PART I: Defining terms

Infant
An infant, for the purposes of engaging with screen technology and media, is zero to 15-18 months old.

Toddler
A toddler, for the purposes of engaging with screen technology and media, is (15-18) – 36 months old (roughly a year and a half to 3 years old).

Pre-Schooler
A pre-schooler, for the purposes of engaging with screen technology and media, is 3 – 5 years old.

Technology
When considering technology and child interaction, the focus is primarily on screen-based technology, such as Television, Mobile devices - phones and tablets - and e-readers or e-book devices. Screen technology is a 2-dimensional representation of a 3-demensional world that young children have a difficult time processing and learning from.

The majority of the research done on pre-K children and technology was conducted on TV use, as mobile devices and e-books are newer technology and have had less time to be studied for impact.

Media
Media is the content that is engaged with through screen-based technology. This media can be TV programs and movies, games and applications, and e-books and activities.

Transfer of Learning
Transfer of learning is the application of information and learning. This can be from an experience in their own lives, or from engaging with a 2-D object and then applying it to a 3-D object. An example would be learning something from a book and applying it to a real world scenario.

Time Limit Recommendations from the AAP

Term	Age Range	Tech Time Limit
Infant	0 – (15 – 18) Months	None*
Toddler	(15 – 18) – 36 Months	Up to one hour
Preschooler	3 – 5 years old	One to two hours

PART II: Technoference

When technology interferes with life, learning, and development, it has been called technoference. Over the last 20 years multiple studies have documented how technology can specifically interfere with the life and development of pre-K children.

The Transfer Deficit

Children learn from what they engage with in the real world, and then apply it to their own lives, known as "Transfer of Learning". An example of this is a child who goes to the Doctor for a vaccine, and then plays Doctor and gives their dolls their own vaccination.

"Researchers who study how children learn have concluded, however, that it is easier for young children to learn from real-life interactions with people and objects, compared with information delivered via a screen. Researchers call this phenomenon the Transfer Deficit." (Screen Sense, Zerotothree.org) This isn't to say they are unable, but that it is a harder and slower process for them, and therefore should be used sparingly as an activity, and with specific adult support for pre-K children.

Technoference: TV

Television is the most studied device for impacts on early learning and development. The effects of television on pre-K children is based on the type of engagement that happens:

Background Television: "Several studies tracking children over time have shown that exposure to background television is associated with negative effects on children's language development, cognitive development, and executive functioning skills" (ScreenSense, zerotothree.org). Executive functioning skills are those that are associated with mental processes that apply past experience to present action, and include planning, organization, strategizing, attention, and memory.

Additionally, background television is also associated with poorer parent-child interactions, as related to both quantity and quality. This is considered a major impact, as the vast majority of research shows the critical importance of these child-adult interactions.

Background television appears to form a distraction-type interference, which steels focus from children, and is linked to developmental delays.

Over-Watching: Over-watching television content has been linked to similar developmental delays as background television, though with some variability. Studies have been conducted on Television over exposure and its effects on cognition and language, attention, sleep, and obesity outcomes, and all (for different reasons) are associated with negative outcomes.

- Language and Cognition – There have been multiple studies conducted that have shown that more television exposure was associated with poorer memory and reading scores, lower reading test scores, and lower cognition scores later in school conditions. This is contrasted by a study where children with increased viewing did not see negative test results later on. It is believed that the ***context*** of this viewing was supported by an adult, and therefore mitigated the negative results.

- Attention – Research findings about attention problems related to over-exposure of television is also mixed. The studies that have been conducted on attention have had a hard time separating content from over-exposure, and at this time it appears that so long as children are not spending extreme amounts of time with television (exceeding 5 hours a day), and that content is educational and age appropriate the negative impacts on child attention can be avoided.
- Sleep – Many studies have been conducted on screen technology and its impact on our sleep – for adults and children. It has been found that the *Blue Light* emitted from all screen devices (televisions, tablets, smart phones) disrupt the onset of sleep. Blue light has a similar concentration and wavelength to that of the sun at sunrise, and it can trick our bodies into thinking it is morning. Because of this, it can make falling asleep difficult. The greatest impacts on children have been seen on those who have televisions in their bedrooms, and use them within an hour of bedtime. Therefore, it is advised not to have screen devices in bedrooms, or use them as part of a bedtime routine. For adults who use devices within an hour of bed, it is recommended to use a dark filter or night mode to reduce blue light.
    - In children, sleep disruptions are also related to content viewed directly before bedtime. While any kind of stimulating content can keep a child from falling asleep, scary or violent content have the greatest impact on sleep reduction. While it is advised to limit or completely avoid this content in general, it is advised to specifically avoid it at bedtime.
- Obesity – "Media exposure (screen time) has been found to be a risk factor for obesity in young children due to an increase in food intake, a reduction in physical activity, and exposure to poor quality food and advertising." (ScreenSense, zerotothree.org) While the time of viewing is seen to increase the likelihood of being obese, it is concluded that viewing itself is not the direct cause, instead "the key variable contributing to obesity was most likely to be food intake while viewing." This means that while viewing, there is a greater likelihood of snacking or mindless eating, and a reduction in physical activity. Additionally, food advertisements are seen to be a major factor. "Children are not capable of distinguishing between television program content and advertising until age 4 or 5… A review of the research found consistently that children exposed to television advertisements are significantly more likely to choose advertised food products than children who are not exposed to them, even down to the advertised brand." (ScreenSense, zerotothree.org)

In-appropriate Content: Content is considered the second most important factor when it comes to reducing negative impacts of screen technology for young children. Making sure that content is age appropriate, child interactive, educational, and non-violent is an important step in screening material for children. Content will be discussed in more detail below.

Lack of Supervision while watching: Adult engagement while engaging in media content is the single most important factor to reducing negative outcomes, and increasing learning and development from screen technology and media. More will be discussed below about Joint Media Engagement.

In bad locations, or at bad times: Context, or where and when screen technology and media are used play an important role in learning outcomes and development. Technology, as stated above, is not beneficial in bedrooms, as the blue light disrupts sleep, as well as interfere with soothing activities. It is also not recommended to use technology as a calm down activity (to stop crying or a tantrum), in the

same way offering food at these times is not recommended, as it can form a dependency. Additionally, technology used in this way has been linked to behavioral issues, and an inability to self-regulate emotion in later childhood.

Technoference: Mobile Devices

The study of pre-K children and phone/tablet use is limited, as the technology hasn't been around for very long. The primary area of study is of Transfer Deficit seen in toddlers and preschoolers who use tablets, however, there is also a large body of research on how content and Joint Media Engagement impact negative outcomes.

- Transfer Deficit – Children have a harder time learning and applying learning from screen technology, than they do from real-life interactions. It is believed that the extra demands of running a device, as well as interactive features could create too many competing demands for a child's attention. "These extra demands on attention, combined with complex content, may have overloaded their cognitive capacity and interfered with their ability to learn and transfer this knowledge to the real world. This research suggests that the complexity of the content and the complexity of operating the device needs to be considered at all ages, although cognitive overload can happen especially easily during early childhood." (ScreenSense, zerotothree.org)
- Content – Content is considered the second most important factor when it comes to reducing negative impacts of screen technology on young children. Making sure that content is age appropriate, child interactive, educational, and non-violent is an important step in screening material for children. For tablet use it is important to choose materials that focus attention on Mind-on activities, instead of Hands-on activities that focus on reflexes or twitch responses. Content will be discussed in more detail below.
- Parent and Caregiver Usage – Not only is child device use an important factor in development and learning outcomes in children, parent and caregiver device use is also an important factor to consider. It has been shown in studies that when a parent or caregiver is interrupted by a mobile device during a learning period, children where significantly less likely to be able to retain what they were working on learning. Additionally, it has been found by researchers that "the more time that parents interacted with mobile devices, the more likely their children were to act out, apparently trying to get the parents' attention… it suggests that many parents may be missing valuable opportunities for positive social interaction with their children when using their mobile devices." (ScreenSense, zerotothree.org)
- Lack of Supervision while watching: Adult engagement while engaging in media content is the single most important factor to reducing negative outcomes, and increasing learning and development from screen technology and media. More will be discussed below about Joint Media Engagement.

Technoference: e-books

While many parents and caregivers still prefer print books to e-books for story time with children (9/10), there is great potential for their use in the future. That being said, e-books, like traditional print books, need to be selected with care for young children. The studies on e-book usage are primarily comparison studies of learning outcomes compared to that of traditional books. Because of this, the research is mostly centered around the content of the e-book (which overlaps with the other sections of content),

the additional features of the e-book, and the level of engagement an adult had while the child was engaging with the e-book.

- E-book Interactive Features – "Getting the balance of interactivity right is crucial. Both children and parents can be distracted from the storyline by clicking different hotspots" (ScreenSense, zerotothree.org). When there are too many interactive features, parents tend to get distracted by these, and try to teach them, rather than focus on the story, which will reduce the comprehension of the child.
- Lack of Supervision while watching: Adult engagement while engaging in media content is the single most important factor to reducing negative outcomes, and increasing learning and development from screen technology and media. More will be discussed below about Joint Media Engagement.

PART III: Guidelines for Use

When determining how much time, and what resources are appropriate for a child, it is recommended to always consider the 3-C's:

The 3 C's	Defined
The Child	Think about your child specifically, and consider things like age, interests, attention span, current life happenings, and even current mood. It is important to consider your child RIGHT NOW when considering media engagement – appropriateness of media or screen technology is greatly influenced by the child themselves.
Content	Does the content engage the child in a meaningful way? Is it relevant and appropriate to the child? Do you support the topic and themes?
Context	What is the situation for engagement? Are they alone or with an adult? Where are you when engaging with it?

PART IV: Content

As stated above, content is the second most important factor to consider when engaging in child media technology. The content can make or break a child's ability to learn and transfer learning while engaging with technology. Therefore, it is recommended to make sure that media content meet the *Four Pillars of Quality Media Content: E-AIMS*.

1. Engaged - Engaged stands for the way the child engages with the content, or more importantly, what element of the media the child is engaged with. "Children learn best when they are ENGAGED with the material and undistracted by features that are unrelated to the main content" (ScreenSense, zerotothree.org). The engagement should be centered on a consistent learning goal – is the child staying on task? Are they following the story or learning activity? Make sure the technology does not become a distraction to the main learning goal.
2. Actively Involved – A child should be actively involved in the content, rather than passively observing it. Specifically, it is best when the content directly addresses the child and both asks

for input and leaves time for them to answer – think Dora the Explorer or Blue's Clues. Additionally, there should be a focus on **mind-on** engagement, rather than **hands-on** engagement – the difference being hands-on will focus on motor responses, and repetitive actions, and minds-on will focus on keeping the child mentally active, and putting mental effort into participating in the content. It is important to remember that often times when activities appear to be less physical for a child, the extra effort is being used mentally – slowly working on a screen device is typically more indicative of mental activity than twitch or reflex games.

3. Meaningful – Meaningful content is both age appropriate and educational. Choose content that targets their specific age and the learning outcomes for that age. Not only should content be age appropriate and educational, it is also important to choose content that reflects experiences, settings, and characters that a child can relate to. For children, meaningful content is all about making connections – linking new information to information already familiar to the child or to real-world applications the child cares about. Some key features to look for in meaningful content:
    a. Scaffolding – This is a technique that can be used by a supervising adult, or as a feature of the media itself. Like physical scaffolding that is used in construction, Scaffolded learning is a way to support learners as they work towards a goal. This can be physical support, or cognitive to help children make learning connections. These supports can be removed as the child develops and no longer needs them.
    b. Familiarity – Familiar characters, settings, and activities depicted in media are a way to scaffold learning for pre-K children. When elements of media are already known to the child, the content is more meaningful to them, and therefore easier for them to process. Learning from familiar characters has been shown to be an excellent scaffolding aid to children, with studies showing children as young as 2 years old overcoming the Transfer Deficit by learning from a familiar character. Therefore, choosing content that features a much loved character like Elmo, Dora the Explorer, Peppa Pig, or others can make content more meaningful and easier to learn from.
    c. Repetition – In the same way that familiarity (in its own right, a kind of repetition) scaffolds learning for young children, so does repetition – and luckily, repetition is something young children love. A child can ask to watch the same movie or TV episode, read the same book, and play the same game so many times it can make adults feel annoyed at times. However, repetition is essential to early childhood development. Repetition allows children to focus on different elements with each repetition – allowing them to learn something new with each viewing. Additionally, repeated viewings or interactions with content increases their own imitation and learning. However, it is important to note that when children seem to have content memorized, they are no longer learning from it, and new content should be chosen.
    d. Pro-Social – As stated social engagement is crucial to child learning and development. Media content should either depict positive adult-child socialization, engaged a child socially by asking questions or giving instructions, and waiting for a child to respond, or by having an adult provide social interaction during media engagement.
4. Social – Children learn best when they learn socially – not only when content depicts social interaction but also when we engage in content socially, with send-and-respond interactions. The social element can come in many forms, such as a parent, caregiver, or sibling engaging in the content alongside the child, or from the content itself being social. Some media content

mimics social interaction – such as a TV Program or story that asks for participation and responses. Parental support, and Joint Media Engagement will be discussed in more detail below.

PART V: Context

Context, like content, is an important consideration when determining if media should be engaged with. "What children learn and do with media depends a lot on the content of the media, but they depend perhaps as much on the context in which they are used or viewed, and with whom they are used or viewed." (TheNewCoViewing, joanganzcooneycenter.org) For children, just like for adults, there are certain times, places, and scenarios that are inappropriate for media or technology engagement – and it is important to tech children these technology norms.

The most important factor to consider in the context of engaging in media content, is whether the child will by socially supported by an adult. "The chief factor that facilitates toddler's learning from commercial media (starting around 15 months of age) is parents watching with them and re-teaching the content." (MediaandYoungMinds, aappublications.org)

Joint Media Engagement (JME) – "Joint Media Engagement describes the actions adults and children take when interacting with media and one another, while using traditional, mobile, and digital devices." (ScreenSense, zerotothree.org) These types of social interactions involve serve-and-return or back-and-forth interactions, and are the hallmark of high quality interactions for young children. These interactions with adults are the key factor in helping children overcome the Transfer Deficit with technology, but also simply enable a greater transfer of learning in general. The types of JME tactics that adults use to engage with digital media will be similar to how one would engage with the real world or a book:

1. Label objects, people/professions, locations, etc.
2. Provide Descriptions
3. Talk about actions
4. Ask Questions
5. Relate elements to child's life experiences

Another important consideration when evaluating the context of digital media engagement of young children is the location or scenario.

There are many one-off or emergency type of scenarios where a parent may need to buy themselves sometime with digital media as a distraction – such as at the doctor or the bank, or while traveling – but these situations should not become regular occurrences. In general, a child should have a well-established routine, which can included designated time to engage with technology. When something outside the ordinary is occurring, it is a good idea to plan ahead, and bring non-screen activities that can be used to distract a fussy child.

As stated above, it is not advised for children to have screen technology in their bedrooms, or for it to be used as part of a bedtime or calm down routine. Not only does the blue light disrupt sleep, but in

general digital media requires more mental energy to use, which will wake children up rather than sooth them for sleep. Additionally, children who are given screen technology to calm down – as a mechanism to make them feel better after a tantrum or emotional upset– have been shown to have a more difficult time with self-regulation and emotional intelligence. Many observational studies have also indicated that children have a harder time transitioning from a screen technology activity to any other activity – putting screens down is especially hard for young children – and this can compound in a particularly bad way when a device is used to sooth. Because of this tricky transition, it is suggested to always plan something the child is excited for after screen time, in order to make for an easier switch away from technology. It is also not advised to give children screen time as a reward.

Video chatting, while considered screen time, it is not considered to be media engagement, but rather social engagement that is facilitated with technology. There are many features of video chat that are well suited for the developmental stage of very young children, including the face-to-face visual elements that add meaning and non-verbal communication elements essential for babies and toddlers learning and development. Additionally, the Social Contingency (back-and-forth engagement) to video chats allows children to learn better from these than non-interactive videos. It is still important to use JME with video chats, and to be a creative assistant in the call – scaffolding information, saying who we're talking to, explaining any technical glitches like freezing, playing games like peek-a-boo or having tickle or kissing fights. The adult supporting the call should help the child understand what they are seeing, and even be the body of the person on the other end of the call by tickling or kissing when those actions are needed.

PART VI: Routine & Family Media Plan

A good routine is essential to preschooler's development, which is wonderful, because they thrive on them. A good routine will help a child feel more secure in their surroundings, anticipate the future, and have life consistency, which is essential in helping young children manage their fear of change or the unknown. Routines also help children learn and follow schedules, they increase cooperation while decreasing power struggles, and allow parents and caregivers to have consistent expectations. Children also become more independent through consistent routines, taking charge of their activities as they become more familiar with them. Because of this it is recommended to create a regular routine that is followed daily or weekly, and to schedule media time into that routine.

As part of establishing a routine, it may be desirable to create a Family Media Plan (FMP). The FMP should be based off of your values, priorities, and availability. The FMP will also take into account whether media is engaged in for learning, development, organization and planning, or for entertainment. A FMP will summarize for you:

- When each family member can or should engage in technology
- Where they should and shouldn't engage in technology
- For how long
- What content will be engaged in

As children grow, priorities and schedules change, and it is important to update the FMP to accommodate these changes.

An excellent tool to create your own FMP can be found at:
https://www.healthychildren.org/English/media/Pages/default.aspx

PART VII: Learn More

Library Resources

- Look for **books** on in the Children's section on Parenting/Teaching – Call #'s:
  - Starting at 004.1
  - 649.1
- Sign up for a Prepare, Play and Learn, or Story Time Program!
- Online Resources:
  - Curated App collection: nvcl.ca >> Using the Library >> Children >> Parents and Teachers>> Great Apps
  - Curated Websites: nvcl.ca >> Using the Library >> Children >> Parents and Teachers>> Websites
  - Tumble Books: nvcl.ca >> Research and Learn >> Online Resources A-Z>> Tumble Books

Other Resources

Websites:

- Zero to Three
  - https://www.zerotothree.org/
- The American Association of Pediatricians
  - https://www.aap.org/en-us/Pages/Default.aspx
- Common Sense Media
  - https://www.commonsensemedia.org/
- Kids Health
  - https://kidshealth.org/
- Caring for Kids
  - https://www.caringforkids.cps.ca/

Online Articles:

- Screen Sense – zerotothree.org
  - https://www.zerotothree.org/resources/2536-screen-sense-what-the-research-says-about-the-impact-of-media-on-children-aged-0-3-years-old
- Media and Young Minds – aappublications.org
  - https://pediatrics.aappublications.org/content/138/5/e20162591
- What the Screen Time Experts do with their own Children – npr.org
  - https://www.npr.org/sections/ed/2018/02/06/579555110/what-the-screen-time-experts-do-with-their-own-kids
- The new coviewing: designing for learning through joint media engagement – joanganzcooneycentre.org
  - https://www.joanganzcooneycenter.org/wp-content/uploads/2011/12/jgc_coviewing_desktop.pdf