



Revisiting Young Children's Technological Learning Behavior within a Microsystem Context for Development of the Next Generation

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Abstract

Children nowadays are more likely than earlier generations to understand, get along with, and be comfortable with technology. Compared to children from the past, children nowadays can find basic technology like a laptop or mobile phone with less difficulty. In addition, they can see how adults use those devices. Children may develop tighter and more frequent relationships with the instruments because of these aspects. This research intends to investigate how two children learn to use the available technology. The study adopts a qualitative research method. The data are collected by interviewing the parents of two children. The study discovers that, from the viewpoint of their parents, youngsters are unknowingly gaining information through technology through both individual and peer playing. They begin to learn how to share, analyze independently, work together, and internalize information from their peers through this playing and learning. Children also practice trial-and-error learning, in which they try things out, fail occasionally, and then figure things out. Children also learn how to stimulate their interest and satisfy their curiosity by gaining and examining new knowledge. The study also emphasizes the important functions of a few enabling elements, such as family support, children's active participation, the social dynamics at school, and the link between the family and the school.

Keywords: children's learning behavior, family support, technological learning

Introduction

They are the potential future generation who will take responsibility to sustain and enhance quality and quantity of development in the future. Socially-psychologically healthy and educated children can be promising and potential good citizens compared to uncared for and uneducated children. Thus, education is a means towards better life quality of individual and community.

Nowadays, our life is surrounded by fast development of technology which may potentially support and destroy human life quality. Despite the degrading effects of technology and digitalization, technology is inevitable. Today's people are demanded to learn and embrace technology to sustain their life, as today's life is deeply immersed by technology. Internet, social media, and wide ranges of applications rapidly

permeate into all aspects of human's life, including education, business, social interaction, trades, and entertainment.

Technology also permeates into today's children's life, starting from their birth or very early young age. They are living and playing with technology, knowing mobile phones, laptops, social media from their very beginning of life. Even more frequently, technology starts replacing children outside physical playing and direct social interaction with their peers leading to some bad impacts including obesity, loneliness, depression. Despite its devastating impacts, technology also brings about positive effects for children's future life quality. One of the most impactful aspects is children's learning and development. Technology facilitates children's basic knowledge and literacies such as reading, writing, mathematics, and digital skills as tools

to gain and develop more knowledge and skills. It is likely that in today's life, technological mastery is one of some key tools which determines children's success at their school and future employment. Thus, technology literacies become imperative, altogether with other basic literacies: reading, writing and numeric. This grows increasing concerns in schools and homes to assure their students and children have chances and gain sufficient basic technological knowledge and skills. Furthermore, adults are responsible to protect their children and students from suffering technological devastating consequences.

The study aims to explore children's technological learning behavior and influences of their microsystem contexts (mainly homes and schools). Liu and Audran (2017, pp. 893-894) mention that most past researchers focus on designing classroom activities and programs to optimize children's achievement in specific capacities or competences and less focus on how parents interact with their children by using technology or children's learning engagement with their people around them.

Numerous previous studies concern on children's learning literacies at reading, writing and mathematics, while children's technological acquisition at their immediate environment (home) is still underdiscussed. As mentioned by Stephen and McPake (2010), the concept of letting children experience learning at home is more familiar with literacy and numeracy, but it is less popular with technologies. Thus, there is a shift concern to design less prescriptive curriculum to allow children to experience flexible learning starting at home (Stephen & McPake, 2010). Particularly at this digital age, young children need to have chances and capabilities to handle technology earlier and have access to some technological tools, such as video and audio recorders, digital cameras. Thus, the study aims to fill the gap by focusing on children's behaviour when they learn to use technology. Their learning behaviour can be an input information for designing behavioural-based learning approaches. It is expected that the findings may assist parents and childcare professionals to enable and support children's technological skills acquisition through informal/non-formal and formal contexts by designing specific contextual learning approach as well as creating conducive atmosphere for children to learn technology joyfully.

Compared to earlier research studies and reports that concentrate on planning or developing initiatives to improve children's information and technology skills, such as educational systems, the roles that parents and teachers play in their children's education, support for technological equipment, and technological education design, the greater impact of the outside world and the important functions of technology in education (Campbell & Jane, 2011; Korhonen et al., 2014; OECD, 2016; UNICEF, 2021; U.S. Department of Education, 2017), the study taking different angles by highlighting the children's learning behaviour as active and innovative learners.

As creative and innovative learners, the children can explore their own unique ways of learning technology by adjusting to the available technology provided by their immediate or family environment. Not every parent can provide their children with access to the latest and sophisticated technology. The research also highlights children's ability to learn in their own ways, rather than emphasising the roles that schools (and school learning environments), parents and immediate environment play in providing their kids with the newest and most cutting-edge technical tools, technological education designs, or curricula. Instead, parents, schools, and the technology in their immediate environment are seen as complementary elements. The children's distinct learning styles and actions form the core of the learning result.

Materials and Method

Children and Technology

Numerous studies suggest the significant need to lay proper and adequate education for children at their very young age as it puts strong bases for further learning. As reported by Chordia et al. (2019), early childhood is a crucial time to boost their learning capacities as it is the period when children experience their first learning which impact on long-term outcomes and future well-being. Childhood is the golden period of brain plasticity or development (OECD, 2019).

Considerable previous research examines the roles of technology in assisting children's learning process as well as learning facilitation. As mentioned by Parette and Blum (2013), technology is a learning tool. It is also used by teachers outside classroom to support children's learning (İlter, 2015). It is likely that technology is inevitable, particularly as today's children grow in

environment surrounded by fast changing technology (Parette & Blum, 2013). Thus, technology is undoubtedly the central element in children's lives (Murphy et al., 2003).

Numerous studies explore how technology contributes to children's learning. Some advantages of integrating technology in children's learning are they learn how to collaborate, minimize inequality, particularly when children are learning together and keep their learning engagement time longer (Liu & Audran, 2017). Technology contributes to children's development in wide aspects, including boosting creativity (through drawing, imaginative playing, imaginative construction), increase physical development (such as motor skills, health through music enjoyment), improve communication skills (such as language, reading, conversation, writing skills), enable problem solving, promote emotional development (including self-esteem, self-confidence, cultural affirmation, and language diversities (Corr, 2006). Similarly, Marsh et al. (2020) confirm that digital play broadens children's subject knowledge (such as language, literacy and mathematics), digital knowledge (skills to operate technology tools) and holistic skills (emotion, social, creativity, physical) (Marsh et al., 2020). Technology also can speed up children's learning, supporting writing, mathematics, sciences, numeracy, and literacy skills (The Scottish Government, 2015). By being able to use technology, children can be more expressive, pro-social, more emphatic, confident, and mindful (Ventouris et al., 2021). Technology can also impact children's development within some aspects, including cognition, social emotion, mathematics, language, literacy and physical motor (Donohue, 2003). Through technology (digital cartoon, games, films, social sites), children are also becoming aware of their culture and language, allows children enormously enjoy their learning (İlter, 2015). Charles Nechtem Associates (2021) also finds that technology facilitates planning and organization, triggers critical thinking, promotes connection, enables self-expression, and develops creativity. Technology also allows children to survive and thrive through long-distance education (UNICEF, 2021)

Despite its considerable positive effects, how technology affects children is still in long debate. Some studies also express their considerable concerns on negative effects of technology on children. Laslau (2021, p. 5) identifies the negative effects of technology on children, par-

ticularly on delaying children's speech and reducing children's time to play outside. Technology also impacts on children's social interaction because children may suffer from loneliness and stress as they are not playing outside their home, on children's passivity as technology stir children's over imagination, on children's obesity (physical health) and well-being as children are sitting for a long time (Mashrah, 2017). Parents and educators are also cautioned about the socio-economic digital divide effects of technology, children's narcissistic behaviour caused by social media, violent behaviour impacted by games and sexualized language and behaviour (Ventouris et al., 2021). Charles Nechtem Associates (2021) also finds that technology can negatively disturb children's social skills, such as limiting children's chances to socialize outside, be alone, be reliant to devices and be exposed to dangerous sites.

Some efforts are recommended by existing studies to boost positive advantages of technology and minimize its negative consequences on children. To be beneficial, children need to be introduced appropriate technology to avoid harming children (Kaushik, 2014). Consistently, Sigdel (2017) believes that technology will not harm children if it is used wisely and it becomes the responsibilities of teachers and other adults to select appropriate technology for children. Technology can be effective media for development and learning when it is used appropriately and intentionally (Brown, 2015). The other approach to ensure children's technological safety is by designing positive technological development, particularly by designing children's appropriate or healthy technological learning or practice (Chau, 2014). Meanwhile, Chordia et al. (2019) recommend teachers to scaffold children, manage children's behaviour, implement curriculum and development objectives, encourage children's autonomy, interact with family and tract children's progress.

Children's Learning and Family Roles

Children's learning and socialization start from their families. As the closest and smallest social environment, families provide children's protection, fulfil their physical and social needs. Within their families, children unconsciously learn how to be human, be part of their family and further community members. Thus, family lies living and learning foundation for children. This family learning is frequently deeply rooted in children's self, particularly through the habitu-

ation daily process. Early childhood is the best development period (Naomee, 2012). However, children's fullest development at very young age does not occur automatically. It needs to be supported by their surroundings. Children learn and develop rapidly at their early age, particularly when they are supported by healthy relationship, established by adults who understand and encourage them (Allen & Kelly, 2015).

Previous studies report the roles of family in children's livelihood. Family The functionalists also believe that family is fundamental social institutions and community stabilators (Laff & Ruiz, 2019). Family is the primary and first agent of children's enculturation and socialization process (Laff & Ruiz, 2019). Family teaches how children should behave inherent to social and cultural norms (Laff & Ruiz, 2019). Family involvement is central for children's development of cognition and social (Harvard Family Research Project, 2006). In a broader view, family plays three main roles in children's development, including parenting in which parents nurture healthy relationship with their children by modelling positive attitudes and values, establishing home-school interaction in which parents and schools have formal and informal connections and family's learning responsibilities in which parents facilitate and support children's activities to prepare their children's school readiness and future success (Harvard Family Research Project, 2006). Thus, parents' involvement has considerable implications on children's learning, even more powerful than the influence of school's quality differences (Goodall & Vorhaus, 2011).

One of family's responsibilities is enabling children's learning and preparing them for their school life. UNESCO (2015) believes that early ages is a crucial for laying the children's foundation for learning. This indicates that family's education may provide a strong basis for children's future learning. As supported by Ulfatmi and Rusli (2020), family is the first institution of education for children which mostly influences children's learning and personality. Through parents and other families' members, children get their first learning experiences (Ulfatmi & Rusli, 2020). Families are also the first place where children obtain their pre-literacy skills (UNESCO, 2015) and are enabled to reach higher achievement, increase family resilience to face challenging situations (UNESCO, 2015).

Previous studies investigate how family affects children's learning process. Apriyanti and Candrasari (2021) find that children's learning is influenced by mother's roles, parents' education, home facilities, family's income and occupation. Similarly, Li and Qiu (2018) argue that family background impacts on children's learning achievement. Children's academic achievement is also influenced by family's social status which implicates on children's education opportunities, learning behaviour and parents' contribution (Li & Qiu, 2018), parents' education (Naomee, 2012). How family is involved in children's early education is also influenced by parents' social status, education, health, material deprivation and family ethnicity (Desforges & Abouchaar, 2003).

Family may also affect children's learning through family environment. As mentioned by Apriyanti and Candrasari (2021), family can create conducive environment for children to facilitate children's brain development which affects children's learning process. Similarly, Li and Qiu (2018) agree that families shape children's learning behaviour by providing basic environment for them. Some of those environmental-supporting approaches are giving daily or routine homework for shaping learning habits (Ceka & Murati, 2016). Parents can also support their children by rewarding, boosting children's self-confidence and praising (Ceka & Murati, 2016).

When children start entering their early school age, family is not the only place for children to learn. They begin having new and wider learning experiences from schools. Children also may have broader sources of knowledge and more learning styles. As stated by Bronfenbrenner and Morris (2016, cited in Laff & Ruiz, 2019, p. 6), the development of children and youth is determined by various contexts, including schools, families and communities. ACECQA (2018) recommends parents or families to build links or collaborate with children's schools for enabling children attain their fullest life potentials. Consistently, Firmanto et al. (2020) suggest parents and schools to establish partnership for enabling children to acquire digital literacy skills. These partnerships can be built by exchanging information, engaging, trusting, communicating, getting to know each other, being inclusive and executing professional dialogs (ACECQA, 2018).

Method

The study aims to address two key aspects: young children's technological learning behaviour. The exploration is focused on the children's

Table 1. Semi-structured interview guideline

No	Questions
1	Children's technological interests and behavior: -Why children are interested in using technology. -What they do with the available or given technology
2	Environmental dynamics: -How family involve or engage in children's learning process -What are family habits or daily routines which can be platforms for transferring technological knowledge

parents' perspectives. To achieve the objective, a qualitative research method is adopted. The data are collected through semi-structured interviews with two informants-parents in a naturalistic environment (at their homes). The informants-parents are asked to tell their children's experiences in learning technology. Some questions are prepared to guide the interview process. However, the parents are encouraged to express their stories freely, but not being too restricted to the interview questions.

Triangulation used to ensure the credibility and validity of the research. It is a research strategy to assure the accuracy and validity estimation of the research (Oliver-Hoyo & Allen, 2006). The validity of qualitative research is often ensured using various triangulation techniques, such as investigators, data sources, theoretical and methodological triangulations (Bans-Akutey & Tiimub, 2021; Carter et al., 2014; Chako, 2017; Donkoh & Mensah, 2023; Oliver-Hoyo & Allen, 2006).

The study uses two types of triangulation methods, including theoretical and data source triangulations. To gain a deeper knowledge of the phenomenon, theoretical triangulation is applied by contrasting and comparing analysis and conclusions with earlier ideas and notions. Meanwhile, the triangulation of data sources is employed through the analysis of data from several parent interviews to investigate the phenomenon and comprehend the distinctiveness in children's learning behaviours and styles. The process of the study is started with direct participant observation by directly observing the children's behaviour on daily basis. The direct pre-main observation served as the basis for the re-

Table 2. Children's subtle learning through playing

Themes	Data classification
Playing (PB)	Individual playing (PB1): -Using mobile phone: C1-PB1-A; C2-PB1-A -Drawing: modifying/creating: C1-PB1-B -Digital games: C1-PB1-C; C2-PB1-C
	Collective playing (PB2): Peer playing: C1-PB2; C2-PB2/C2-TEB1
Trial and error or experimenting (TEB)	Observing (TEB1): C1-TEB1; C2-TEB1 Repeating actions (TEB2): C1-TEB2; C2-TEB2 Fixing prior failure (TEB3): C1-TEB3
Curiosity and interest stimulation (CB)	Exploring (CB1): C1-CB1; C2-CB1 Initiative (CB2): C1-CB2 Expanding (CB3): C1-CB3; C2-CB3

C=Child; PB=Playing behaviour; TEB=Trial and error behaviour; CB=Curiosity behaviour

searchers' study design, which involves the triangulation of data sources through parent interviews to gather data. This data source triangulation ensures the exploration on the children's uniqueness in learning technology by adopting to different environment. The collected data is analysed and validated by using theoretical triangulation. This is carried out by examining, contrasting, and comparing data findings with viewpoints from earlier or other investigations to understand their perspectives on the phenomenon.

The following table (Table 1) displays several interview questions. The questions are grouped into three clusters. The first cluster relates to children's technological interests and behaviours. Questions in the first cluster addresses the main issue of children's technological learning behaviour. The second cluster relates to children's environmental dynamics (particularly within family context). It provides data on environmental impacts on children's learning, how

Table 3. Children's subtle learning through playing

Data extract	Meaning
"...I let her play my mobile phone freely. The first time she plays my mobile phone is when there are incoming phone calls, she tries to press it..."	Child A plays individually using her father phone, she plays by exploring mobile phone's features/C1-PB1-A
"...she plays how to add spectacles. She opens the application and adds something to the photos. She edits them. She adds accessories to the playing figure. She learns from the internet how to draw..."	Child A rehearses her creativity through drawing or modifying pictures/C1-PB1-B
"...his mother frequently uses computer to run online business. When her mother opens browsers, many game ads appear. He tries to play it..."	Child B plays online game when his mother runs online business/C2-PB1-C
"...she plays online games. She remembers how we open computer, and she tries..."	Child A plays digital game after understanding how to open computer/C1-PB1-C
"...she usually also opens the games when her friends come. She loves to show them new games and teaches them how to play. Her friends watch how she plays, and they play together..."	Child A engages in collaborative learning, shares knowledges and creativity/ C1-PB2
"...initially, he asks his mother how to turn on computer. Then his mother shows him how to switch them on and opens some files. Afterwards, he wants to try by himself by clicking some icons in desktops. Sometimes, he fails, he can't click, he click wrong icons. He also tries and asks his older sister..."	Child B asks and observes how to operate through his mothers and sisters and tries independently/C2-PB2; C2-TEB1

family may intentionally or unintentionally encourage children's learning.

The collected data are analysed by executing thematic analysis. As mentioned by Creswell (2006), one of qualitative data analysis method is by managing data, reading or memoing, describing/classifying/interpreting and representing/visualizing. The interview data are transcribed, read, classified into some emerging themes, and analysed. The process of analysis is divided into the process of coding, describing, and interpreting the meaning and connecting the data meaning with previous studies.

From the collected data and data analysis, the authors draw some themes. Those are children's playing, children's trial and error behavior and children's interest and curiosity fulfilment.

The following table (Table 2) represents the data classification based on the emergent themes.

Results and Discussion

The study finds that the children engage in some learning behavior.

Playing Behaviour

The study finds that the children-informants are learning technology unconsciously. They unintentionally elaborate it with their natural playing. How they integrate technological learning into natural playing tends to rely on the availability of technology and social agents around them. The following table (Table 3) represents children's playing behaviour as conveyed by their parents.

The study reveals that the children are playing using technology available around them. They play alone and together happily, curiously, and collectively. However, this learning is not only for satisfying their innate playing needs as children, but also laying the foundation for their future educational necessities. This confirms existing studies revealing the significance roles of playing in children's nature. Playing is central for children's development as it is the gate for children's creativity and skills development (O'Neill et al., 2005; Slutsky et al., 2014). It is implicitly shown that Child A engage in her individual learning and peer learning as she is happy and curious to play using her father's mobile phone (C1-PB1-A). Playing also manifests children's freedom (O'Neill et al., 2005) and chances for children to create their own fun world (Downey et al., 2007). Children also use technology for free play which brings them happiness, mindfulness and problem solving (Granone & Reikerås, 2021). Furthermore, learning by playing occurs when children sense the joy and meaningfulness impacting on children's activeness, increasing iterative thinking and develop more complex social interaction (Marsh et al., 2020, p. 4). Online games, for instance, are getting immersed in many today's children life in which they intend to spend many hours for playing games happily, which means that technology evokes feeling of happiness for children to unintentionally develop their competencies (Žumárová, 2015).

The data show that underneath their playing, the children unconsciously acquire several fundamental literacies. It is indicated

that Child A is increasingly becoming more creative as she can modify the online picture, draw, and add accessory (hair band) to her playing figure (C1-PB1-B). This shows that technology enables the child to increase their creativity through freedom to create and modify pictures as she wants. This confirms that in learning to use technology, children do not only acquire digital literacy on how to operate technology, but also other skills, such as critical thinking and creativity in using technology (Marsh et al., 2020). Because of freedom that Child A enjoys, she can independently develop her creativity. As reported by Baker (2014), when children start interacting with their playing objects, they begin having control and causality which indicates that they are repeating and modifying their playing activities.

The data indicate that the children engage in social and collaborative learning. Child A plays together with her friends (C1-PB2). Similarly, Child B engage in social learning with his mother and older sister (C2-PB2; C2-TEB1). This indicates that technology enables the children to get along with others and learn from others which can be the basis for social learning skills (social competences). For instance, through or peer learning, Child A unconsciously learn how to share (knowledge) with others as she is willing to teach her new capability to her friends (C1-PB2). She also learns how to be initiative by teaching her peers. Moreover, by having opportunity to share her knowledge to others, she can grow sense of being worthy, meaningful and boost her self-confidence. This indicates that technology indirectly brings about emotional benefits. Meanwhile, Child B asks his mothers and older sister to teach him when he finds difficulties. This shows that technology allows children learners to explore their chances to solve his problem socially by involving others and solve his technological difficulties. This reflects that playing with technology can nurture children's social skills, physical, emotional and creativity (Marsh et al., 2020). This finding validates previous studies' findings which highlight the social learning functions of technology for children. One of those is Hsin et al. (2014), who find that technology benefits children's social development, particularly when they are collaborating and interacting with others and support children's multiculturalism understanding. Technology can develop children's intellectual, social, physical and emotion through educational activities when they play with their peers (Jabbar et al., 2019).

Table 4. Children's Learning through Trial and Error

Data extract	Meaning
"...maybe she observes when her seniors at schools play the application. She sees and plays again. So, she can play the application by observing from her seniors and re-trying alone. From observation and trying, she gets new experiences. She takes the pictures, then she watches it and starts editing the pictures to make it more attractive..."	Child A observes how to play from surrounding, gets more experiences and increases her creativity by being different from her modelling figure/ C1-TEB1
"...initially, he asks his mother how to turn on computer. Then his mother shows him how to switch them on and opens some files. Afterwards, he wants to try by himself by clicking some icons in desktops. Sometimes, he fails, he can't click, he clicks wrong icons. He also tries and asks his older sister..."	Child B asks and observes how to operate through his mothers and sisters and tries independently/ C2-TEB1
"...the first time she plays by using mobile phone is when the phone is ringing. She tries to take the phone. She presses again and again..."	Child A executes some trials to take phone from her fathers' mobile phone/ C1-TEB2
"...he always wants to try new online games when his mother operates computer for online business. When he can't play, he asks his mother..."	Child B tries new games and involves his mother when he finds difficulties/ C2-TEB2
"...firstly, she presses the button at my mobile phone randomly. But finally, she knows which one is the correct button to press to take the incoming calls..."	Child A tries to fix her learning failures by re-searching the correct buttons/ C1-TEB3

By interacting, socializing, and collaborating with others, the children (Child A and Child B) can develop their communication skills. This confirms Pirani and Hussain (2019), who find that technology can facilitate children to obtain some other key skills, such as multi-tasking, communication abilities, learning new things readiness, reading skills, visual skills, information storage for longer period and more complex concept comprehension (Pirani & Hussain, 2019).

Trial and Error

The data also show that the observed children also perform trial and error behaviour

in which they are experimenting new things repeatedly and working out how to make the technology or the tools work. The following table (Table 4) represents how the observed children execute trial and error learning behaviour.

The data show that the observed children are not playing passively. Instead, they are observing how their families operate the technology, imitating and finding their own ways to play (C1-TEB1). Children learn technology as they see adults using technologies (Vasquez & Felderman, 2013, cited in Lentz et al., 2014, p. 16). It is shown that the children (A and B) seem eager to know what their parents do and how their parents operate their digital devices. To satisfy their eagerness, they observe how adults use technology and do some trials and errors (C1-TEB1; C2-TEB1). This indicates that the children unintentionally engage in inquiry-based learning to answer their curiosity on how their families use technology and attractiveness of the available technology itself. This confirms Wang et al. (2010) who report the technological function on children's inquiry-based learning for encouraging children to create their knowledge. The repetitive action that the children perform (C1-TEB2, C1-TEB3) enables them to understand the patterns and analyse the results or consequences of their actions. This process leads to deeper learning process. Trial and error enable learners to learn deeply through which the learning participants can perform in-depth analysis, grow initiative skills, do logical thinking, expand into more complex knowledge and support scientific and humanistic literacies Qu et al. (2021). Furthermore, Lentz et al. (2014) state that technology may assist children to prepare their emergent literacy learning.

It is revealed by the data that the children do trial and error to know specific things. Child A wants to be able to answer incoming call through her father mobile phone (C1-TEB2). Meanwhile, Child B wants to play various online game, but he does not know how to turn on his mother home computer and click the correct icons (C2-TEB2). The children may feel they have problems. These problems lead them to find solutions and trying some ways or approaches. This indicates that technology stimulates children's problem-solving learning. Technology benefits problem solving (Lee-Cultura et al., 2022). The children experiment though trial and error to gain solution (Tönnsen, 2021). To do trial and error, it is shown that the children have specific goals. Child A wants to learn how to pick-up calls (C1-TEB2), while Child

B wants to play online games (C2-TEB2). This confirms Tönnsen (2021), who argues that people do trial and error for two main purposes: exploring specific problem, finalizing for optimized solutions or gaining better overall or final solution.

The study finds that the children can fix their prior failures. As revealed by Child A, she keeps on pressing the phone buttons several times and trying other buttons when she finds the previous pressed button is not the correct button until she finds the correct one (C1-TEB3). This indicates that Child A uses her previous failure as feedback which leads her to find the correct button. As mentioned by Tönnsen (2021, p. 304), who asserts that people learn through trial and error by dividing complex tasks into smaller elements, gaining relevant feedback and experimenting more.

It is implied from the data that as they play using technology, they are in the process of being more creative learners in three ways. Their first way is they are being creative in finding the solutions. The children use several different ways to learn, such as observing their parents, asking older sister (other family members), observing school seniors, or collaborating with their peers. The second way is they are being creative in operating technology. For instance, Child A learns how to modify doll figure accessories and show it to her peers. The third way is they are being creative in modifying new appearance of doll figure by accessorizing them (adding hair bands). This confirms that technology increase children's creativity, as supported by data and is confirmed by prior studies. Digital technology can trigger children's creativity (Fielding & Murcia, 2022) and this creativity skills is essential in 21st century (Fielding & Murcia, 2022). Children's trial and error learning behaviour is one of learning approach to be creative. As supported by Fielding and Murcia (2022), children's creative thinking is developed through several behaviour, including agency (being self-determined), curios (by questioning, discovering), connecting (through sharing, identifying connecting patterns), daring (being resilience, daring to be different) and experimenting (by testing new ideas, tolerating uncertainties).

Table 5. Children's Learning based on Curiosity and Interest

Data extract	Meaning
"...firstly, she takes the picture. Then, she sees the result. She learns from her seniors and imitates. Afterwards, she opens the application by herself, adds something, such as hair bands until she feels she really master the application. After that, she explores the internet to find kid stories. She sees the pictures..."	Child A explores digital kid's stories to add her creativity in drawing through application/ C1-CB1
"...his father teaches him how to open YouTube. So, Child B can watch his favorite cartoon movie, such as <i>Upin Ipin</i> , heroes' film, like <i>Batman</i> from YouTube. His mother shows how to operate. Then, he explores by opening other cartoon films..."	Child B explores other film cartoon after his mother shows him how to do/ C2-CB1
"...she loves when her mother tells her stories, folklores. She asks her mother to tell her, such as <i>Bawang Merah</i> , <i>Bawang Putih</i> . But sometimes her mother runs out of stories. Knowing that her mother does not have many stories to tell, she tries to find stories from the internet. She also finds her favorite songs..."	Child A is being initiative to get more folklores through internet; she also expands her mother stories telling by exploring stories in internet/ C1-CB2; C1-CB3
"...what makes him more interested is he can find many various games from internet. Initially, he plays easy games. After he really master the easy level games, he starts more advanced games. If he does not how to play, he asks his mother or older sister..."	Child B is expanding by progressively playing easier games to more advanced games by asking his mother and sister/ C2-CB3

Curiosity and Interest

The data reveal that the children are learning through play technology based on their curiosity and interest. This is as displayed in Table 5.

The study shows that the children unintentionally learn technology through playing for satisfying their curiosity and specific interests. Children's natural curiosity emerges as the children observe adults' or other members' activities around them. As mentioned by Ministry of Education, Republic of Singapore (2013), children have innate or natural curiosity to explore world around them

with wonder and excitement. The data show that Child A explores more folklores through the internet as she loves and eager to listen kids' folklores, such as *Bawang Merah dan Bawang Putih* (C1-CB1). Child A also perform initiative behaviour by exploring more stories when her mother runs out of children's stories to tell (C1-CB2; C1-CB3). Meanwhile, Child B is being curious to explore more online games and favourite cartoon films (C2-CB1). This shows that children's technology learning needs to be supported and sustained by children's curiosity and interests. As mentioned by Hogan and Gomm (2000), technology can be used to enhance children's natural curiosity by connecting technology and exploration of real-life experiences and investigation of objects around them. It is also implied that the children seem to be more motivated to play technology when they are curious and attracted to play because of their interests. This confirms Malon and Lepper (1987, cited in Ciampa, 2014), who argue that intrinsic motivation can be arisen through sense of curiosity, challenge, recognition, cooperation, competition and control. Curiosity can be a means for increasing students' motivations (Singh & Manjaly, 2022). Furthermore, curiosity leads to the building of children's capacity to be self-determined, find relevance, concreteness, comprehensive, build belief, create imagination, express interests and fill information gap (Singh & Manjaly, 2022).

The children seem to enjoy their playing and they tend to happily engage as technology offers some flexibilities and attractiveness. For instance, Child A can learn visually by modifying picture, changing and re-changing the picture to satisfy her eagerness. This is allowed as the multimedia can fulfil people's sensory curiosity by allowing people to learn more through not only words, but also pictures, which allows children to process information cognitively and reduce learners' cognitive load for deeper learning (Mayer, 2005, cited in Ciampa, 2014, p. 89). Moreover, the children can play it anytime they like, which may potentially harm children's sleeping or school's work learning or studying time. This indicates that technology offers personal flexibility for children to learn, as multimedia meets people's cognitive curiosity by allowing them to learn anywhere, anytime, learn informally and engage in self-directed learning outside schools (Sharples, Taylor & Vavoula,

2007, cited in Ciampa, 2014, p. 90). This flexibility is inherent with children's nature as they are still do not aware of clear separation between playing and studying for schools' works. Charvátová (2007, cited in Žumárová, 2015, p. 780) mentions that children do not divide strictly their learning or educational or working time from leisure moment as what are more matter for them are their natural curiosity, motivation, emotion and competition. Technology's flexibilities also enable children to personalize their learning time, style or approach and content. This confirms that technology allows personalized learning (Lips et al., 2017). Mobile devices allow people to personalize their learning and facilitate diverse learning styles (such as kinesthetics, auditory, visual) (Ciampa, 2014).

Children's Learning Behaviour: The Unseparated Individual-Social Quest and playing-learning exploration.

The study shows that technology is becoming significant part of children's life. It mediates almost all children's activities: playing, unconscious learning, socialization, or interaction. It is immersed into children's nature as it becomes interesting toy and exploring tool.

The study finds that technology is a playing tool for children. As children, they are innately and naturally happy to play. They move, click, push, throw and experiment their toys. Different from previous ages who play using more traditional tools from wood, bamboo, plastic, or fabric, today's children play using technological tool. They frequently play available technological tool such as their parents' mobile phone or desktop. The study also shows that adults' activities or their daily life when they use technology attract children's curiosity to do the same things. Then the children are observing, imitating, trying or experimenting exploring and expanding their knowledge which results in creativity and deeper knowledge. Thus, the study confirms prior studies which find that technology is integrated into children's playing as their fundamental nature. As mentioned by Slutsky et al. (2014), today's children's playing is changing because of the fast growing of technology. They are susceptible to technology transformation (NAEYC & Fred Rogers Center, 2012). This susceptibility and the changing of playing landscape are influenced by their open and wider access to digital devices (Marsh Plowman & Yamada-Rice et al., cited in Marsh et al., 2020, p. 4).

The study finds that the children perform various unconscious learning which is immersed into their playing activities. Playing is not just

playing, but it is a way to learn. They are happily play alone to remember what they have just observed from adults' activities, do deeper analysis and experiment. They explore their environment, what the adults do and what technology they can use. Children naturally explore their environment through inquiry and today, technology can provide access for children to explore their environment and extend their inquiries (Wang et al., 2010).

They also engage in social learning with adults around them by asking guidance on how to operate technology to their parents or older sisters, observe their school seniors, play together with their neighbours, and share their new gaming or playing skills with their peers. This indicates that the children engage in social learning which is enabled by the available or familiar technology. From this social process, the children learn how to share new knowledge, play together, manage their emotion, communicate, share feelings, collaborate and build joint creativity. This implies that technology enables the children to acquire social skills. This confirms previous studies revealed the social functions of technology for children. As mentioned by Marsh et al. (2020), playing with technology can nurture children's social skills, physical, emotional and creativity competences. Technology also positively can boost children's creativity (Murcia et al., 2020), support children's literacy development, communication, understanding and participation in learning (Khoo et al., 2015), particularly today's children are growing in rapid advent of technological world (NAEYC & Fred Rogers Center, 2012). Similarly, Figueiredo et al. (2021) also report that technological varieties enable children to freely explore, establish diverse relationship with technology and various social uses of technology.

The study also finds that through playing, the children engage in discovery, experiment or trial-error, inquiry and interest-based learning. The data indicate that the children are eager to satisfy their growing interests as they play with technology. They do not stop their learning after they understand the basic operating skill taught by their parents. Instead, they expand their knowledge, satisfy their burning interests, arise their sense of curiosity by exploring more through internet. Thus, their knowledge development is not restricted to the border knowledge of their parents. This shows

that children's basic digital skill allows them to construct and re-build their knowledge. As mentioned by UNICEF (2017), in this digital era, children need to grow their digital capacity, immerse technology when they shape their life experiences, include technology when they learn, connect and socialize. This also indicates that today's digital era demands today's children acquire technological skills for thriving in 21st century, including creativity, communication, collaboration, critical thinking, social-emotional skills (Campbell & Walsh, 2017; Scott, 2019). Similarly, Suardi et al. (2020) report that some competencies which should be acquired by young children at the millennial age are creativity, critical thinking, innovation, collaboration and communication. Technology allows children to not only learning information, but also be more expressive, creative, communicative and entertain themselves (Omar et al., 2014).

The study also acknowledges previous studies' findings on children learning behaviour. Murcia et al. (2020) find that in learning using technology, young children predict, experiment new ideas and play the devices. Meanwhile, Plowman et al. (2008) identify three main learning modes children acquire during their playing activities, those are operational skills (in which children are playing by switching off and on, replaying, exploring web-sites), extending knowledge (in which children use technology to gain early literacy and numeracy, expand information) and learning dispositions (in which children start developing independence in learning, maintaining their attention, gaining confidence from their achievement and learning by following instructions). Meanwhile, Marsh et al. (2020) identify several stages of children's behaviour when they use technology, which includes passive behaviour (when children just obey the instructions), responding behaviour (when children start welcoming parents, understanding the design element, welcoming their peer), exploring behaviour (when children follow their own purpose), owning behaviour (when the children internalize the playing), recognizing behaviour (when the children develop new insight), transferring behaviour (when the children raise their own questions. Other study, Ministry of Education, Republic of Singapore (2013) highlights some modes of children's learning, including children's discovery learning which involves learning through everyday experiences, learning through their environments (such as schools, homes, culture, events and neighbours). Meanwhile, World Economic Forum (2016) identifies two main or basic competences in

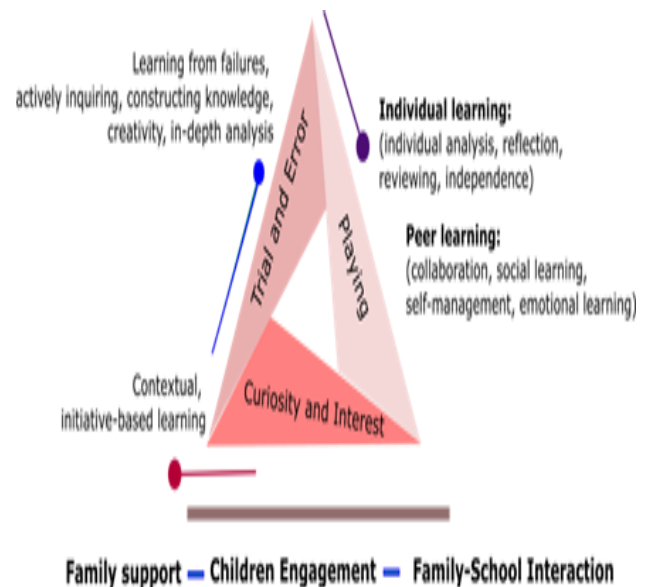


Figure 1. Children's learning behaviour mediated by technology.

21st century, including foundational skills (such as literacy, numeracy, ICT, financial, scientific, culture, civic, critical thinking, problem solving, creativity, communication and collaboration) and character education (which include curiosity, initiative, persistence, adaptability, leadership and social-cultural awareness) (World Economic Forum, 2016). Meanwhile, other study, Ministry of Education, Republic of Singapore (2013) highlight children's discovery learning based on their everyday experiences and interactions with their surroundings (such as schools, homes, culture, events and neighbours. In learning using technology, young children predict, inquire, experiment new ideas and play the devices (Murcia et al., 2020).

Different from the previous studies, the study finds technology mediates some children learning behaviour: playing, trial and error and curiosity behaviour. The following figure (Figure 1) represents children learning behaviour mediated by technology. Figure 1 shows the children's behaviour when they learn to use technology. It is shown that the children are learning through playing, trial and error, curiosity, and interest fulfilment.

The study finds that children learning using technology requires several enabling factors. The first factor is family support. This includes how parents or surrounding adults nurture by modelling, showing, guiding, providing tools, challenging children to explore, giving chances, supervise and trusting them to operate their (adults') technology

(such as father's mobile phone, laptop). This confirms Lips et al. (2017) who highlight parents' contributing factors, including funding, creating conducive climate, guiding. The second factor is children's willingness to engage. The learning process will not occur when the children react passively towards the available technology and ignore their parents' activities. The study shows that the children are curious to what their parents are doing, showing interest, showing desire to be involved and passion to try to do the same things as what their parents do and modifying the activities. This also confirms some findings on how children do some participating activities, such as sharing, chatting, playing, blogging (Graafland, 2018) and trying how to use social media (OECD, 2015). This also indicates the need to improve quality of children's and their social environment relationship. One of some key elements in integrating technology in children's life is enhancing children's social interaction with their peers and families (Figueiredo et al., 2021). The third is relationship between family and school. The study finds that the children are also learning from their school seniors how they play technology and privately learn what their senior model at home. This indicates school's roles in triggering children's ideas and motivation to master what their senior can do. This also show that social interaction at school pushes the children to try. This confirms some studies who emphasizes significant collaboration between school and parents (Zulkifli et al., 2021) and considers school dynamics in children learning using technology at home (Zulkifli et al., 2021). Thus, the study highlights the need to acknowledge the school's social interaction into children's learning at home. This also indicate a need to integrate school social life and family life into stimulating program or conditions to enhance children's learning.

Conclusion

Today's children are facing more dynamic challenges as they are living in more competitive, global, modern, and technologically surrounded environment. This demands them to master technology as part of living skills, even more as a tool to improve their life quality. The study aims to explore how some today's children's learning behaviour to acquire technological literacies. The study finds that the children exhibit some learning behaviour. The first behaviour is playing. The children prefer to use technology as a playing tool. They love playing both individually and in groups. Through playing, they learn how to analyse, un-

consciously reflect, remember, and review what they have observed when they see the adults use technology. Through group process, they learn how to collaborate, share, manage their self and emotion while playing together. The second behaviour trying, experiencing error and retrying. During this process, the children are actively inquiring, constructing knowledge, analysing deeper and developing creativity. The third behaviour is satisfying their interest and curiosity. The study also highlights the enabling factors which bridges the success of children technological learning.

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