Designing for Children
- With focus on ‘Play + Learn’

The TAD Play framework
3 Ways Children Combine Digital and Tangible Play

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Abstract: Terms like “Digital Natives” and screen-savvy childhood, fuel both debate and stereotypes about children’s play today. Toy companies have been trying to add digital components to their products to entice their young audiences. However, when looking deeper at how children play today, we discover a range of interactions and play patterns, as well as a range of toys, games, and technology, that do not match the assumptions of “Kids only want screens”. This paper presents the TAD Play framework, which maps three ways children today combine digital and tangible play: Cross-platform play, Complementary platforms, and Hybrid platforms. Looking at both success stories and toys that weren’t successful, this framework aims to highlight the affordances of play experiences that are both tangible and digital, using a user-centered design perspective.

Keywords: Play, Digital, hybrid, tangible, children, toys, games, platform, media.

1. Introduction

Combining tangible and digital play is the holy grail of toy creators these days. Assumptions such as “The screen killed traditional play”, “Kids only care about digital” have sent toy companies searching for ways to incorporate digital elements in their toys and games, to win back children’s hearts.

Not only are those assumptions misleading, but the solutions found when making them do not always create the magical play experience children are looking for. In this article the state of play today will be discussed, followed by how both American and Israeli children combine digital and tangible toys and games: The TAD play framework. Lastly, a way to design better play experiences for children will be presented.

2. Constants and Variables Affecting Toys, Games, and Play

2.1 Childhood has changed

Childhood changes over time, and generations. This includes what society expects from children, the freedoms and independence it allows them, and the tools and content they have access to. School, family, community, culture, and social-economic status all impact the nature of one's childhood. Parents today, like the generations before them, see their children growing up in a different reality than their childhood. These changes elicit both excitement for the new opportunities, and fears for the loss of others, as well as treading in uncharted territories, which parents must navigate for the first time together with their children.

Technology has played a big part in changing childhoods. In many countries, children today have access to mobile screen-based content that is unlimited in breadth and variety. The tablets' interaction affordances allow children as young as toddlers to interact with digital media, unlike their parents' computers. Mobile devices can be accessed everywhere and anytime, changing the time and location-based habits of media consumption of previous generations. Finally, new types of content created for personalized online audiences differ greatly from previous generations' culture of community viewing of the same shows, movies, games, music, and even ads.

While these incredible technological changes indeed affect childhood, they also affect all of society. Adults themselves are struggling to find a balance between harnessing mobile online media abundance while maintaining other aspects of their lives. Learning as they go, individuals, companies, schools, and communities, try to understand how to make the best of this new content, tools, access, and information, while discovering the challenges and perils that lie ahead. Adulthood has changed dramatically, from homes, workplaces, to hobbies. One cannot isolate changes in childhood, from the changes in society as a whole, in the same way, that solutions to some of these challenges cannot be applied only to children, without taking into consideration the adults around them.

Screen-time has been declared new the enemy of childhood. This claim is misleading on two accounts. First, screen-time has been a worry of parents for more than 50 years, this therefore not "new". In his classic children's book "Charlie and the Chocolate Factory"(1964) Roald Dahl presented characters that portraited children's 'Seven sins'. Representing 'Sloth' is Mike Teavee, a 9 yr-old who does nothing but watch television. Even when today's children's grandparents were children, their parents criticized their extensive screen-time.

The other misleading element in the actual definition of screen-time. By declaring a time-limit to screen-based media for children, one completely ignores the content and quality of the media consumed. Are 20 minutes better than 2 hours? What if those twenty minutes were Sesame Street? What if they were Sports? A violent movie? Reality TV? These alternatives vary greatly in their benefit or harm, showing that a time limit on its own ignores the more important aspect of digital media for children: Quality of content. This is true for TV shows, movies, videogames, YouTuber channels, video conferencing, online participation, and any screen-based experience.

Lastly, when considering how childhood has changed, we must consider the alternatives to digital play. In many communities, children of previous generations spent a big part of their childhood playing outside in their neighborhood; independent to choose their activity, their companions, and their location. This allowed for the development of many children's needs: physically, socially, and emotionally. In the past few decades in many communities it has become less socially acceptable for children to walk on their own to school, and to play after school in the streets and parks, on their own. Children depend more on their parents for access and chaperoning, as well as planning their activities for them. This change is due both to growing concerns about child safety, but also a more hands-on parenting approach. These changes imply that regardless of digital media, children cannot "go out and play on their own" like their parents did when they were children, it simply isn't allowed. However, the developmental needs of children still exist: the need for independence, wandering, exploring, socializing, adventures, taking risks, and free play. These are all important experiences that cannot be achieved within adult-led activities and limitations. Where can children experience them if their independence and free-play time are constricted? The answer is Digital play.

2.2 Children's play has changed

Naturally, when childhood changes play will change too. What's fascinating about play though, is that while technology may impact many aspects of our daily lives, habits, and tools, our initial play patterns remain constant over history. Therefore, while play has changed over time, especially its tools and means, the motivations for play, play-schemes, and mechanics, have greatly stayed the same.

Children today, both Gen Z (born 1995-2009) and Gen Alpha (born 2010-today), love to play with mud and clay, build with LEGO bricks and wooden blocks, dress up in costumes and play with dolls, actions-figures, and Playmobil, run around playgrounds climbing and jumping, sing and dance to their favorite tunes, solve puzzles, play with cards and board games, and design and draw beautiful art and inventions. This hasn't changed. The tools

for doing these things, access to them, and their place in the daily routine, have changed dramatically.

2.3 Digital Play

If you ask children about “digital play”, you may get puzzled reactions. For Gen Z and Alpha, the digital world is a ubiquitous term that describes the world around them. They make no distinctions between digital play and tangible play, physical play, or outdoor play because for them it’s all just a continuum of the same experience. The term ‘digital play’ was created by adults trying to make sense of children’s current play habits and childhood. Digital play is an artificial definition of a technical medium, used to slice up different play activities. Play by nature is holistic, encompassing the imagination and activities of children, based on their preferred play patterns in a certain age, culture, and personality. There is no such thing as ‘digital play’, there is just play. Play can occur on digital platforms or with a stick, with cards and a board or in an online virtual world, or in all of them together.

3. The TAD (Tangible and Digital) Play Framework

While toy developers look to add digital elements to tangible play, children are already organically playing by combining digital and tangible toys, games, and tools. The TAD (Tangible and Digital) Play framework presents three ways digital and tangible elements are combined for play: Cross-platform play, Complementary platforms, Hybrid platforms.

3.1 Cross-Platform Play

Cross-platform play is the most traditional way to combine tangible and digital play. It consists of continuing one’s play across different media platforms: books, TV, websites, card games, movies, online worlds, etc. Unlike cross-platform marketing, cross-platform play isn’t about slapping the image of your favorite character on a T-shirt or a lunch box, to encourage you to consume products of that brand. But rather it’s about carrying the same play values across different media, allowing children to experience what excited them with one medium, in a new way in other media. Often, each medium adds new content as well, as seen in Transmedia design (Jenkins, 2009).

When designed properly, cross-platform play allows children to discover the magic of their beloved toy/game/story all over again in a new medium and continue the play pattern that excited them initially. When design improperly, cross-platform play leads to disappointment and sometimes even anger by the fans, as the additional medium “ruins” the original play experience.

One example of cross-platform play is the Harry Potter universe. The Harry Potter book series debuted in 1997 and went on to become the bestselling book series for children today (Katie Meyer, 2016). Harry, Hermione, and Ron's adventures in the wizarding school Hogwarts have captured the hearts and minds of millions of children around the world (as well as those of adults). For a while, the Harry Potter universe didn't have a digital presence, until Pottermore was created In 2012 as the official Harry Potter website. It allowed children to participate in the story presented on the website, chapter by chapter, as they read the book. It was full of wonder and mystery and respected each child's place in their literary journey ("no spoilers!"). In 2016 it was redesigned to be more text-based. While some fans missed the interactive personalization, others loved the unique experience of an "encyclopedia" that is all about Harry Potter's world. Based on a blog metaphor, Pottermore presents new writing from J.K. Rowling, articles about themes and characters, and a shop for ebooks.

Unlike other websites for books/movies, Pottermore chose to focus on content as the value add, using text and reading, as the main medium. While this is unusual in the landscape of children's media, it is consistent with the play experience and values that the original book series afforded its readers. Mystery, social justice, and growing up, are still current themes, as well as "unlocking the power of imagination" via text. By staying true to the play values, Pottermore successfully allows for cross-platform play via different forms of media. It encourages children to go back and forth between the media, learn and explore, and enjoy Harry Potter's imaginary world.

Another example of good cross-platform play is Minecraft. The virtual online world was launched in 2011 by Swedish game developer Mojang, as a sandbox video game with a unique block-pixelized look. Becoming the single best-selling video game of all time, it has 112 million active players globally, many of them children (Steve Dent, 2019). The online game allows for a variety of play patterns, which is one of the reasons it has been able to attract and sustain play of so many children worldwide: Survival mode fighting zombies, creative mode designing and building projects, as well as a multiplayer mode that allows children to play with their friends in the worlds they created.

Despite starting as a digital play experience, Minecraft expanded its universe to cross-platform play. Minecraft created a physical embodiment of its unique block-like virtual world with LEGO brick sets. While not having all the capabilities of the online digital world, children did have the possibility to continue their passion building tangibly, with the same characters and objects. The Minecraft creative mode could now be experienced

offline, on the floor at home, solitarily or with friends and family, and without any "screen-time" limit. This proved very successful.

SpongeBob, another beloved children's media character, presents us with an example of cross-platform play that did not create the intended effect for kids. Released in 2009, this online casual game was intended to give a virtual presence and play experience, to the SpongeBob TV show fans. Based on a template of the successful Diner Dash game (2004), its creators used the same gameplay with a 'skin' of SpongeBob's characters and locations. Adults fans enjoyed the cross-platform wink, especially those who were already fans of Diner Dash. When testing with children (in 2009), reactions were different. Children love SpongeBob due to his quirky humor. When they watch the TV show they laugh along with the familiar characters. Their initial excitement upon hearing there was an online SpongeBob game quickly diminished: "But this isn't funny! This isn't like SpongeBob…". The value of humor was missing from the play experience on the new platform, thus creating disappointment and abandonment.

3.2 Complementary Platforms

The second-way children today combine digital and tangible play, started in a more subtle bottom-up manner. When Rainbow Loom, the rubber-band based arts and crafts activity, became a global sensation (2013), many were surprised. The so-called "digital generation" children were suddenly collecting simple colorful rubber bands, designing unique bracelets and crafts, trading with friends at school, and this was happening with both girls and boys, all over the world. How could such a low fidelity toy capture the imagination of today's 'digital' children?

The answer is two-fold. First, this is a perfect example that play patterns have not changed. Children still love craft, creating with their hands, design, and invention. They don't need fancy materials or sophisticated technology to get deeply involved with play and have a great time. Second, this shows that being digital natives, children are used to independently learning online. It is not that they are tech geniuses or understand more about computers, but rather it is their assumption of easy access to (online) information about anything, that creates new behaviors, ways of learning, and tools. Children were enamored by the colorful rubber bands and the variety of objects they could create. When then wanted to learn more – they went online and searched for it. Some children had uploaded "tips and techniques" to YouTube, showing how they created unique Rainbow Loom patterns and objects. These unpolished amateur videos soon became the main source of knowledge for children by children, about play with Rainbow Loom. The rubber

band loom had inspired a peer-learning community, that encompassed children ages 8-14 globally, both as creators of content, and learners.

In this example, the tangible toys and digital experience were two complementary platforms, each contributing something different, but both complementary to the play experience. The content in each platform is not addressing the same play pattern, or even from the same source. However, it enhances the play of the original toy, allowing for additional types of play – by expanding the play experience, or by including social media tools for creation, curation, and collaboration.

The Slime play craze of the past few years was another example of Complementary Platforms that enhanced play. In this case, too, children have embraced traditional play patterns (crafting unique home-made doughs, collecting, and sharing), enhancing them with online reference content (much of it created by children themselves).

3.3 Hybrid Platforms

The third-way children today combine digital and tangible play is the most novel one, with the challenge and excitement of creating new play experiences that haven't been possible before: the design of digital-tangible hybrid toys. Hybrid toys and games are planned and designed to afford both tangible and digital play in the same play experience. Treading in the uncharted world of novel human-computer interactions, designing a digital/physical toy is a risky investment, and one all toy creators want to master.

Every possible technology has been "added" to games and toys – from blinking lights and sensors to AR, VR, AI, and screens. However, most of these have succeeded only as short-term novelties and failed the real-life long-term play test of consumers. Appmates was released in 2011, providing an intriguing way to play with both physical toys and the child's tablet. Using different content themes, children could drive their tangible toy-car on virtual roads on the tablet screen, for example. While it looked like an exciting hybrid platform, the physical toys' distribution lasted a couple of years. Apparently, after the novelty wore off, the play itself lacked both in usability (i.e., the child's hands hid the screen) and game mechanics. 'Hello Barbie' is another hybrid platform example, that failed. Despite being based on research with children and families, and on well-established play patterns, the AI-enhanced Barbie never made it to wide audiences due to concerns over data privacy.

Despite being a complex challenge, there are a few products that have succeeded in combing digital and tangible play within one hybrid platform. One example is Osmo, the iPad enhanced game system that incorporates physical elements such as cards, blocks, and chips, in its applications. Using a mirror, Osmo technology incorporates children's physical

actions as part of its digital gameplay, whether it is drawing, spelling, counting, or coding. They have been successful in creating a variety of play experiences since their launch in 2013 and were named one of Time magazine's "most innovative companies" in 2017.

Skylanders is another example of a successful hybrid platform, and the first in the toys-to-life genre (later followed by Disney Infinity and LEGO Dimensions). Launched in 2011, they presented a line of toy characters that were part of a rich story-based universe. These physical action figures could be then placed on "portals" attached to gaming consoles, and "jump-in to" the virtual game. While it may seem like a gimmick to some, this hybrid platform builds upon well-established play patterns such as character action-figure play, role play, collecting, and standard (age-appropriate) virtual-world gaming. Skylanders became very successful, and in 2016 over 300 million toys were sold worldwide.

Finally, one of the most successful examples of hybrid platforms is one of the simplest. Interactive books for toddlers, are physical books (usually with thick printed pages), that incorporate simple battery-based electrical elements within the book's narrative. For example, in a book about 'the farm', the child could click on the cow in the picture (or the button next to it), and hear a "moo" sound, or someone saying, "a cow!". This simple interaction allows for several play patterns that enhance the original storytelling activity: Toddlers can feel able and independent, they can exercise repetition, and they can alter the order and context of the story creating humorous events. This product has been widely successful for many years, and across the globe, both due to its good play patterns and its low cost.

4. Conclusions: The Secret Sauce

4.1 Summary: The TAD play framework

By defining the experience they want children to have with their products, toy designers can identify which of the three tangible/digital combinations could work best for them.

Tangible/Digital relationship	Number of products	Play experience	Consideration
Cross-platform	Multiple products in different media	Creating similar experiences, play patterns, and values, in each medium	Make sure the core experience is transferred to the new medium, in addition to branding
Complementary	Multiple products in different media	Each medium creates a different play experience and play pattern.	Make sure there is a value-add in each medium, and consider incorporating more play patterns
Hybrid	One product that is both tangible and digital	One novel play experience	Make sure you address play-patterns, game mechanics, and content quality. Consider outcomes of a novel experience!

Table 1. The TAD play framework: Combining tangible and Digital play

4.2 Additional tools and methods

How can toy designers create successful play experiences for today's kids? How can they design for both traditional play patterns, and Gen Z' and Alpha's changing assumptions and childhood? The answer lies within methods, rather than guidelines. Given that childhood will continue to change, the only way creators, inventors, developers, and designers, can gauge a good play experience, is by getting to know their audience. As in standard user-centered design practices (Norman & Draper, 1986), only by listening to children, playing with them, observing them in their environment, and really getting to know their delights and challenges, can we design a play experience that will fit their needs (and wants) (Gilutz, 2019).

There are many ways to incorporate children in the design process, from testers to co-designers (Druin, 2002). Each method has its tradeoffs, but any method is better than designing play experiences without incorporating children. Even if only as testers, playtesting sessions with children should be planned to go beyond marketing and novelty impressions, but rather focus on long-term play, engagement, and interest.

The design process should also include ethical considerations, for example as described in the Designing for Children's Rights guide developed in collaboration with UNICEF (Designing for Children's Rights Association, 2018). The need for this is both growing public concern and how children value products, but also in truly creating the next wave of quality play, for future generations.

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