SUMMARY REPORT

Children, Technology and Play

Key findings of a large-scale research report published by the LEGO Foundation, and carried out in collaboration with the University of Sheffield, UK, the University of Cape Town, South Africa, and Dubit Ltd, UK

The University Of Sheffield.

dubit

The LEGO Foundation

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Summary of full research report by Marsh, J. et.al. 2020
Full research report available on www.LEGOfoundation.com

Summary

Technology is now embedded in children's lives: *how does it affect the way that children play, and how they learn and develop critical skills through play?*

An important new study, *Children, Technology and Play*, published by the LEGO Foundation, finds significant evidence that **playing with digital technologies, in its many different forms, has a range of positive effects on children's knowledge, creativity and skills.**

Among the new insights that it provides, the study shows that **quality play with digital technologies, when it is examined closely, is clearly good for children's knowledge, their development of skills (both tech skills and wider skills, including social skills), their emotional wellbeing and their family relationships.** It also **supports creativity** in all its forms.

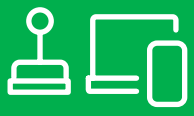
Compelling new evidence, gathered in the UK and South Africa, shows that the **benefits of play with digital technologies depend upon children's learning environment**, both in the home and outside of it.

Children's access to technology varies greatly, and some devices, apps and games are better than others for children's development. Above all, the **involvement of adults is vital**: adults have a crucial role in supporting children's play with digital technologies, and engaging with it. Some parents, however, continue to have a negative view of children's play that involves digital technology: they have concerns about children spending too much time on it, as well as concerns around privacy and suitability of content.

The study has **important implications** for parents, teachers and the children's toy and media industry, as well as for policymakers and researchers. **They can all be doing more to support children's learning and development through play with digital technologies:**

Children's play with digital technologies needs help to become more **social** (involving collaboration) in some contexts, and it needs to do more to allow children to **test ideas, try out new things** and create content.

Children need to be able to take the **initiative** in their digital play: not just following a fixed path that a game or app sets out for them, but being more engaged in **setting their own goals and personalising their experiences.**



Children need to be given **a varied diet of play with digital technologies:** children who engage with more and different types of play are more likely to be engaged and happy, to experiment and mix with others.

Children learn best when they are **actively supported by an adult,** and so parents especially can be **more engaged in children's play** with digital technology.

Games and apps **need to reflect more diversity** in terms of culture, race and ethnicity, language and gender.

01.
A ground-breaking study – aims and methods

The study breaks new ground in a number of ways

- → **It is large-scale, involving several thousand children, parents, teachers and others.**
- → **It looks at children's play in very different settings, in South Africa and the UK, showing the similarities, differences, and underlying patterns.**
- → **Most importantly by combining qualitative and quantitative data it provides an indepth and nuanced understanding of children's play with digital technologies and their learning, showing how children learn through digital play.**

What did the research set out to achieve?

The study *Children, Technology and Play* provides a detailed picture of how children play now, when they have increasing access to a range of digital technologies in their homes and at school.

There is extensive evidence that play supports develoment and learning, when the experience is actively engaging, meaningful and enjoyable, and involves experimentation and social interactions. But how does play with digital technologies support learning, in particular?

The aim of this study is to show how children's use of technology affects their play, their learning and their development. Looking at the environments that children play in, it:

- → **identifies how play is shaped by technology**
- → **examines the relationship between play with digital technologies, learning and creativity**
- → **explores the role of adults in supporting children's digital play.**

The study is based on new evidence, showing the similarities and differences in children's play with digital technologies, in different locations in South Africa and the UK.

The objectives of the research are:

- Exploring how children engage with digital technology in different contexts in their everyday lives
- Understanding the many background factors that affect children's play with digital technologies – in their homes, schools and communities
- Showing how children's use of technology affects their skills, knowledge and creativity, their family connections and emotional wellbeing
- Examining the vital role of adults in supporting and engaging with children's digital play: a kind of connection that is just as important as access to technology
- Considering how far play with digital technologies demonstrates the five characteristics of learning through play that the LEGO Foundation has found evidence for
- Identifying the implications of all this for parents, teachers, the children's toy and media industry, policy makers and researchers.

What research questions was this study looking to answer?

- What is the relationship between technology and children's play?
- What skills and knowledge do children develop through play with digital technologies?
- What is the relationship between play, technology and creativity?
- How do parents and other adults see children's play with digital technology, and how do they support it and engage with it?
- How much is children's digital play shaped by social and cultural factors?
- How far does children's use of technology fit the five characteristics of learning through play, which the LEGO Foundation has found evidence for?

Learning through play is:

- **a joyful experience**
- **that helps children find meaning in what they do and what they learn**
- **it involves active, engaged, hands-on thinking**
- **it involves experimentation and the testing of new ideas**
- **it involves social interaction**

- And finally, what more can important groups of people – parents, teachers, the children's toy and media industry, policymakers and researchers – be doing to enhance the positive aspects of play with digital technologies?

The partners in the study

Children, Technology and Play has been jointly produced by four project partners:

The University of Sheffield, UK
The University of Cape Town, South Africa
The LEGO Foundation, Denmark
Dubit, UK.

Dubit is a global children's research agency, which works closely with young people to understand their behaviours and the patterns of their play.

The research project that led to the study was co-produced by the project partners, who jointly set out its aims and objectives, conducted interviews and collected data, carried out analysis and disseminated the study findings.

How we gathered evidence

The methodology that was chosen for this study was intended to provide a rich, detailed picture of a complex subject. It considered the substantial cultural and socio-economic differences between locations in South Africa and the UK, while also showing the similarities between those locations.

An important aspect of this research was its combination of quantitative data (from questionnaires) with more nuanced, qualitative evidence (from interviews and case studies). In particular, it was important to hear children's own voices in the study.

One of the new things about the study was the way it used direct observations of children playing: children were given the chance to get involved in play, using GoPro cameras, WhatsApp messages and LEGO® bricks.

Who took part?

Parents of children aged between three and 11 were asked to complete a survey on their child's digital play: over 1,200 from the Cape Town area in South Africa took part, and over 2,400 across the UK.

30 parents in each country then took part in follow-up telephone interviews. Case studies of selected families were produced, with parents and children being interviewed and videoed. Parents also filmed their children playing. Children were given diaries to record their use of social media and television, and they used GoPro cameras to record their play with digital technologies.

Further, children were invited to build toys that they would like to see invented.

Children were also observed in schools, after-school clubs and community venues, with the child's class teacher or club leader also being interviewed.

Finally, children in schools took part in focus group interviews.

Ensuring that we acted ethically

Informed consent underpinned this research, in line with the BERA Ethical Guidelines for Educational Research and the research ethics regulations of the School of Education at the University of Cape Town.

Parents of children in the case studies and focus group interviews signed consent forms, and all adult participants signed consent forms. With young children, ongoing assessments of the child's body language were made during exercises, to check whether they appeared tired.

South Africa*

1,286 Survey respondents

9 Case study families

10 Case study children

9 Number of early years settings and primary schools involved

49 Focus group children

30 Telephone interviews with parents

14 Teachers and community members interviewed

UK

2,429 Survey respondents

10 Case study families

17 Case study children

5 Number of early years settings and primary schools involved

71 Focus group children

30 Telephone interviews with parents

24 Teachers and community members interviewed

*From the Cape Town area

Differences in approach between Cape Town in South Africa and the UK

In both the UK and the Cape Town area in South Africa, it was important to ensure that the people who were surveyed and interviewed were a mix of age, gender, ethnicity, race, socio-economic class and geography. This meant that there were some particular issues to consider.

In South Africa, special efforts were made to include marginalised communities in the research. In 'post-apartheid' South Africa, deep divisions remain in terms of gender, race, language and class.

In many suburbs in South Africa, safety issues, lack of infrastructure and parents' financial resources prevent children from taking part in out-of-school activities, and this was reflected in the collection of data. Lack of financial resources also means that access to data can be limited for South African children.

English is not the home language for the majority of South Africans, and so other languages were used in some of the research.

Interview and survey questions were also adjusted to reflect the realities of South African families. For example, many children do not have their own bedrooms, and so questions related to use of digital devices in bedrooms were removed.

Social, cultural and geo-political factors had to be considered for the focus groups, home visits and classroom observations in South Africa. So, for example, the use of wearable cameras was of concern in some of the communities where the study was carried out. Leaving the GoPro at home with children who live in poverty would jeopardise the safety of the child, their family and the researchers. The decision was therefore taken to change this aspect of the research.

02. What the evidence showed

Some broad themes emerge from the quantitative evidence in the report.

How is children's digital play affected by where they live?

Children's access to technology

The children who were surveyed in South Africa have much less access to technology such as tablets, smartphones and wearable technology compared to their peers in the UK. Nevertheless, children were found to be highly creative in using the technology that they have.

Children's play with technology

A far lower proportion of the South African children engage with any of the branded games (Minecraft, for example) that are popular in the UK. Across both countries, boys are more likely to play racing games, but the gender gap across other games is small.

Children's ability to create digital content

More than half of the South African children can create digital content, and almost half of UK children can. A substantial minority in both countries can share data without assistance.

Data privacy

Only a quarter of the children in South Africa and around a third in the UK understand issues related to data privacy.

Standard TV

65% of SA children and **82% of UK children** have access to a standard TV.

Tablet

21% of SA children and **94% of UK children** have access to a tablet.

Laptop

23% of SA children and **72% of UK children** have access to a laptop.

Smartphone

28% of SA children and **84% of UK children** have access to a smartphone.

Differences in parents' attitudes to digital play

Parents across the two countries expressed both positive and negative thoughts about the role of technology in children's lives. More UK parents said that they felt comfortable with children's use of devices, with the exception of television.

Parents in both countries gave similar reasons for joining in with children's play (primarily to support their development and foster relationships). Very few UK parents felt that their children did not spend enough time with technology, whereas many South African parents felt this way.

A higher proportion of South African parents said they were confident in playing with technologies and helping their child to play with technologies. However, UK parents were more likely to say that they knew who their children were playing with online most of the time, and that they knew where to get help and advice if they needed it.

Parents controlling technology

Similar numbers of parents in both countries said that they used the parental control and safety features of devices, but a higher proportion of South African parents said that they were not aware of these.

Children's play with technology is shaped by many things, such as the time and space that they have to play in, the shape of their families, and the experiences, beliefs and values of their parents, which affect how they support or limit play.

Then there is the wider 'ecology' of children's digital play – the historical, material, linguistic and socio-economic contexts that affect play. Digital play is woven into the cultural, aesthetic, emotional and political fabric of children's lives.

Play in families

Children's use of the resources that they have access to depends upon a range of factors, including their family's economic situation, where they live, the history of play in their families (gamer parents are more likely to encourage videogame play than other parents), and the language they speak at home.

Parents face common dilemmas, such as how much technology they should let children use, or what apps and games should be allowed. But each family addresses these in different ways, based on the beliefs and values of parents, and sometimes also of the extended family, including grandparents, uncles and aunts.

How is digital play woven into children's lives?

'Children's play lives are as vibrant and complex as ever in this digital age.' [All quotations are from the report.]

The report shows that technology is embedded in most children's lives, but in different ways for different children.

Overview of where children play, how long they play for, and who they play with

- → Our case studies show that children's play with digital technologies spans a wide range of places and spaces.
- → There is a great deal of play across the digital and non-digital.
- → Digital play occurs around the home, but much of it takes place in shared family spaces.
- → Children play digitally both on their own and with friends and family members, both in the physical world and virtually.
- → Despite parents' concerns, this study confirms that most children have varied play lives, and technology plays an important part in them. Technology does not exclude other forms of play.

Where play takes place

One of the things that this study considered was the way in which children's play with technologies crosses the boundaries of home and school. We saw children using at home some of the games and apps they had been introduced to at school. In the UK and South Africa there were a few examples also of home digital play being brought into school.

This kind of flow between school and home, formal learning and play is part of the everyday fabric of children's lives.

Play 'on the go' is also frequently digital in the UK, with families reporting play in cars, trains and other forms of transport using tablets and smartphones, for example. In South Africa, the public display of technological devices can encourage theft and related violence, and so play 'on the go' is much less likely.

Connections between the digital and non-digital

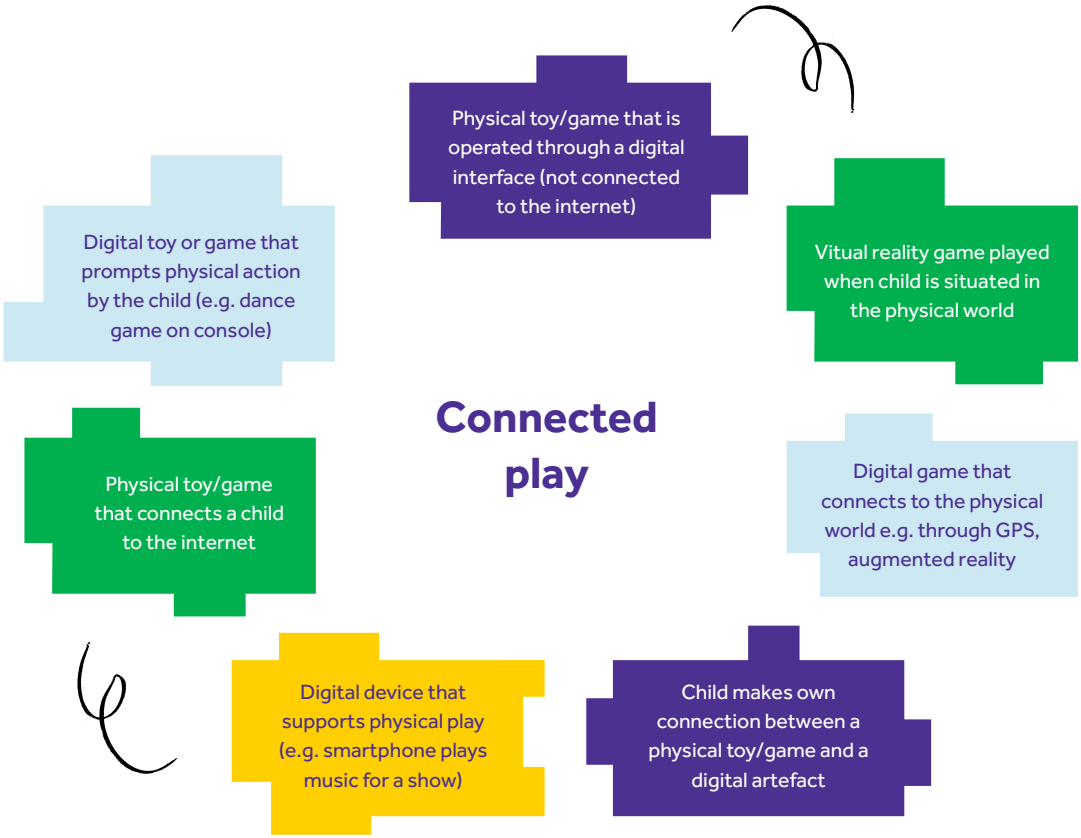
Some digital games and toys prompt a physical response in children, for example encouraging them to dance. Some digital devices (such as Pokémon Go) can, through technology such as GPS or augmented reality, deliberately connect the digital and physical world.

Children also invoke the digital world in their play, without actually using technology: acting out narratives from digital games, for example.

YouTube also crosses over to children's offline lives in various ways. Children incorporate elements of what they see in their offline play, and a number of them capture their own play and upload it to YouTube to share with others.

Who do children play with – on their own, or with friends and family members?

Young children do play with others online, but this is likely to be with family members and friends, who they play with over Facetime, Skype, SnapChat and Instagram, for example. Older children are more likely to play with others who they do not know, via videogames such as Fortnite, Minecraft or TikTok.



How much do children collaborate in play with digital technologies?

The study found that children often collaborate in playing with digital technologies. In classrooms in South Africa, for example, children were sometimes seen working in small groups, or in pairs. They co-produced content with their tablets, exploring new possibilities by discussing them with their peers and a variety of adults.

Children's own reflections on their play

Across both countries, children expressed a wide range of positive thoughts about technology, which were not limited to education and entertainment. For example, they discussed the positive impact that technology had on their friendships, their family relationships and their physical mobility, amongst other things.

It was clear that the children were aware that technological devices were everywhere in their lives, and they had a good idea of which devices are particularly good for play, and which are not.

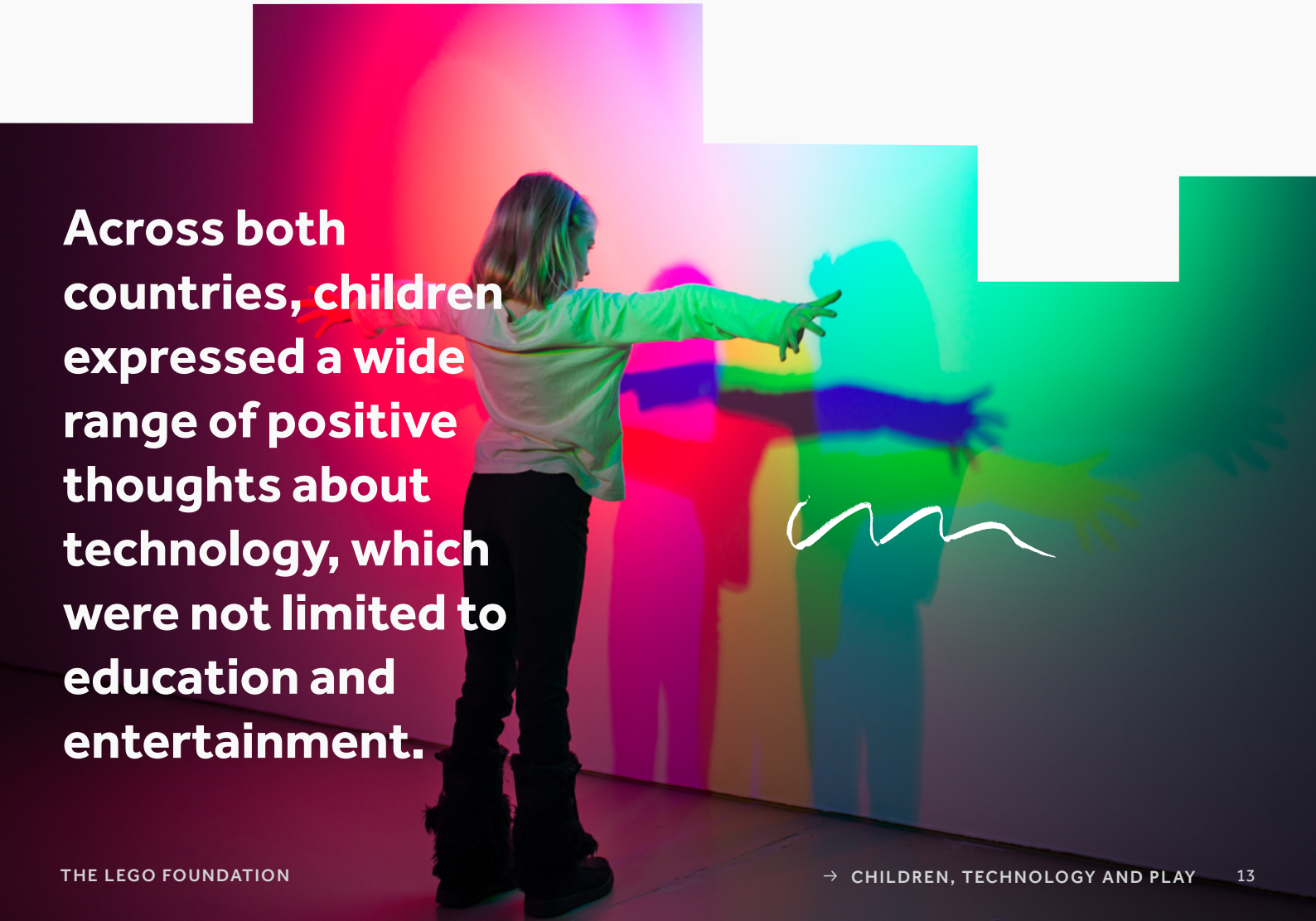
Children understood some of the nuances of technology use, and that devices can be used in both productive and unproductive ways. Some of the concerns that they expressed seem to mimic adults' concerns about digital media: some made comments about getting 'square eyes' from viewing screens passively.

Toys that children would like to see

An important part of this research involved children being asked to design a toy that they would like to see. What emerged was that children would like more toys to be developed that:

- → **link together the online and offline**
- → **give children a sense of independence and agency**
- → **enable them to link up with friends**

These features are already present in many toys, but children's media producers should continue to develop these kinds of products in the future.



Across both countries, children expressed a wide range of positive thoughts about technology, which were not limited to education and entertainment.

What children learn through play with digital technology – *knowledge*

The study reveals that play with digital technology supports the acquisition of knowledge and skills in more ways than parents may be aware of.

Learning though digital play can be both intended and incidental. Children learn a great deal through television programmes, apps and games that are designed specifically for that purpose, but they also learn much when playing with games and devices that are not explicitly educational.

Children learn most from play with digital technology when the app, game, programme and/ or device they are playing with is appropriate to their needs, and when they interact with a device in the right way.

This does not mean, for example, that adults always have to be present when children learn through play with digital technology. Indeed, there is good evidence of children learning when playing on their own with a range of devices. What is important is that the content is right for them, and that they can use the device easily: parents can help to ensure that this is the case.

Learning can be seen in the areas of subject knowledge, digital skills, and wider social, emotional, cognitive, physical and creative skills.

Subject knowledge and understanding

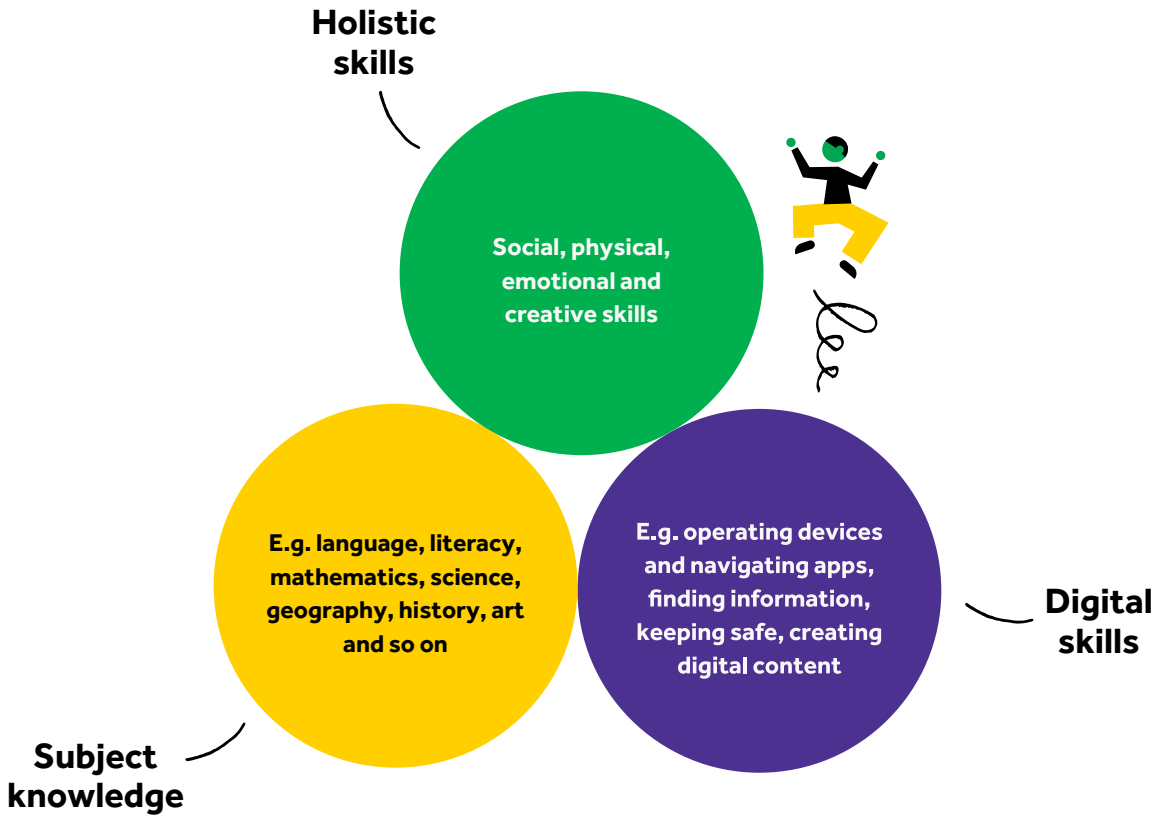
Sometimes, the knowledge that children gain through play with digital technology relates closely to school curricula.

Especially in the UK, the development of subject knowledge is sometimes through the use of apps and games that are designed specifically for this purpose: the increasing 'gamification' of learning by schools is increasingly noticeable.

At other times, families source apps specifically to help children with learning.

Parents' perceptions of play versus work

In both countries, though, parents made a clear distinction between play and work. Parents suggested that digital play can help children to develop subject knowledge and understanding across a range of areas. However, some parents said that they only allowed children to play with technology once school work was finished.



What children learn through play with digital technology – *skills*

As well as helping children to gain knowledge, an important aspect of digital play is that it helps children to develop many different skills.

Digital skills

Digital skills are those skills that people need to be digitally literate in the 21st century. Children need to be able to operate devices, but they also need a wide range of other skills that help them to be creative, to stay safe online, and to use technologies to solve problems.

The five aspects of 'digital literacy'

The EU Digital Competence Framework outlines five areas that are important for becoming a digitally literate citizen:

- → **information and data literacy**
- → **communication and collaboration**
- → **digital content creation**
- → **safety**
- → **problem-solving.**

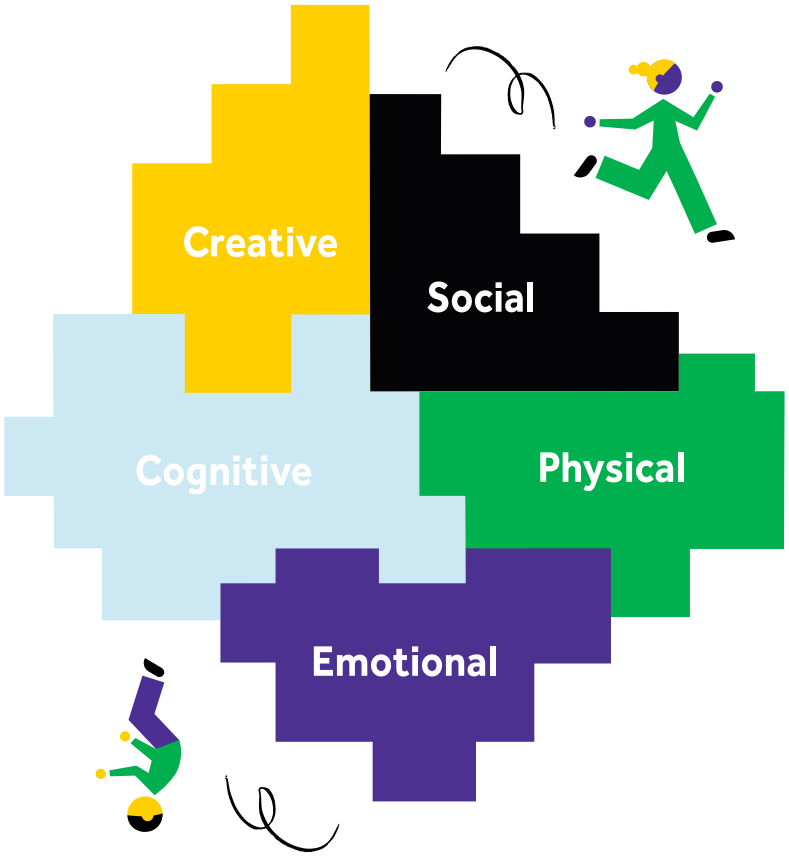
The study identified that digital play can develop skills across all five areas.

Do parents understand the digital skills that their children are developing?

The superior knowledge and ability of children in this area was a theme that came across throughout the telephone interviews with parents. This was despite some parents being obviously very skilled themselves, having worked in jobs requiring IT skills or having been keen gamers.

In addition, some adults may assume that all children develop digital skills from a young age, when a number of children only have access to a limited range of devices, apps or games. In other words, the development of digital skills always depends on context.

Children acquire a wide range of digital skills through their digital play.



The holistic skills that children develop through play with digital technology

The study shows that children develop a much wider set of skills through playing with digital technologies: sometimes these are less obvious than the specific digital skills that children may be gaining, and parents can be less aware of them.

Social skills

'Digital play can be very social.'

Children play with technology together, both in the same room and at a distance. They learn to communicate and collaborate with others, to understand their perspectives and build empathy. Digital play can help children learn to take turns, and to negotiate around turn-taking.

Some children in the study played online games with parents who lived separately from them, enabling them to develop a stronger relationship. Play at a distance through the use of digital devices can also be of value to children who otherwise might be geographically or socially isolated: in the UK, for example, there were many examples of children using video-conferencing software to play with others.

According to the children and parents who were interviewed for the study, some games are better than others for sociable play. Fighting games are often limited to one or two players, but strategy games such as Minecraft can encourage children to play together.

Play involving spectators

The sociable aspect of play with digital technologies is not limited to the children who are playing. Digital play can involve spectators as well: while they may not be physically involved in the game play, children can still make comments and offer encouragement from the side.

Physical skills

'Digital play can help develop a range of motor skills.'

Play with digital technologies was seen to help children enhance their physical skills in a number of different ways. Our researchers felt, though, that with better-designed games and apps children could be encouraged to do more to develop their motor skills.

Our research shows that children develop fine motor skills through digital play, for example by controlling handsets. Game play or navigating screens involves many actions such as pushing, pointing, swiping, clicking and scrolling. These fine motor skills can be transferred to non-digital contexts.

Children also develop gross motor skills as digital media motivates them to get involved in physical play, for example by copying dance moves that are shown on screen or practising new football skills that they have seen being demonstrated online.

Children were seen joining in with family members as they followed workout routines on YouTube, while others developed their tennis skills by using their Fitbits competitively.

Though there were a number of examples like these, this is an area that the researchers felt was still under-developed, with technology still falling short of its potential. With the development of wearables and GPS technologies, in particular, we might expect more evidence of the link between digital and physical play than this study found.

There may be implications in this for the children's media and games industry, which could focus more attention on the development of children's games and apps that encourage the cross-over between digital play and physical skills.

Cognitive skills

'Digital play develops children's cognitive skills in a range of ways.'

Improvements in concentration

An important stage in children's cognitive development is learning to concentrate and sustain their attention over time. There were many examples in the study of this happening, particularly in relation to game play.

It was particularly interesting to see this in relation to competitive play around videogames, which many of the children in the study were involved with and enjoyed. This kind of competitive play seems especially to help children develop the habits of being persistent and focused.

Improvements in children's working memory, and their ability to make sense of information

Play with technology also seems to give children the chance to strengthen their working memory – their ability to store and manage the information that they need to take on certain tasks. Some of the digital games that are played by children require them to manage a complex range of information, both in terms of what they see and what they hear.

Across the UK and South Africa, children showed that they are able to manage dense screens that contain a range of icons, symbols, texts and still and moving images. Children also showed that they can integrate new onscreen information with what they already know, to carry out tasks. In addition, some digital games involve the player completing a quick sequence of steps, which children were often able to memorise in order to advance through the early levels of games that they had already completed.

An important stage in children's cognitive development is learning to concentrate and sustain their attention over time. There were many examples in the study of this happening, particularly in relation to game play.

Digital play helping with critical thinking and complex problem-solving

This study also found evidence of children developing critical thinking through digital play – making judgements about various forms of digital content and applying it in their everyday lives. Watching videos and television programmes and films, for example, sometimes prompted critical thinking and questioning.

Certain apps and games also enable children to develop skills such as problem-solving and flexible thinking. These were more likely to be seen with open-ended games and apps, such as Minecraft and Roblox. Furthermore, it was clear from the study that educational games which involve rote learning can be quite limiting in terms of prompting curiosity. Games involving regular changes and new aspects of game play can create more opportunities for being inquisitive.

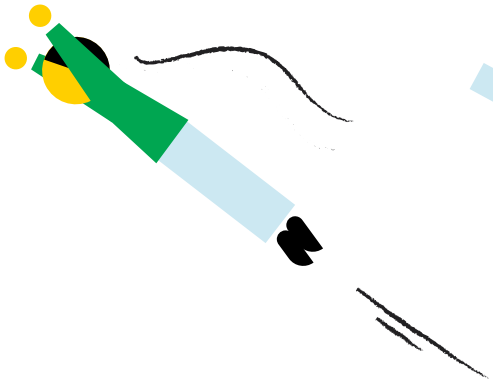
Other types of videogames can also enable children to develop higher-order thinking skills. Some children talked about how Fortnite helped them to strategise, and were aware that the learning they experienced playing this game was different from learning to play a musical instrument, or from the passive experience of watching videos.

Voice-activated devices and speaker assistants

The study found that smart home assistants and voice-activated devices, such as Alexa, Google Home and Siri, are popular playthings in the UK, with many examples of children asking them to answer absurd questions, or tell jokes.

At the same time, the devices were used by the children in the study as a tool for answering questions or carrying out web searches for information, helping children to answer questions that arise from their own interests. These devices help to develop inquisitiveness in children, which is an important part of learning and development.

Games designers should not be afraid to take risks in creating content for children that breaks with the usual conventions of games, to make them more open-ended



The role playing that digital play makes possible helps some children to protect their mental wellbeing, when they are living in a hostile environment.

Emotional skills

The study showed that digital media can have an important role in supporting children's emotional wellbeing, helping them to explore and express their emotions through play with digital technology.

Many parents said that digital play led to strong emotional reactions in their children, but that such emotional reactions were not always negative.

There was evidence that play with digital technologies can indeed be helpful in developing children's ability to understand and manage their emotions. This includes children learning how to deal with frustration, and staying motivated in the light of disappointments and challenges.

Certain features of apps seemed to help children regulate their emotions, such as the ability to undo actions or return to a lower level, thus reducing feelings of frustration. In addition, some apps and games also supported self-evaluation, which is an important aspect of self-regulation. This applies particularly to games that enable children to check on their own progress.

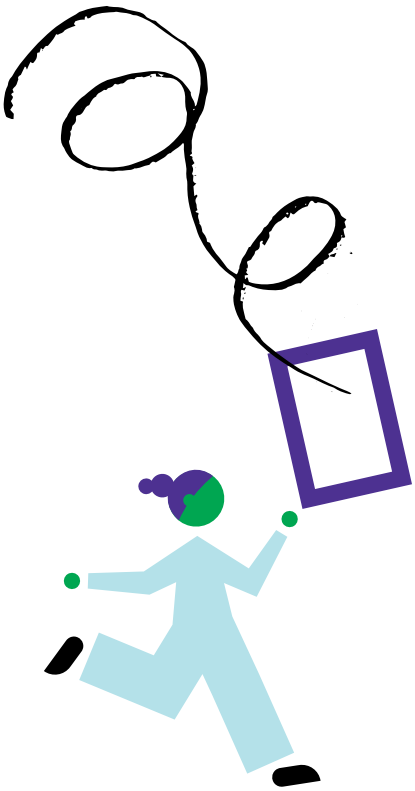
Play with digital technology helping children to bond with family members

Another way in which digital play performs a significant role in the emotional lives of children is the way that it allows them to bond and spend time with others, strengthening family ties and forging friendships with children outside of the family.

How play with digital technology can help protect children in dangerous environments

Finally, the study suggests that the role playing that digital play makes possible helps some children to protect their mental wellbeing, when they are living in a hostile environment. Some of the children in South Africa were living in areas that are plagued by gangsterism, drugs and a high incidence of violent crime.

Drawings that children make physically often find their way into the digital world, while children also act out or make sense of digital content by applying it in their daily lives.



Creative skills

'Digital play provides multiple opportunities for developing creative skills.'

Creative skills are key in the 21st century. There is little doubt that play with digital technologies supports creativity in all its forms.

What we mean by creativity

Although the concept 'creativity' remains broad, complex and fuzzy, it is widely understood to involve individuals being innovative and imaginative in bringing together pre-existing knowledge with new knowledge, to create things that did not exist before.

Digital and non-digital play both support creativity

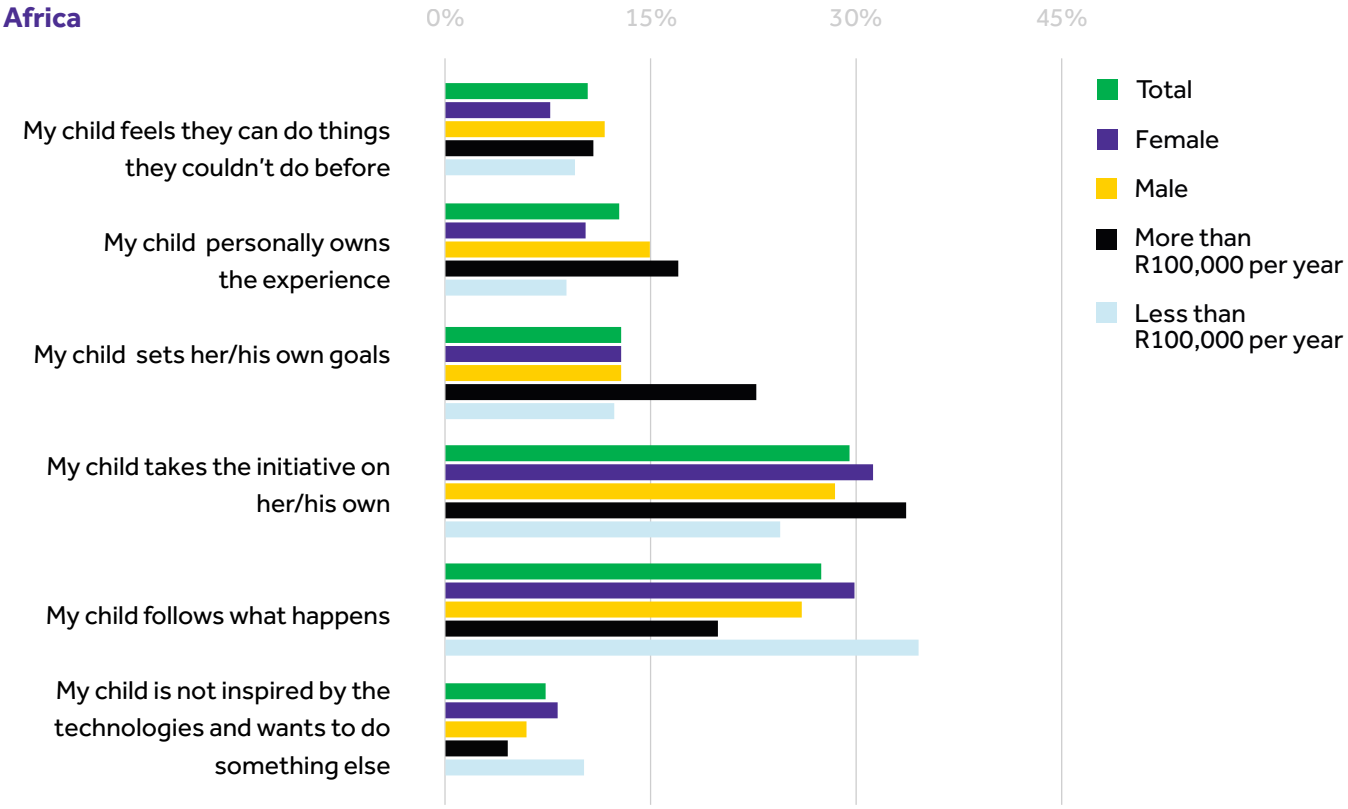
The findings of this study suggest that the development of creative skills can be seen in both digital and non-digital environments, as well as in children moving easily between the two. Drawings that children make physically, for example, often find their way into the digital world, while children also act out or make sense of digital content by applying it in their daily lives.

Coding games for children

Coding games and apps specifically enable children to create new games that others could play. For example, the study found examples of children who were able to code and build games quite quickly using their current devices and apps that are often free. Children were seen to build their own game play environments in Roblox as well as on the Xbox game console, and were able to play these games with family members. Some of these children had got involved in animation and coding using computers at home, after they had been given the chance to learn how to use key pieces of software at school.

Levels of agency in play with technology

South Africa



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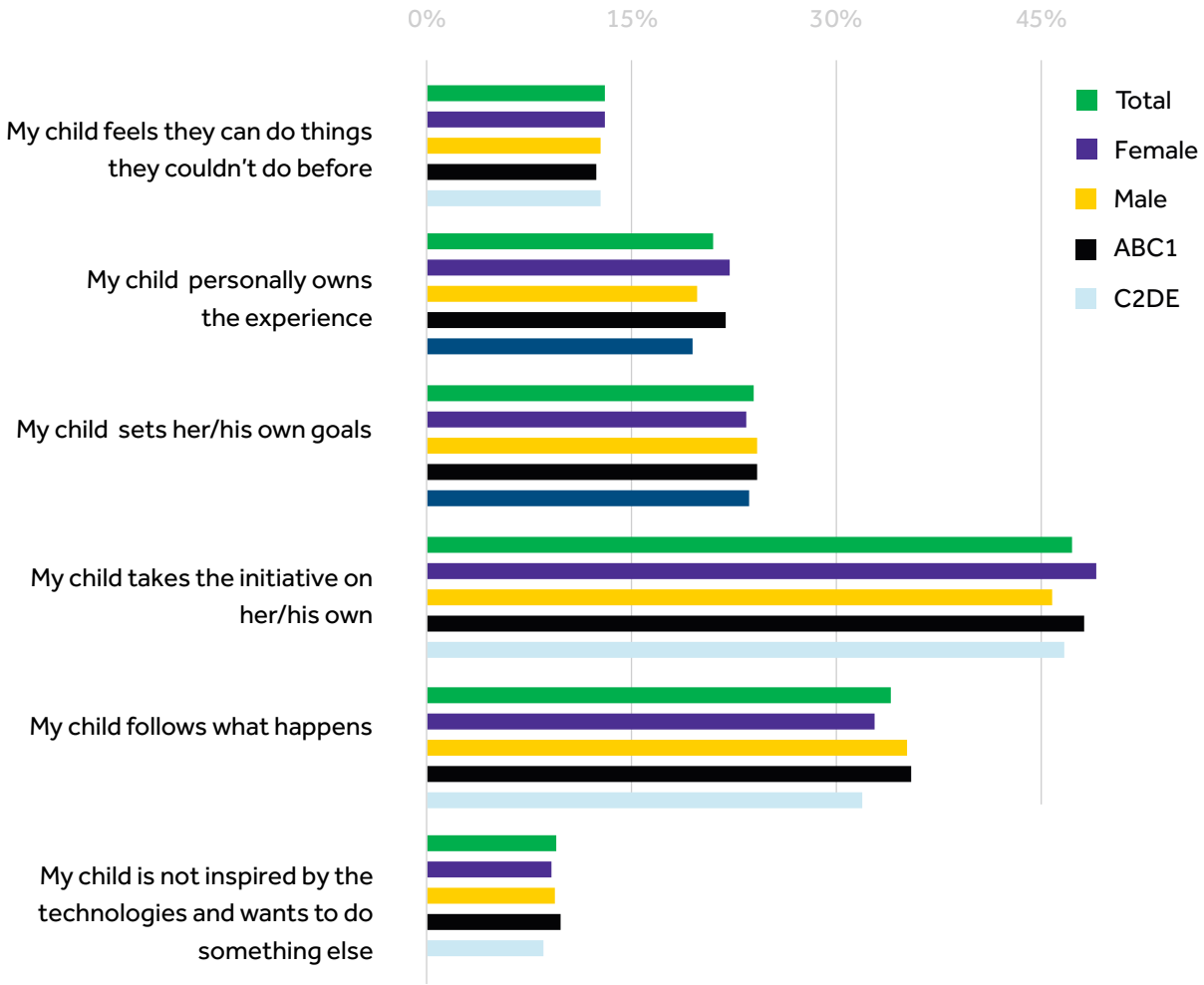


Source: Dubit/University of Sheffield - November 2019. BQ13. When your child plays with technologies, how far are they taking an independant approach? (Base; n=2429)

The value of open-ended and self-directed digital play

A key finding of this study is that the more open-ended and self-directed is children's play with digital technologies, the more children are able to develop creative habits of mind.

Imagination is a key aspect of creativity, and the researchers found much evidence that digital media stimulates imaginative play. Children played at being their favourite digital characters, acted out scenarios related to programmes and games, and gave their dolls and soft toys the characteristics of superheroes and princesses that they had met in the online world.

Digital devices also gave children a way of exploring and expressing their imaginative thoughts, and this kind of play was often highly creative. YouTube is a significant source for children's imaginative play in this respect, both as a prompt and inspiration, and as somewhere that children can put recordings of their own creations.

Creativity and specific devices

There is an interesting relationship between specific kinds of devices and particular kinds of creativity. For example, apps and videogame play appear to support cognitive creativity, whereas television leads to physical and imaginative play. Smart assistants were notable for the way they appear to help with language-based, musical, physical and imaginative play. Tablets and smartphones help with creative production, such as drawing and making films.

Creativity and adult input

Finally, the study found a link between creativity and the involvement of adults in children's play with digital technology. As well as the particular devices that children have access to and what they are good for, it is important to consider the attitude and input of parents, the questions asked by adults, and so on. When the right kind of device comes together with the right kind of adult involvement, to give children agency in their digital play, then creativity can be found in abundance.

Open-ended digital tools, including photography and YouTube tutorials

The more open-ended digital tools, which are often associated with a particular creative process such as photography, appeared to give children the deepest engagement in developing a cross-section of creative skills. So, for example, when the children were using YouTube tutorials or more open-ended apps designed to support drawing, they had more possibilities for creative play.

Cameras were another form of creative tool that was widely used in the study, partly because children were asked to take photographs and films using GoPro cameras, but also because many children enjoyed using the camera function of smartphones and/ or tablets.

This kind of 'boundary crossing' between the functions of one device has been shown to be very productive for children's play, both on their own, with their imaginary friends, or with others around them, whether they are their peers, teachers or parents.

'Boundary crossing' between the functions of one device has been shown to be very productive for children's play.

Creativity is not dependent on the devices that children have access to

Of course, children's creativity did not always revolve around the digital tools that they have access to now. The ability to explore and express one's imagination through play is an important aspect of creativity, and a considerable amount of the imaginative play that was observed in the project took place away from digital devices and digital content. Even so, children still drew on the digital world in their play, as an aspect of everyday life. Children described acting out scenarios from favourite videogames such as Minecraft in their offline play.

Videogames, role play and children's imaginations

The study explored some interesting connections between children's play with digital technologies and the development of their imaginations.

On the surface, the playing of videogames such as MarioKart or FIFA does not appear to involve much imagination, but on closer inspection they often involve children in forms of role play, putting themselves in the position of certain characters and exploring what it would mean to be them. Immersion in a game world like this gives children rich opportunities to be imaginative, playing with possibilities and making connections with their offline worlds.

Voice-activated devices also proved to be an interesting tool in relation to children's developing imagination. Often the devices were used to play music, and this supported imaginative and creative play, especially singing and dancing. These devices seemed to offer children considerable potential for being imaginative, at least in terms of playing with possibilities, so that the children could use their intuition and make what they described as 'random' connections as a means of being funny.

Creativity needs fear-free environments

The examples in the study make it clear that any investigation into children's creative skills when using digital tools needs to take account of the wider social environments that children find themselves in. This includes considering whether children are relatively free of fear and/ or anxiety, both inside and outside the classroom.

The role of adults in developing creativity

On an individual level, also, children's creativity is affected by the people around them. Having an adult who listens responsively and respectfully makes it possible for the child to bounce off ideas and create new ideas together. It also encourages the child to take the initiative in finding out. By recording in detail the dialogue between adults and children, the study shows clearly how the adult's patience and genuine interest in the child's ideas make creativity possible.

Other skills

There are many other ways in which play with digital technologies can help children develop important skills.

Digital play can help children develop media and information literacy, for example, as they learn to carry out searches on the internet or organise the information that they find.

The networking power of the internet also gives children an understanding of themselves as citizens in a global, multicultural and multilingual world. For example, a number of children in the study said that they played with others from across the globe on console games and platforms such as Minecraft and Roblox. This led in some cases to friendships being struck up, giving children the chance to learn about other cultures.

How play with digital technologies helps children with additional needs

The study found evidence that digital play supports the learning of children with additional needs, in particular. Some children with sensory awareness challenges, for example, appear to find the playing of games a calming process, and it can help them develop emotional and other skills.

There was some evidence that digital technology can be particularly helpful for a child with additional needs in regulating their emotions. One child, for example, used her iPad as a diary in order to help her be more in control of her feelings.

At the same time, however, children with additional needs are also vulnerable to the more harmful aspects of digital use, and this creates extra challenges for parents and teachers in terms of choosing devices and apps, and supporting children as they use them.

Play with digital technologies in the classroom

'Teachers use technology in creative ways to foster learning.'

The study found that teachers use digital technologies in the classroom in a variety of ways, to record students' work, make lesson plans and share good practice.

In some schools, photography and video were used to make children's learning visible, and enable children to become aware of how they learn and what they have learned.

Teachers also used technology to plan for lessons, to take ideas from other teachers who they were inspired by, and to work together to improve teaching.

However, while 'gamification of learning' is a feature of schools' use of educational technology, there seemed to be an over-reliance in some schools on programs that had a very fixed educational purpose. Other, more open-ended forms of digital play and creativity were less evident in these schools.

In some schools, teachers had knowledge of the way that children were using technology at home, and built on this in effective ways. Given the influence that schools have on play with digital technologies in the home, there is an opportunity for all schools to broaden their understanding of how children learn through technology.

How children take digital knowledge and skills from home to school

The researchers found some good examples of teachers building effectively on the digital knowledge and skills that children gain outside of school, and letting children bring in digital products they had created at home to show the class.

This approach, which recognises the range of skills and knowledge that children bring with them to school from their homes and communities, is one that is needed increasingly in a time when children's learning is being transformed through play with digital technologies. When children can fact-check their homework on devices such as Alexa, Google Home and Siri, for example, then teachers need to take account of this in the kinds of tasks they give children to extend their learning outside of school.

The researchers found some good examples of teachers building effectively on the digital knowledge and skills children gain outside of school.

The 'digital divide' – how are some children disadvantaged in playing with digital technologies?

Technology is embedded in children's everyday play lives but there is evidence of a 'digital divide', meaning that children

- → **do not have equal access to material resources**
- → **do not develop the same kinds of digital skills from a young age**
- → **are affected in their play with digital technologies by differences in infrastructure, class and cultural preferences.**

This digital divide emerges both from the survey data and our detailed studies of individual families.

The digital divide can be seen as playing out in three ways.

Differences in access

Differences in access to tablets, smartphones, or digital home assistants such as Alexa and Siri, have significant implications for children's ability to play and learn with these new and emerging technologies.

Household income is a key factor in this in South Africa, and (due to the country's apartheid legacy) these differences are still closely linked to race. In the UK there are some differences in relation to social class and race, but they are not as stark, and the patterns sometimes defy expectations (for example, children in lower socio-economic groups are more likely to own their own devices, and differences relate to the types of uses of the devices).

Infrastructure is also a critical factor. Although South Africa is more developed than other African countries, a lack of basic amenities (such as electricity) and network infrastructure still plague it. Mobile phone penetration is lower than the global average, and broadband is expensive.

Differences in skill

Skill in using technology also varies between children from different backgrounds. Levels of education in South Africa are particularly affected by race and class.

Other inequalities

Even when groups of children have access to the internet and related infrastructure, forms of structural inequality can mean that a divide still exists. Race, ethnicity, income, age and gender affect access to and use of technology. In South Africa centuries of colonisation, marginalisation, deep inequalities, government-controlled media and a two-tier educational system fundamentally affect who people are and what they know.

The five characteristics of learning through play

Do they apply equally to play with digital technology?

The LEGO Foundation and its partners have found evidence that there are five characteristics of play that leads to deeper learning. This kind of play is:

- → **a joyful experience**
- → **that helps children find meaning in what they do and what they learn**
- → **it involves active, engaged, hands-on thinking**
- → **it involves iteration – repeated experimentation and testing of new ideas, and**
- → **it involves social interaction.**

From the study, it is clear that all five characteristics can be seen in play with digital technology.

While the study considers the five characteristics one by one, it is important to remember that they are often found together in children's play with digital technologies.

Five characteristics of learning through play

Joyful

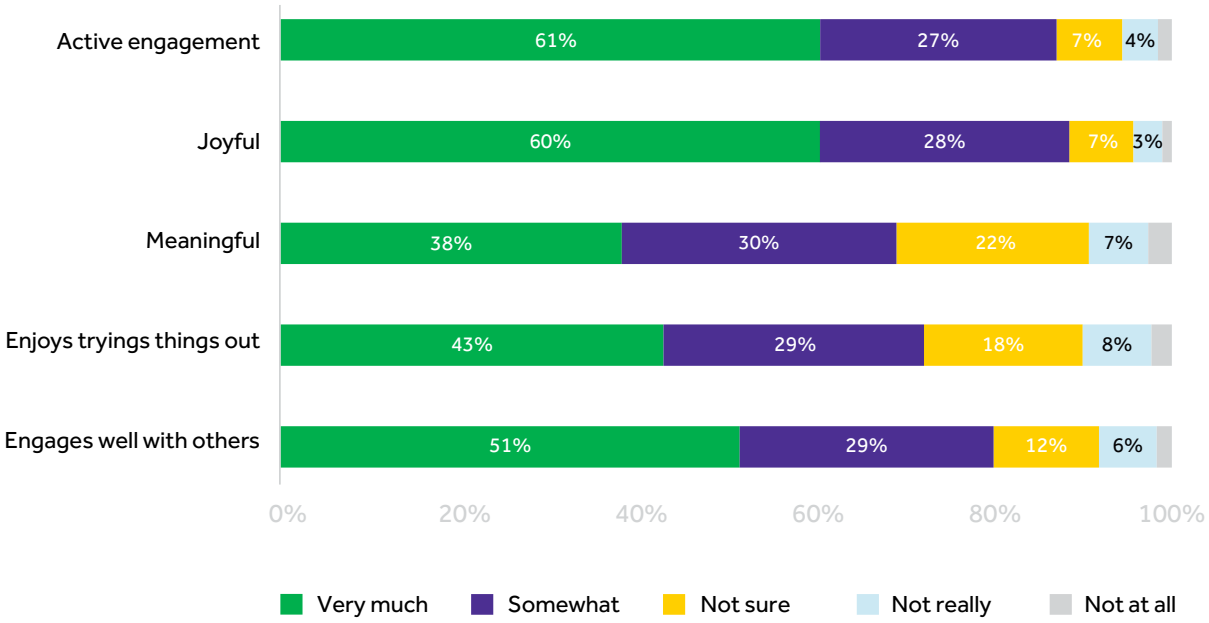
Across both countries, there was evidence that digital play brings much joy to children. Parents and children often used the word 'love' to describe play with digital technology, as well as the non-digital play that is related to the digital world.

it is important to bear in mind, though, that the joy that children experience may follow initial frustration. An achievement is often even more satisfying and joyful when it takes determined effort to succeed or solve a problem. This kind of satisfaction is closely linked to the development of tenacity. Joyful play is also sometimes hard to see, as children may be so absorbed in play that their facial expressions and body language do not show what they are feeling.

Clearly, the intensity of emotions that children feel when playing with technology can be negative as well as positive. Parents described children using technology to 'calm down' when they were upset, but at other times the use of technology created frustration and anger. This was especially the case when children were asked to stop using technology by parents who were concerned about the amount of time children spent on it.

It is significant, though, that parents were often focused on the negative effects of digital play, and not the joyful ones.

Characteristics of learning through play - South Africa



Meaningful

Across the two countries, there was little doubt that playing with digital technology is meaningful to children. Children draw on their engagement with characters, programmes and films they encounter on digital devices in their everyday lives.

Children's play is always part of their wider experience. It moves from the digital to the non-digital, meaning that the distinction between the two can be blurred. There is a need to see children's play all together, therefore, not focusing on play with a particular technology.

Parents' perceptions of meaningfulness

Close observation of children's play showed strongly that play with technology is meaningful to children, and deeply connected to their everyday lives and interests. It was therefore surprising that this characteristic, along with play being iterative, was less widely recognised by parents. This may be because parents were making their own judgements about what and is not meaningful, and do not share the child's sense of what is important.

Diversity and meaningfulness

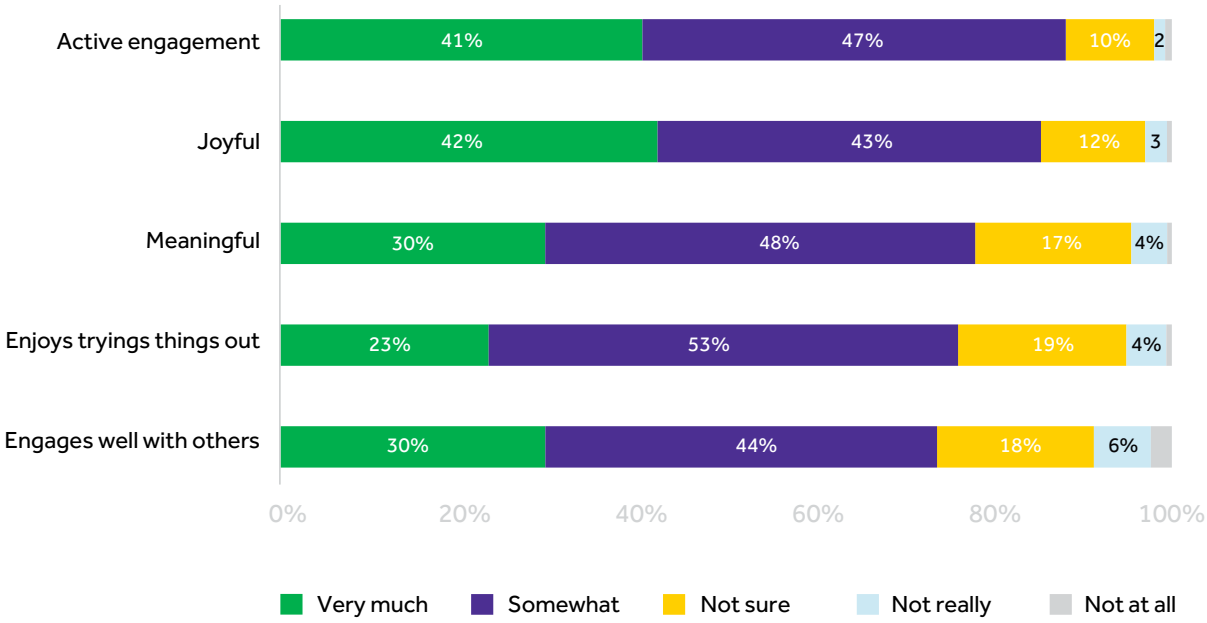
The lack of diversity in digital media content can make play with digital technology less meaningful for some children.

A number of parents in the study felt that there was limited representation of the large majority of South Africans in digital games and apps, which were seen as reflecting Western values and identities. This lack of representation is not just an issue for South African children, but for black and minority ethnic (BAME) children in the UK also.

Unless children's digital content producers take up the challenge of producing resources that represent the diversity of contemporary childhoods, the meaningfulness of digital play for many children will be severely limited.

The lack of diversity in digital media content can make play with digital technology less meaningful for some children.

Characteristics of learning through play - UK



Source: Dubit/University of Sheffield - November 2019. BQ7-11. We are interested in children's active engagement with technology in play. When playing with technology, is your child... (Base; n=2429)

The vast majority of children aged 3-11 enjoy their play with technologies and are generally actively engaged while doing so.

Actively engaging

The study found plenty of evidence of children actively engaging with digital technology: showing the active, 'minds-on' thinking that is one of the characteristics of learning through play.

Children were often seen to be focused on what they were doing, and often immersed in it, especially when children were involved in game play. Other kinds of digital play that children found particularly engaging include drawing using a tablet: children were sometimes absorbed in this for long periods of time.

The researchers found that in terms of active engagement, the quality of an app or game itself is crucial to the quality of play that children have with it. Some devices, apps and games are easier for children to engage with actively than others, but if the fit between the child and the game or app is right, they can experience 'flow' that comes with profound involvement in a task.

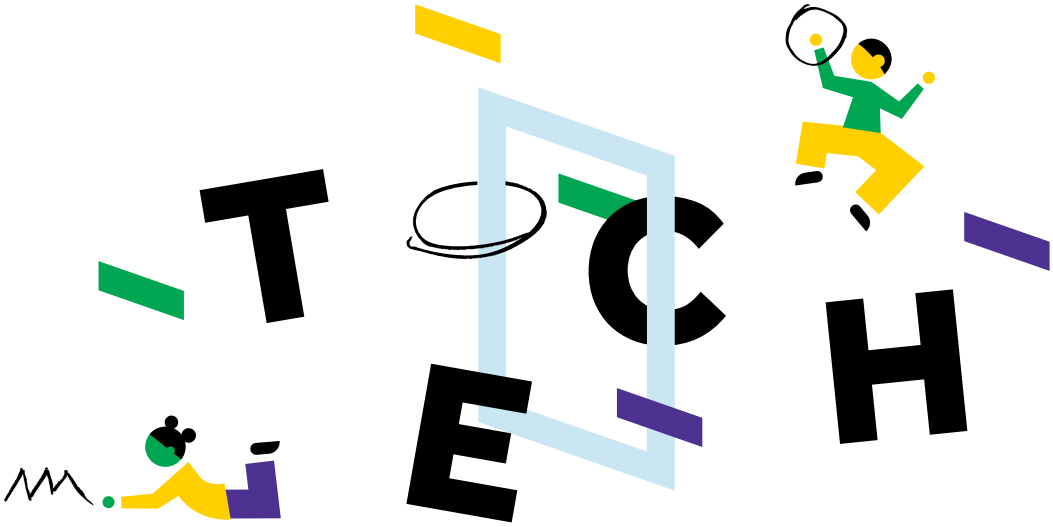
Playing with digital technology is absorbing for children, then, and active engagement is a defining feature of that play. Indeed, apps and games are designed to be engaging and absorbing. Adults need to make judgements about when this level of active engagement becomes potentially harmful or limiting: not only parents but teachers too, with the 'gam-ification' of learning aiming to use this aspect of play in the classroom, to make education more entertaining and less boring.

The study suggests that, with careful management, the high level of active engagement involved in digital play does not need to be harmful, as many parents fear.

Iterative

Iterative play (play that allows children to repeat what they have done, to experiment and test hypotheses) was seen in a number of the detailed observations of children, as they interacted with technologies. Again, some apps and games are better than others in enabling children to seek out new challenges, try out different solutions, set their own goals and vary their approach through repetition.

Some of the kinds of apps and games that children played with are limited in design and fixed in content, and so they do not promote open, iterative play. Apps and games that are more open-ended, such as Minecraft and Roblox, provide many more opportunities for iterative play.



Key points

More can be done **to enhance** some of the characteristics of learning through play **with digital technologies.**

Children's digital play needs help to become **more social** in some contexts, and better at allowing children **to test ideas** and try out new things.

Children need to be given more **agency in their play with digital technology,** not just following a fixed path that a game or app sets out for them, but being more engaged in **setting their own goals and personalising** their experiences.

Children need to be given a **varied diet of digital play**: children who are involved in more types of different play are more likely to be engaged and happy, to experiment and mix with others.

Parents, teachers and game and app designers can all help with this – see 'Implications of this study.'

Socially interactive

From the research, it is clear that a range of rich social interactions take place around play with digital technology, involving many different kinds of devices.

It is true that children can learn a great deal through playing with digital technology on their own, if the content and the device are appropriate for their needs. The researchers saw many examples of individual play that were enjoyable, productive, challenging, and led to all kinds of learning. Some play with digital technology can be very individualistic, if children are playing a game that is designed for this. Children playing independently should not be viewed negatively, therefore.

However, some apps and games actively encourage socially interactive play, and this social interaction is one of the most important benefits that this kind of play provides: there was plenty of evidence of this in the study.

Again, this type of play depends very much on the particular type of device and the particular game that children play with. Games consoles lend themselves in particular to social play, and not just when games allow for multi-play: children at times play together using the same handset. The give-and-take of sharing and negotiating turns is an important part of the social interaction that children have around play with digital technology.

Of the many ways that digital play helps to strengthen social bonds within families, play involving several generations was seen to be especially important.

Play involving several generations was seen to be especially important.

03.
The involvement of adults in children's play with digital technologies

The active engagement of adults (including parents, grandparents and teachers) is especially important in shaping the way that children play with technology.

Adults' views of children's use of technologies

The study shows that parents and other adults hold a wide range of views about children's use of technology.

On the positive side, parents, community leaders and teachers see play with digital technology as helping with the development of subject knowledge, as well as helping to develop valuable digital skills that can serve children well both in school and in future employment.

At the same time, adults often see digital play merely as a reward, or as a distraction from the 'really' important things in life, such as work.

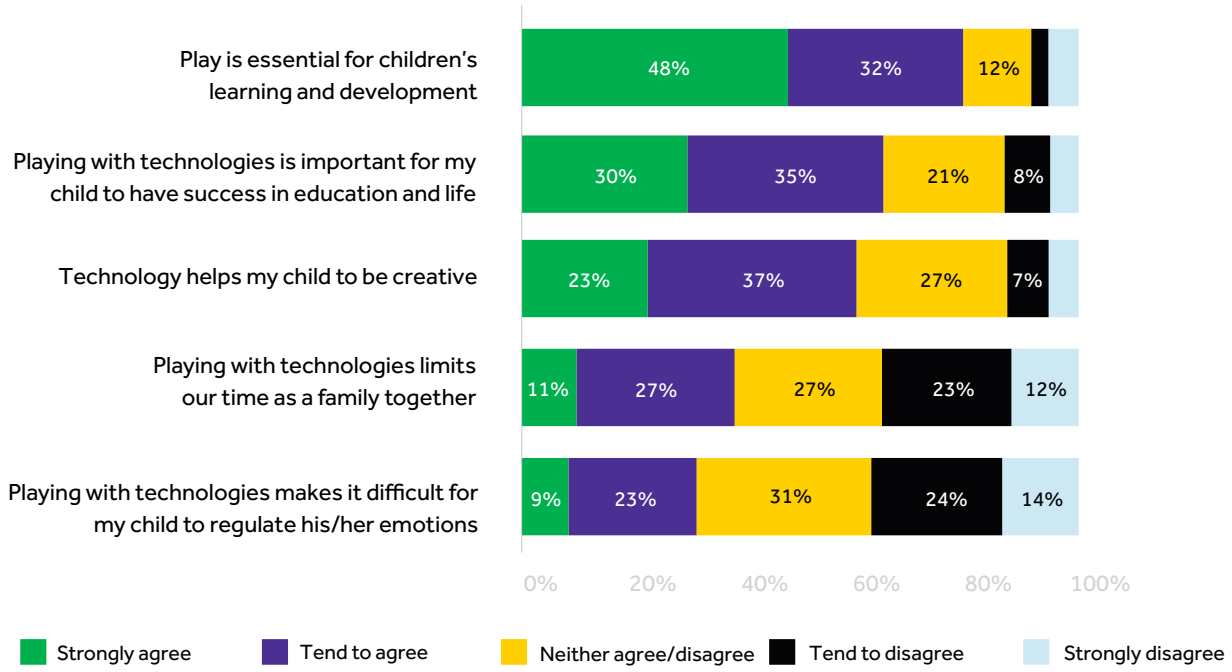
The study also found that many adults have concerns about the perceived negative aspects of technology. Some parents are concerned about digital 'addiction', about whether digital content is suitable for children, and about the risks that children can face online. Some parents in South Africa were concerned about the effects on children of violence in games. Some parents see children's play with technology as 'inactive', as less social than non-digital play, or simply as a waste of time.

It was noticeable that parents put less emphasis on the social, emotional, cognitive and creative skills that can be developed through play with digital technology, compared to the benefits in terms of learning and development. This may partly be because, while many schools emphasise the learning benefits of technology, parents do not hear similar messages about the wider benefits of digital play.

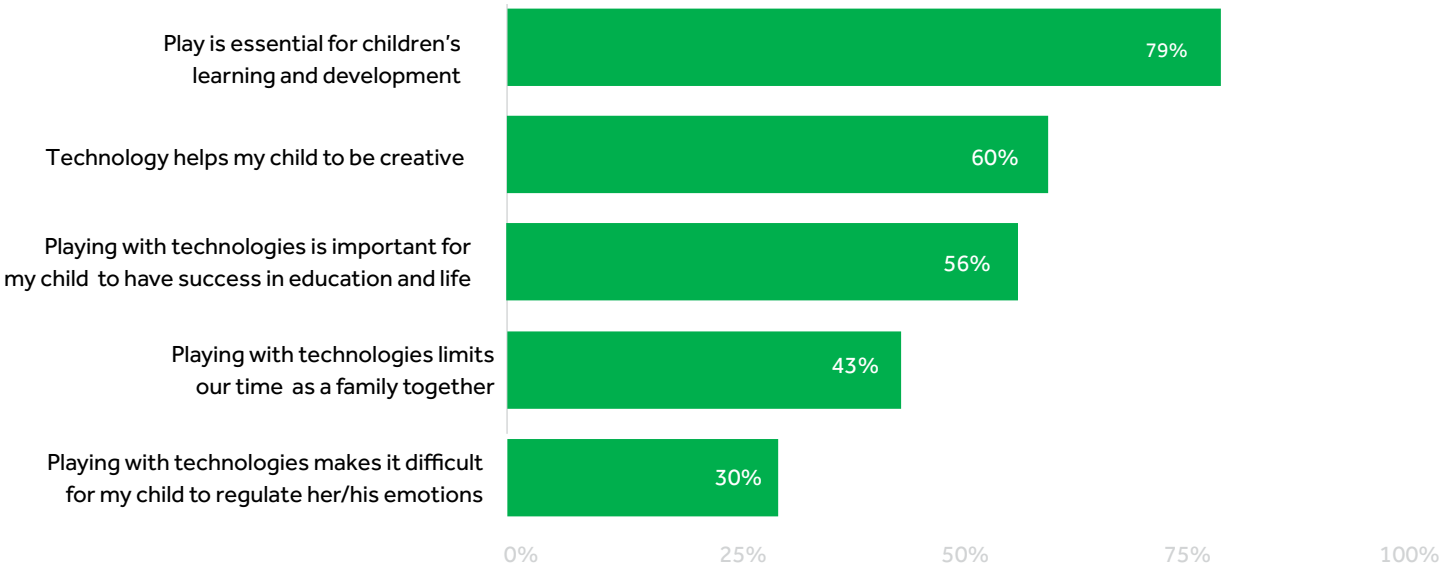
The study also found that parents sometimes hold views on negative aspects of play with digital technology, when it is clear that such play in their own households is generally well balanced. Some parents may be reflecting dominant views in the media on children's uses of technology, even when these are not supported by their own experiences.

For some parents, there was a sense of being in a 'runaway world' in which they struggle to keep control of their children's engagement with technologies, and feel that they lack expertise in using technology themselves.

Parental attitudes and practices - South Africa



Parental attitudes and practices - UK



Source: Dubit/University of Sheffield - November 2019. DQ1.Please indicate how much you agree or disagree with one of the following statements. (Base; n=2429)

Within the family: how much do parents and other adults get involved with play with digital technology?

Parents in the study demonstrated a range of approaches to getting involved with their children's digital play.

The involvement of parents varies with children's ages: as children get older, they tend to have greater independence in their technology use, with parental monitoring decreasing in the early teenage years.

Differences between free play and guided play

A great deal of playful learning with technologies is 'free play'; unstructured play that is initiated by the child. In the study, adults were seen to spend a good deal of time observing or listening to their children's free play with technologies without intervening. But just by observing free play, parents could develop knowledge and awareness of their children's interests and abilities when it comes to play with technologies, enabling them to provide what the child needed, or help get videogames started.

Some parents spend much more dedicated time with their children, paying close attention to the way they play with technology, talking to them about what they are doing, and sometimes joining in.

The researchers also saw an amount of 'guided play', with adults supporting children to achieve particular goals: often this involved helping children to operate devices.

The involvement of parents was found to depend partly upon what they are comfortable with. Sometimes there is an element of gender stereotyping in this, with fathers for example playing more sport games with their children.

The study found that, while parents demonstrated a range of confidence in their own technological capabilities, their involvement in children's play with digital technology was not always reliant on their own digital skills and knowledge. This finding is important since many parents lack technical knowledge, but this need not be a barrier in supporting their children's playful learning through technology.

When do parents intervene to restrict play?

Parents described many ways in which they step in to restrict digital play, and discussed the circumstances in which they would close down play – when they disapproved of content, when play descended into arguments, and when they felt that children had spent enough time on a particular activity.

Parents facilitated children's play in the following ways:

Free Play

Parents provided resources and space for children's free play

Guided Play

Parents helped children in their digital play, and sometimes co-played

Game Play

Parents played digital games with children, or explained the rules of games to them

Adults other than parents: the importance of grandparents and older siblings being involved

Although studies of adult involvement in play with digital technology tend to focus on the role of parents, adults other than parents play an important role too. It is interesting that some of the more relaxed, non-educational digital co-play that was observed in the study was between children and grandparents. It is also true that children's older siblings, who may themselves be adults, play an important role in shaping their play with technology.

Adult involvement in schools and the wider community

As might be expected, the research that was carried out in schools suggests that teachers tend to get involved in more of a directive way in children's interactions with technology. Educational approaches such as active learning, inquiry-based learning and problem-based learning can all involve teachers supporting children's learning through the use of technologies, which give them the chance to explore, experiment, and learn through trial and error. Teachers are less likely, however, to enable children to involve themselves in more open-ended digital play, which does not have a clear outcome in view.

In early years settings, adults were seen to take on slightly less directive roles, although they were still more directive than many adults in the home environment.

Finally, home and school are not the only environments in which adults can shape the way that children play with technology. The research also included observations of children learning with technologies in community settings such as after-school clubs.

04. Implications of this study

The findings of the study have a number of important implications for a range of different stakeholders:

For parents

For teachers

For the children's toy and media industry

For policymakers

For researchers

For parents

The study has a number of significant implications for parents. First, there is the question of the extra help and information that parents need to be provided with, so that they can have a better understanding of the nature of children's play with digital technology.

→ It is clear that there is still much work to do in terms of persuading parents that digital play is valuable, and in providing them with support and guidance.

→ Key messages about the value of digital play need to be framed in a way that is easily accessible, and they need to be communicated in parents' own languages. It would be helpful if parents themselves could be involved in the production of these resources.

→ In particular, parents should be given information about the range of learning and skills that play with digital technology helps children to acquire: not merely the cognitive skills and subject knowledge, but the wider physical, social, emotional and creative skills that parents tend to be less aware of.

In terms of what parents themselves can be doing to support their children and engage with them in play with digital technology, the study makes a number of recommendations.

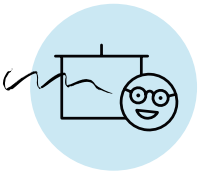
→ Parents need to be more familiar with ways of engaging in digital play with children that are child-led and focused on creative production, rather than limiting co-play to games (although these are also of value).

→ Parents should be encouraged to talk to their children in meaningful ways about their play with digital technology, to help to develop a shared understanding of what that play involves. This can include conversations about managing risks in the online world, but it should not focus on such negative aspects at the expense of the more positive ones, such as the opportunities that technology provides.

→ The five characteristics of learning through play, which have been identified by LEGO Foundation and its partners, give parents a useful way of thinking about children's play with digital technology. Parents could be introduced to ways of enhancing the five characteristics in relation to their child's play.

→ Parents could be offered advice on ways of linking digital and non-digital play, to encourage movement between them. This could be of particular importance to parents who feel that their children spend too much time in the digital world.

For parents



For teachers

For the children's toy and media industry

For policymakers

For researchers

For teachers

Schools are a vitally important environment in which many children encounter technology, and from which they take ideas home for further exploration. The study has some important implications for teachers.

→ While great strides have been made in the use of educational technology in schools, there is room for the development of more playful approaches in some classrooms.

→ There is a need to broaden the experiences of children, so that they have more opportunities to get involved in more open-ended, creative uses of technology, which can include them playing and experimenting with devices. This would require schools to allocate additional time and resources.

→ Teachers should introduce a broader spectrum of teaching approaches around the use of technology, with more of a continuum between free play and directed instruction.

→ Teachers should see technology as an additional 'language' that children can use to express themselves and communicate meaning.

→ Children themselves can be involved in co-creating a curriculum that takes children's interests as a starting point for learning around technology.

→ Schools can do more to use technology to document children's learning, and to enable the creative exploration of concepts.

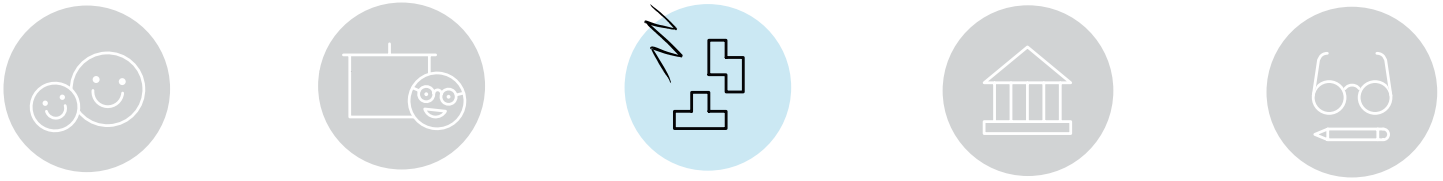
→ Schools could consider how they might provide pop-up or permanent maker-spaces (specific areas that contain a range of digital and non-digital resources for making and tinkering), which have been found to promote digital play, experimentation and innovation. Schools could seek the support of local businesses, charities and trusts in this.

→ Teachers should bear in mind the fact that play with digital technology does not simply develop children's cognitive skills and subject knowledge, but also helps them to develop wider physical, social, emotional and creative skills. It would be helpful if this message could be communicated to parents.

→ The study shows clearly that schools play an important role in encouraging play with digital technology at home, which is particularly important when children's home experiences of technology might otherwise be limited. School can also be a valuable source of support for parents who are looking for ideas for embedding technology in their children's lives in safe and productive ways. Schools should consider how they might do more in this respect, for example by offering workshops for parents on how to support children's learning through digital play.

→ The five characteristics of learning through play, which have been identified by the LEGO Foundation and its partners, can be useful in developing playful teaching methods, and guidance could be developed for schools to ensure that these characteristics are embedded in classroom learning around technology.

→ Many schools organise after-school activities, which could include the playful use of technology. Where possible, schools could support this through training and short-term loans of equipment.



For the children's toy and media industry

The study shows that children's play with digital technology can be very much affected by the design of particular games, apps and devices. There are important considerations in this research for the toy and digital content industry.

→ The children's media industry should work to develop a set of standards for technology and play, to ensure that products have the best interests of children at their core. These standards would need to be broad enough to include digital devices, apps and games, online services and software. Among other things, the standards should emphasise the need for goods and services to

- **be age appropriate**
- **support learning**
- **meet a range of learning and development needs**
- **be diverse in terms of culture and language**
- **enable children to play safely**
- **cultivate creativity and imagination**
- **give children choice and autonomy**
- **promote sustainability, and**
- **be tested appropriately with children before release**

→ The study shows that many of the digital games that children play reflect a Western perspective: there is an urgent need to research the design and production of digital media content that is more culturally relevant to children around the world.

→ Producers should focus on the development of toys, games and apps that reflect not just geographical and cultural diversity, but other kinds of diversity too. This could include racial/ ethnic diversity, and representations of people with disabilities, families with LGBT+ parents and/ or wider family members, single-parent families, and so on. Games should reflect the diversity of family life.

→ Where possible, the industry should do more to engage children themselves in the design of digital toys. This could be through extended observation of play, but also through talking to children about products, either individually or in focus groups.

→ More products could be developed that integrate online and offline play, including physical, outdoor play.

→ There is a need to develop more games and devices that support family play. Designers should focus on making it easy to become familiar with a game and its potential, and should consider imaginative ways to use smart assistants in game play.

→ More can be done to develop virtual reality games, with more attention being paid to the development of storytelling and narrative in VR.

→ Finally, play with digital technologies involves content creation and some of this content is focused on toy and game brands and apps. Companies should, therefore, think of imaginative ways to engage positively with this user-generated content.

For parents

For teachers

For the children's toy and media industry

For policymakers

For researchers

For policymakers

Play with digital technology has significant value for children's learning, yet it has largely been ignored in terms of policy development.

→ Policymakers need to consider how digital play can be embedded in curriculum development.

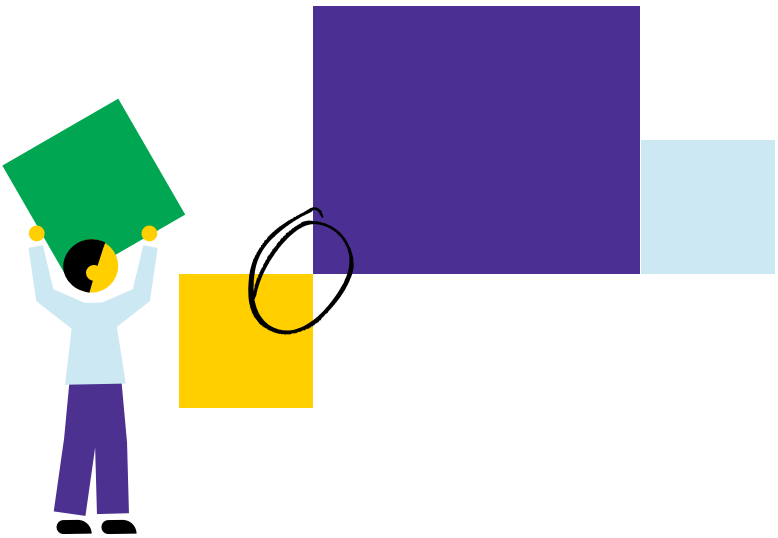
→ Policymakers need to listen more closely to children's own voices in developing policy around digital play. This needs to be undertaken in a way that is representative of diverse communities.

→ The study points to the need to develop a policy approach to digital wellbeing that is much broader than one focused on online safety and the management of risks. It needs to recognise the role of digital play in children's learning and development, and also the wider social, physical and emotional benefits of digital play.

→ There needs to be greater emphasis on the quality of technologies, products, devices and software that are designed for children's digital play. Governments could set standards and apply kitemarks, or publish lists of approved products, which could offer valuable guidance to parents.

→ Teacher education programmes need to be developed that address the issue of play with digital technology, encouraging more open-ended and experimental approaches rather than guided learning alone, and building on children's digital play at home.

→ Policymakers need to give parents more support in understanding how they can get involved in their children's play with digital technology.



For parents | For teachers | For the children's toy and media industry | For policymakers | **For researchers**

For researchers

Further research is needed on a number of the issues that were raised in the study.

→ There was clear evidence that the five characteristics of learning through play can all be seen in play with digital technology. However, adults are not always aware of how these characteristics can be brought out, to enhance children's learning through digital play. Further research should focus on the development and evaluation of best practice guidance in this area.

→ In South Africa, future initiatives to enhance children's play with digital technology need to take account of the barriers that children encounter, such as language differences, lack of resources and infrastructure and limited classroom space. Further research is needed to understand these barriers fully, especially given that *Children, Technology and Play* focused on Cape Town and the Cape Flats.

→ The study indicates that there is a need for a longitudinal study to consider the development of digital play over time in families, and enabling researchers to build good quality, long-term relationships with children, parents/ guardians, teachers and community leaders. Such work needs to draw in the voices of children as far as possible, and it should also engage more broadly with racial, ethnic and linguistic minorities.

→ The vast amount of digital content that children access is in English, but this is not the home language of the majority of children. Further exploration is needed of the ways in which children's digital play moves across languages.

→ Many studies of play focus on younger children, as it is assumed that play is more important or relevant to them. Further study is needed to explore the play of older children, and to consider how secondary schools can value and incorporate play with digital technology.

→ There needs to be further consideration of the value of digital play for learning and social interaction between generations.

→ There is a need to consider more ways of collecting information on play with digital technologies. *Children, Technology and Play* included videos, images, drawings, concept maps and models, but there are other methods which would be of value in research on digital play, and more inclusive ways of engaging children as co-researchers in a topic which is of great interest to them.

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