Challenges and Opportunities of Digital Technologies in Facilitating Children's Participation in Urban Planning and Design: A Swiss Case Study

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Abstract

Children remain largely excluded from participatory planning and design processes. Yet, their participation is key in meeting sustainability agendas and creating inclusive cities. Their exclusion largely stems from knowledge deficits and misconceptions on children's capabilities. Stereotyping and prejudices made on children's capabilities and willingness to participate have until now largely led planning professionals to overlook them in participatory decision-making. This research investigates the potentials and challenges of digital technologies in supporting children's capabilities and facilitating their participation in urban planning and design. While minimally studied with children, digital participatory tools have been extensively explored with adults and reveal many advantages, particularly in broadening and facilitating participation. By enhancing accessibility, digital technologies can lead to the inclusion of new socio-demographic profiles and hard-to-reach groups and thus hold great potential in facilitating children's participation. Ten semi-structured in-depth interviews were conducted with both (1) planning professionals and (2) educational experts who utilize digital tools with children, giving rise to three key findings. Firstly, the findings demonstrated that children have the capabilities to meaningfully engage in participatory planning and design processes. However, tailored methodologies are crucial in effectively engaging children. Creative and informal participatory elements, together with extended support, are key in supporting children's dynamic capabilities. Digital technologies can further support children's capabilities and make participation more engaging for children. Secondly, digital methodologies hold great potential in broadening participation through digital participation, especially for adolescents. Lastly, digital technologies must be seen as complementary rather than substitutive tools to current practices so as to combine unique advantages of both methodologies. Challenges of digital technological use can be overcome through a balanced integration of digital and non-digital methods, among other mitigation strategies discussed in this paper. Overall, the use of digital technologies holds great potential in both supporting children's capabilities and broadening participation. For adolescents, digital participatory methodologies are especially crucial to explore, as they remain the least represented group in current practices. At a less immediate priority, digital participatory tools can be explored to enhance existing processes and further expand participation among younger children too.

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1. Introduction

Children are largely excluded from participatory urban planning and design (Frank, 2006; Stenberg and Fryk, 2021). Yet, their participation is key in meeting sustainability agendas and achieving inclusive cities. The inclusivity of cities and settlements is one of the key priorities in the United Nations' Sustainable Development Goals (SDGs) (United Nations, n.d.). For instance, SDG goal 11 emphasizes the need to create inclusive, safe, resilient and sustainable cities and settlements (United Nations, n.d.). Target 11.7 aims to provide inclusive, safe, accessible, as well as green and public spaces that are accessible to all, especially for underrepresented groups such as children and seniors (United Nations, 2023). The SDGs also highlight the importance of multi-stakeholder processes and of inclusive and representative decision-making at all levels (Ozaki and Shaw, 2022; United Nations. n.d.). Although not considered as such, children can be a key actor in accomplishing more inclusive cities. Indeed, research highlights that cities that are healthy and livable to children can result in better living environments for everyone, thus contributing to the creation of inclusive cities (Danenberg et al., 2018).

Global awareness on children's participation in urban planning and design has been increasing, particularly since the establishment of the United Nations' Convention on the Rights of the Child in 1989, which established children's participation in matters that affect them as a human right (Frank, 2006). However, despite decades of promotion, children's participation remains atypical and neglected, and efforts to realize such visions have been minimal (Frank, 2006; Stenberg and Fryk, 2021). Key reasons for which children continue to be excluded from such processes are knowledge deficits and misconceptions on children's capabilities. As highlighted by Stenberg and Fryk (2021), there remain significant knowledge gaps regarding the system changes required for children's participation to become institutionalized. He further explains that fuzziness regarding the actual meaning of children's participation and the competences of children are further challenges that remain largely unexplored. Ataol et al. (2019) emphasize that there specifically remain knowledge gaps regarding the involvement of toddlers in decision-making processes, highlighting the need to develop strategies that are adapted to the maturity and communication levels of this age group. The neglect of the benefits of children's participation is a further barrier to their involvement (Wilhelmsen et al., 2023). The stereotypes that children are subjected to - such as lacking cognitive skills - by planning professionals also results in their input being viewed as irrelevant (Vissing, 2023). This is problematic, as children's input is essential in creating inclusive cities and achieving sustainability targets.

Children's exclusion from decision-making processes ultimately results in their exclusion from public space. Indeed, the majority of planning practices have until now led to the development of **adult only environments**, thus obliging children to use spaces that are not designed to serve their needs and preferences (Ataol et al., 2019). Elsley (2004, p.156) puts out a similar argument, stating that "modern day children are described as inhabiting spaces within an adult-constructed world". This is problematic, considering that children themselves regard outdoor spaces as being important (Elsley, 2004). Acknowledging children's actual desires and providing them an opportunity to express their needs is thus crucial in creating more child-friendly cities. The creation of child-friendly cities becomes an even more imperative matter when considering that 70% of the

world's children are estimated to be living in cities by 2050 (UNICEF, 2017). Although such estimations have increased the urgency to create child-friendly spaces, the reality is that many cities remain mostly unfriendly to children (Cordero et al., 2023).

This study explores the potential of digital technology in removing barriers to children's participation in urban planning and design. While minimally studied with children, digital participatory tools have been extensively explored with adults and reveal many advantages, particularly in broadening and facilitating participation. By improving accessibility, digital technologies can lead to the inclusion of new socio-demographic profiles and hard-to-reach groups, including young people, marginalized groups and disabled individuals (Congge et al., 2023; Hasler et al., 2017; Hokke et al., 2019). Digital technologies are therefore crucial to explore with children, as they hold significant potential in facilitating and broadening participation among this neglected group. This brings us to the aim of the study, which is to shed light on the potential challenges and opportunities associated with the use of digital technologies in facilitating children's participation in urban planning. This study can be seen as a step towards achieving the meaningful involvement of children in urban processes, which can strongly benefit them as it would allow them to have a say in the design and development of their environments. This study thus bridges part of the knowledge gap on how to involve children in participatory processes. This study also challenges often made assumptions and stereotypes on children's capacity to participate in urban planning as well as in their ability to navigate and utilize digital technologies. To gain a more general understanding of the topic, this study focused on children aged 0-18.

The challenges and opportunities associated with digital technologies in assisting children's participation are explored in the Swiss context specifically. The country's strong political background in democracy and participatory processes provided a strong background in exploring this topic and making children's participation in planning and design a common routine. This brings us to the research question of this study: *How can digital technologies be integrated in participatory urban planning and design to support children's dynamic capabilities and facilitate their participation towards the creation of inclusive cities?*

Three further sub-questions have been formulated to guide the research, which are outlined below:

1. *How do existing digital technologies support the dynamic capabilities of children?*
2. *What are the challenges and opportunities in using digital technologies to collaborate with children?*
3. *How can the challenges in using digital technologies to collaborate with children be overcome?*

To shed light on these questions, qualitative in-depth interviews were conducted with professionals working in the fields of planning and design, as well as education. A diversity of research was used to build a strong theoretical underpinning to the study, which follows this section. The theoretical framework is divided into three main sections, namely (1) inclusive cities, (2) children's participation in urban planning, explored through the capability approach, and (3) digital participatory tools. The theoretical framework is followed by the methodology, findings, and

lastly the discussion and conclusions. The findings revealed the significant potential of digital technologies in supporting children's capabilities, enhancing existing practices, and broadening participation.

2. Theoretical framework

2.1 Inclusive cities

The inclusivity of cities and settlements is one of the key priorities in the United Nations' Sustainable Development Goals (United Nations, n.d.). SDG goal 11, for instance, emphasizes the need to create inclusive, safe, resilient and sustainable cities and settlements (United Nations, n.d.). Target 11.7 aims to provide inclusive, safe, accessible, as well as green and public spaces that are accessible to all, especially for underrepresented groups such as children and seniors (United Nations, 2023). The SDGs also highlight the importance of multi-stakeholder processes and of inclusive and representative decision-making at all levels (Ozaki and Shaw, 2022; United Nations. n.d.). Although not yet considered as such, children can be a key actor in accomplishing more inclusive cities. Indeed, prioritizing children's interests in planning and design can create better outcomes for all. Quoting Danenberg et al. (2018, p.42), "by placing children's rights at the main planning stage, **an urban environment that is healthy and livable to children would also be healthy and livable for all**". It is therefore worth expanding on the concept of child-friendly cities.

2.1.1 Child-friendly cities: background and key principles

UNICEF (n.d.) defines child-friendly cities as those dedicated to fulfilling children's rights and ensuring that children's voices, needs and rights are heard, respected, and integrated into spatial policies. The concept was formulated to ensure that public authorities would consider children's best interests when making decisions and create an environment in which children can exercise their rights (Riggio, 2002). Furthermore, Riggio (2002) contends that a child friendly city is one in which the United Nations Conventions on the Rights of the Child (UNCRC) is fully committed to by public authorities. The UNCRC came into effect in 1990 and is the most extensively ratified international human rights treaty ever to be produced. (UNICEF, 1989; UNICEF, n.d.). The UNCRC embodies four overarching principles, namely (1) the principle of *non-discrimination*, (2) the principle of *best interests of the child*, (3) *the right to life, survival and development*, and (4) *the views of the child* (OHCRC, n.d.). These principles are meant to assist the interpretation of the Convention and inform the development of national initiatives of implementation (OHCRC, n.d.). The principle of non-discrimination can be related to Vissing's (2023) study stating that children are often subject to stereotyping, prejudices and discrimination. This reality violates the principle of non-discrimination, which asserts that all children should be able to enjoy their rights and not suffer any form of discrimination (OHCRC, n.d.). The second principle urges authorities to prioritize children's best interests when making decisions that affect them, which also reflects one of the fundamental aspects of the Convention (OHCRC, n.d.). The third principle emphasizes the right of children to develop in a number of dimensions, namely the physical, mental, emotional, cognitive, social and cultural dimensions (OHCRC, n.d.). Lastly, the fourth principle is particularly

relevant to this study, as it states that the views and opinions of children must be meaningfully considered in matters that affect them and that they should be given the opportunity to express such views in decision-making processes (OHCRC, n.d.). The prejudices regarding children's cognitive capabilities that Vissing (2023) describes in her study can be seen as a barrier to the effective compliance of this principle, as such prejudices are likely to make authorities see children's input as irrelevant and not worth consulting.

2.1.2 Importance of child-friendly cities and the need for children's participation

The failure to treat children as political citizens has until now led to the development of environments catered to the needs of adults, forcing children to use spaces that do not reflect their own needs (Ataol et al., 2019; Elsley, 2004; Barker, 2003). As an example, Barker (2003) highlights that children's exclusion in transport policy in the UK has undermined their travel needs, thereby increasing restrictions on their mobility. Barker (2003) further highlights that children's independent spatial mobility has significantly declined over time and that less and less children walk to school. This decline results from the increase in car ownership and traffic in the UK, which in turn can be explained by government policies aimed at increasing the spatial mobility of UK residents, which was primarily accomplished through road-building programmes (Barker, 2003). Parents view the increase in road traffic as a threat for their children, which stimulates them to bring their children to school with the car (Barker, 2003). Children's exclusion from transport policy thus not only creates unfavorable conditions for them to independently use the streets, but also reinforces the problem for other children, as parents further contribute to road traffic (Barker, 2003). The decline in children's independent spatial mobility can be linked to the Bullerby model of environmental child friendliness (Broberg et al., 2013). The model bases environmental child friendliness on two criteria, namely (1) "children's possibilities for independent mobility" and (2) "their opportunities to actualize environmental affordances" (Broberg et al., 2013, p.112). The disproportionate investments in road building programmes violate the first criteria, contributing to a child unfriendly city that only prioritizes the needs of adults who own a car.

The physical environment also plays a significant role in shaping children's development (Christian et al., 2015), thus further emphasizing the importance of creating child-friendly cities. Christian et al. (2015) highlight the importance of the design and characteristics of the neighborhood environment in providing opportunities for children to play, be active, social and stimulated, all of which are key to healthy child development. While having access to parks, recreational facilities, public transport and walking/bicycle paths can positively contribute to children's physical activity and play, heavy road traffic and crime have the opposite effects (Chrisitan et al., 2015). Thus, linking this insight back to Barker's study (2003), one can conclude that children's exclusion from transport policy and public participation more generally can negatively harm their development. The role of physical environmental characteristics in determining youth outcomes has also been highlighted in a number of other studies (e.g. Kenney, 2012; Villanueva et al., Teedon et al., 2014; Molina-García et al., 2019; Ortegon-Sanchez et al., 2021). For instance, Kenney (2012) found that poor physical conditions and limited amenities were associated with significant reductions in peer play and outings for children aged 1-5 in the United States. The age group is also a period in which rapid changes in brain development occur,

which is therefore a critical time for children to establish optimal developmental patterns (Kenney, 2012).

Overall, the variety of studies introduced above highlight the importance of child-friendly cities in fostering children's healthy development. Children's exclusion from decision-making processes can hamper their healthy development, stressing the importance of including them in the development of urban environments. This also links back to the fourth key principle of the UNCRC, which is to include children's views in decision-making processes (OHCRC, n.d.). Furthermore, children's participation is relevant, as children can provide new insights in the analysis of urban problems and recommend interventions, both in terms of policy and design (Krishnamurthy et al., 2018). This, in turn, can contribute to child-friendlier cities, as their perspectives become included in the planning process.

To conclude this section, it becomes clear that children's active involvement has multiple roles: it both contributes to the creation of child-friendly cities that are key to their healthy development, while also contributing to the inclusivity of cities and settlements for all, thereby contributing to the Sustainable Development Goals and improving living conditions for all population groups (United Nations, n.d.; Danenberg et al., 2018).

2.2 Children's participation in urban planning and design

The influence of children on planning processes has until now not been purposefully acknowledged, with their views remaining largely underrepresented in urban development projects (Stenberg and Fryk, 2021; Elsley, 2004). The interest in children's participation in planning was already apparent in the 1970s, which was a popular research theme at the time (Horelli, 1997). In her study, Horelli (1997, p.113) pointed to the fact that participation was "the least recognized of the 3Ps - provision , protection and participation - included in the UN Convention on the Rights of the Child". A significant turning point in the promotion and recognition of the importance of children's participation was with the establishment of the United Nations Conventions on the Rights of the Child (UNCRC) in 1989, prior to which children were considered not to have sufficient agency and competence to participate in political discussions, or what has also been termed the **adult domain** (Frank, 2006; Carroll et al., 2019). Despite decades of promotion, youth participation remains atypical and neglected, which Frank (2006) explains is due to barriers to the implementation of the practice. Research investigating the barriers to the institutionalization of children's participation has been growing, shedding light on important barriers and valuable insights. Carroll et al. (2019) explain that the meaningful engagement of children in "adult matters" remains very poor and that children's voices remain largely unaccounted for outside of child-specific areas such as playgrounds. They go on to explain that this is largely due to power dynamics, lack of skills on the part of planners, and conventional practices.

In addition, significant misconceptions exist among planning professionals and authorities that impede children's participation in decision-making. The tendency to view children as future citizens rather than current ones is an important barrier to children's intervention in decision-making (Elsley, 2004; Cordero-Vinueza et al., 2023). Elsley (2004) explains that professionals

have underrated the skills and competences of children in both using and understanding public space, contributing to their exclusion from participatory processes. Cockburn (2005) explains children often face negative labels from adults, including incompetent, emotional, unreliable and unstable. He further argues that such negative stereotyping results in the positioning of children within the “political safe spaces of the family, school and day care center” (Cockburn, 2005, p.110), shielding them from the public eye and thus limiting their visibility and agency in broader political matters and decision-making processes. Vissing (2023) explains that children are an unrecognized minority group and that like other minority groups, they are susceptible to stereotypes, prejudices and discrimination. For instance, children are often assumed to lack the cognitive attributes to perform certain intellectual or technological tasks. Stenberg and Fryk (2021) also highlight that the competences of children remain a largely unexplored topic in the context of planning and design. Such assumptions and knowledge deficits may lead authorities to conclude that children’s input is irrelevant and that they are not worth consulting in the first place (Vissing, 2023). Wilhelmsen et al. (2023) explain that the neglect of the beneficial aspects of children’s participation is an important reason for which their involvement is not often considered. Frank (2006, p.353) explains that the “developmental view of youth emphasizes their being in a period of early psychological growth and thus lacking the level of knowledge, skills, attitudes, behaviors, and social connections of adults”. This results in a situation where children’s capabilities to participate in planning is questioned by society, creating a belief that adults are more competent to speak on behalf of children and adolescents (Frank, 2006). Furthermore, the assumption that children do not have the political leverage to effectively communicate their ideas often leads to superficial participation even in instances where they may be consulted, with adults largely maintaining control (Frank, 2006). Similarly, Cockburn (2005) explains that children’s lack of political power renders them unequal in terms of political rights in addition to the general inequality in power seen between children and adults. While children may not have the right to vote, Cockburn (2005, p.115) highlights the importance of seeing children as “serious social actors in our society”. A last key obstacle to children’s inclusion in participatory processes is the assumption that consulting parents or teachers on matters affecting children will suffice, assuming that children either do not need or cannot have a say (Alderson in Christensen and James, 2008).

2.2.1 Children are (more than) capable for society

Contrary to these assumptions and misconceptions, a growing body of research has shown that children are well equipped with the skills and competences to participate in planning processes. Carroll et al. (2019) explain that there is increasing recognition that children should be included in participatory processes and that they are sufficiently competent to be so. They further emphasize that while the nature of their competencies and skills may differ from those of adults, it does not make their opinions and perspectives any less valuable. While children may not have the educational background on urban planning and design, their experience using and living in urban environments is a valuable form of knowledge in itself. As stated by Bąkowska-Waldmann (2023, p.1): “As everyday users of space, residents have knowledge about the functioning of its elements resulting from their experience, the so-called experiential knowledge”. Listening to children’s perspectives is thus highly valuable as their local knowledge can lead to a greater understanding of public space from a “non-adult dominated perspective” (Cordero Vinueza et al., 2023, p.8).

Frank's (2006) scoping review further demonstrated that children and youth have the capacity to meaningfully engage in planning processes. Furthermore, his study revealed that their involvement also plays a role in raising awareness, learning about the local community and environment, and learning and applying new skills. Children's involvement can also serve to develop their enthusiasm for planning and community involvement and making them more confident in their abilities. Children and youth also feel frustration when their recommendations are not taken seriously by adults (Frank, 2006). Elsley (2004) also found that children felt like they were not being listened to when being consulted by professionals and felt a lack of powerlessness. This is relevant, as it shows that children care about being consulted and having a say. In fact, Cordero-Vinueza et al.'s scoping review (2023) revealed that children themselves acknowledge that being actively involved in planning matters and having agency is crucial for their wellbeing. Overall, this growing body of research shows that children are capable of applying and developing the necessary skills to participate in planning and design.

2.2.2 The need for external capabilities

While children are equipped with capabilities, external support is required to achieve meaningful participation. Carroll et al. (2019, p.4) argue that children "require adult assistance to develop participatory skills and pathways to participate", as well as "methods and spaces which enable them to form and express their views". The need for children to be supported in order to be able to act on their capabilities resonates with the core principles of the **capability approach** pioneered by Sen (2005) and Nussbaum (1987). Similarly to the participatory literature described above, the capability approach recognizes that marginalized individuals are "more than capable of making informed judgements, analyzing their situation and articulating their interests" (Clark et al., 2019, p.7). However, the capability approach says that having the capacity and skills to make informed judgements and articulate one's thoughts is not sufficient unless individuals are actively encouraged and have a fair chance to do so. Nussbaum (1987) refers to these capabilities and skills as ***internal capabilities*** - in other words, skills that are internal to children. To provide children with a fair chance to participate and exercise their skills, however, internal capabilities must be supported with ***external capabilities*** (Nussbaum, 1987). External capabilities refer to background conditions that enable internal capabilities to be exercised. One may have internal capabilities but still lack the necessary circumstances to activate and exercise them (Nussbaum, 1987). Dixon and Nussbaum (2012) explain that the realization of capabilities requires the right social and economic background conditions, which in turn require proactive action to be taken by governments. Dixon and Nussbaum (2012) further relate the capability approach to children's rights. They argue that respecting children's rights does not mean treating them in the same way as other groups, but in recognizing that they differ in the amount of external support they require. It means acknowledging that children differ in their needs and requirements due to differences in cognitive and physical aspects, as well as in their social position (Dixon and Nussbaum, 2012).

The power imbalance between children and adults, along with the misconceptions and negative labels attached to children by adults, make the need to establish external capabilities ever more crucial, as children cannot assert their voice in the way adults can. Indeed, Dixon and Nussbaum (2012) argue that children strongly differ from adults in the amount of support they require to

develop and exercise their internal capabilities. In practice, this means that planning professionals must establish effective channels of communication and opportunities for children and young people to learn about their environment and express their views and experiences (Wilks and Rudner, 2013). However, to achieve this, there first needs to be a recognition among planning professionals that children and youth have the capacity and skills to participate in decision-making processes (Wilks and Rudner, 2013).

2.2.3 Child-friendly methodologies

A key way to support children's participation in planning and design is through the adoption of child-friendly methodologies. Research shows that children's participation in planning and design requires different participatory methods than those used with adults (Krishnamurthy et al., 2018; Wilhelmsen et al., 2023). Wilhelmsen et al. (2023) highlight the need to develop strategies that are adapted to the maturity and communication levels of children, as this group is unique and heterogeneous, showing evolving capabilities from age 0 to 18. Elsley (2004) also argues that traditional formal structures of participation are not proper for children, and that using creative and dynamic participatory methods are likely to be more successful. Krishnamurthy et al. (2018) suggest that participation methods taking the form of observation, drawings and dramatization are most fitting for children. The valuable role of visual techniques has also been highlighted by Grant (2015), who argues that they can enable children to have an influence on the planning process and teach them to express themselves in a nonverbal way. This is particularly promising when thinking of young children's participation in planning, who may not yet have the ability to articulate their thoughts properly. Furthermore, Derr et al. (2013) highlight that the use of more conventional participatory methods may hamper children's participation in planning, as such methods have shown to create resistance among youth. What children and adolescents seem to be more engaged in are participatory methods that allow them to express themselves easily. In their scoping review, Cordero Vinueza et al. (2023) also highlight the success of participatory practices that involve taking pictures, drawing, or taking neighborhood walks with children.

While creative-based methodologies are most suitable for children, Grenni et al. (2019) have also highlighted the potential risk of using creative-based tools in going beyond the planning scope, although this risk is not restricted to these methods solely. Creative methodologies give participants greater freedom to express and design their ideas, which could result in input that is not relevant to the planning process being undertaken (Grenni et al., 2019). To overcome this challenge, creative-based methods can be used in a more structured way so as to guide participants toward specific mindsets and frames. At the same time, Grenni et al. (2019) highlight that doing so could result in input reflective of planners' values instead of those of the participants. Grenni et al. (2019) argue that facilitators play a key role in ensuring such skewing does not occur and need to exhibit active listening skills, deep ethical considerations, as well as reflexivity.

The urgency to find appropriate strategies to enhance children's agency in participatory processes has also resulted in an increasing body of research investigating possible methodologies and tools that can improve this participation (Cordero-Vinueza et al., 2023). Innovative strategies, including the use of digital technologies such as gamification and social media, are increasingly

explored and have proved effective in supporting and enabling children to assert their voice. Such digital participatory tools are further discussed in the following section.

Lastly, Derr et al. (2013, p.500) argue that “the most effective way of engaging youth is to go where they are”, either in the classroom itself or out-of-school programs. They argued that such settings are not only more comfortable for youth but also result in broader and more regular participation. Furthermore, they explain that reaching out to children through the school ensures that no discrimination occurs, as more marginalized youth may not have the possibilities or confidence to participate in a more formal context. Derr et al. (2013) further explain that children themselves also prefer such informal and interactive participation as opposed to more formal settings seen in more conventional participatory approaches. This is contradictory to what adults believe, who think that youth should engage in formal adult procedures (Derr et al., 2013).

2.3 Digital participatory methods

2.3.1 Background

In the age of increasing digitalization, increasing numbers of digital participatory methods have been explored and utilized to engage citizens in planning processes. Such methods range from the use of digital tools to support in-person collaborative activities (e.g. Scholten et al., 2017, de Andrade et al. 2020), while others consist of entirely digitizing the participatory experience. The terms e-participation and digital democracy are commonly used when referring to the digitization of participatory processes (Aichholzer and Rose, 2019; van Dijk and Hacker, 2000). Van Dijk and Hacker (2000, p.1) have defined digital democracy as “the use of information and communication technologies (ICT) and computer-mediated communication (CMC) in all kinds of media for purposes of enhancing political democracy or the participation of citizens in democratic communication”

Professionals have increasingly turned to digital tools as a way to overcome the challenges faced with traditional participatory methods and enhance citizen participation (Lin and Kant, 2021). Traditional participatory methods include town hall meetings, focus groups, public hearings, public surveys and more, and require participants to be physically present at a specific time and location (Kleinhans et al., 2015). These conventional participatory methods have faced various challenges, including time constraints, high costs, low participant motivation, and the inability of some groups to articulate their thoughts (Kleinhans et al., 2015). Disadvantaged and marginalized groups in particular often encounter greater barriers to participating in such activities (Kleinhans et al., 2015). The lack of motivation or capability to participate is problematic, as it leads to decisions that reflect the needs and values of older, wealthier and mostly white inhabitants rather than the larger community (Abas et al., 2023). Planning professionals have thus increasingly explored alternative approaches to overcome the limitations of traditional participatory methods and improve the collaboration process between experts and citizens (Kleinhans et al., 2015). A common approach for planners has been to turn towards contemporary technologies.

2.3.2 Opportunities

The potential of digital tools was already recognized in the 1990s with the rise of Geographic Information Systems (GIS) (Kleinhans et al., 2015). GIS was seen as an empowering tool that would allow citizens to have access to spatial information and allow them to convey their ideas through maps. The rise of platforms such as Google Maps provided an opportunity for any citizen with access to the internet to create and publish their own maps and generate geographic information (Kleinhans et al., 2015). Another tool has been social media, which has been increasingly employed by planning professionals to support citizen engagement, share information and gain public opinions (Lin and Kant, 2021). Furthermore, contrary to traditional participatory practices, citizens are very enthusiastic about using social media to collaborate with planning professionals (Kleinhans et al., 2015). Social media is also a portable participatory tool, as citizens can easily access it from their phones. This both removes barriers to accessibility and increases time efficiency, as citizens are not required to travel to a location at a specific time (Kleinhans et al. 2015). Hokke et al. (2019) have also highlighted the increased time efficiency provided by digital technologies, as well as reduced costs, both of which were identified as being key challenges of conventional participatory approaches. The potential of technology in removing barriers to accessibility has also been highlighted by Abas et al. (2023), who note that technology can be a great tool to widen public involvement. Indeed, the use of modern digital technologies in various European countries has proved to be an effective method in facilitating citizens's participation in decision-making processes (Galassi et al., 2021). Through their improved access, digital technologies can lead to the inclusion of new socio-demographic profiles and hard-to-reach groups, including young people, marginalized groups and disabled individuals (Congge et al., 2023; Hasler et al., 2017; Hokke et al., 2019). Other advantages include the ability of researchers and participants to interact in real-time and to collect and analyze data more efficiently (Hokke et al, 2019). More innovative approaches utilizing digital technologies have also been explored, particularly the use of digital visioning techniques and gamification, allowing participants to immerse themselves in virtual environments and illustrate their visions (Kleinhans et al., 2015). This is promising for children, as visual and creative techniques have been shown to be most fitting for this age group (Krishnamurthy et al. 2018; Grant. 2015, Derr et al., 2013). The aforementioned advantages and opportunities of digital technologies offer great potential in removing barriers to children's and youth participation. Kleinhans et al. (2015) also note that youth and young adults in particular are a difficult group to engage with in public matters and that digital technologies are likely to motivate and facilitate their engagement. By offering children an opportunity to participate, digital technologies and social media can also serve to develop them into "more competent and confident members of society" (Hart, 1992, p.34) and serve to "stimulate political knowledge and discussion" (Li and Li, 2022, p.2).

While digital technologies have not been extensively explored with children, a number of recent studies have explored innovative digital methodologies with children. Scholten et al. (2017) have explored the potential of geocraft in supporting Dutch children and youth to address spatial planning challenges. They describe geocraft as ***the real world in Minecraft***, and involves the import of real geospatial data in the game environment. Geocraft was used for children to design and build cities and public spaces as a way to express their wishes and ideas. The possibility to insert real-world features into the game is a significant opportunity, as it allows children to interact

with the “real world" in a playful manner. Furthermore, the possibility to add any 2D or 3D geospatial data means that comprehensive visualizations of specific geographical areas can be created. Overall, the user-friendly nature of Geocraft enabled children and students to effectively engage with the virtual environment (Scholten et al., 2017). Schoeten et al. (2017) highlight that students were able to gain a deep and quick understanding of the complex issues at hand, which was enabled by the intensive gaming undertaken in geocraft. This study highlights that children and youth were not only digitally literate and quickly learned how to engage in digital environments, but also had the cognitive capacities to critically think and analyze real spatial planning cases. A similar experiment was conducted by de Andrade et al. (2020), who examined the potential of the Minecraft game environment in facilitating children’s engagement in planning in the town of Tirol, Brazil. Children were tasked with a similar challenge, namely to alter and redesign the town’s landscape, allowing them to express their wishes for the town’s future in a visual and engaging way (de Andrade et al., 2020). The results of the experiment illustrated the fast-learning nature of children and their ability to successfully interact with the digital environment and visualize their wishes (de Andrade et al., 2020). The project also served as a way to develop children’s skills in a challenging and engaging way, as well as raise their awareness regarding the town’s rural fabric (Andrade et al., 2020). Another study, conducted by Chan (2019) explored the extent to which digital storytelling could enhance the critical and reflective mindsets of young participants aged 16-24 in Hong Kong. Participants were required to share captioned photos in a Facebook group over a 3-week period on the theme of *civic identity in Hong Kong,* creating a digital photo storyline. (Chan, 2019). Participants could see one another’s post and interact with them, making the process highly collaborative and social (Chan, 2019). The findings revealed that this method resulted in high participant motivation and enhanced the critical thinking disposition in civic participatory activities in young individuals. Similarly to the use of Geocraft, digital storytelling highlights the beneficial effect of using visual, creative and engaging methods to encourage and facilitate children’s and youth’s participation in planning.

2.3.3 Challenges and limitations

While digital technologies hold significant potential in facilitating participation, they also present some limitations. A first limitation of digital participation is the heterogeneity of the data produced due to the larger number of participants that can participate, creating significant diversity and increasing complexity (Hasler et al., 2017). This makes the selection process more challenging, in that planners may not know which input to prioritize, particularly as opinions might be conflicting (Hasler et al., 2017). The process by which planners prioritize one input over the other must therefore be taken into consideration to ensure a fair outcome.

Lindner and Aichholzer (2019) have also warned that digital participatory methods may hinder meaningful interaction and discussion. Some research has shown that the use of social media, for instance, may lower the quality of the deliberation process, where participants start engaging in political confrontation rather than dialogue (Lindner and Aichholzer, 2019). Scholars have also argued that “weaknesses in democratic systems cannot be solved through social media or media technologies alone” and that this was “a job which must lie with citizens” (Linder and Aichholzer, 2019, p.34). Another point of concern is that media technologies could be used in a manipulative

way to shape citizens' political opinions (Lindner and Aichholzer, 2019). This is particularly significant for children, who may become biased and whose opinions may be even more easily shaped by adults due to their lack of expertise and knowledge. Distraction has also been raised as a potential concern of digital technological use, particularly for children (Hatch, 2011). Hatch (2011) explains that digital technological use leads to a state of ***continuous partial attention*** in children due to the fact that these technologies require them to pay attention to several things at once. This results in a situation where children are not able to give their full attention to any one task (Hatch, 2011). In the context of participatory processes, this could mean that the use of digital technology may distract children from the topic that is being discussed due to their attention being divided over several elements. Lastly, Sharma et al. (2014) identify a number of other challenges when it comes to the implementation of e-governance, including the digital divide, digital literacy, infrastructure development, accessibility, and privacy and security concerns. In the context of this research, it is relevant to expand further on the concept of digital literacy, as the lack of digital literacy could hamper the success of digital participatory methods for children.

Digital literacy refers to the competences individuals are equipped with in navigating and interacting with the digital world (Li and Li, 2022). Digital literacy extends beyond the simple capability to use digital devices, to also having the ability to consume and generate digital content and to purposefully engage in online communities (Nascimbeni and Vosloo, 2019). Considering the increasing influence of the internet and online communities in public participation, digital literacy becomes key, as it serves to provide people with the necessary skills to express their political viewpoints online (Li and Li, 2022). In fact, Li and Li (2022) demonstrate the positive effect digital literacy has on the probability of online public participation. Lacking digital literacy may be a barrier to participation regardless of whether or not one has access to digital platforms and is therefore critical to take into account in the discussion on the potential of digital technologies in facilitating children's participation. What is hopeful, however, is that individuals can be trained to become digitally literate (Li and Li, 2022). Furthermore, children born in this age are considered to be digital natives, as they become exposed to digital technologies early in life, are surrounded by the internet and have access to a wide array of digital information (UNICEF, 2017; Palaiologou, 2014). This possibly strengthens their potential in using digital technologies to participate in planning processes. In the 2019 UNICEF report on digital literacy for children, Nascimbeni and Vosloo (2019) describe a variety of challenges that children could be facing in the development of digital literacy. For example, the importance of having access to online content in the local language and being exposed to a variety of online content and activities is emphasized (Nascimbeni and Vosloo, 2019). Parents' attitudes, beliefs and behaviors with digital technologies and how these are passed on to their children also plays a role, as children become socialized into particular practices (Nascimbeni and Vosloo, 2019). Furthermore, the integration of digital technologies in schools can also have a positive effect on children's digital competencies (Nascimbeni and Vosloo, 2019). The importance of including digital literacy in school curriculums is emphasized and can serve to develop children's digital skills, and thus empower them to engage in digital participatory projects (Nascimbeni and Vosloo, 2019). The fourth and last challenge described by Nascimbeni and Vosloo (2019) regards the role of private companies, whose devices and services should empower and guarantee children's safety. Private companies not only have the capacity to contribute to initiatives aimed at encouraging children's digital

literacy, but also to influence governmental decisions regarding which digital competencies should be included in school curriculums (Nascimbeni and Vosloo, 2019). The points raised by Nascimbeni and Vosloo (2019) should also be taken into consideration by planners and designers, who can tailor their tools and processes to empower children and enable them to easily engage with digital technologies, as well as safeguard their safety and privacy.

2.4 Conceptual Model

Figure 1 depicts a simplified visual representation of the key themes and concepts discussed in this theoretical framework and their connection to one another.

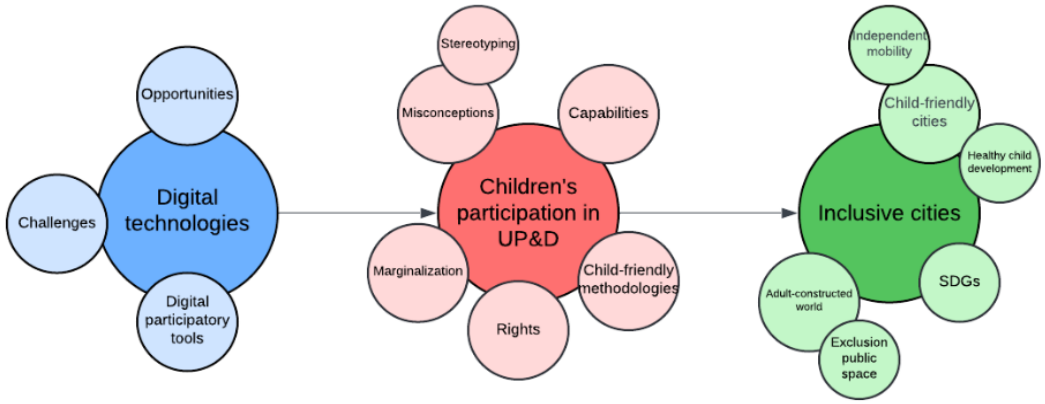

Figure 1 - Conceptual Model

3. Methodology

3.1 Research design

A qualitative exploratory research approach has been chosen for this research. A qualitative research design can shed light on participants' experiences, perceptions and behaviors, which cannot be captured with numerical data as found in quantitative research (Tenny et al., 2021). Furthermore, this approach is strongly suitable when more explanatory "how", "what" and "why" questions need to be answered (Tenny et al., 2021). This is relevant, as the aim of this study is to gain in-depth appreciation of challenges and opportunities associated with the use of digital technologies in facilitating children's participation in planning and design. The in-depth nature of the qualitative approach may also clarify how and why such challenges and opportunities are experienced. The decision to explore this topic in the Swiss context was primarily motivated by practical considerations and personal interest. The author's familiarity with the country and language allowed for a more efficient data sampling and collection process. Furthermore, the absence of language barriers allowed participants to better articulate their thoughts and experiences. The choice to focus on the Swiss context also holds academic relevance, as it not only serves to bridge the research gap on children's participatory capabilities and possible methodologies, but also contributes to a global scale. Lastly, limited research has been conducted in Switzerland on this topic, however, the country's strong political background in democracy and

participatory processes provide a strong background for exploring this topic. This is expanded upon in Section 3.2.

3.1.1 Semi-structured in-depth expert interviews

Semi-structured in-depth expert interviews were conducted in this study due to their potential in generating an in-depth and multilayered understanding of particular topics (Osborne and Grant-Smith, 2021). Furthermore, compared to structured interviews, they allow for greater flexibility regarding the way in which questions are posed, giving the interviewer the possibility to clarify and ask follow-up questions where needed (Osborne and Grant-Smith, 2021). The open-ended nature found in in-depth interviews - semi-structured or unstructured - can also better capture the experiences, perceptions and behaviors of stakeholders regarding digital technologies in relation to children's participation. This is contrasted with structured interviews, which typically consist of closed-ended questions that leave little room for clarification (Osborne and Grant-Smith, 2021), resulting in potentially less detailed insights and incomplete information.

The use of expert interviews was chosen in particular, as specialized knowledge, experiences and perspectives are essential to answer the research question. Expert interviews have been popular in social research and offer an efficient and concentrated approach to data collection, as opposed to more time consuming data gathering processes such as participatory observation (Bogner et al., 2009). The efficiency provided by such expert interviews - compared to other qualitative methods - was useful considering the relatively short data collection period of this research, allowing valuable information to be collected from key stakeholders. Furthermore, Bogner et al. (2019) explain that the shared understanding of the topic and social relevance of the research that the experts and the interviewers might share reduces the need for extensive rationale and potentially increases experts' motivation to take part in the research.

3.2 Case study

3.2.1 Background

The challenges and opportunities of digital technologies were explored in the Swiss context. Switzerland is a small country of 43,000km2 located in the heart of Europe, boarded by France, Germany, Austria, Italy and Liechtenstein (see Fig 2) (Schöffel et al., 2014). Four official languages are spoken in Switzerland, namely German, French, Italian and Romansch. These languages often serve as a geographical reference point, as they are spoken in different parts of the country (see Fig 3). These geographical reference points are also used in the participant description table (Table 1).

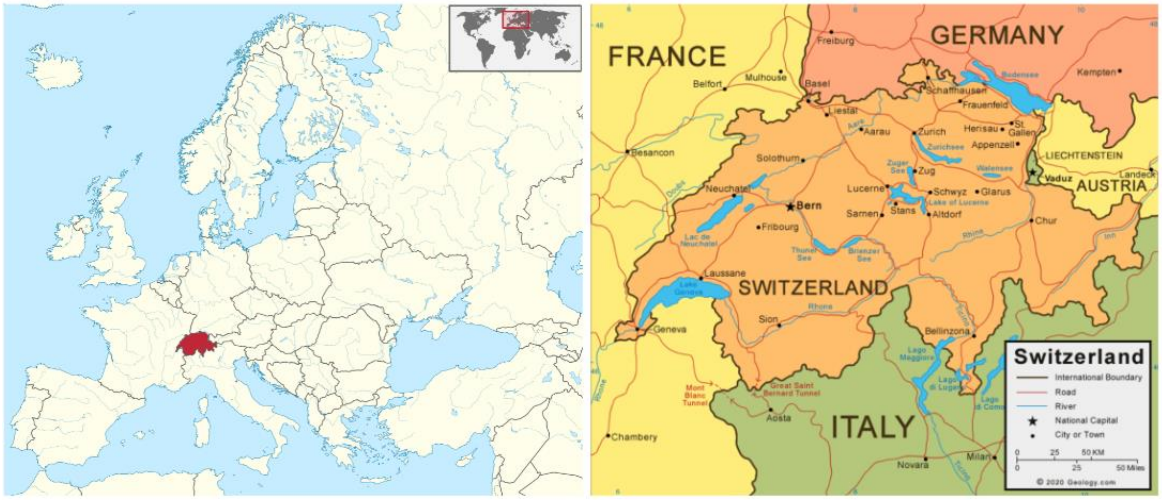

Figure 2 - Location of Switzerland (Wikimedia Commons, 2001; Geology, 2006)

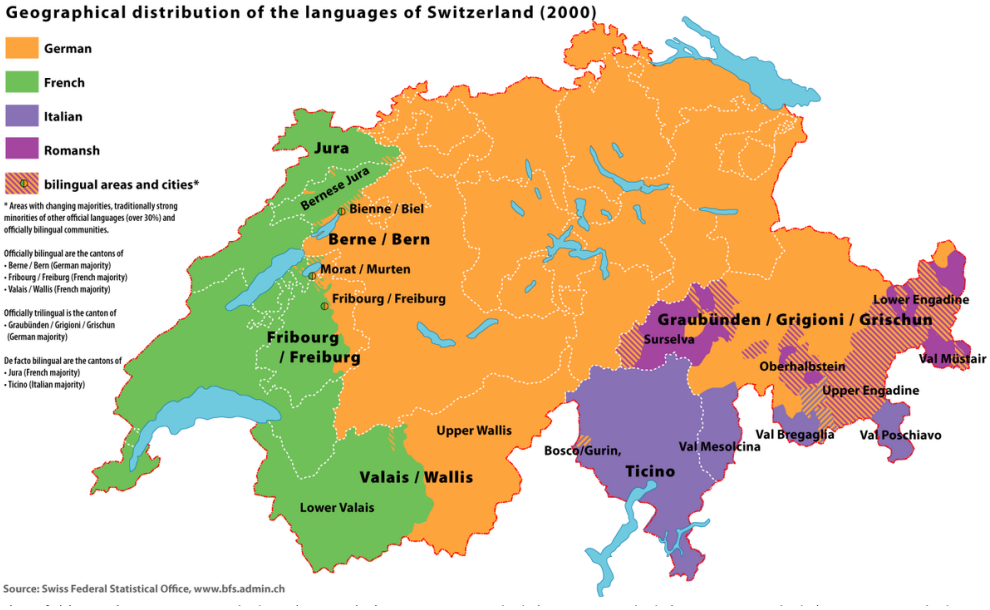

Figure 3 - Geographical distribution of languages spoken in Switzerland (Wikipedia, 2006)

A large percentage of the country is covered by high mountains, forests and lakes, leaving roughly 30% of the area suitable for human use (Schöffel et al., 2014). This results in a high intensity of the land use, which has been compared to countries like the Netherlands (Schöffel et al., 2014). As only a small percentage of the country's land is suitable for intensive human use, one of the primary aims of Swiss spatial planning is to maximize the utility and value of the land in order to effectively support both societal needs and economic activities (Schöffel et al., 2014).

Switzerland is known for its political stability and well-developed democratic rights (Moser, n.d.; Schöffel et al., 2014). Direct democracy is a key characteristics of the country's political structure, which operates as a federalist three-tier system consisting of the Confederation, twenty-six

cantons, and roughly 2150 communes, or municipalities (Schenkel and Plüss, 2021; Confédération Suisse, n.d.). Cantons and municipalities are key actors in Swiss spatial planning, as the main responsibilities for this field lie with them (Schenkel and Plüss, 2021). The Confederation has a rather limited responsibility but is in charge of establishing guiding principles that cantons must adhere to, as well as coordinating cantonal efforts (Schenkel and Plüss, 2021). Such principles can be found in The Federal Law on Spatial Planning, which was established in 1979 (Confédération Suisse, n.d.). Of particular relevance in the discussion on (children's) participation in planning is Article 4, which stipulates that planning authorities must (1) inform the public on the timing, progress and goals of planning projects, (2) ensure that the public is able to participate in the planning process, and (3) ensure plans are made available for public scrutiny (Confédération Suisse, n.d.; Schöffel et al., 2014). In addition to public participation being mandatory by law, authorities often establish optional participatory processes, thus creating great potential for public participation in decision-making processes (Schöffel et al., 2014).

3.2.2 Cantonal and municipal responsibilities

Although bound by the guiding principles and overarching aims set in the Federal Law on Spatial Planning, Cantons have some freedom and autonomy when it comes to practical planning (Schöffel et al., 2014). This allows for thoughtful planning tailored to the unique characteristics of each individual canton. Cantons are responsible for developing a structure plan covering the entire territory. The aim of this structure plan is not to prescribe a blueprint of the desired spatial development of the territory, but instead is seen as "a process plan for coordinating and steering the next stages of spatial development already underway (Muggli, 2012 in Schöffel et al., 2014, p. 36). Cantons then give the responsibility of drawing land use plans to the municipalities. These land use plans must in turn adhere to the guiding principles and regulations outlined in the Federal Law on Spatial Planning (Schöffel et al., 2014). Other responsibilities of the municipalities include issuing building permits and funding the provision of infrastructure for building sites.

3.2.3 Public participation

Various forms of public participation exist at the Federal, Cantonal and Municipal levels (Schöffel et al., 2014). Relevant to this study are those taking place at the Municipal level, as they are in charge of carrying out land use and local design plans (Schöffel et al., 2014). Before the municipal council can make a decision, it first has to receive public approval through three distinct stages. The public can firstly provide input in a first official consultation procedure prior to the enactment of the decision. In a second stage, the public can participate in the form of an optional referendum vote after the decision has been enacted. In this stage, anybody directly affected by the plan can object. Lastly, a second public disclosure of the plans takes place in which citizens can provide further feedback. Most often, the public is informed on any plan via the webpage of the local authorities, through informational meetings, exhibitions, leaflets. Surveys and workshops are regularly conducted as well. In terms of children's participation, most municipalities have a system in place wherein local primary and secondary school children are invited to participate in various activities as part of the (extracurricular) school program. For instance, many municipalities have a children's / youth council in place, whereby children are given the opportunity to share their needs and wishes, offer their perspectives and work on projects (e.g. Ville de Delémont, n.d.; Ville

de Lausanne, n.d.; République et Canton de Genève, n.d.). These meetings usually take place one to two times a month and are facilitated by a person who is responsible for collecting all the information and building a report that is then disseminated to relevant local authorities.

3.2.4 Digital democracy in Switzerland

A number of discussions and initiatives surrounding the digitalization of participatory processes have been taking place in Switzerland, some with greater success than others. While discussions on electronic voting have been taking place for a number of years with little to no effect, other endeavors have gained greater momentum (TA-SWISS, 2024). These more successful initiatives have been termed *civic tech* and aim to achieve a variety of objectives by digitizing political instruments (TA-SWISS, 2024). Such objectives include increasing citizen participation and making political language / issues more accessible to all. There is acknowledgment in Switzerland that there is a need to keep up with societal changes in order to keep up with democracy, which includes the increasing importance of digital technologies (Swiss Info, 2021). However, the independent advisory body for technology assessment *TA Swiss* also warned that while digital tools have great potential for forming opinions and making participation more accessible, they could also lead to the spread of misinformation, distortion and manipulation (Swiss Info, 2021). Another concern brought by the advisory body was the risk that such a process would deepen the digital divide. Both of the opportunities and concerns brought up by the advisory body resonate with the concepts discussed in the literature review, illustrating the real-world application of important theoretical discourses and highlighting their significance. The former Swiss government minister also argued that democratic processes cannot adapt to the speed of digital technologies, as voters require adequate time to formulate opinions and think of political matters (Swiss Info, 2021). A Swiss study also found that collecting signatures digitally could overburden the Swiss political system due to the large amount of public votes (Swiss Info, 2021). The authors of this same study further argued that digital technology might only benefit those already involved in politics and who are digitally literate. There is therefore an ambivalent perspective on the role of digital technologies in Switzerland, with both advantages and disadvantages. They do however hold great potential in making participation accessible to larger numbers of citizens. TA Swiss has therefore argued that digital and non-digital tools should always be used in combination and that democratic processes should not be fully digitalized (Swiss Info, 2021).

3.3 Participants

Interviews were conducted with professionals from the fields of urban planning and design, and education to allow for a comprehensive understanding of the topic. While planners and designers can shed light into the more practical aspects and feasibility of digital technologies in participatory processes, professionals in the field of education can provide insights into the integration of digital technologies in educational settings and how they affect children’s experiences at school. Educators can also shed light on how children engage with digital technologies and their capabilities in using them. Challenges and opportunities of using digital technologies to engage children can therefore be learned by interviewing educators. Learning from the educational context can offer valuable insights for their potential integration into participatory processes. Furthermore, Section 2.3.3 highlighted the influential role of the educational environment in

enhancing children's digital competencies, further highlighting the importance of including this field. Table 1 provides a detailed description of the participants.

Participants	Working field	Workplace	General position	Geographical area	Works with children
P1	UP&D	Urbanism/Design Office	Architect/Urban Planner	French speaking area	NO
P2	Education	International School	Head of Digital Learning	German speaking area	YES
P3	UP&D	Non-Profit Organization	Landscape architect	French speaking area	YES
P4	UP&D	Municipality	Project manager for schools and institutions for children	French speaking area	YES
P5	UP&D	Municipality	Animator children's council	French speaking area	YES
P6	Education	International School	Teacher Year 5	French speaking area	YES
P7	UP&D	Municipality	Animator children's council	French speaking area	YES
P8	Education	International School	Primary school librarian & technology integrationist	French speaking area	YES
P9	Education	International School	Educational data and technology coordinator	German speaking area	YES
P10	Education	International School	Curriculum Coordinator Primary School	German speaking area	YES

Table 1: Participant Description

3.3.1 Recruitment

Experts working in the fields of planning and design were found by conducting online searches. Keywords such as "urbanism", "architecture office", "child participation" followed by the name of any Swiss canton or city were used to find relevant offices or organizations. Their websites were then scanned to learn more about their projects and their involvement with children and local communities. This method narrowed down the search and allowed the sampling of offices / organizations that had some form of experience in engaging children or local communities. In some cases, children's participation was not explicitly mentioned. These places were contacted nonetheless as their knowledge in involving local communities could still be insightful, also in understanding why they might not involve children specifically. Furthermore, considering that children's participation has not yet been fully institutionalized or integrated into planning processes, it was still relevant to contact those. In addition to this, cantons and municipalities were contacted, as many have children's councils in place. In such instances, the council was directly contacted. In other instances, the urbanism and planning department was contacted.

Although contact was made with a wider diversity of regions, all of the recruited participants from this field came from the French speaking part of the country due to many instances of non-response.

The integration of digital technologies in participatory activities was not a requirement. Their novelty in participatory processes and in children's participation specifically meant that it was unlikely for planners and designers to have adopted them. However, their perspectives remain highly valuable, as they can offer perspectives into advantages and limitations of current participatory tools, potential barriers to the integration of digital technologies, as well as perceived opportunities in adopting them in the future. Planning and designers can also offer insights into children's capabilities in engaging with current tools and methods, and in planning more generally.

Having attended school in Switzerland, the author's own familiarity with educational establishments in various Swiss areas made the recruitment phase less challenging. The only requirement set for this field was for digital technologies to be used with children. This was inquired in the emails sent to them, as schools did generally not have this information written on their website. Contact was primarily made with international schools, which are more advanced in the use of digital technologies. After the first interview was completed, a snowball sampling method was used to aid the recruitment process and find additional participants.

In both cases, contact was made both by email and phone. Information about the research topic and objective, a timeline and the duration of the interview were provided. A total number of 10 interviews were conducted, with 5 in each field. All interviews were conducted online as the author could not travel to Switzerland at that time. Interviews were conducted until the saturation point was reached, whereby similar themes were repeatedly coming out and no new significant themes were emerging (Saunders et al., 2018).

3.4 Interview guides

Interviews were conducted with professionals in the fields of planning and design, and education. Two separate interview guides were designed for each of these fields, following similar themes but with questions tailored to each field. The interview guides were built around the core themes discussed in the theoretical framework and conceptual model, namely children's capabilities, digital literacy, participatory methodologies, and digital technologies.

For planners and designers, the questions delved into their current levels of engagement with communities and children and what challenges and opportunities they perceived in this regard. Questions also addressed the participants' current participatory tools and approaches and their advantages and limitations. Participants were also asked to reflect on children's capabilities in engaging with these tools and on their intellectual capacity to participate in planning processes more generally. The last section of the guide focuses on digital technologies, asking participants whether they currently used them in their daily work flow and for engaging communities. Depending on the answer, participants were either asked to discuss their advantages and limitations or to imagine what those could be and whether they saw themselves incorporating

them in the future. In the last stage, participants were asked to reflect on the feasibility, barriers and opportunities of utilizing digital technologies for facilitating children's participation in planning and design. The guide served as a general guideline to ensure that the core themes would be addressed and thus allow the research questions to be answered. Furthermore, the questions always had to be tailored to each participant depending on their profession and type of work they undertook. A number of questions were also formulated on the spot. This was particularly the case for one of the planning and design firms that did not involve children, as the guide included many questions specifically built around children's participation. In such cases, questions on their perceived limitations and advantages of including children, as well as whether they saw themselves collaborating with them in the future, were posed. Questions regarding current participatory methodologies and the use of digital technologies largely remained the same. Overall, the flexibility of the interviewing style meant that the flow of questions was unique to each participant. The principle interview guide can be found in Appendix 1.

For educators, the questions focused on the role of digital technologies in the educational context and their effect on children's digital competencies and general experience at school. Broadly speaking, the guide examined educators' use of digital technologies in the classroom, the advantages and disadvantages of using them for educational purposes, children's digital competencies and their ability to learn and interact with digital technologies. The formulated questions again served as a general guideline rather than a detailed instruction and can be found in Appendix 2.

3.5 Timeline and data collection procedure

The data collection process began in February 2024 and concluded in May 2024. The recruitment process was challenging considering the limited time availability of the research. This resulted in a concentrated and intensive process that involved researching, contacting and calling a wide range of companies, schools and municipalities. The process was time consuming as most establishments either took two to three weeks to respond or never did. This required additional time to send and make follow-up emails and calls. Furthermore, the contact person was in most cases not the one who participated in the research, as most emails first went through the reception of the establishment.

Despite these challenges, this intensive process allowed for sufficient participants to be recruited and reach the saturation point in time for the data analysis. Furthermore, the snowball sampling method applied to the recruitment of educators eased the process after the initial establishments were contacted and first interviews were conducted. One challenge regarding the recruitment of educators in particular was the two-week spring break that schools had, which delayed the data collection process. Fortunately, most interviews were completed prior to this point, enabling the data analysis process to begin prior to completing the data collection. All (online) interviews were completed within an hour, ranging from 22 to 56 minutes. To facilitate the analysis, all interviews were recorded with the participants' consent.

3.6 Data storage and analysis

3.6.1 Thematic Content Analysis

Thematic content analysis (TCA) was carried out for this research. TCA is a common approach used in qualitative research and broadly refers to the identification, analysis and reporting of themes within data (Friese et al., 2018). TCA can be approached in two ways: in an inductive or a deductive way (Friese et al., 2018). While deductive coding is theory-driven, inductive coding is data-driven, meaning that the researcher does not try to fit the data to pre existing theories. A combination of both was chosen for this study. Deductive coding is useful in looking at whether the participants touched upon the concepts and ideas discussed in the theoretical framework, such as children's capabilities or digital literacy. Appendix 3 displays a list of concepts used for deductive coding, which was built based on the core themes of the interview guide and concepts discussed in the theoretical framework. As deductive coding only can be restrictive, it was combined with inductive coding (Appendix 4). Inductive analysis is useful in identifying themes or concepts that were not covered in the theoretical framework. In this process, codes are developed inductively to complement the theoretical thematic analysis (Friese et al., 2018). Overall, the combination of inductive and deductive coding means that the data is approached both with some expectations of what might be found and openness to the discovery of new insights. This openness was key for this research, as the use of digital technologies in children's participation remains a novel topic. This made it crucial to go beyond the concepts discussed in the theoretical framework, as new insights were likely to be derived.

3.6.2 Thematic content analysis using Atlas.ti

Atlas.ti - a computer-aided qualitative data analysis software - was used to facilitate the analysis of the interviews. Using qualitative data analysis software offers various advantages, such as saving time, being liberated from manual tasks and having the ability to deal with large amounts of data (John and Johnson, 2020). Saving time was important for this research considering the short time horizon. Atlas.ti also offered a way to have all transcripts in one place and the ability to quickly go from one transcript to another.

In their paper, Friese et al. (2018) show how **inductive** thematic content analysis can be carried out in Atlas.ti. They discuss and illustrate seven different phases. These were used as a guideline for this study's data analysis and are illustrated in Figure 4.

Figure 4 - Steps for thematic content analysis in Atlas.ti (Friese et al., 2018)

Transcripts of the interviews were created with the use of two AI platforms, namely Sonix AI and TurboScribe AI. All transcripts were stored in Google Drive and Atlas.ti. After this, Friese et al's (2018) seven steps were followed.

1) The first step involved **becoming familiar with the data**, which was useful in identifying initial themes and patterns in the data (Friese et al., 2018). This step was particularly crucial in gaining initial insights and understanding the data, considering that the transcripts were not created by the researcher but with the use of AI. This step was undertaken when listening to the interview audio and reading the transcripts simultaneously to correct for minor mistakes made by the AI tools.

2) The second and third phases involved (2) **the generation of initial codes** and (3) **building a coding frame**. For these phases, transcripts were imported into Atlas.ti. In this phase, the topics discussed by the participants were labeled using both deductive and inductive codes. Thus, some codes were chosen from the premade coding framework, while others were made at the time of the analysis. A refined list of deductive and inductive codes (coding frame) was later created, whereby some codes were deleted or merged together if they only appeared once or twice throughout the data. However, a low frequency code was kept when it was particularly valuable in answering the research question.

3) The fourth step involved **searching for themes**. In this stage, similar codes were categorized together into code groups. These groups were used to identify relevant themes that related to the main research question.

4) Themes were then **reviewed** by describing and connecting individual themes to one another. This step allowed the author to identify whether the themes and codes told a coherent story that related to the main research question.

5) After adjusting and expanding upon some of the themes, a **name was assigned** to each of these themes that would reflect its core message. These are the key themes that are discussed in the discussion section.

6) After completing these steps, the findings, discussion and concluding sections of this thesis were produced.

3.7 Ethical considerations

Prior to the interviews taking place, an informed consent form was written and shared with participants via email (Appendix 5). Participants were asked to sign this document if they agreed with the terms of the research and consented to participate. The document outlined the research and its purposes, the voluntary nature of their participation, the use of their information and data storage, their rights, as well as matters of confidentiality and anonymity. Participants were also asked whether they consented to the interview being recorded. At the time of the interview, participants were asked once again whether (1) they had carefully read the document, (2) whether they had any questions, and (3) whether they consented to the recording of the interview. In a

few cases, informed consent was done verbally at the time of the interview when participants did not have the opportunity to sign the form prior to the meeting.

The specific geographical location of participants, as well as their workplace, are not disclosed in this study. Instead, Cantons were used to provide a more general idea of the geographical context. To ensure confidentiality and privacy, only the author had access to the recordings of the interviews. All collected information was used for research and analysis purposes. Transcripts were stored in Google Drive for the duration of the research and also imported into Atlas.ti for the coding and data analysis process.

4. Findings

4.1 Going where children are

Planning experts revealed that ***going where children are*** was a key way in which children were engaged in participatory activities. Four out five participants working in the planning and design field collaborated with children, and participatory activities were generally held one to two times a month. Participatory activities conducted with children were primarily organized in collaboration with schools, for instance in the form of extracurricular activities. Workshops and activities were also sometimes organized within the school itself. Participant 6 explained that going to the school to reach out to children was a way to avoid bias and discrimination due to the greater diversity of children found in that setting. Although the school was the principal setting in which participatory activities took place, some organizations went beyond this setting to reach a larger audience. Digital platforms were for example used by one organization to enable children (and parents) to directly sign up online. In another case, targeted advertisements were also used as a method to recruit children, using flyers and billboards. Participant 6 explained that their organization collaborated with neighborhood centers and local libraries to hand out flyers to children.

4.2 Awareness on the need and value of children's participation

Planning experts had a positive view on children's role in planning and design and a common awareness of the exclusion, discrimination and stereotyping children were often subjected to. As Participant 3 put it:

> *"[...] they [children] are considered either too young to be involved, or because it's just not something that should concern them. So here, we are first of all convinced that we must also talk to children and young people."*

Participant 3 said she saw children's inclusion as an opportunity to gain new insights, as they are not conditioned by any professional training or society in the same way that planning professionals or adult citizens have. Participant 5 saw children's inclusion as a way to empower them to be citizens and train them to become aware of the fact that they have power over their situation. He referred to this as "training the adults of tomorrow". On the other hand, the planning expert not

involving children viewed their involvement more as a challenge. She explained children's lack of political voice means that they are more challenging to involve than adults would be.

4.3 Motivation

The interviews revealed that children's age tended to determine their motivation levels. Participants working in the planning and design field explained that young children are highly enthusiastic and motivated to take part in participatory activities and to share their ideas, perspectives and opinions. For instance, Participant 7 noted that "*children are motivated, sometimes very motivated, and sometimes very motivated to get together in this group dynamic with a lot of energy. It's a bit special".* On the other hand, collaborating with older children, specifically adolescents, was experienced by participants to be more challenging for several reasons. Firstly, adolescents were perceived to be less motivated to participate than younger children, as Participant 4 explained:

"[...] if we work with older children, so the seven…seven-eighth grades, it's true that sometimes there are some who are already a bit pre-teen like that, who do not necessarily really want to participate in this type of thing. And so we have… we have to try to motivate them, mobilize them. It's maybe sometimes easier with the little ones [...]"

Adolescents were also said to be more challenging to reach due to their busier lives and narrower school curriculums, making it more challenging to integrate planning and design related activities compared to younger children's broader curriculums. Additionally, for children, it is often the parents who will sign the children up for extracurricular activities, while adolescents usually opt for other activities or prefer to make use of their free time to meet up with their friends.

4.4 Capabilities

The interviews revealed that both planning and educational experts generally engaged with children capable of understanding planning projects, critically thinking, expressing themselves, thinking out-of-the-box and coming up with creative solutions to planning challenges, and effectively navigating digital tools and platforms.

4.4.1 Understanding

When asked whether children understood the topics that were discussed in participatory activities, Participant 4 answered *"Yes, without a doubt*". Although some challenges were encountered, he explained, that these did not have to do with children's capacity to understand the topics and effectively participate. Participant 3 explained that children tend to quickly understand the topics that are being discussed and what is being asked of them.

Participant 7 explained that children taking part in participatory activities for the first time did not always have the "codes" or good understanding of the process. Thus, taking sufficient time to assess whether children have an understanding of the process and adapt to their feedback was

essential to ensure they remain motivated to participate. She further revealed that explaining processes multiple times was key to allow children to fully understand the process.

Another commonly revealed challenge was children's lack of understanding, not of the projects discussed, but of the long-time horizon and commitment required in planning projects, and that this was also something difficult to make them understand. As Participant 3 explained:

"It was also difficult to make them understand that today we were going to talk about a very important subject, that made sense, that was current, but that we were going to see each other again in a month, in 6 months and then in 2 years for a simple restitution of the process. And that the project will still happen much later."

Participant 4 also explained that participants usually have to be consulted after a project has been implemented, however, this proved more challenging for children as contact was sometimes lost. He explained that children and adolescents are a very "changeable" and dynamic age group, in that they change and leave schools regularly. This was particularly challenging when working with older children, as they sometimes leave the school the following year, thus hampering the consultation process. He explained that this was not something that was encountered when working with "regular" citizens. Another related challenge was the fact that children quickly forget about the participatory activities that took place a few months before. The regularity with which professionals meet with children was also addressed by other participants, who wished they could meet more often, even those who met children on a monthly basis.

4.4.2 Critical thinking and creativity

In addition to having a general good understanding, planning experts agreed that children demonstrated an ability to critically think about public spaces and come up with creative solutions. For instance, Participant 4 recalled a time where children spontaneously came up with ideas about how to fill up a public square when walking past it on a neighborhood walk, without even having to ask them:

"And then our walk passed through this square. And spontaneously, the children proposed things for this square: games, a blackboard where they could write, a small stage where they could get together, tell stories, put on plays."

He also explained that the analysis and "*diagnosis*" that was made by children about this public square could actually be used and implemented, although he said that there were times where translating children's ideas into projects proved more challenging. In addition to coming up with creative ideas, Participant 7 revealed that children not only thought of themselves but also how other neighborhood users could benefit from a project. She further revealed that children exhibited knowledge and awareness of how other public space users were experiencing the city or neighborhood, exemplifying it with a recent experience:

"The other day we had a council and it was really very interesting because not only are they aware of how children already use themselves in the first place [...] public spaces, but they are

also aware of how certain other groups will use these spaces. And I had a young girl who told me that, for example, for teenagers in the neighborhood, it's complicated because they can't find a place where they can meet up, etc. Or for example, for this person it's super complicated with their stroller."

Although planning experts thought children generally expressed their thoughts and ideas clearly and confidently, Participant 5 explained that children sometimes held back by fear of their ideas and opinions being judged and criticized by others in the group, which he referred to as the group effect. Such fear was also apparent in the educational context, with some educators explaining that children sometimes feared expressing themselves due to others' presence.

4.4.3 Translating children's wishes into concrete planning terms

Above all other challenges, translating children's narratives into working plans remains one of the key challenges. When asked about challenges of collaborating with children, a common theme was the difficulty of translating children's wishes into professional planning terms. Participant 4 explained that the difficulty of collaborating with children did not lie in making them participate and asking for their opinions, but in knowing what to do with the input provided by children:

"It's not complicated, I feel like, involving the children, asking them for their opinion. But then you have to succeed in transforming that into a project and into a determining element for planning. I think this is the most difficult and I think that all cities, all institutions are faced with this to some extent. Meaning that we can have beautiful testimonies from children about their relationship with the street, their relationship with their neighborhood, their relationship with their school. But then, what do we do with it?"

Participants explained that translating children's input into professional terms required reading in between the lines to understand what they mean. This interpretation was seen as one of the main challenges of collaborating with children. Participant 3 explained that the way children formulate their thoughts was sometimes not clear enough to directly be used for a project, hence why interpreting is a key but challenging task.

An often mentioned challenge directly related to this difficulty is children's wishes for often unrealistic projects, such as aquaparks in the middle of the neighborhood, bouncy castles, or even simpler projects such as planting trees that do not fit the specific terrain in the area. This incompatibility between children's wishes and realistic possibilities means that their ideas sometimes have to be rejected. Participant 2 however explained that the tendency to come up with unrealistic project ideas was also apparent when collaborating with adults, although this tended to be more extreme for children.

4.5 Supporting children through tailored methodologies

The findings revealed the importance of tailoring methodologies to the target audience as a way to achieve meaningful participation, facilitate children's participation, and overcome the aforementioned challenges. Firstly, participants acknowledged that participatory methods used

with children strongly differ from those used with adults. Participants 4 emphasized that he tended to avoid classic participatory approaches that involved lengthy meetings largely based on discussion. He argued that such approaches were difficult to implement with children, as children do not enjoy spending their free time in formal settings, especially after being at school all day. Rather, he and other participants emphasized the importance of using playful and creative tools when working with children, which are revealed in the subsequent section.

Participants also emphasized the slowness and patience required in participatory activities when involving children compared to adults, as greater assistance and explanations are required. For instance, to support children's understanding of unfamiliar topics, Participant 3 revealed that they referred back to public spaces or situations that children were already familiar with and had a good understanding of. Thus, while children often had a good level of understanding on a certain process, this was not always consciously recognized. This therefore required additional effort on the part of the organization to guide children in connecting the unfamiliar topic with their existing knowledge and experiences. Participant 7 also emphasized the importance of regularly explaining and repairing the logistics of the process to children, which is why the association insists on meeting with them on a regular basis. She explained that this was different with adults, who tend to immediately be aware of what is happening, why, and how, thus allowing them to get straight to the point.

Divergence in participatory approaches was not only apparent between children and adults, but also between children and adolescents. For example, although social media was not used when working with children, Participant 3 explained that Instagram was used with adolescents. The thinking behind this was for them to use a tool that the adolescents were already familiar with.

Although additional support was given to children to support their understanding of the general topic and process, several participants highlighted the importance of letting children be autonomous and think for themselves. For instance, Participant 5 explained that he primarily thinks of himself as a coach and facilitator, letting children come up with ideas and think for themselves with very minimal influence:

“[...] for me, it's really putting myself in the position of a coach. That is to say that any decision in the projects, any direction, it is not me who will give them. I really leave room for young people. It is they who choose what they want to do, how they want to do it, in what time frame they want to do it. I really try to put no barriers.”

At the same time, the participant noted that he sometimes needed to set some barriers due to children’s unrealistic proposals and wishes, which he explained was also not ideal.

4.5.1 Participatory tools and digital technologies

4.5.1.1 Non-digital tools and methodologies

Planning and design experts mostly employed non-digital participatory tools and methods, which were mostly of creative and explorative nature. The lack of digital device use mostly had to do

with experts' lack of knowledge on possible tools, the success of their current methods, and wariness towards digital participatory tools.

Neighborhood walks was a commonly used methodology by planning experts. The findings revealed that such visits allowed children to experience and discover neighborhoods in a different way, allowing them to interact and be embedded within the environment. Such walks enable children to reflect on their surroundings and identify what they see, hear and feel in a particular place. On these walks, children are often asked to identify and describe aspects of the neighborhood they like or dislikes, as well as reflect on what their ideal city would look like.

Drawing was also a commonly employed methodology. Participant 3 explained that drawing was often used in their participatory activities/workshops and was used as a tool to help children share their views and opinions. One way to do this was to ask children to draw something based on an open question and later ask them a set of other questions based on their drawings. She explained that it is when children start describing their drawing that many valuable insights arise:

"[...] And they tell us about their drawing. And it's when they tell us about their drawing that a lot of things actually come out. And that's really a methodology that we use that works very well."

Participant 3 also explained that drawing allowed children to really think and also remember what their thoughts were. She explained that in a more oral or verbally based activity, children are more likely to lose their train of thought. Participant 7 had a similar view on the value of writing things down on paper, saying that committing to paper allows children to really think, compared to typing them down on a digital device. Another methodology based on drawing was to have children add on to an existing image of a playground. Children could draw shapes, cut out shapes, add post-it notes, and more. The idea was for them to add on anything they would like to see appear in that space. The images were then used in combination with the neighborhood walk to develop playground projects. In discussing this methodology, the participant emphasized that children strongly enjoyed such crafty and creative methodologies.

Some experts also organized discussion-based participatory activities. An interesting discussion-based activity, although not something organized regularly, was debate competitions. For this activity, children were instructed to randomly draw out a recent Swiss vote that the animator thought would interest them or concern them. Children then had to draw lots which side they would be defending, either for or against the specifics of the vote. Children were then given an hour to develop their argumentation. Such debate competitions were organized to expose children to real-world debates and get them accustomed to voting and participating in planning matters.

Participant 7 highlighted that, although their participatory activities were primarily based on discussion, including child-friendly elements in these meetings to allow children to still "be children" was key. Thus, an important element in their activities is having an informal moment with children, which takes place in the form of a "goûter" (a snack that is often taken mid-morning or mid-afternoon). This time allows children to get to know each other and to ensure a good exchange and experience afterward.

4.5.1.2 Digital Tools and Methodologies

Digital tools were not commonly employed by planning and design experts in participatory activities and were only used occasionally. Participant 5 made use of *Canva* and *Kahoot* in some participatory activities. In both cases, these were used as supportive tools to enhance participatory activities and not as a way to replace in-person participation and collaboration. *Canva* was used with children to create digital posters or flyers to advertise their events, which are then posted on social media. This tool is more team-based and provides creative space for children to experiment with different ideas. *Kahoot* was used to create poll-based online quizzes, allowing children to individually answer questions from their own digital devices. The participant uses this platform to create "general knowledge" quizzes and likes to strategically insert one or two questions to prompt children to think and express their thoughts on a spatial challenge. This method was used as a way to encourage participation and provide children with an opportunity to express their thoughts, without them sometimes even realizing that they are doing so.

Digital participatory tools were also used by other planning experts, such as the use of Instagram to involve adolescents and blogging. Online surveys and local community platforms were also used by the organization who did not involve children. Some experts involving younger children also revealed that the municipality they worked at made use of online surveys with other target groups, namely adolescents and (young) adults.

Another methodology employed by two planning experts was the creation of digital recordings and songs. These tools were used to invite children to share their thoughts, observations, and their likes and dislikes on particular neighborhoods and areas. This activity allowed children to express themselves in a fun way and for adults to learn more about how children perceive their surroundings and allow them to see the world from a different point of view.

While digital technologies were seldom used in participatory planning and design practices, a variety of digital platforms and devices were utilized within the classroom setting and educational experts displayed a strong pro-technology attitude. Tools such as iPads and Chromebooks were commonly utilized in the classroom with children of all ages, including toddlers. iPads were commonly utilized for online reading, writing, and other educational activities such as story creation, taking photos, or mathematics practice. For instance, Participant 7 used an online application named *Mathletics* with children to complete various math drills and activities whenever they had some spare time available. Digital softwares focused on creativity were also commonly employed in classrooms, including *Canva*, *Procreate*, *PuppetMaster* and *Bookcreator*, to create stories and develop children's creative and expressive skills. Digital recordings and speech to text features were also commonly utilized in the classroom, primarily with the aim to support children's thought expression and learn to express their voice.

Participants 7 and 8 also described a number of innovative digital technologies that were used in the school, including Lego Technology and Minecraft. For instance Lego Technology was used with children to study earthquakes and design earthquake proof buildings. Children could program the robot through coding to control the earthquake simulation in order to build the most efficient buildings. Lego Technology came with a step by step guide that children themselves could build.

Minecraft was also used as an educational tool for various activities, such as designing cities or building and exploring biomes.

4.6 Digital literacy

A general consensus emerged that children demonstrate good competencies in navigating and utilizing digital environments and tools. Participant 1 perceived children as being the most adaptable to digitalization and that it was often said that the Alpha Generation, as she put it, "*will be ready to have a chip under their skin"*. She saw this generation as being particularly open to technology, more so than other age groups - such as older adults.

Participant 3 explained that the intuitive nature of *Canva* allowed children to easily work with this digital platform and that they are only briefly instructed on how the platform works prior to using it. Participant 7 said that most children had the capacity to be efficient and effective when using digital technologies, but that it was dependent on children's character and also on the day. For instance, she explained that children with attention issues sometimes were more distracted and less efficient when using them. Contrary to this, Participant 8 explained that digital tools supported children with learning differences, arguing that such tools were essential in allowing such children to fully participate in the curriculum. For instance, she explained that dyslexic children needed the accommodations and accessibility that such tools provide. Several educators also explained that children have a fast learning nature and the ability to pick up on things very easily, more so than teachers themselves.

The important role of the school in contributing to children's digital literacy and citizenship was revealed throughout the interviews. Participant 8 highlighted the importance of teaching children digital skills despite them being digital natives. She further argued that teaching children how to utilize and navigate digital tools and environments at school specifically was key, as using digital technology as a work tool strongly differed from using it as a play tool, which children already tended to do at home. Beyond learning to utilize digital devices as work tools, Participant 10 argued that the integration of digital technologies in the educational context was key in preparing them for the future; teaching them about the world they were going to live in. Educators had various strategies in place to support children's digital literacy and understanding. At a broader level, digital citizenship was a commonly taught element in the various schools interviewed, which is a commonly employed strategy in international educational settings. Digital citizenship covers a variety of aspects related to digital technological use, including how to safely navigate the internet, research skills, social media, and other digital competencies. At a smaller scale, Participant 7 also taught her students keyboarding skills. This participant uses a program that children can navigate themselves and has them doing ten minutes in the morning. She emphasized the importance of teaching children these skills, as they were going to increasingly use it as they progressed higher through the school. This participant viewed the use of digital technology in the classroom not only as a way to contribute to children's digital literacy but also their general literacy skills.

4.7 Potentials and challenges digital technologies

4.7.1 Time efficiency, accessibility and motivation

Time efficiency, accessibility and motivation were revealed as key potentials of digital technologies. Time efficiency and accessibility were discussed by both planning and educational experts as being key advantages of using digital technologies as participatory and educational tools. As explained by Participant 5: *"I really think that the biggest advantage we get from this is really the exchange of ideas, the potential, the enormous potential and the speed, the time that we can, that we can save in procedures. The number of people we will be able to reach."*

Participant 2 explained that digital technologies offer a way for children and teachers to access educational material much more efficiently and provide resources and information that could not be provided otherwise. Participant 8 explained that the accessibility to a wide range of platforms provided by digital tools supported children's creativity at school, offering endless possibilities for creating stories and more.

The findings further revealed the potential of digital technologies in enhancing educational and participatory activities and making them more fun and engaging for children. For instance, Participant 8 explained that the use of digital tools made children feel like they had more fun despite doing an activity that would be of similar nature on paper. Participants 7 and 8 explained that children would much rather complete an activity with the use of their iPads or other digital devices rather than doing it manually. From this point of view, digital technologies can be seen as a motivational tool. Furthermore, Participant 4 revealed that digital technologies could be effective in enhancing current practices, such as neighborhood walks. On the other hand, Participant 9 revealed that children were more excited by the use of digital tools than adolescents, as children tend to be more motivated by the educational material than the latter group.

The potential of digital technologies in motivating adolescents in particular to participate was discussed by several planning experts. Due to adolescents being less motivated to participate and more challenging to reach out to, some participants saw digital technologies as a potential solution to involving them more. In fact, one participant was currently collaborating on an initiative with other members of the municipality to allow adolescents and young adults aged 16-25 to express themselves on matters related to the city, which he saw as an important and often forgotten group. This initiative will involve sending out online surveys accessible via a QR code, consisting of 4-5 simple questions. This participant explained that in discussing how to best include this age group, the use of digital technologies was deemed the most appropriate solution:

"The thinking was about how we could include them and keep in touch with them and allow them to have this participatory power. Well it is via the digital world, because they either have… they are completing their studies just like you, even sometimes abroad, or they have multiple activities, multiple hobbies. So for this type of questionnaire, we thought that, in the end, digital technology was the best solution."

In addition to potentially benefiting adolescents by providing them with a way to get involved, participants also saw the valuable role of digital technologies in also broadening participation among younger children. Although participants viewed digital technology as a potential way to reach a greater diversity of people, some also emphasized that children, especially the youngest ones, may not benefit from them as they may not yet own a phone.

4.7.2 Distracting and overstimulating nature of digital technologies

Distraction was one of the most recurrent challenges when discussing digital technologies as a tool for collaborating with children, both with educators and planning and design professionals. Distraction was discussed both in the context of stirring children from the task at hand due to the constant availability of other aspects than learning, and in the context of overstimulating children.

Participant 7 argued that digital technologies should be used very carefully, as they can serve as a source of distraction that steers children away from the task they are meant to be working on. Although this participant hadn't experienced any serious issues, she did experience times where children used their digital devices, in this case tablets, to search pictures of "puppies and kittens" rather than working on the assigned task. Participant 9 attributed this distraction to the constant presence of sources of stimulation caused by digital devices, although he did not view this as a significant downside of digital technological use for learning. Participant 2 also viewed digital devices as a potential source of distraction. However, he explained that middle school students in particular tended to be more distracted by them. He explained that this was because the youngest students tend to very much be under the teacher's eye, while older students tend to be more focused on the tasks they are meant to be doing and have a better understanding of the time they have to be working on something. Similarly, Participant 8 highlighted the importance of having a secondary monitoring system for younger children as going off books is highly tempting for them. She explained that when using Minecraft, children's ability to circumvent the activities and play the actual Minecraft game instead of focusing on the task was a disadvantage of using digital devices in the classroom.

In a similar line of reasoning, Participant 3 explained that the use of digital technology may result in information overload for children, as there are too many different types of information provided all in one place and at the same time. She explained that such information overload can lead to distraction for children and illustrated this by describing a time when a recording device was used to create digital recordings as a part of a participatory activity. She explained that children were so captivated by the many aspects of the recording device that their attention got completely diverted from the activity:

> *"[...] in our recording experience, in fact, sometimes they were just captivated by the object. There was a pole to pick up the sound, there was the microphone, there were perhaps the headphones of the person recording, the little box. And already all of that, it makes them disengage completely, change the subject [...]"*

This distraction primarily had to do with the novelty of the device, stirring curiosity among children. Participant 10 revealed similar experiences regarding the distraction that occurred among young

children as a result of this novelty. To avoid such distraction, she explained that a key component when introducing new digital devices to young children was to have some exploration time, to allow the novelty and excitement to wear off slightly prior to using them as work tools.

4.7.3 Collaboration and expression

Another recurrent challenge when discussing digital technologies was that such tools could hamper and restrict the deliberation process and collaboration. As Participant 7 explained:

"I think the collaboration element maybe might be compromised [...] I've seen it where they're, they're supposed to be collaborating, but they're working in tandem and they're not even talking to each other because they're fixated on the screen"

Similarly, Participant 5 expressed a fear that if in-person participation would be replaced by digital technologies, that there would no longer be debate or exchange of ideas between children. He expressed that in his view, our society was already looking at issues in a black or white matter and that being in gray areas was already challenging, and that going completely digital with participation would further intensify this divide:

[...] I'm afraid that if we go all digital with participation, there won't even be these exchanges of ideas and points of view anymore. And we enter even more into a black or white divide, right or wrong, that's all. That's a little bit of the danger that I see."

Participant 1 explained that although she did not believe that digital technologies were against or opposed to participation, that participation was still first and foremost about seeing each other in person and exchanging ideas and information in real life. She also explained that conducting a participatory activity via zoom, for instance, was something that she had a hard time picturing.

Some participants also touched upon bias. When asked about the potential limitations of digital participatory methods, Participant 7 explained that one of the risks of using digital technologies was that it could result in biased feedback from children. She argued that it is very difficult to build online questionnaires or surveys that allow to collect people's opinions and be close to them. This same participant explained that conducting in-person participatory activities based on discussion resulted in a greater diversity of opinions, free from bias that would otherwise be imposed from tools such as surveys. Participant 5 had an opposing view on the intersection of digital technologies and bias. He found the use of the digital platform *Kahoot* great, not only because children find it very fun to work with but also because it helps limit the biases in relation to the judgment of the group, which sometimes make children hold back. He explained that individually sharing their opinion behind a screen can aid children to express themselves and reduce this potential bias and fear.

The role of digital technologies in supporting children to express themselves was revealed by several other participants. Participant 6 said that digital technologies were helpful in assisting some children to express themselves, particularly those with learning difficulties, through features such as speech to text. Similarly, Participant 10 explained that the creation of digital recordings

reduced anxiety among children who feared expressing themselves in front of others by providing them a safe space to do so. By providing children with an opportunity to comfortably express themselves, she argued that digital tools can even serve to build skills that could otherwise not be developed.

4.7.4 Balancing digital and non-digital methods

Balance was an overarching theme addressed in the interviews. Experts from both professional backgrounds emphasized the importance of having a balance between the use of digital and non-digital methodologies. For instance, Participant 5 believed that the use of digital devices was all about dosage. On one hand, he believed that dealing with digital technology was unavoidable nowadays and that wanting to completely exclude such technologies would be utopian and counterproductive, even for social work. On the other hand, he explained that human contact and collaboration must remain central in participatory processes. Similarly, Participant 1 saw the use of digital technologies as part of the evolution of society and their use unavoidable and necessary, however, still viewed public participation as an exchange of ideas that should take place in-person. Such wariness was also revealed by Participant 7, who saw digital technologies as a powerful tool yet remained skeptical about using them too much in the classroom. Having taught for more than thirty years, she noticed a downward trend in children's ability to spell and express themselves in writing, which she attributed to the increasing use of digital technologies in schools. She also noticed a decline in children's ability to think and pay attention. Thus, for her, finding the right balance and setting clear parameters in terms of how much digital devices are used by children was key. Participant 8 also observed a decline in children's grip strength, although the recent use of apple pencils in the school slowed down this trend. Overall, balancing digital and non-digital participatory methodologies was revealed as key in avoiding the downsides of digital technological use and preserving the advantages of in-person contact.

5. Discussion

5.1 Differing perspectives on children's participation

It is interesting to note the contrast between experts involving children and the expert not involving children in terms of how they viewed youth participation. While planning experts involving children had a common awareness on the importance of including children and highlighted the importance of giving them a voice and empowering them, the expert less experienced in collaborating with children had greater difficulty picturing how their involvement would be arranged due to their lack of political voice and power. The latter view is in line with previous findings, which highlighted that viewing children as future citizens rather than current ones was a key barrier to their involvement (Elsley, 2004; Cordero-Vinueza et al., 2023). This view is also a good illustration of Frank's (2006) argument, who asserted that the assumption that children do not have the political leverage to participate is a further barrier to their meaningful involvement. This view did not have to do with a negative outlook on children's skills and competencies but rather represented a lack of knowledge and understanding on how children's participation could be integrated. This supports the remark made by Stenberg and Fryk (2021) that there remain knowledge gaps regarding the system

changes required for children's participation to become institutionalized. Although the positive view displayed by experts involving children is biased due to the fact that their work revolves around children, it also highlights that including children may not be as challenging as it is perceived to be. It further highlights the need to educate urban planning professionals and other authorities on the importance of youth participation and the ease with which it can be organized. Lastly, the findings revealed the value of including children due to their different, non-biased outlook on public spaces, supporting the insights discussed by Cordero Vineuza et al. (2023) that children's perspectives are highly valuable because of their non-adult dominated perspective, offering new insights and a more profound understanding of the built environment. Overall, children's lack of political power (voting) does not make them any less meaningful participants in urban planning and design and should be viewed as important social actors in society, as argued by Cockburn (2005).

5.2 Children's capabilities in participatory urban planning and design

The findings, which highlight children as competent participants in urban planning, are in line with the growing research showing that children are sufficiently competent to participate in planning and design processes. Elsley (2004) had noted that professionals had largely underrated children's ability to utilize and understand public spaces. The findings revealed that misconceptions on children's ability to understand planning processes and public spaces have no foundation, as children always understood the processes and topics being discussed and what was being asked of them. Not only did children understand these topics but were often very fast in grasping what was going on, again contradicting many of the common misconceptions made by planning practitioners, who have strongly underrated children's skills and competencies. Furthermore, children's ability to critically think of public spaces, their users, and their creativity in coming up with solutions illustrate a multifaceted understanding of public spaces. In line with Bąkowska-Waldmann (2023), this shows that while children may not have the education, their experience is sufficient in having a multifaceted understanding of public spaces, their users and functionalities, and therefore should not be dismissed. In addition to being equipped with diverse skills and competences, the findings revealed (younger) children as highly enthusiastic participants, showing that children enjoy being included in such processes. This is in line with previous findings, which suggested that children care about being consulted and having a say on the environments that affect them (Cordero-Vinueza et al., 2023; Elsley, 2004).

While children were deemed sufficiently competent by planning experts, various challenges of collaborating with children were revealed by participants. A key challenge was experts' perceived difficulty of translating children's wishes and ideas into concrete planning projects, either due to their children's lack of knowledge of technical planning rules or due to their out-of-the-box thinking. While children have the capabilities to participate in and understand planning processes, as well as think of creative solutions, their out-of-the-box thinking does not necessarily always fit real-world settings. Thus, while participants emphasized the importance of giving children as much freedom as possible, setting up some rules and restrictions could potentially allow the input to remain within the planning and design scope. Other perceived challenges included children's struggle in articulating their thoughts, fear of group judgment, and challenges related to the long-

time horizon of planning projects, both in regards to commitment and the difficulty of keeping in touch with children due to regular school changes.

Despite the challenges associated with children's collaboration, their participation remains key, not only as a way to receive their input, but to help them grow into informed adults. As Frank (2006) and other scholars highlighted, involving children is an opportunity for them to learn about the local community and environment, as well as learn and apply new skills. This can cultivate a greater sense of civic responsibility among youth, who may feel more empowered and confident to participate in later life as well. In the same way that children's experience of public space can inform decision-making, their experiences as active participants in decision-making processes are equally crucial in building further knowledge and preparing them for the future. Furthermore, the findings revealed the importance of tailored methodologies and potential of digital technologies in further supporting children's capabilities and overcoming some of the aforementioned challenges, discussed in the subsequent section.

5.3 Supporting and facilitating children's participation through tailored methodologies

The finding revealed the key role of tailored methodologies in supporting children's effective participation in urban planning and overcoming the aforementioned challenges. This idea supports one of the key aspects of the capability approach, namely that good background conditions - or external capabilities - are key for individuals to successfully engage in participatory processes and exercise their internal capabilities (Nussbaum, 1987).

5.3.1 Going where children are: advantages and limitations

Firstly, the findings revealed that a key aspect of children's participation was the process of going where children are, supporting the arguments made by Derr et al. (2013), who argued that engaging children in the school context was the most effective way of engaging youth for a number of reasons. Firstly, engaging children in the school setting was argued to be beneficial in reducing discrimination, by having the possibility to reach out to a wider diversity of students, including groups that may otherwise be marginalized or not have the possibility or confidence to participate outside such contexts (Derr et al., 2013). The findings indeed revealed that this was the reason planning and design experts collaborated with schools to reach out to children. At the same time, some organizations went beyond the school setting to reach an even wider range of children, indicating that solely organizing participatory activities within the school setting may not be sufficient to have a large and diverse enough group. Not all schools may have children of diverse socioeconomic and sociocultural backgrounds, such as private schools, who would largely consist of higher socio economic groupings. Additionally, reaching out to children via schools does not mean that all children will necessarily want to participate in planning related extracurricular activities/children's councils. Thus, while collaborating with schools should be an integral part of engaging children in planning and design, planning and design experts should not limit themselves to this one setting.

A second reason discussed by Derr et al. (2013) for which organizing participatory activities within the school setting was key was due to the greater comfort this would bring to children themselves,

who tend to prefer informal settings than those seen in more conventional participatory settings. They further argued this was contrary to what adults believe, who think that engaging children in formal adult procedures is most optimal. Some experts revealed that some of their activities were largely discussion based, slightly mimicking more conventional participatory procedures seen with adults. However, they remained aware of the importance of including informal elements in these activities, including the “goûter” period where children get to know each other around drinks and snacks.

The finding further revealed that the school setting provided an easy way for children to be involved. Firstly, the integration of planning and design related activities in school curriculums is very easy, particularly for earlier grades with broader educational goals. Secondly, children enjoy taking part and are more likely to take part in extracurricular activities. On the other hand, involving adolescents through this context was proved more challenging due to their more narrow curriculums and lower motivation to participate in such activities. Thus, using the school setting as a way to engage children may potentially be less effective to involve adolescents, who could benefit from other participatory approaches, including digital approaches.

5.3.2 Supportive roles of patience, creativity and informality

Alongside going where children are, the findings revealed that children’s participation necessitates a slower methodological approach. Taking additional time to explain processes to children and doing so repeatedly, ensuring they understand what is going on, and activating their understanding by taking additional time to relate the activity to children’s past experiences were revealed as key ways to support children’s participation. The findings further revealed an abundant use of creative and participatory tools by planning experts, supporting the wide array of research suggesting that such methods are most appropriate and engaging for children (Elsley, 2004; Krishnamurthy et al., 2018; Grant, 2015; Derr et al. 2013; Cordero Vinueza et al., 2023). Such participatory tools were revealed to be employed to support and empower children to participate in planning processes, highlighting that the use of creative tools is not merely a symbolic gesture but a supportive system, relating again to the concept of external capabilities discussed previously (Nussbaum, 1987). Furthermore, the integration of non-verbal elements such as drawing were highlighted as crucial tools in supporting children to articulate their thoughts. Such tools were also chosen in line with children’s developmental stage and what tools they already had experience with, supporting Wilhelmsen et al.'s (2023) argument on the need to develop strategies adapted to the maturity and communication levels of the participants.

A key point to note is the potential limitations inherent in creative-based participatory methodologies. The literature highlighted the risk of using creative-based tools in going beyond the scope of the planning process and aims due to the greater freedom assigned to participants. (Grenni et al., 2019). The findings resonate with this observation, which revealed that children often generated creative but impractical proposals. Considering that most participatory methodologies employed were rooted in arts and creativity, it is plausible to assume that such approaches may exacerbate the generation of ideas that do not lie within the scope of the given scenario. Grenni et al. (2019) argued that a potential solution to this challenge could be to use arts-based methods in a more directive way to fit within a specific planning scope. However, they

also pointed out that doing so could result in ideas that are influenced by the values of planners themselves. Children could benefit from greater guidance in the generation of their ideas, however, a balanced approach is required in order to both give children sufficient freedom and yet remain within the planning scope. The integration of educational components in participatory activities could further benefit children in understanding what is feasible or not.

Although many participatory methodologies were based on drawing, crafting, observations and other creative activities, participants also organized discussion-based activities resembling conventional participatory methods. Previous literature has criticized such practices for potentially hampering children's participation and creating resistance among youth (Derr et al., 2013). Issues such as time constraints, low participant motivation and challenges in articulating thoughts had also been described as significant downsides of conventional practices (Kleinhans et al., 2015). This research only partly supports these views. The findings revealed that young children in particular strongly valued social interaction and always came highly motivated regardless of the nature of the activity, showing no signs of resistance. However, the importance of including informal and playful elements in such conventional participatory approaches was highlighted in the findings. The importance of informality had also been highlighted by Derr et al. (2013). Overall, conventional practices should not be seen as a "no go" for younger children. However, the inclusion of engaging, informal and supportive elements in conventional practices is key in ensuring children's effective participation.

On the other hand, the downsides of conventional practices were more apparent for adolescents. As Kleinheins et al. (2015) noted, the findings indeed revealed that adolescents tended not to participate due to time constraints and low participant motivation, both being key downsides of conventional practices. At the same time, adolescents not only displayed resistance to conventional practices per say, but rather existing methodologies altogether. Adolescents' low receptivity to current methodologies highlights the need to explore alternative approaches to get them involved in planning and design discussions, digital technologies being a promising one.

5.3.3 Digital technologies as supportive tools

The findings revealed the potential of digital technologies in further supporting children's capabilities. As revealed in the findings, digital technologies show potential in facilitating children to express themselves, both those who find it difficult to articulate their thoughts verbally, and those who fear group judgment. Digital technologies can further cultivate expressive skills among children and empower them to assert their voice, particularly those reluctant to speak in others' presence. This is key within the realm of urban planning and design, as it empowers children to assert their voices and articulate their thoughts. The use of online quizzes, digital recordings, and digital storytelling were revealed as key tools to support and cultivate such expressive skills.

The ability to visualize environments in a realistic way and interact with digital worlds in real-time are further advantages of digital technologies and can serve to support children's understanding of planning and stimulate knowledge creation. Furthermore, digital technologies were revealed to be fun and engaging for children and enabled them to more effectively engage with the educational content. Thus, by providing a fun way for children to participate, digital technologies

can also increase engagement among children. As revealed in the findings, the use of gamification and Lego Technology in the school context served to stimulate knowledge creation and support children's understanding of various processes in an engaging way. Similarly, the ability to more clearly visualize children's ideas holds significant potential for planners to more easily understand what children mean and facilitate the integration of these ideas into planning projects. For example, the findings revealed that gamification was used for children to design their dream cities, supporting children to express their visions in a realistic manner, in addition to building their digital competencies. Designing "dream cities" is also a recurrent activity conducted by planning experts, without the support of digital technologies. Adopting digital tools could serve to enhance this process and facilitate the integration of their ideas. The potential of gamification in enhancing participatory activities with children is in line with previous research (Scholten et al., 2017; de Andrade et al., 2020), which had highlighted gamification as a suitable tool to involve children.

Lastly, digital technologies can serve to provide greater structure to participatory activities, which could support the integration of children's ideas into planning projects. For instance, the possibility to set greater restrictions in a Minecraft game and have children interact with ***the real-world in Minecraft*** (Scholten et al., 2017) could allow children to remain within the scope and assist children towards proposing projects with higher chances of implementation. The use of simpler tools such as online quizzes can serve a similar purpose.

Overall, the findings on children's capabilities in providing meaningful input for planning and design revealed that their participation necessitates a tailored approach different from those that could be imagined with adults. Going where children are, taking the time, and incorporating creative and informal elements are key to activating children's internal capabilities (Nussbaum, 1987). Children's capabilities in quickly grasping what is going on, having a good understanding of public spaces and their users, displaying out-of-the-box thinking, and exhibiting critical thinking skills, brings out not only meaningful input for planning and design, but also prepares them for adult life by providing them a learning environment to enhance their skills and grow civic responsibility, as indicated by Frank (2006). Furthermore, children's input is as valuable as those of adults if translated properly, as indicated by Carroll et al. (2019).

5.4 Digital competencies

Children's abilities to efficiently utilize and navigate digital tools and environments also contradict the prejudices found in the literature about children's ability to perform technological tasks (Vissing, 2023). It is noteworthy to highlight the irony inherent in such stereotyping, as the findings revealed that children could more quickly grasp and efficiently utilize digital tools and platforms than adults themselves. It is also key to question who exactly is behind such stereotyping, as all experts interviewed did not encounter significant challenges in children's use of digital tools and platforms. At the same time, it is relevant to note that the educational experts interviewed for this thesis all worked in private, international schools. Such wealthier schools have greater access to digital tools and platforms and have a higher socio economic grouping compared to public schools. This both means that students may make greater use of digital technological use at

school and have (earlier) access to digital tools at home. Thus, children attending international schools may be more digitally literate than those attending other schools. However, planning experts also viewed children as digital natives and did not encounter any challenges in children's use of digital tools. Switzerland is also a wealthy country, where a digital divide may not be as applicable. Thus, the results gained from educational experts remain relevant and representative of the Swiss context.

The concept of external capabilities (Nussbaum, 1987) is also applicable to children's utilization of digital tools and platforms, where supportive strategies were put in place in the educational context to support children's use of such tools. This was seen through the implementation of digital citizenship lessons and practical training, such as keyboarding lessons. Participants themselves also found the use of digital tools at school key in making children more digitally competent, particularly in teaching them how to use digital tools as a work tool. These findings are in line with the arguments made by Nascimbeni and Vosloo (2019), who argued that the integration of digital literacy in school curriculums could serve to develop children's digital skills and ultimately empower them to engage in digital participatory projects. The findings suggest that integrating digital tools at school indeed contributes to children's digital competencies. Teaching children how to use digital tools as work tools is also relevant to the field of planning, as children must be able to make the distinction between play and work for the process to be taken seriously. Although experts highlighted the need for playful and informal elements, using digital tools as a way to participate in planning conversations would require greater attention and thinking than simply playing a digital game. Teaching children how to use these tools as a work tool is therefore key, both in education and planning itself. However, this additional step would likely require very minimal effort on the part of planners and designers due to children's strong proficiency in using and navigating digital tools. This was indeed the case for some planning experts, who were already making use of some digital participatory tools with children.

5.5 Broadening participation through the use of digital technologies

In addition to enhancing and supporting current participatory processes, the findings revealed the significant potential of digital technologies - through digital participation - in broadening participation, particularly among adolescents. Adolescents are not receptive to current processes due to their lack of motivation, busier schedules, and simply because they prioritize other tasks. For these reasons, this group remains the least represented group among children. Through greater time efficiency and enhanced accessibility, digital tools, particularly the use of digital surveys and questionnaires, may remove barriers to participation for adolescents due to the greater freedom this would provide them, without having the obligation to partake in physical activities. These insights resonate with Kleinhans et al. (2015) and Hokke et al. (2019), who noted that time efficiency was a significant advantage of digital participatory tools as it does not require participants to travel to a location at a specific time. Kleinhans et al. (2015) had further noted the potential of digital tools in removing barriers to accessibility, particularly marginalized groups such as youth, which they noted as being a difficult group to engage with. While the findings revealed that digital tools did not necessarily make educational material more exciting for adolescents due

to their lower levels of motivation, the freedom provided by fully digitalized processes could in turn serve to motivate them.

Beyond the potential of digital tools in involving adolescents, the findings revealed the potential of digital tools in broadening participation among younger children too. Firstly, if organizing in-person activities is too challenging, digital tools can provide a time efficient way to gather input from children. This is a promising and easier way for those not experienced in collaborating with children to gather input from them. The findings further revealed that participants working with children wished they could meet with them more often as a way to receive more regular input and feedback. The implementation of digitalized participatory processes could therefore allow children to participate more regularly and facilitators to receive feedback on a more constant basis without the need to organize additional in-person participatory activities. Simple methods, such as polls or online quizzes that children can access from home, could be used for this purpose.

At the same time, the findings revealed that very young children may not benefit from the use of digital participatory tools such as online questionnaires, as they may not yet own a cell phone. While they could participate with parental support, relying solely on digital participatory tools such as online surveys is not inclusive. Furthermore, relying on parental support to participate would not allow children to have as much agency over the process. While e-participation may not be appropriate for very young children, digital tools can still be used as a supportive tool in regular participatory activities, combining advantages of both non-digital and digital participatory approaches.

Overall, digital technologies, in the form of digital participation, show significant potential in broadening participation among children, particularly for adolescents, who remain the least represented groups among children. By providing them with a more appealing way to participate, digital technologies can ensure this group remains included and represented in decision-making processes. This is key, as adolescents are also everyday users of the built environment.

5.6 Overcoming challenges of digital technologies

While digital technologies hold significant potential in facilitating children's participation in urban planning, several limitations and challenges were revealed. Firstly, while digital technologies were found to increase engagement among children, distraction and overstimulation were also revealed as potential challenges. These findings support Hatch's (2011) research, which revealed that digital technologies could be distracting for children due to their demand for multi-tasking, thus resulting in a situation where children are not capable of giving their full attention to any single task. The findings revealed that young children in particular are prone to getting distracted by digital tools, both because digital tools represent novel experiences for them and because they tend to exhibit lower levels of task-related focus compared to older children. This means that children may be more interested in learning about and playing with the tool than focusing on the task at hand. Thus, the use of digital tools may be more appropriate for children already using them outside participatory activities in order to avoid introducing too many novelties at once. Using simplified tools and platforms and introducing them prior to the activity could also be beneficial in

avoiding distraction later on in the process. As revealed by one participant, giving children the opportunity to explore novel digital tools can be a key step in avoiding distraction when conducting a task. Lastly, clear instructions can also be key in educating children about the process and what is being asked of them, directing their attention away from the characteristics of digital tools toward what is to be achieved with them.

Secondly, the findings highlighted the potential danger of digital technological use in compromising collaborative aspects between children. The findings are in line with previous research, which revealed that the use of digital participatory tools could hinder meaningful interaction and discussion (Lindner and Aichholzer, 2019). Adding on to this research, the findings revealed that the use of digital tools may foster a more individualistic approach to participation instead of a collaborative one, the latter being central to participatory processes. As participants noted themselves, a balanced approach to digital technology is key in avoiding such consequences. Digital tools should thus not replace existing processes entirely, but be used as a tool to enhance and broaden participation. A balanced approach to digital technological use ensures that current collaborative aspects are not compromised, while serving to further assist children in their participation and reach new groups. Broadening participation is key, as important groups such as adolescents are currently not commonly involved in and motivated by current practices.

The findings on bias support Lindner and Aichholzer's (2019) argument that digital tools can potentially be used as a manipulative tool to shape participants' opinions. This could be particularly problematic for children, who may be unaware that such manipulative processes are taking place due to their lack of expertise. It also means that their opinions could more easily be shaped by planning professionals. At the same time, introducing a degree of bias when involving children could be seen as providing more structure to the planning process rather than impeding their freedom. This could be beneficial considering children's out-of-the box thinking and sometimes impractical design ideas. Bias can therefore serve to refine children's ideas into more actionable plans that lie within the planning scope.

However, while introducing some bias can be beneficial in guiding children, facilitators should not dismiss children's imaginative ideas. Grenni et al. (2019) highlighted the crucial role of planning facilitators in ensuring that structured participatory methodologies remain unbiased. Thus, facilitators should ensure that bias is used as a structuring tool and not as a way to manipulate children. Introducing structure through the use of online quizzes or gamification can potentially assist in channeling children's imaginative ideas toward solutions with a higher likelihood of implementation. Additionally, bias can also be seen as an educational tool; teaching children what plans are feasible or not within a certain space. Furthermore, bias is more likely to occur when participatory processes are fully digitalized, as participants may not have a chance to expand their ideas or question what is being asked of them. This again highlights the importance of using digital technologies as complementary tools and not substitutes for existing practices, particularly for younger children. When integrated in in-person participatory processes, digital tools can motivate children and even serve to reduce group biases, as revealed in the findings. Furthermore, this would allow children to expand on their thoughts and ask questions if need be. If certain groups

participate through fully digitalized processes, such as adolescents, facilitators must ensure that online questionnaires still allow participants to express their opinions freely without manipulating them toward choosing solutions that are reflective of planners' values only.

Overall, using digital tools as complementary tools that add to rather than substitute existing processes is key in ensuring that current strengths are preserved, while unlocking new dimensions and possibilities for participation. In practice, this could mean enhancing current participatory activities through digital support, as well as offering additional possibilities for participation by implementing digitalized processes such as online questionnaires. Digitized processes should not be used as a tool to replace in-person activities, but as one that enriches current practices through the greater abundance and diversity of input they can foster. Exploring digital participatory tools is however most crucial for adolescents, who remain one of the least represented groups in current practices. At a less immediate priority, digital participatory tools can be explored to enhance existing processes and further expand participation among younger children too.

6. Conclusion

This research aimed to explore how digital technologies could be integrated in participatory urban planning and design to support children's capabilities and facilitate their participation towards the creation of inclusive cities. This research is in line with growing literature on the importance of children's participation in both achieving Sustainable Development Goals and contributing to their healthy development and wellbeing. Despite this growing awareness, children remain largely excluded from planning and design processes. Previous literature revealed that children's exclusion largely stems from both (1) knowledge deficits and (2) misconceptions about children's capabilities and their willingness to participate in such decision-making. This research bridged part of this knowledge gap by presenting digital tools as a potential participatory tool to enhance existing practices and broaden participation among children. Additionally, this paper challenged common misconceptions made by planning professionals, presenting children in a new light, as ones sufficiently competent and highly enthusiastic to participate in planning and design.

Based on a qualitative research design involving ten semi-structured in-depth interviews with planning and educational experts, three key findings emerged. Firstly, the findings demonstrated that children have the capabilities to meaningfully engage in participatory planning and design processes. However, tailored methodologies are crucial in effectively engaging children. Creative and informal participatory elements, together with extended support, are key in supporting children's dynamic capabilities. Digital technologies can further support children's participation by facilitating thought expression, supporting their understanding, building knowledge, providing greater structure, and increasing engagement. Children and planners alike can benefit from the greater structure provided by digital participatory tools in directing children's visions toward projects with a higher chance of implementation and remaining within the desired scope. Secondly, digital methodologies hold great potential in broadening participation through digital participation, especially for adolescents. Challenges of digital technological use such as distraction, bias and hampered collaboration can be overcome through a balanced integration of

digital and non-digital practices, the adoption of simplified tools, a thorough education on digital functionalities, familiarization time, and careful facilitator supervision to avoid biased processes. Lastly, digital technologies must be seen as complementary rather than substitutive tools to current practices so as to combine unique advantages of both digital and non-digital methodologies.

Overall, the use of digital technologies holds great potential in both supporting children's capabilities and broadening participation so as to make planning processes more inclusive and accessible to all, ultimately contributing to more inclusive and sustainable cities. For adolescents, digital participatory methodologies are especially crucial to explore, as they remain the least represented group in current practices. At a less immediate priority, digital participatory tools can be explored to enhance existing processes and further expand participation among younger children too. While this research has served to better understand the potentials and challenges of digital participatory tools to engage with children, there remains a gap in understanding how these tools can effectively be integrated in practice. An experimental research approach testing these tools in real-world settings to assess their practical applicability and impact could be one way to bridge this gap. Furthermore, the limited response rate during the participant recruitment process resulted in a more heterogeneous sample of planning and design experts. A more extensive study covering a greater diversity of Switzerland's geographical areas could therefore reveal new insights on the topic.

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Appendix 1: Interview Guide Planners and Designers

Introduction

A. Ask participant to introduce themselves
B. Ask participant how many years they have been working in the field

Methodologies

1 - Could you describe the type of projects and participatory activities that you undertake?

A. How old are the children who participate in your activities?
B. How do I get in touch with these children?
C. How many children participate in your activities?
D. Is it always the same children?

2 - Could you tell me about your participatory approaches and methodologies?

A. Could you talk me through some of the advantages and disadvantages of your current activities / methodologies ? i.e. what works, and what does not / what could be improved
B. Was there a logic behind the choice of your participatory methodologies?
C. Are children able to engage with your current participatory tools?

3 - From a more general perspective, could you talk me through your perceived advantages of including children in these types of projects? (i.e. planning and design)

A. What have been some of the outcomes of involving children / collaborating with children in your projects and activities?
B. How is their contribution used? In what way are their views integrated into real urban projects?

Capabilities and challenges of involving children

4 - Did you experience any difficulties when involving children in these participatory activities?

A. Do children understand the projects and subjects that are discussed?
B. Can children express their point of view and thoughts?
C. Do you have any strategies in place to facilitate and support their understanding of expression?

Integration of digital technologies

5 - Do you currently use any digital technologies in your participatory activities?

IF YES

A. Could you give me some examples of these digital tools and their goals?
B. How have these digital technologies impacted your work / activities?
C. What are some of the advantages and limitations of using digital technologies as a participatory tool?
D. Are participants able to effectively use/engage with these tools?
E. Are there any risks or obstacles that you can think of when it comes to the integration of digital technology in participatory activities, particularly for children?

F. Do you think that digital technologies offer unique opportunities in terms of children's engagement, compared to other, more conventional participatory approaches?

IF NOT

A. Could you share with me your reflections on the potential advantages and limitations of using them to involve citizens/children in participatory activities?
B. Are there any risks or obstacles that you can think of when it comes to the integration of digital technology in participatory activities, particularly for children?
C. Do you think that digital technologies offer unique opportunities in terms of children's engagement, compared to other, more conventional participatory approaches?

Conclusion

A. Ask participant if they would like to add anything else
B. Thank participant for their time and valuable insights
C. Follow-up questions

Appendix 2: Interview Guide Educational Field

Introduction

A. Ask participant to introduce themselves
B. Ask participant how long they have been working in the field
C. Ask what grade/year they are teaching

Effect of DTs on children's experience at school

1 - To begin with, I was wondering how you perceive the role of digital technologies in enhancing children's experience at school

A. Do you have any examples of how digital technologies have contributed to enhancing children's experience at school? (Examples of how children's experience at school was enhanced through the use of digital technologies)

Advantages, limitations and challenges

2 - What other benefits or unique opportunities do you think digital technologies provide compared to other more traditional teaching methods?

A. What effect do you feel like digital technologies have on children?
B. Are they more excited? Engaged?

3 - Are there also drawbacks, concerns or considerations that need to be taken into account?

A. What considerations need to be taken into account when children engage with digital technologies?
B. Are there risks to be aware of when using them in the educational context?
C. How do you feel like these risks or drawbacks compare to the advantages of using digital technologies in the classroom?

4 - Could you tell me about the type of digital tools that you use as part of your teaching?

A. What are the advantages of using these digital tools specifically?

5 - Have you experienced or heard of any unexpected outcomes or challenges from children's use of digital technologies?

A. How were these addressed?
B. How can these challenges be best addressed in your opinion?

Digital competencies digital literacy

6 - Do children have the capabilities to use and engage with digital technologies?

A. Does children's use of digital technologies in the classroom contribute to their digital competencies?
B. Have you observed children making progress in their digital competencies?
C. Are children able to quickly learn and adapt to the use of digital technologies?
D. Do children get taught how to use digital technologies?

7 - To finish off, I was wondering if you had heard of any other innovative teaching approaches / activities using digital technologies?

Conclusion

A. Ask participant if they would like to add anything else
B. Thank participant for their time and valuable insights
C. Follow-up questions

Appendix 3: Deductive Coding Framework

(Child-friendly) participatory methodologies	Advantages / Limitations Methodologies	Conventional participatory tools	Downsides conventional methodologies	Digital participatory tools	Advantages / Limitations digital methodologies	Misconceptions	Capabilities
School setting	Support thought expression	Focus groups	Require physical presence	Social media	Time efficiency	Skills and competencies	Critical thinking
Going where children are	Engagement	Town hall meetings	Time constraints	Online surveys	Empowering	Children as future citizens	Understanding
Tailored approaches		Public surveys	High costs	GIS	Accessibility / Broaden Participation	No political leverage	Digital literacy
Informal			Low participant motivation	Gamification	Data heterogeneity		Fast-learning
Creative			Inability to articulate thoughts	Digital storytelling	Bias / Manipulation		Creativity
Visual			Barriers to participation		Digital divide		
Observation			Resistance		Security concerns		
Gamification					Infrastructure development		
Social media					Lower quality deliberation process		
Digital storytelling					Distraction		
Photography							
Neighbourhood walks							
Capability approach							

Appendix 4: Coding Frame

Participatory methodologies (children)	Advantages / Limitations Current Methodologies	Conventional participatory tools	Downsides conventional methodologies	Digital participatory tools	Advantages / Limitations digital methodologies	Misconceptions	Capabilities
School setting	Support thought expression	Focus groups	Require physical presence	Social media	Time efficiency	Children as future citizens	✓ Critical thinking
Going where children are	Engagement		Time constraints	Online surveys	Empowering	No political leverage	✓ Understanding
Tailored approaches	Support understanding		Low participant motivation	Gamification	Accessibility / Broaden Participation		✓ Digital literacy
Informal	Limited adolescent involvement		Inability to articulate thoughts	Digital storytelling	Bias / Manipulation		✓ Fast-learning
Creative	Group effect			Drawing /Design software	Security concerns		✓ Creativity
Visual				Lego technology	Lower quality deliberation process		✓ Out-of-the box thinking
Observation					Distraction		✓ Thinking of others
Gamification					Fun / Engaging		X Long-term commitment
Social media					Creation		
Digital storytelling					Facilitating role		
Photography					Undermine other skills		
Neighbourhood walks					Reduce group effect/bias		
Capability approach					Build skills and knowledge		
DIY / Crafting					Novelty		
Slow							
Exploration time							

(Applied) Deductive codes

Inductive codes

Appendix 5: Informed Consent Form

Consent form for research interviews

Research background

You are being invited to participate in a research study for a Master's thesis project undertaken at the University of Groningen, in the Netherlands. This research focuses on children's participation in urban planning, who until now have been largely excluded from planning and design processes. This exclusion stems partly from the lack of knowledge concerning strategies and methods on how they can be effectively included. Considering this, this research seeks to understand the potential risks and opportunities of digital technologies in facilitating children's participation in urban planning. Digital technologies have already been studied and explored in the context of urban planning and have been shown to be very successful in enhancing public participation and getting in touch with hard-to-reach groups. Little research however has explored them in the context of children's participation. Digital technologies are hopeful in the context of children's participation, as they may serve to facilitate their inclusion in decision-making processes. Including children in planning and design can shed light on their views and preferences regarding urban environments, which in turn can contribute to more inclusive and sustainable cities. As Danenberg et al. (2018) nicely puts it: "by placing children's rights at the main planning stage, an urban environment that is healthy and liveable to children would also be healthy and liveable for all". This research thus has both academic and societal relevance. To achieve a comprehensive understanding of the limitations and advantages of digital technologies for facilitating children's participation, interviews are conducted not only with urban planners and designers, but also professionals working in the educational field who incorporate digital tools in their curriculums/schools.

Procedure

If you agree to participate, you will be invited to participate in a one-on-one interview. The interview will not last more than an hour, and will be conducted online. The interview will involve questions related to:

Educators: your professional experience and perspectives on the integration of digital technologies in educational contexts and their impact on children's learning and digital competencies

Planners/Designers: your professional experience and perspectives on youth participation in planning and design processes. Questions on your current approaches and methodologies, as well as the use of digital technologies as a participatory tool, will also be asked.

Anonymity and confidentiality

Your participation in this study is entirely voluntary. Information gathered from the interview will only be used for research purposes and only be disclosed within the University of Groningen. To ensure your anonymity, no personally identifiable information such as your name and contact details will be given. However, your general position (e.g., municipal official, architect, educator) and workplace (e.g., municipality, architecture/urbanism office, school) may be mentioned **unless you explicitly request otherwise.**

1

Recording of the interview

With your permission, the interview will be recorded for accuracy and reference purposes only. The recording will be stored securely and will only be accessible to the researcher involved in the study. Please indicate below whether you consent to the recording of the interview:

☐ Yes, I consent to the recording of the interview.
☐ No, I do not consent to the recording of the interview.

Voluntary participation

Your participation in this study is entirely voluntary, and you have the right to withdraw from the research at any time. If you choose to withdraw, any data provided up to that point will be discarded.

Consent for participation

By signing below, you confirm that you have read and understood the information provided above, and you voluntarily agree to participate in this study.

Name:
Date:
Signature:

[ChatGPT partially used with formation of the text]

Data Availability Statement

The data collected and used to support this thesis are available upon request. Please contact the author for access to the transcripts:

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