

Exploring Play and Creativity in Pre-Schoolers' Use of Apps



Exploring play and creativity in pre-schoolers' use of apps: Report for the children's media industry

Background to the project

The project was a collaboration between the Universities of Sheffield and Edinburgh, the BBC children's television channel CBeebies, children's television production company Foundling Bird, development studio and consultancy company Dubit and Montenev Primary School, Sheffield.

The aims of the study were to examine pre-school children's use of apps on tablets and identify how far apps for pre-school children (aged 0-5), including apps that incorporate augmented reality, promote play and creativity. The objectives of the study were as follows:

- To collect information about UK preschool children's access to and use of apps in the home.
- To identify the most popular apps for pre-school children and develop an understanding of the extent to which these promote play and creativity.
- To identify the factors that currently inform parents'/caregivers' choices of apps for this age group.
- To examine the impact of apps (including augmented reality apps) on the play and creativity of pre-school children.
- To identify the affordances of apps that are particularly successful in promoting young children's play and creativity in order to inform: (i) future app development by the children's media industry and (ii) the future choices of apps for young children by parents/caregivers and early years educators.
- To increase dialogue and promote knowledge exchange between academics, children's media industry, parents/caregivers and early years educators with regard to pre-school children's use of apps.

In Phase 1 of the study, 2000 parents of children aged 0-5 who had access to tablets completed an online survey. Phase 2 consisted of case studies conducted of six families with children aged from birth to five. Five visits were made to each family over a period of one to three months and interviews with parents were conducted, children were filmed using tablets and in some cases parents collected data between visits using their own smartphones and/or a 'Go-Pro' chestcam (to be used by the child) left by the researcher. In Phase 3, children in Foundation Stage 1 and 2, aged 4-5, were filmed as they used a series of apps. The apps used were those identified as the top 10 favourite apps in the survey conducted in Phase 1, along with a selection of other apps that were appropriate for the age group, including augmented reality apps. The data from Phase 2 and 3 were analysed in order to determine how far the apps promoted play and creativity. This report outlines preliminary findings from the survey, along with a review of those features of apps that were identified as promoting play and creativity.

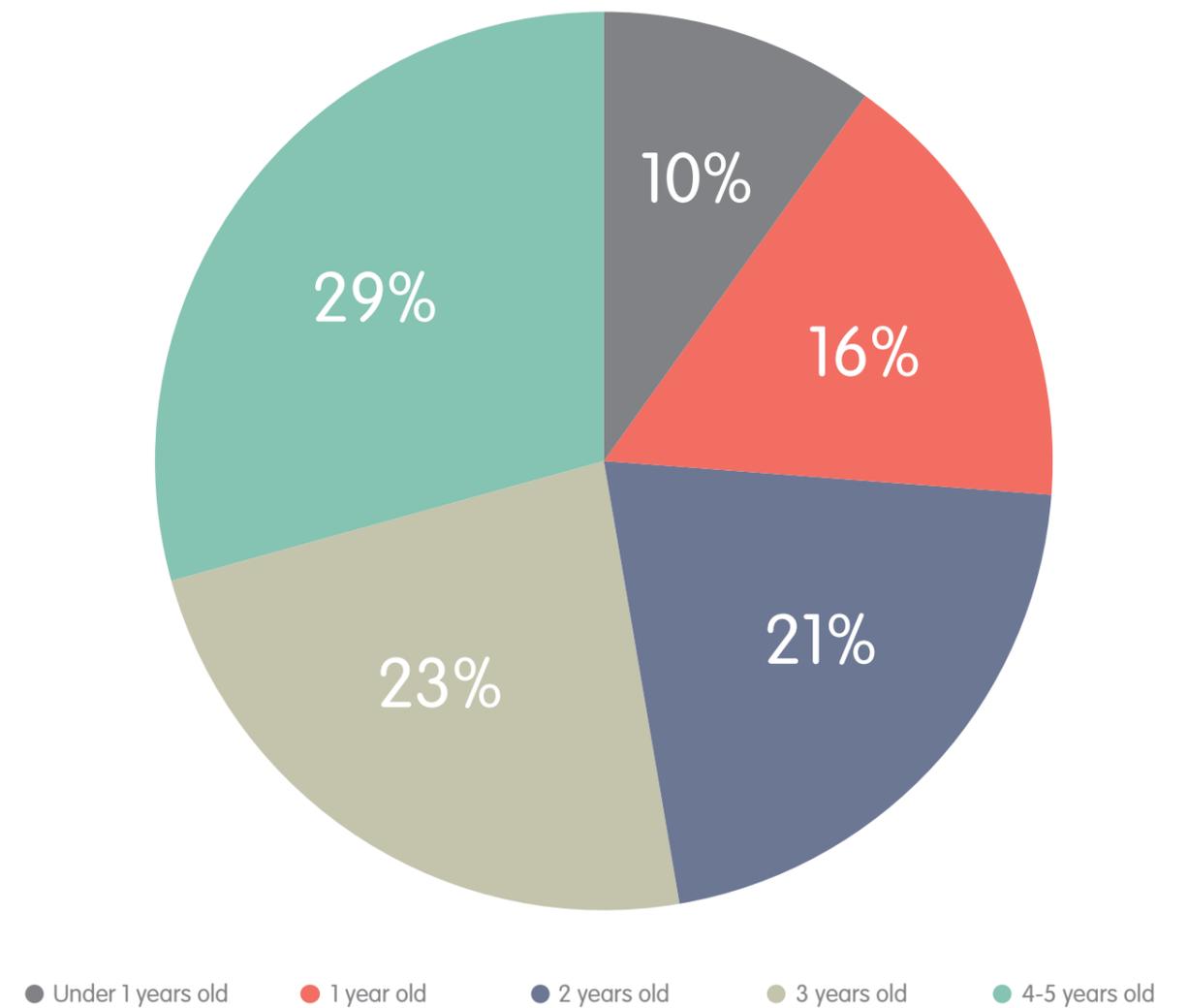
This summary of key findings has been prepared for the children's media industry; future reports in this series will be completed for other audiences including academics, parents and carers, early years practitioners and policy-makers.

Survey Findings

1. Access to and use of tablets

The sample consisted of 2000 parents and carers of 0-5 year-olds who used tablets. The breakdown in ages is outlined in Figure 1.

Figure 1: Age of children in the sample



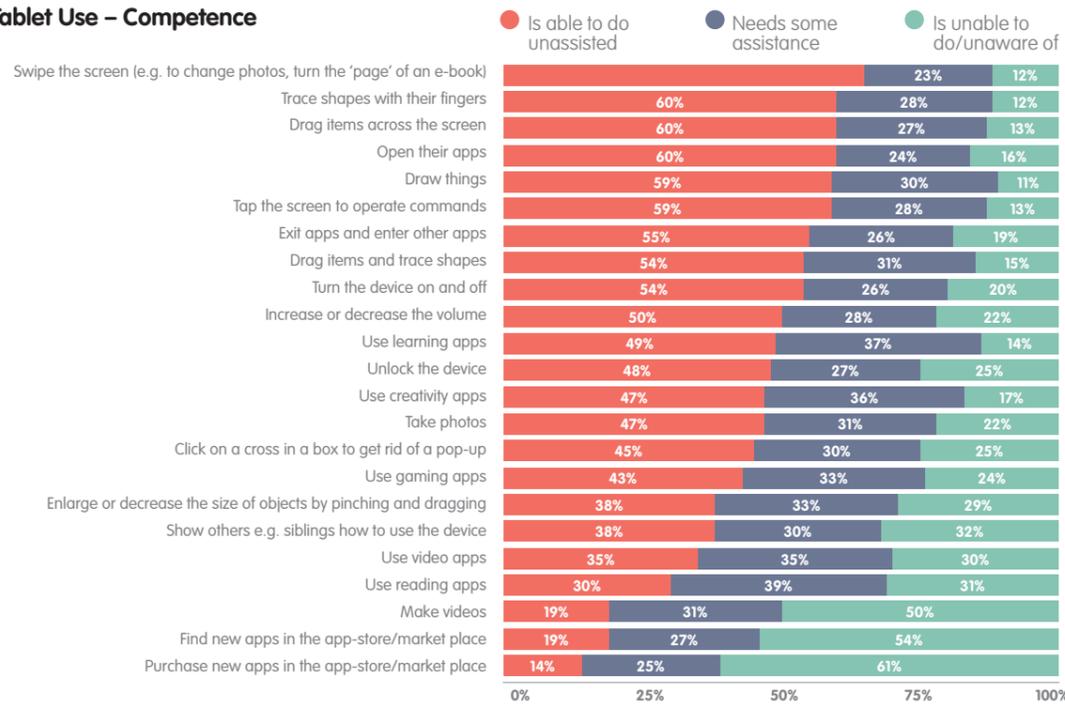
Source: Q1 Age and gender of child taking part in the survey? (Base 2000)

Tablet Use

25% of 0-2s owned their own tablet; 36% of 3-5s owned their own tablet. iPads are the tablet which most 0-5s have access to (62%). Children have access to tablets at a variety of locations, but the main access is in their own homes or grandparents' and relatives' homes.

Parents report that their children exhibit a wide range of competencies when using tablets, as outlined in Figure 2.

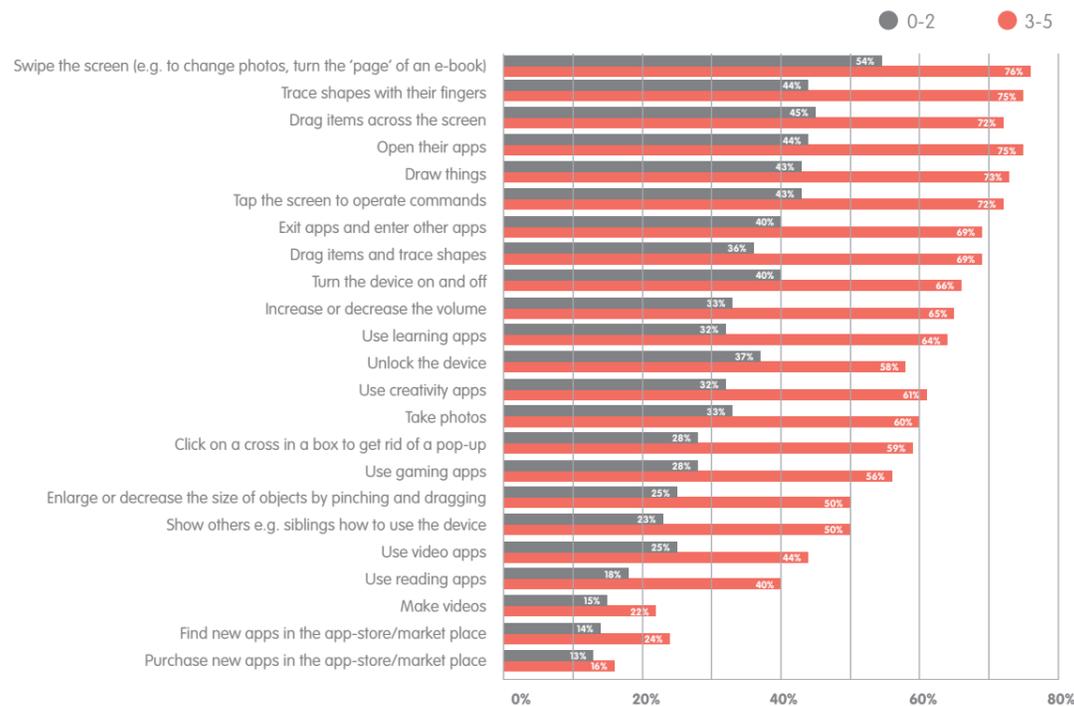
Figure 2: Tablet Use – Competence



Source: DQ1 We want to understand how comfortable your child is using a tablet. (Base 2000)

Inevitably, there are age differences in terms of the competencies developed, as outlined in Figure 3.

Figure 3: Tablet Use – Is able to do unassisted

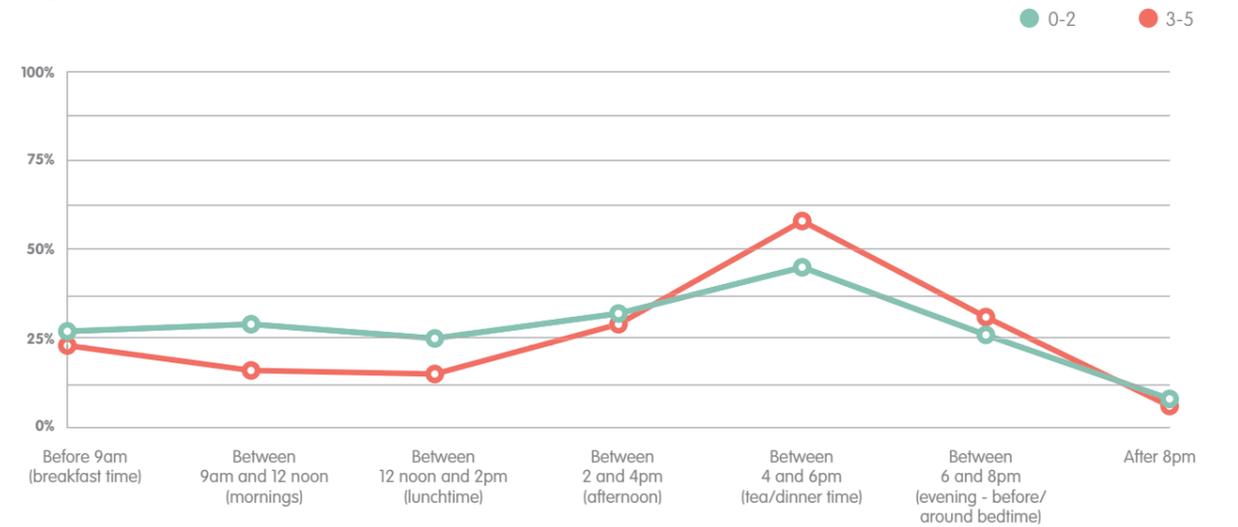


Source: DQ1 We want to understand how comfortable your child is using a tablet. (Base 2000)

On average, children spend 1 hour and 19 minutes using a tablet on a typical weekday, and 1 hour 23 minutes on a typical weekend day. Under 3s spend slightly more time using tablets than 3-5 year-olds, perhaps due to the busier lives of the latter (e.g. nursery and school during the week; organised activities at weekends).

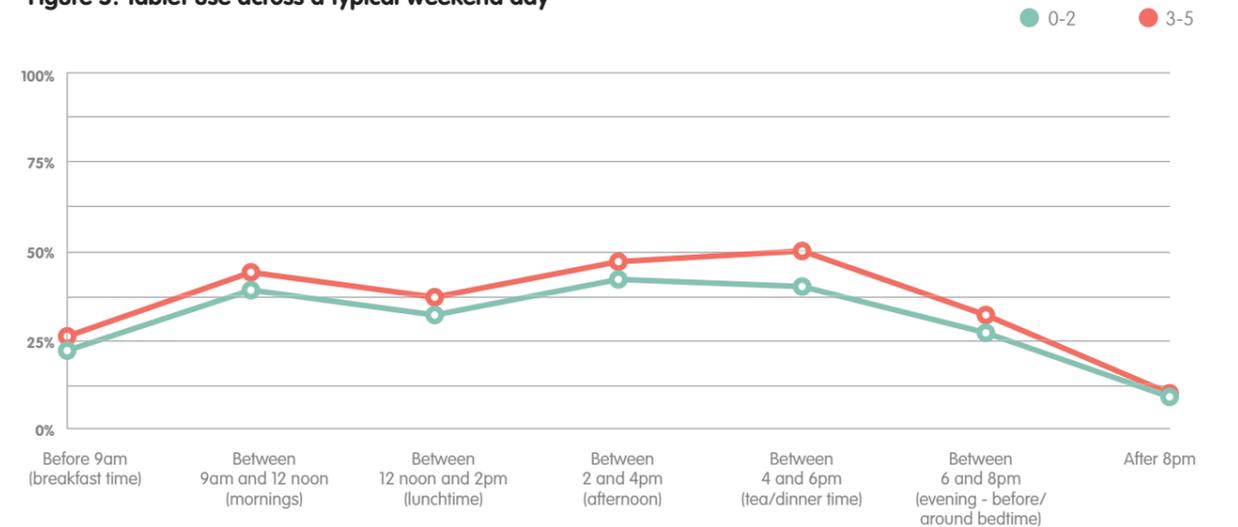
Children were more likely to use tablets between 4-6pm on weekdays (see Figure 4), with a more even pattern of use demonstrated at weekends (see Figure 5).

Figure 4: Tablet use across a typical weekday



Source: BQ1 On a normal weekday, how much time does your child spend using the devices they have access to - Tablet (NET)? (Base 2000)

Figure 5: Tablet use across a typical weekend day



Source: BQ1 On a normal weekend day, how much time does your child spend using the devices they have access to - Tablet (NET)? (Base 2000)

A day in the life of 0-5 year olds

In terms of types of use, the findings suggest that children use the tablet for creative, educational and entertainment purposes.

During the week, tablets are used for more traditional purposes, such as creative activities (drawing and painting), reading and to support learning. At the weekend, tablets are more likely to be used for watching videos on sites like YouTube and playing games, although this is not to suggest that these activities are not creative or educational. 26% of children use tablets to browse the internet on weekdays, 25% at weekends.

Tables 1 and 2 present a weekday and weekend day respectively in the life of an average 0-2 year old in terms of where they use a tablet, how they use it and who with, whilst Tables 3 and 4 present the same picture for 3-5 year-olds.

Table 1: A weekday in the life of 0-2 year olds who have access to a tablet

	Time of Weekday						
	Before 9:00am	9:00am-12:00pm	12:00pm-2:00pm	2:00pm-4:00pm	4:00pm-6:00pm	6:00pm-8:00pm	After 8:00pm
Use of tablet	27%	29%	25%	32%	45%	26%	8%
Tablet Activity	Making collages or using search engines	Making collages	Looking at magazines or using search engines	To help with education/ learning	Colouring in or looking at pictures/photos	Making videos, watching videos or using search engines	Making videos
Where	51% Lounge / Sitting Room	74% Lounge / Sitting Room	74% Lounge / Sitting Room	78% Lounge / Sitting Room	71% Lounge / Sitting Room	58% Lounge / Sitting Room 30% Bedroom	46% Lounge / Sitting Room 28% Bedroom
Who with	49% With parent or guardian	66% With parent or guardian	61% With parent or guardian	69% With parent or guardian	64% With parent or guardian	66% With parent/ guardian	51% With parent or guardian
Motivation	60% Used as a form of distraction or quiet time, whilst I complete other tasks or relax	59% Encourage creativity and play / 52% Educational purposes	61% Encourage creativity and play	61% Encourage creativity and play / 52% Educational purposes	52% Encourage creativity and play / 47% Educational purposes / 46% Used a distraction	44% Distraction or quiet time 41% Encourage creativity and play / 40% Bedtime stories	46% Distraction or quiet time 46% Encourage creativity and play / 45% Sit back experience

Table 2: A weekend day in the life of 0-2 year olds who have access to a tablet

	Time of Weekday						
	Before 9:00am	9:00am-12:00pm	12:00pm-2:00pm	2:00pm-4:00pm	4:00pm-6:00pm	6:00pm-8:00pm	After 8:00pm
Use of tablet	22%	39%	32%	42%	40%	27%	9%
Tablet Activity	Watching catch up TV	Watching music videos on YouTube	Browsing the internet or watching videos on YouTube	To help education / learning, play apps for gaming, watch YouTube, listen to music, colouring in	Watching music videos on YouTube	Watching music videos on YouTube	Reading stories
Where	52% Lounge / Sitting Room	68% Lounge / Sitting Room	72% Lounge / Sitting Room	76% Lounge / Sitting Room	71% Lounge / Sitting Room	55% Lounge / Sitting Room 31% Bedroom	46% Lounge / Sitting Room 28% Bedroom
Who with	66% With parent or guardian	61% With parent or guardian	54% With parent or guardian	65% With parent or guardian	68% With parent or guardian	65% With parent or guardian	49% With parent or guardian
Motivation	56% Used as a form of distraction or quiet time, whilst I complete other tasks or relax	54% Encourage creativity and play	52% Encourage creativity and play	58% Encourage creativity and play / 50% Educational purposes	45% Encourage creativity and play / 42% Distraction or quiet time / 42% Educational purposes	45% Bedtime stories	46% Bedtime stories

Table 3: A weekday in the life of 3-5 year olds who have access to a tablet

	Time of Weekday						
	Before 9:00am	9:00am-12:00pm	12:00pm-2:00pm	2:00pm-4:00pm	4:00pm-6:00pm	6:00pm-8:00pm	After 8:00pm
Use of tablet	23%	16%	15%	29%	58%	31%	6%
Tablet Activity	Looking at magazines or making collages	Look at magazines	Using a search engine or browsing the internet	Browsing the internet, watching video or drawing and painting	Play with/use apps for gaming	Watching video, listening to stories or browsing the internet	Browsing the internet
Where	61% Lounge / Sitting Room	76% Lounge / Sitting Room	74% Lounge / Sitting Room	82% Lounge / Sitting Room	82% Lounge / Sitting Room	63% Lounge / Sitting Room	50% Bedroom 34% Lounge / sitting room
Who with	44% On their own / 40% With parent or guardian	58% With parent or guardian	57% With parent or guardian	60% With parent or guardian	64% With parent or guardian	64% With parent or guardian	35% On their own / 34% With parent or guardian
Motivation	59% Used as a form of distraction or quiet time, whilst I complete other tasks or relax	61% Encourage to be creative or play / 61% Educational purposes	61% Encourage creativity and play / 55% Educational purposes	66% Encourage creativity and play / 61% Educational purposes	58% Encourage creativity and play / 57% Educational purposes / 53% Distraction	48% Encourage creativity and play / 47% Educational purposes / 46% Sit back experience	45% Sit back experience / 45% Encourage creativity and play / 45% Social device / 42% Distraction or quiet time

Table 4: A weekend day in the life of 3-5 year olds who have access to a tablet

	Time of Weekday						
	Before 9:00am	9:00am-12:00pm	12:00pm-2:00pm	2:00pm-4:00pm	4:00pm-6:00pm	6:00pm-8:00pm	After 8:00pm
Use of tablet	26%	44%	37%	47%	50%	32%	10%
Tablet Activity	Watching videos made by other children on YouTube	Watching videos made by other children on YouTube	Watching videos made by other children on YouTube	Watching videos made by other children on YouTube, play apps for gaming	Play apps for gaming	Watching videos made by other children on YouTube, watching video, listening to stories/ audiobooks	Browsing the internet
Where	63% Lounge / Sitting Room	76% Lounge / Sitting Room	74% Lounge / Sitting Room	79% Lounge / Sitting Room	80% Lounge / Sitting Room	62% Lounge / Sitting Room / 27% Bedroom	44% Lounge / Sitting Room / 42% Bedroom
Who with	45% With parent or guardian / 35% On their own	53% With parent or guardian	53% With parent or guardian	56% With parent or guardian	58% With parent or guardian	57% With parent or guardian	38% With parent or guardian / 33% On their own
Motivation	56% Used as a form of distraction or quiet time, whilst I complete other tasks or relax	68% Encourage creativity and play	60% Encourage creativity and play	67% Encourage creativity and play / 60% Educational purposes	58% Encourage creativity or play / 51% Educational purposes	46% Sit back experience / 45% Encourage creativity and play / 42% Educational purposes	46% Bedtime stories / 42% Sit back experience

It can be seen that the majority of tablet use is in the lounge/sitting room, with play, creativity and education key drivers for use. The data also indicate that 3-5 year-olds are slightly more likely to use a second screen simultaneously, with 53% of parents of 0-2 year olds stating that their children never or rarely used second screens, a figure dropping to 46% for 3-5 year-olds.

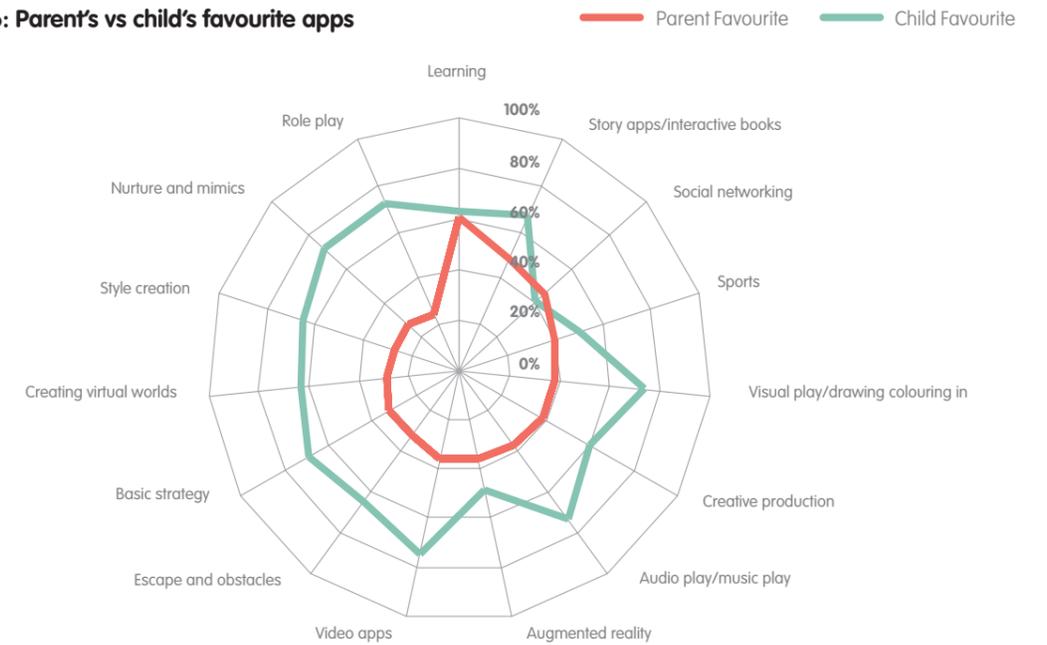
2. Use of apps



Apps: Favourites

Parents favour educational and story apps, whereas children prefer using video/audio apps and visual play and drawing apps (see Figure 6).

Figure 6: Parent's vs child's favourite apps

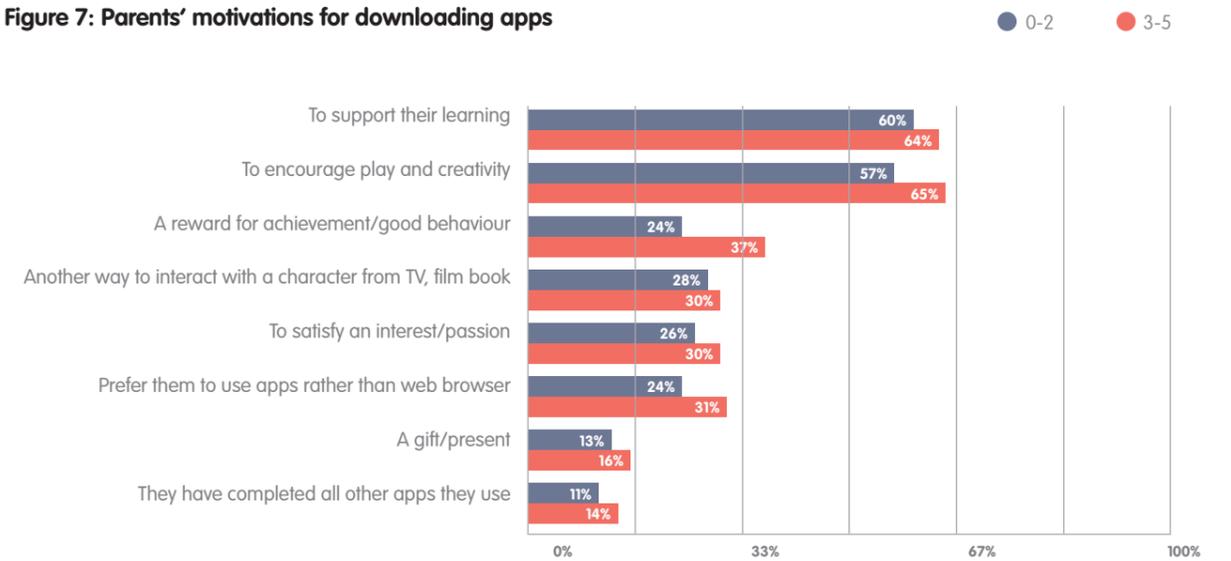


Source: CQ5 Of all the different types of apps your child uses, we'd like you to tell us which one(s) are YOUR favourite(s) and which are THEIR favourite(s)? (Base 2000)

Apps: Motivations

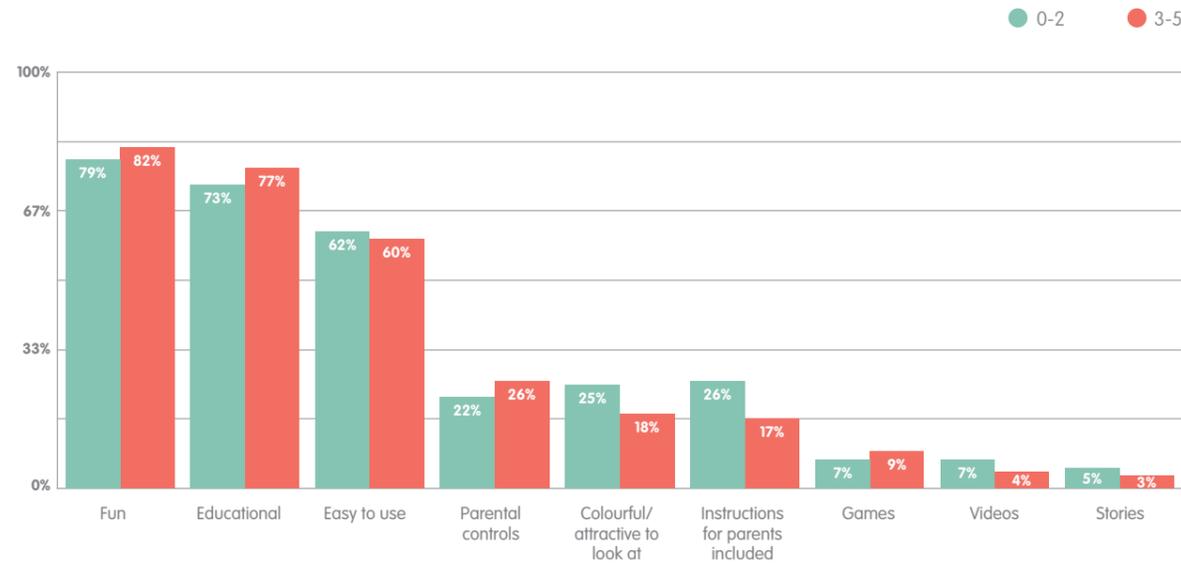
The parental motivations for choosing apps were largely focused on promoting play and creativity and to support learning (see Figure 7).

Figure 7: Parents' motivations for downloading apps



When searching for new apps, parents look first for apps that appear to be fun for children to use (see Figure 8).

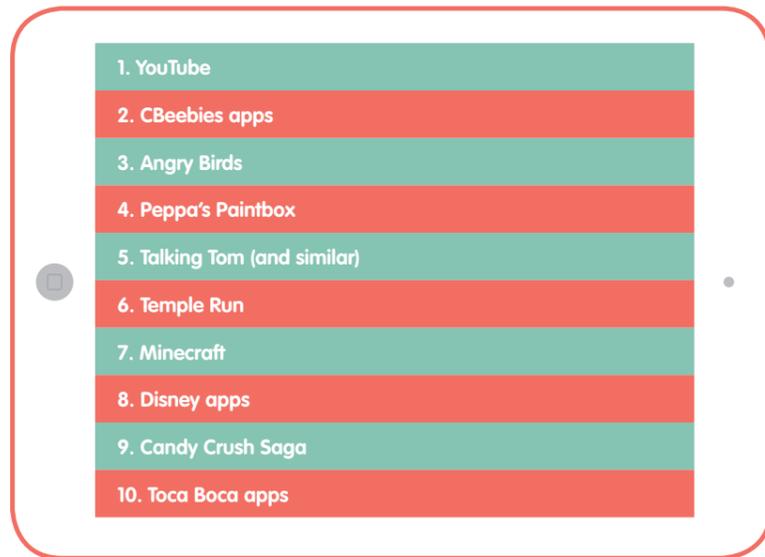
Figure 8: Important features of apps for parents



Source: CQ9 Please rank (in order of importance) the following features of apps that you look for when choosing for your child (Top 3 rank) (Base 2000)

Apps: Children's top ten favourites

Children's top ten apps were as follows:



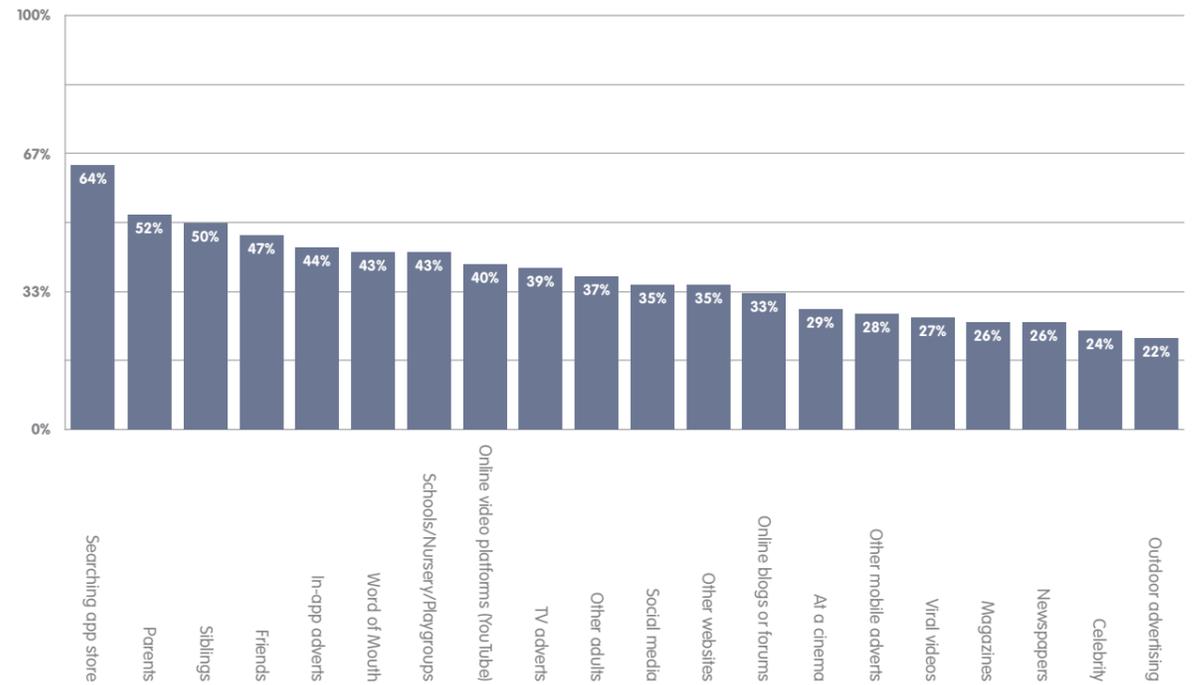
C-Q7. Please write your child's favourite five apps at this moment in time? (Base 2000)

Apps: Influencers on downloads

Families own an average of eight apps for children on the tablet, with 62% of these paid-for apps. On average, parents download new apps once or twice a month for this age group. The app store is clearly very important for parents when choosing apps for this age group and in-app advertising can have an impact upon how children find out about new apps for their device (see Figure 9).

Figure 9: Influencers on children's choice of apps

Online sources like the app store, in-app advertising and online video platforms like YouTube have a big influence on children's choice of apps



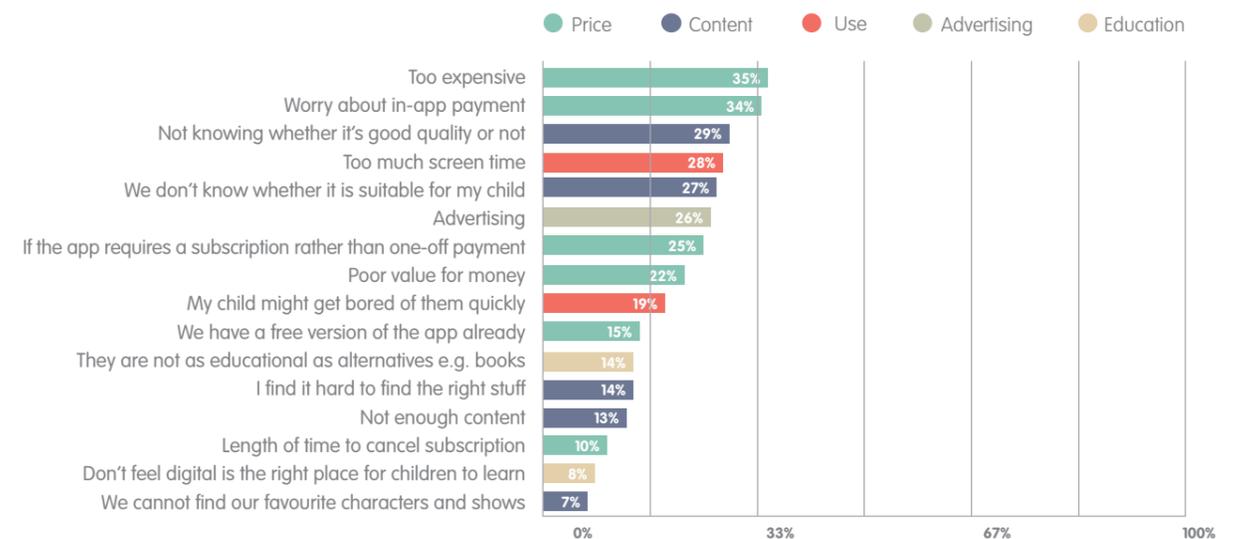
CQ8 Please rank in order of importance if there was more than one influence (please only rank the relevant options) (Top 3 rank) (Base 2000)

Three- to five-year-olds have more influence on what apps are downloaded for them on the tablet, as they are more able to articulate their choices. However, across the 0-5 age group as a whole, children do have opportunities to contribute to the process, as much of the decision-making is joint or mainly the parents' decision, with some input from the child.

Apps: Barriers

Parents suggested that the main barrier to the download and use of apps was cost (see Figure 10).

Figure 10: Barriers to parents downloading apps for children

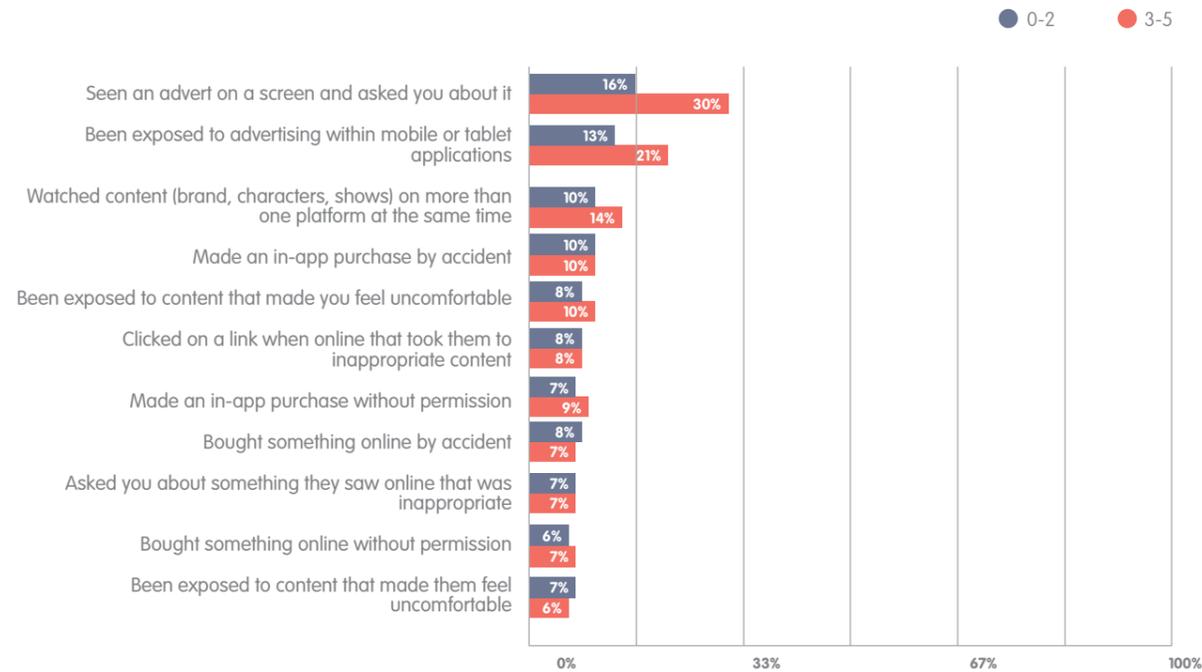


CQ12 What are the main barriers to the downloading of apps for your children on tablets? (Base 2000)

Apps: Interactions

Finally, a small minority of parents reported that their child had been exposed to something on the tablet that had made them uncomfortable (7%), whilst 10% reported that their child had made an in-app purchase by accident (see Figure 11).

Figure 11: App interactions



DQ2 Has your child ever? (Base 2000)

Many parents (45%) are open to the idea of paying for apps if it means that there is no in-app advertising.

The survey findings suggest that for families whose young children have access to tablets, this technology plays an important role in children's media lives. A key focus of this study was the extent to which use of apps on tablets promoted play and creativity. Children were observed using a range of apps, including the apps identified as favourites above, in homes and school. From these observations, the characteristics of apps that promoted play and creativity were identified, along with those characteristics that limited play and creativity. These are presented in the next section of the report.

App Design



Tables 5 and 6 are intended to guide the future design of apps for under-5s. In Table 5, the features of apps that limited play and creativity in the observations in the study are identified. In Table 6, a range of suggestions are made for the development of apps that promote play and creativity.

Table 5: Characteristics of apps that limit play and creativity

<p>Purpose of app</p> <ul style="list-style-type: none"> • Purpose not clear, or the app has too many aims, so children may wander from activity to activity and then disengage <p>Overall design features</p> <ul style="list-style-type: none"> • Initial entry to the app leads to a home page that is not understandable, so children may not pursue the app • Home page icon is not visible, so children may use the home button on the tablet and exit the app if they wish to move from a page in the app • Tappable areas leave little margin for error, which may cause frustration • Too many pop-up menus create confusion, so children may exit the app • There is inconsistency in terms of the demands made on the user (when to swipe, tap and so on), which may cause confusion <p>Commercial properties</p> <ul style="list-style-type: none"> • In-app advertisements in the form of pop-ups cause frustration and children may then disengage • Too many barriers to play in the form of the need for in-app purchases cause frustration and children may then disengage <p>Supporting (scaffolding) of use</p> <ul style="list-style-type: none"> • Too much written text, with limited use of text-to-speech instructions may mean that children are not able to use apps effectively • Limited use of the scaffolding techniques outlined in Table 6 below may mean that many children are unable to use apps effectively <p>Promotion of play and creativity</p> <ul style="list-style-type: none"> • Narrowly-focused apps, which require children to complete tasks that have limited challenge, or have few opportunities for children to explore and experiment, are less likely to promote play and creativity • Use of augmented reality features that do little more than animate characters or objects are of limited value, as children cannot utilise fully the animated features and may disengage

Table 6: Characteristics of apps that promote play and creativity

<p>Purpose of app</p> <ul style="list-style-type: none"> • Does not have too many aims • Purpose clearly articulated to target audience, both within app store/website and the app itself <p>Overall design features</p> <ul style="list-style-type: none"> • Use of colour and design features are appropriate for the type of app (n.b. it is not always necessary to use bright colours for young children, but clearly defined pictures/signs/symbols etc. are important) • Parents should be able to activate and deactivate features which may distract children and thus limit play and creativity, and also set levels of challenge if appropriate • Easy navigation, from the moment the app is launched, with audio and/or visual support to support navigation through the first stages of the app • Home page icon always visible on each 'page' • Home screen should not be overly-complex in nature for younger children • It is helpful for apps that contain lots of aural elements for the volume to be easily adjustable from within the app • Arrows used to navigate backwards and forwards • Navigation signs (arrows etc) placed at the top of screens aimed at under 2s, as they may press them accidentally if placed at the bottom • Repeated characters, shapes, colours, signs, movement, music and sounds can be used as cues to stimulate particular responses • A consistent approach is utilised in the requirements for the use of touch e.g. particular actions always require swipes, others taps • Tappable areas allow for a margin of error • Pop-up menus are limited • It is possible to personalise and customise where possible e.g. in terms of spoken voice, linguistic, cultural and social content <p>Commercial properties</p> <ul style="list-style-type: none"> • No in-app, pop-up adverts • Limited or no use of banner adverts • In-app purchases limited <p>Supporting (scaffolding) of use</p> <ul style="list-style-type: none"> • Developmentally appropriate – e.g. little or no text support should be used for pre-schoolers • There should be opportunities for adults to adjust the scaffolding techniques used e.g. turning off some cues and prompts when relevant skills are mastered and the app becomes more familiar • Text-to-speech instructions and comments used where necessary • Spoken instructions should be given at a speed which will enable comprehension, and instructions need to be phrased in a developmentally appropriate way • Objects/signs are animated or highlighted (visually, aurally) in order to signal that they can/should be touched • Modelling of responses used where appropriate, or support provided if children do not respond as desired e.g. by using moving arrows to signal that a swipe should be used

- Use of pauses to allow children to think about their response
- Repetition of instructions if child does not respond
- Word highlights are useful in apps that include text-to-speech sentences and phrases to be read
- Use of upper and lower case letters is consistent with use in pre-school/school
- Positive feedback and rewards for effort used to enhance motivation where appropriate (e.g. badges, characters cheering and clapping and so on). Not all apps require such rewards, as play is intrinsically motivated, and they should not be over-used
- Voice reinforcement (i.e. recognition) of children's input where relevant e.g. "You pressed the red square, well done!" It should be possible for adults to turn this feature off if it is not felt to be of value because the child has used the app frequently
- Use of prompt questions to promote reflection on actions/progress

Promotion of play and creativity

- Open-ended apps, which enable children to experiment for themselves and focus on the process rather than an end product, are more likely to promote play and creativity
- Apps that embed problem solving, critical thinking and abstract reasoning activities are more likely to promote creativity
- Apps can embed prompt questions/statements to promote play, exploration and/or experimentation with the app's resources
- Apps that stimulate children to ask questions and/or set challenges can promote creative thinking
- Apps that foster co-production of content (with peers or adults) can promote play and creativity
- Imaginative use of the tablet itself or the properties of the tablet may enable children to become more involved in the app e.g. through inserting their own photograph or voice, tilting the tablet to move visual material, blowing into the microphone to move visual material and so on
- Apps can promote play by linking offline and online activities (e.g. a physical doll or car that triggers activities in the app), but these need to be meaningful and engaging activities, otherwise the initial engagement may quickly wear off
- Apps may also promote physical activity in playful and creative ways, by linking online activities/games/rewards to offline physical movements or tasks
- Apps may promote play with offline, non-digital playthings
- The use of augmented reality techniques can stimulate children's imagination as characters are 'brought to life', but the apps need to enable creative use of such features, such as linking animated characters to further activities e.g. storytelling

It should be stressed that we are not recommending that all apps contain all of the features in Table 6. For example, some very successful apps for pre-schoolers contain no text, text-to-speech or scaffolding (supporting) strategies at all, but their design is such that children are encouraged to playfully experiment. For other apps that aim to promote specific aspects of play or creativity, such as problem-solving games or drawing apps, strategies may be required that support learning. In addition, in outlining ways in which app producers might ensure that children are able to use apps independently, we do not mean to suggest that app design should focus only on sole use by children. They should also facilitate meaningful co-use with peers and family members.

In Table 7, we outline successful features of apps for each age group addressed in our study, based on an analysis of apps and observations of children using them. Again, this is not to suggest that apps should include all of these features. In addition, children progress at individual rates and, therefore, some children may find apps easier or harder to use than others.

Table 7: Features of apps for different age groups

Apps for under 1s

- As parents will primarily be navigating these apps, and may not have engaged children previously in the use of tablets, then support and guidance on use should be offered
- The apps should not be too 'busy' – having one or two clear functions is sufficient for this age group, with functions that do allow for multiple possibilities and potential for creativity
- Apps that enable and encourage parents to join in, for example with singing, would be useful. Apps could feature unaccompanied musical performances, or naturalistic ones, or ones in which pitch and speed can be easily altered to match the vocal range of parent
- Apps should promote sensory play e.g. sound, vision and touch are the primary features for this age group
- Young babies are attracted to large shapes, distinct patterns, use of contrasts (e.g. black and white)
- Audio should be used to support visual and animated elements, not detract from them, and vice versa
- Apps for this age group that foster listening and vocalisation are of value
- Interactive features should promote understanding of cause and effect e.g. if the child touches a certain spot, something happens (and actions should be consistent throughout the app, with a large margin for error)
- Games that mirror offline games are popular e.g. peekaboo
- Babies enjoy seeing their faces and the faces of those close to them, so features that enable this are appealing e.g. embedding the use of the tablet camera. Similarly, they enjoy hearing their own and others' voices and so apps can embed creative uses of the microphone
- Apps that encourage children and parents to name objects are useful for this age group, but care should be taken to ensure that they do not become monotonous in nature

Apps for 1-2s

- Apps should have some simple, repeating actions which support prediction
- Open-ended apps, which do not require prescribed outcomes, can encourage play and creativity
- Children at this age enjoy apps that reflect something of their own daily routines and can support their engagement in these routines
- Children enjoy seeing and hearing other children in apps e.g. voice-overs
- Apps should stimulate vocalisation and talk where possible, either through the provision of activities which could foster conversation, or through the use of prompt questions/statements that promote a vocal response
- Recall/recap features should be embedded where appropriate
- Games that mirror offline games are popular e.g. hide and seek, snap, odd one out, jigsaws
- Interaction with apps is appealing for this age group. This can be achieved through personalisation, such as enabling children to make noises into the microphone, which are captured and embedded in the app, or creating a short film to be inserted in the app
- Nursery rhymes, lullabies and popular songs apps are appropriate for this age, but care needs to be taken to ensure they are appropriate for context (e.g. some aimed at UK children contain American vocabulary)
- Apps should encourage early competencies e.g. swiping, tracing, tapping
- Apps that enable collages/pictures to be made through the use of stamps/ready-made shapes and so on can enable children to create images quickly and easily, but they should also have opportunities for more open-ended mark-making

Apps for 2-3s

- It should be easy for parents to operate control features which offer safeguarding when online
- Text-to-speech, as well as animation, sounds and visual effects, should be used to support independent operation of apps
- Scaffolding principles outlined in Table 6 should be used to support engagement and learning
- Apps that support co-operation and turn-taking are appropriate for this age group
- Music apps should encourage experimentation and not be overly directive
- Music apps could incorporate auto-recording and playback and should encourage exploration of all dimensions of music, e.g. rhythm, pitch, timbre, speed, volume, texture
- Drawing apps should not be limited to colouring in pre-drawn figures/scenes (although these are enjoyable for young children) and those that do involve colouring in should not require colours to be contained within lines
- Apps that aim to promote engagement with sounds and letters should do so in a playful manner and upper and lower case should be used appropriately (it is not appropriate to only use upper case, for example)
- Early engagement with numbers should occur in a playful context
- Apps that encourage play and creativity through the use of popular characters can be appealing
- Apps can demand more complex competencies e.g. dragging, pinching
- Autosaving features in apps means that creations can be kept if the child (or parent) forgets to do this, or if play with the app is interrupted partway through

Apps for 3-4s

- Some of the features outlined above are still relevant for this age group
- Apps can promote independent use of tablet features to develop specific competencies e.g. taking photographs that then appear in the app
- Apps that link or encourage offline to online play can be appealing e.g. building models, images of which can then be uploaded into the app
- More extended games are possible at this age, as children can concentrate for longer periods on apps, but there need to be a number of levels of challenge to encourage continuity in use
- It is useful for children to be able to pause and resume the app if interrupted
- Drawing apps should embed an undo function, as this encourages review and reflection
- Use of features to promote extrinsic motivation are useful for this age e.g. virtual badges and stickers, but should not be over-used. Apps should be satisfying in their own terms and promote intrinsic motivation
- Apps that promote a sense of wonder at the world can prompt children to ask questions and think creatively
- Apps that enable the building of worlds are popular for this age group and it should be easy to save creations in order to return to them
- Role-playing apps enable children to develop skills of empathy and care for others

Apps for 4-5s

- Some of the features outlined above are still relevant for this age group
- Apps that foster solving real world problems e.g. through early mathematical skills or scientific understanding, are helpful in both the skills developed and in enabling children to see the value/purpose of such activities
- 'Drill and skill' activities can be embedded in games and puzzles in order to make them more engaging
- Writing and spelling games should not be approached in an overly 'drill and skill' manner, as this could demotivate children at a crucial stage of their early reading and writing development and undermine any work taking place in nurseries/schools in this area. Instead, apps can foster creative engagement with letters and words through meaningful tasks, some of which may be embedded in stories
- Story apps for this age group may promote independent reading through highlighting words as the narrator says them and can enhance comprehension by asking questions. However, in-story features should not distract the young reader from the narrative structure, or the reading task itself, but should support/enhance these
- Regular opportunities for feedback should be provided throughout apps where relevant, in addition to final feedback at the end of the activity
- Apps that enable online social interaction with others should ensure sufficient safeguarding features are in place – children of this age frequently use apps aimed at an older age group, so producers of apps aimed at over 6s should take the needs of this age group into account also



This report is one in a series of reports that will be published from this project. For access to other project outcomes, log on to:

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