls finished the game at relatively similar speed. When comparing the number of attempts though, girls needed less than boys, therefore seemed to be more careful before selecting the right animal, for instance. It also looks like there is a tendency for older children to make fewer mistakes, it should be noted though that the sample for the 6-year-olds is very small.

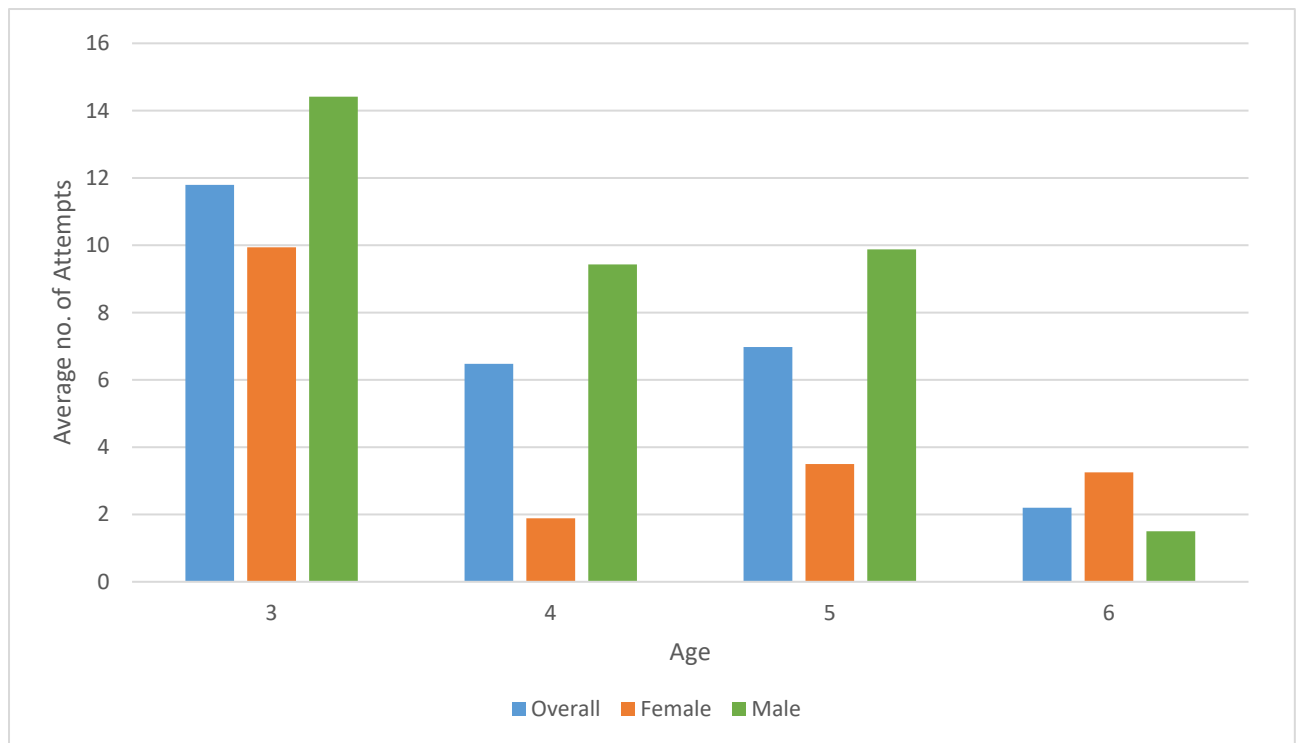


Figure 10: Attempts needed to solve the tasks, sorted by age and gender (arithmetic mean).

### 3.2 Media Usage in General

During the app interviews, we asked each child which medium they like to use the most. Children were asked to select one from an illustrated list of media shown in Figure 11. As we can see, most children picked the educational toy (e.g., “tiptoi” by Ravensburger, an audio-digital education toy system for children of 3 years and older) which was said to be very popular among children at the time of the survey. Over 20 children picked watching television as their favourite activity and after that magazines and audio content were the most picked media. The computer or laptop were the least chosen as the children’s favourite medium.

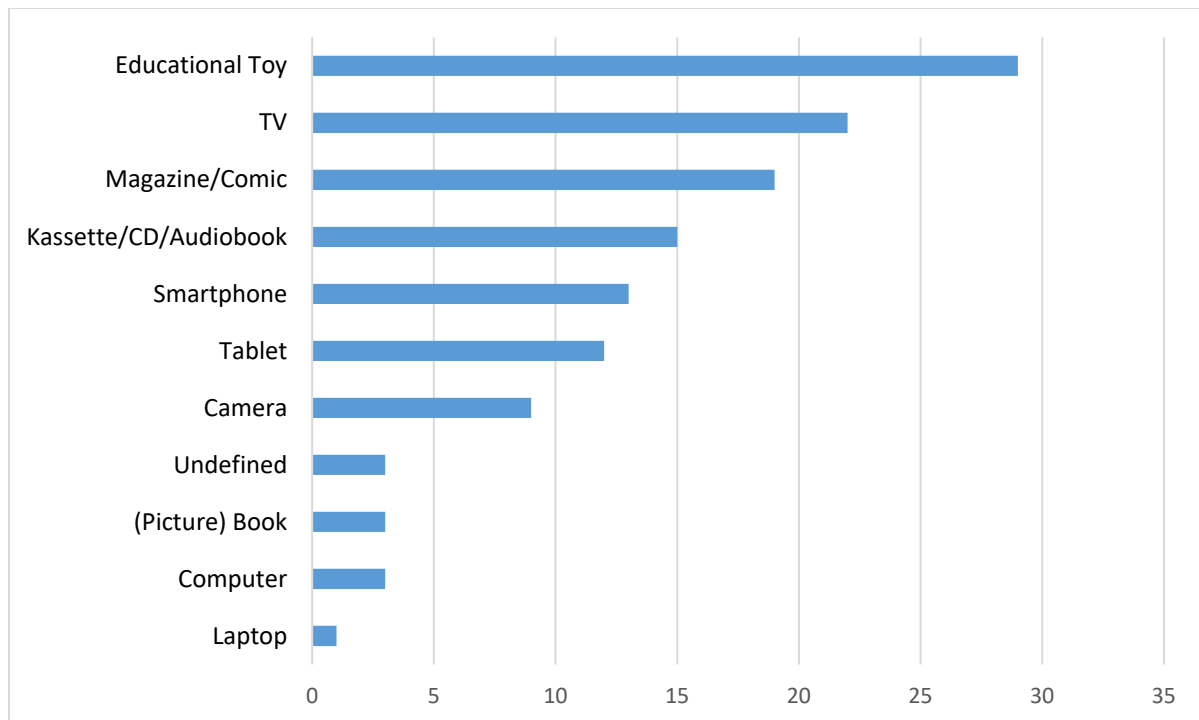


Figure 11: Children's favourite media (N=129).

A total of 43 parent questionnaires contain full details of the children's three most used media. Overall, books, audio content (CD, cassette or audio book) and television were the most frequently mentioned, followed by the tablet. According to the parents, their children spend the most time reading magazines or comics and television, followed closely by books and audio content. Different media activities were described during the interviews: watching television or DVDs together, playing smartphone apps or tablet games, but also looking at photos or listening to music. The internet was especially often described to be used to clarify questions the children might have.

Most parents restrict the time their children are able to watch television, videos or play games. Some restrict media use to a certain time frame; some children are only allowed to watch a certain television show or video. The children themselves often know these rules well. In the children interviews they often told us what and when they were (not) allowed to do, for example "I am not allowed to play with my mom's iPad." or "I can play with my dad's smartphone sometimes. But only for ten minutes!" or "I watch Barbie in the mornings.". On average, parents reported a media usage of 40 to 45 minutes a day for their children. This may not include time that is not known by the parents, as many children also told us about media use outside of their parent's reach, for example, at a friend's house, with grandparents or at home without asking their parents.

On another note, there were often certain rituals connected to the described media use, such as watching a movie on the weekends or following a certain show together. Children told us about this, too (e.g., "My mom reads to me every day, when I go to sleep."). It was also often reported that media usage is strongly influenced by siblings. In many cases, if there was an older sister

or brother, children picked up media behaviour much earlier. The children also reported to play games with their siblings or to use devices of their older sister or brother. Some told us they had their own mobile phone which was an old device discarded by another family member.

In general, media was seen as useful by the parents “if used right”. One parent, for example, explained that watching a video can be a good distraction when treating illnesses, so that the child would sit still. Picture books and magazines took a special role as a very positive and educational medium. Reading time is often not restricted and readings is an activity that is “allowed” anytime. Many parents described reading with and to their children as a very important activity.

### 3.3 New and Old Media in Kindergarten

In the kindergartens we visited, traditional media were still the most popular. Almost all facilities had photo cameras, CD players and a children’s library. Only one kindergarten teacher reported to have a tablet computer at work. Of course, all facilities owned a personal computer or laptop, but for office work rather than for working with the children. One of the teachers explained that sometimes children would follow her into the office, so that they could print some images or colouring sheets. All, except for one, estimated their own digital media skills to be sufficient. Some had already taken part in or

heard of further education seminars that promote media literacy. Only two kindergarten teachers reported that media education was part of their basic education as educators. Among other questions, we asked them to rate from 1 (not true) to 7 (absolutely true) the following statements:

- a. To promote child development, traditional media (books, CDs, radio, television) are more suitable than digital media (computer, tablet, Internet).
- b. Using the internet is more of a hazard to children than a benefit.
- c. Media and information literacy education should start in primary school; as other aspects of child development should be given priority in kindergarten.
- d. I feel that I am able to adequately communicate information and media literacy to children.
- e. Adequate use of digital media (computer, tablet, Internet) in the everyday life of

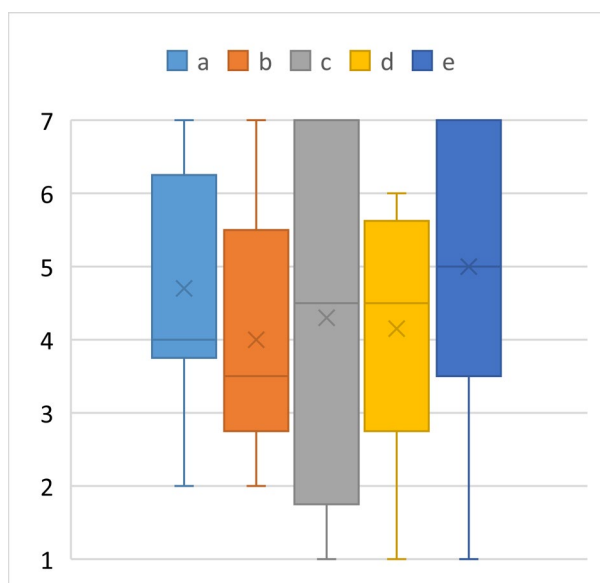


Figure 12: Responses to statements a-e from 1 (not true) to 7 (absolutely true).

the kindergarten is not realistic due to various factors (lack of space, financial shortcomings, lack of staff).

The answers to these statements can be seen in Figure 12. Our participants tended to attribute equal value to media old and new or to prefer traditional media like books, audio content and television (a). Only a few respondents thought that the internet is more hazardous than beneficial for young children (b). Opinions regarding the beginning of media and information literacy education were mixed (c). It should be noted that no participant was entirely confident in their ability to adequately promote media and information literacy to their protégés (d). Many kindergarten teachers agreed with the last statement (e) as they felt there is not enough staff, time, space or money for the adequate use of digital media in kindergarten.

### **3.4 Media and Information Literacy in Kindergarten**

During the parent-interviews we thoroughly discussed the role of media education in kindergarten. The most common answer was that children are already sufficiently exposed to new media content and technology at home. Parents often stated that while their children spend their time with watching television or playing digital games at home, time in kindergarten should be spent in a different way. The development of social skills while playing with other children was seen as most important. Often mentioned was also the time spent while playing outside on the playground. Parents were of the opinion that in kindergarten, traditional games and toys should be the main focus. Activities that promote creativity, like singing, crafting and drawing were also mentioned. So, to our question whether the use of new media devices and contents should be increased in kindergarten, 85% (n=45) responded with “no” and 15% (n=8) responded with “yes”. Furthermore, we asked who should be responsible of media and information literacy education in early childhood. Here, most parents thought that it was more their own responsibility than that of the kindergarten teachers. In comparison, many kindergarten teachers answered that it was equally their and the parents’ responsibility. During the interviews, some parents felt that our society is already full of digital media and therefore in kindergarten it should be secondary. Some parents feared that children in today’s society would forget how to play “traditionally” and that using new media too much would isolate them. When we mentioned how media education in kindergarten could also be an instrument for prevention, however, it was regarded very positively.

## **4. Discussion**

To assess the current role of digital media in kindergarten and in the family lives of young children, we designed and conducted an extensive survey with children from three to six years, their parents and their kindergarten teachers. After visiting 12 kindergartens in a major city of North Rhine-Westphalia, Germany, we were able to conduct 129 children interviews, supported by a self-developed tablet app. Furthermore, we conducted 14 parent interviews and distributed

questionnaires. We collected 11 questionnaires from the kindergartens and 60 questionnaires from the children's parents. In this work, we summarized first results of this survey.

#### **4.1 What role do digital technologies and Media and Information Literacy play in Early Childhood?**

The interviews with the children clearly show that even the youngest children are in contact with digital technology in form of smartphones, tablets and other devices already.

Although digital media, just like television, generally have a bad reputation when it comes to their influence on children, and even if parents actively try to keep their young ones away from these, children naturally want to do what their families and friends are doing and therefore their interest in digital media is high. There is the common opinion that digital media and its diverse contents do not apply to children of a very young age, as they are not able to read and their motoric skills may not be fully developed. But, our study shows that even our youngest participants (3 years old) were able to productively interact with the app used in the interviews. Of course, this happened under supervision and combined with an active exchange, as it is recommended. Many children had already gained some experience in using apps or watching videos online at home or with friends. Some children even reported to own a tablet or smartphone. The statistics from our survey show that portable touch devices play a much bigger role in childhood than personal computers or laptops.

Here, it should again be clarified that our intent is not to promote digital media use in early childhood, but rather to observe what is already happening. Having observed that digital media is already part of young children's life, inferentially we propose that media and information literacy education should be as well. Parents often were of the impression that digital media is so widespread in our society already that children should be actively kept away from it in kindergarten. Often there are time constraints around media consumption in early childhood. Media use is seen as something that is just done and there is generally no idea of how it can be actively shaped. It does not seem to be the primary concern of the parents to think about how media use can and should be learned actively, for example for the sake of prevention. If this was mentioned, however, it was received very positively. Children already have a strong opinion of what they want to do, they know their favourite shows, games and characters or themes. Rules and rituals around media consumption are very common, but also behaviour that is not mentioned or known by the parents. Even more so it should be our task to shape children's contact with digital media in a way that is safe and has a positive influence on their present and future media behaviour.

#### **4.2 Are Kindergartens ready to provide Media and Information Literacy Education?**

In the facilities we visited, children spent their day with free play, drawing and reading, playing outside and similar traditional activities, as it is to be expected. Through the kindergarten survey



we learned that traditional media was still preferred over new media by the kindergarten teachers. Opinions regarding the beginning of media and information literacy education were mixed and most of our participants did not receive any formal education that would support them in actively promoting media and information literacy skills among their protégés. It is no wonder that most kindergarten teachers agreed that there are not enough resources for the adequate use of digital media in kindergarten at the time of the survey. Of course, media and information literacy education does not equal, for instance, time spent with a tablet. There is a big difference between media use and media education, although many do not seem to differentiate between the two. In our opinion, a save and productive use of media can be promoted without any equipment. The most important element is the education of staff.

In 2016, the Ministry of Family, Children, Youth, Culture and Sports and the Ministry of Education and Training of North Rhine-Westphalia published education principles for children from 0 to 10 (Ministerium für Familie, Kinder, Jugend, Kultur und Sport des Landes Nordrhein-Westfalen, 2016). These guidelines for elementary and primary pedagogical and teaching staff also include the chapter “Media” as one of ten teaching areas and are also meant to support kindergarten teachers in promoting media literacy not only among the children, but also among parents. This can be seen as a good start in establishing media and information literacy education in kindergartens, but it does not ensure that staff is willing or ready enough to put these ideas and guidelines into practice.

Furthermore, we learned during the parent-interviews that parents do not wish for more or any media education in kindergarten. Although or especially because digital media is omnipresent in our and our children’s everyday lives, some parents are unsure if, especially young children, should be in contact, use or consume digital media contents and tools. While some parents try to keep their children as far away from the new media as possible, there are also families who embrace them and where computers, tablets and consoles are parts of the nursery. In both cases, media and information literacy should be a topic. It has to become part of the dialogue between children, parents, kindergarten teachers, and policy makers for the sake of prevention if not also for facilitation of other educational activities.

#### **4.4 Limitations and Outlook**

This study was one of the first to explore media use and behavior of young children, their families and their teachers in kindergarten. As of now, there are no existing standards for measuring media information literacy in early childhood, and often media use in early childhood is overseen, because the “users”, who are only a few years old, are underestimated. We learned, however, that children seem to intuitively learn to operate touch media even at an early age. Our explorative survey utilized a self-developed tablet application to show the status quo in German kindergartens and families. It has to be mentioned that our results cannot be

seen as representative for all German children or kindergarten facilities. With limited time and resources, we could not gather representative sample of North Rhine-Westphalian or German children, especially since a German citizenship was not required to participate. Considering the explorative nature of this work, we rather welcomed any child, parent or kindergarten who was willing to work with us. We should also mention that the majority of families who participated in the study, came from a middle-class background. It is advisable to conduct further studies that will run for a longer period of time, investigate a larger and more representative group of children and, if possible, look beyond the borders of North Rhine-Westphalia. Knowledge gathered through our study will surely help in designing and conducting further studies in this direction. We can definitively recommend working closely with kindergarten teachers and parents, and especially the children themselves.

### Acknowledgement

This study was initiated and led by Dr. Sonja Gust von Loh. Many thanks to her as well as Stéphanie Koglin-Bühnsack who assisted in conducting and evaluating the survey and Fabian Pegel, who developed the interview app.

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