

## DESIGNING TO SUPPORT CHILDREN DEVELOPMENT: A LITERATURE REVIEW

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### ABSTRACT

*The article is an attempt to discover how useful the existing literature in field of designing children's playful learning products, is for people who wish to create quality toys and games. It sets out from the right of children to play, and the assertion that plays is crucial for the development of children, to the massive size of the global toy industry. It reviews the literature in terms of its usefulness in terms of information and inspiration, covering all related factors, such as the design process, the nature of play, and the products themselves. The aim is to propose a solution that would improve the situation, and ensure quality play products.*

*Keywords: Designers, Toys, Children, Playful Learning, Making, Development.*

### INTRODUCTION

According to Article 31 of the United Nations Convention on the Rights of the Child, all children have the inalienable right to experience play. It states that every child has the right to rest, to leisure, and to recreational activities. The Convention declares that its member governments should provide opportunities for children to engage in and benefit from, artistic, recreational, and cultural life. United Nations Children's Fund (UNICEF), the United Nations' program for providing developmental support for children across the world, expands on this objective by claiming that it is through play that children learn to create and explore, express themselves, develop social skills and to grow, in confidence and ability. And even though this right to play was ratified by the United Nations (UN) as far back as 1989, it still surprises many people that it is regarded globally to be a basic freedom alongside the rights to a fair trial and to free speech (Hastrich, 2011).

Although the word 'play' has numerous meanings, it is in its general sense of being an activity for enjoyment, that it is most widely understood. Play can be defined as "an arrangement in which one can practice behaviour

without dreading its consequences" (Csikszentmihalyi & Rochberg-Halton, 1981, p. 14). Often, play is associated with frivolity, but it is a fundamental part of a child's development process. Participating in play develops creativity, cognitive skills such as language and comprehension, as well as physical, personal, and social skills, "Play is the chief vehicle for the development of imagination and intelligence, language, social skills, and perceptual-motor abilities in infants and young children" (Frost, 1992, p. 48). Though it is commonly acknowledged that children develop through playing, there has been debate about whether they actually 'learn' through play. Piaget described play as assimilation, an attempt to imitate the external world with already learnt ideas and notions. In this view, a child could only practice what they currently know and would be unable to form new ideas. However, Vygotskian disagreed and claimed that playing creates new thoughts, rather than mere reflections on previous thoughts.

Whether play results in new learning or not, it is still generally accepted that playing provides children with opportunities to develop their skills and gain confidence in their abilities. Within national and educational bodies,

play is extensively recognised to be crucial to both the development and the learning of children. The Early Years Foundation Stage (EYFS) Statutory Framework set out that play underpins its standards and principles, "Through play, children develop language skills, their emotions and creativity, social and intellectual skills." (Early Years Matters, 2017). The framework holds that in the play environment, children can explore the world around them and discover more about themselves. Through taking risks in this safe setting, they are given the opportunity to develop new ideas and skills, inspire their imagination, and to work with others to solve problems. Since play is acknowledged to be so important to a child's development at this governmental level, and it is also the intuitive belief of most parents, it is understandable that there has been plenty of focus on supporting children's play and in producing products that aid playing.

The global toy industry is valued at a massive \$87.4 billion, with five major corporations dominating the field- Mattel, Namco Bandai, Lego, Hasbro, and Jakks Pacific. Mattel alone has annual revenue of \$5.4 billion and the gross sales of just one of their toys, 'Barbie', comes to \$971.8 million. The United Kingdom is a world leader in the amount it spends per child on toys, spending \$438 annually, compared to \$371 in the United States and \$358 in France. Since the toy product market is so vast, and the importance that play has in the development of children, the question remains as to whether the design of these products is good enough for the crucial role that they serve.

The purpose of this research is to conduct a comprehensive analysis of the existing literature and research, on designing children's toys and games. The aim is to provide a review of the available writings on the subject and assess how useful it is for preparing designers to create quality products. This is to be ascertained through identifying and exploring the relevant work in the area, analysing the current views and theories, and critically evaluating this in terms of its value for enabling designers to be better equipped in producing superior designs. Through concluding an extensive examination of the previous studies in this field, the intention is to propose

reflections that would contribute towards establishing a framework or mechanism that would facilitate better designed children's play products.

## 1. Finding Guidance in Literature

The question on how useful the existing material is for those aiming to design quality toys and games, requires scrutiny of the previous work in this field and a judgement on its utility as a medium for offering understanding and guidance. To assess whether the information available provides designers with knowledge and motivation towards creating better products for children's play, the research has been compiled as an extended literature review. Through this, a broad and practical awareness of the subject matter can be achieved, and a basis constructed for presenting the value and suitability of the work published on this topic.

The scope of the research ranged across various sources and formats, including books, articles, papers, and online material. It covered only texts relating to products designed specifically for play by children, and does not include for example, work that refers to purely adult playthings or toys for pets. It also excluded references to toys as collectable items, where the interest is in antique value rather than playing. Much of the primary research that has been carried out in the field of toy products, centres around two main themes; gender issues and toy preferences, and the concerns around excessive toy purchasing. These have been omitted from the review as they relate mainly to sociological and psychological studies, although these important matters are addressed in the other sources included. Also, literature based on design in general has been precluded to allow focus on the specific demands of toy product designing. The review took a broad view in its definition of products for play, and involved toys, games, puzzles, costumes, environments, and digital applications.

The criterion for assessing the literature was formed in two parts; information and inspiration. The analysis of the information was from three views, design, play, and products. The aspect of 'design' comprised the theory, process, and practice of creating children's toys. The view

of 'play' covered the activity and experience of children playing, as well as the children themselves and their development. The element of 'products' included the context for the items, such as history, market, culture, and statutory implications. The evaluation in terms of inspiration regarded the utilization of the material to a concurrent design project, parallel to the undertaking of this research. The literature was assessed by its usefulness, during the research and ideation stage of this open brief to design a child's play product.

## 2. Literature Review

The following works encompass a mixture of the concerns related to the designing of play, and an accessible channel into this field is Toy Design (Uffelen, 2010). This volume contains a broad and diverse collection of products including babies' mobiles, fancy dress costumes, tricycles, and video consoles, and ranges from classic toys through to contemporary designs. The examples offered by Uffelen (2010), gives a detailed insight into some of most successful children's play items in recent history, and available on the market today. The text gives value to the pictorial catalogue, by pointing out the significance of every product and the way in which children enjoy them, as well as the thinking of the creators behind each case. This is the book's most practical service, providing the reader with background to the objects, and awareness of the child's play experience. Although some of the captions for the products are merely descriptive, the author's passion for designing playthings comes through in the chapter summaries. The inclusion of many lesser known pieces featured in this record, provides designers with interesting material to develop their own ideas, and perhaps to progress them in unexpected directions. Notwithstanding that it is was never the intention of the author, information on the manufacturing processes and construction method of the products exhibited, would have greatly enhanced this publication's utility for those aiming to produce their own toys and games. However, since the book gives so many instances of quality designs, the benefit of this work is in its scope, rather than its depth.

A more commercially driven venture, is 'Designing for Children: Marketing Design that Speaks to Kids' (Fishel, 2001). This work displays an array of campaigns that have been effective in capturing children's interest for content that includes toys, but also media, venues, and consumables. It sets out to reveal the challenges and opportunities in appealing to a young audience, and to demonstrate how successful designers have reached their solutions. Throughout the book the underlying principle is clear, that listening to children and understanding their needs, will ensure better designed material. This guidance is unquestionably beneficial to designers in these fields, but the three objectives set out by the author (Fishel, 2001) that the products must delight, inform, and satisfy, offers a practical framework upon which a designer could possibly advance their own project. These fundamentals are reinforced by the numerous case studies in the publication, from the creators of some of biggest selling brands and products on the market, as well as imparting their own individual advice on the industry. One of the most useful aspects of this text is the addition of detailed pointers towards age related characteristics. Although general indications of childhood development can be found elsewhere, the information here is directly linked to design matters, including graphics, interactivity limitations, and complexity. Despite this work being geared in the direction of marketing, and that much of it is given over to content other than toys, the ethos and guidance all through is directly applicable to designing play products for children.

Although 'Play All Day: Design for Children' (Klanten & Ehmann, 2009) approaches the subject from the viewpoint of parents and those who work with children, Klanten and Ehmann's (2009) work grants designers an abundance of informative samples from the world of play. This book features an expansive range of engaging and stimulating concepts related to childhood environments, including leisure products, furniture, venues, and decorations, as well as toys and games. The intention behind this collection is to promote designs that nurture the healthy development of children by creating

items that allow them to learn and grow through challenging activity, in safe and secure surroundings. The entries in the volume are well detailed; giving information that highlights the function of the products and the rationale behind their inception. Also, the pieces are accompanied by a great deal of images that show the designs in context, with children using, playing, and interacting with them, which enables the reader to understand the substance of the work. There is plenty of innovative material in this publication to influence someone wishing to design better products for play, and to inspire them to consider different solutions to their own design projects. This text offers toy designers a comprehensive and varied selection of intriguing ideas for research, but since it is aimed at parents it contains little instruction in the terms of the industry, market, or history of toy production. Instead, the editors have focussed on encouraging original and inventive work, and different means by which parents and carers can engage their children, which is itself fertile ground for a designer to explore.

Looking at play from a different direction is 'Rules of Play: Game Design Fundamentals' (Salen & Zimmerman, 2004). In this book, Salen and Zimmerman set out to establish a framework for understanding play activity and the factors that surround it, allowing a foundation upon which developers can progress their concepts. Although primarily concerning itself with games, particularly the digital versions, and making little distinction between children and adults, this work offers a deep and theoretical understanding to the nature of play, and insight into the various ingredients that make for successful play interaction. The textbook aims to formulate a vocabulary with which designers can communicate ideas and systems, and this can be a crucial tool for game creators looking to contextualise their work and produce effective play products. Probably the most useful and practical aspect of this writing, is the composition of eighteen 'schemas' for designing games, standpoints from which to view a specific part of a design, such as, narrative, conflict, or pleasure. Each 'schema' is supported by its own detailed chapter, providing for the

reader a thorough examination of every facet of game play design. This series of measures and strategies lays out a pathway that affords designers a methodical approach to creating more progressive and compelling arenas for play. The publication is an exhaustive reference targeted at game developers, and as so, makes no attempt to tackle matters outside of its remit. However, the literature's clear structure for analysing mechanics can be applied to other types of play, and a more open version of this format taking in other genres, could be even more beneficial to toy designers.

'Pervasive Games: Theory and Design' (Montola et al., 2009), goes further into the territory of game design, and explores the possibilities of how play and gaming may change in the future. Although also centred on gaming, and dealing mainly with adult playing, this too offers guidance on how to plan and manage the play environment. In this book Montola, Stenros, and Waern, describe how new technologies are allowing designers to push the boundaries between the real and the imagined worlds. This is pertinent to designers of play, as the potential for challenging previous notions, becomes increasingly possible with the advent of unforeseen opportunities, due to the advances in connectivity and media. The text provides case studies in the field of immersive and ubiquitous play, which can spark ideas for playing that might not have occurred to many designers when thinking along traditional lines. As with all products, there are ethical matters to be considered, but within the uncharted realm of virtual and augmented reality, it is even more important, and this piece of work does well to examine the issues and implications involved. Since the conventional view is to see play as an activity outside of regular life, this look at gaming from a different angle can open new and exciting channels for designers to approach the subject.

Presenting another perspective to the matter of producing items for play is 'Beyond Child's Play: Sustainable Product Design in the Global Doll-Making Industry' (Edward, 2010). As it is often the case that toys and games are generally seen as trivial things with short lifespans, and mass consumer culture with its high

turnover and competitive nature means that so much is being produced and then discarded, the play design industry must recognise the implications of the products it designs, manufactures, and sells. Through investigating real cases from around the world in the production of dolls, Edwards highlights the importance of appreciating the impact this business has on both the environment and on communities. Although a concern for all product designers in any field, understanding the ecological and sociological effects of the construction behind the output they create is essential for those aiming to bring playthings to the market. Through this work, the author demonstrates in stark detail the damage that has occurred through this practice, but also possible opportunities for alternative methods of production. This text provides the reader with a solid account of the need to think about sustainability when designing children's toys, and a realistic awareness of the process of how these objects are made and sold. Embedding consideration for the people who make the products, and for the places where they live, into the way toys are designed must be a priority for products that are ultimately meant for the benefit and development of children.

A repeatedly overlooked region within the sphere of play design, are the concepts and products that include disabled children. 'Play Development in Children with Disabilities' (Besio et al., 2017), is a thorough and informative text which aims to contribute to this field by establishing a standardised understanding of the issues. To do this, Serenella Besio, Daniela Bulgarelli, and Vaska Stancheva-Popkostadinova have compiled a framework that seeks to create a common language with which to advance solutions, make play a central tenant in supporting disabled children, and raise awareness of this subject by having a more rigorous approach to the matter. The literature sets out a researched classification system that orders types of play by two themes, cognitive complexity and social interaction, and within this it overlays a hierarchy of activities that relate to abilities and impairments. This categorisation is a helpful means for designers to gauge the suitability of their concepts, and it also provides a measure by which they can frame their

work in terms of the developmental stages and capabilities of the child.

Although this work is focused around disabilities, the definitions and review of play presented in this study is an instrument that has value for anyone designing toy and game products for all children, with regards to appropriateness, safety, capacity, pleasure, and context. However, it is in the editors' declared aim to promote play for its own sake in meeting the needs of disabled children, and in demonstrating the methods by which this can be achieved, that this publication has its greatest merit and significance.

Building a universal model to enable designers to create effective concepts for play products is the core aim of Kudrowitz and Wallace in their article, 'The Play Pyramid: A Play Classification and Ideation Tool for Toy Design' (Kudrowitz & Wallace, 2010). In this text, the writers have formulated a three-dimensional chart upon which a toy concept can be positioned in terms of four classes of play; challenge, construction, fantasy, and sensory. This can then be further modified by utilising the sliding scales of involvement, gender, social, physical/mental, and restraint. These categories and descriptions of play types form a structure that provides a platform for brainstorming and ideation. Using this system, designers can perceive the play value of their potential product, and then shift the concept around the pyramid map or sliders, to see what other affordances are available or if new directions for the project appear. It can also be used to analyse other toys and games on market, and to identify possible gaps in the market. This design tool, specific to toys and children's playthings, is an excellent mechanism for designers and students to initiate their ideas, rethink their concepts, communicate abstract notions of play, and to explore variations on a theme. In essence, this arrangement gamifies the design process, and it allows those creating innovate play designs to challenge themselves within an organised and methodical foundation. This is particularly beneficial to designers of toys and games, as the abstruse nature of play requires a more specialised approach.

Differentiating the design process of toys from other types

of product design is 'Essential Concepts in Toy Design Education: Aimlessness, Empathy and Play Value' (Gielen, 2010). The main aim of this paper by Gielen, is to improve the education of students in the field of designing for play, by defining three core principles that underpin the design quality of toys and which are often problematic for those undertaking this venture to comprehend. By describing the concept of aimlessness, the author contextualises how the design of playthings is dissimilar to conventional processes because playing rarely has a specified outcome.

Through depicting empathy, it illustrates the importance of seeing the items being produced through the eyes of children, and to relate to their needs and preferences. In terms of play value, it conveys the necessity to understand the various factors that make the experience enjoyable and satisfying for the users. Since this article is targeted towards assisting toy design students in their learning, it offers a constructive means from which someone designing a play product can evaluate the positive and negative qualities of their project, and to develop the concept by recognizing the key components that can make effective designs for playing. One especially useful device within this text, is the technique of 'context mapping'. This is a method for exploring initial ideas by thinking about children's potential behaviour and activity, and to consider design solutions creatively, by adapting and reworking the product through a range of possible behaviours, styles, and experiences.

Delving deeper into the topic of how and why children play the way they do, is 'The Value of Toys: 6- 8 Year- Old Children's Toy Preferences and the Functional Analysis of Popular Toys' (Mertala et al., 2016). This article presents primary research into the types of toys children choose to play with, and the reasoning behind their preferences. Through this investigation, the team of Mertala et al. had found two main values in the rationale for the choices that were made; that which is apparent in the item itself, and that which the child assigns to the product. The writers break this down further, by describing four overlapping categories of functional, material, personal, and social value. This work offers the reader some insight into the

design of toys from the perspective of what the plaything means to the child that uses it. Understanding these products as cultural artefacts that are not only embedded with the functions or features that the designer has created, or that the parent or purchaser desires, but as an expression of the child user's own identity or view on the world around them, is an important consideration when designing toys. Placing children's playthings within the context of culture, media, peer pressure, and other factors, and being aware of how children attribute value to toys, can help designers to form a more complete picture of what their products mean, and how successful they might be.

The article 'Plenteous and Limited Play, Transmedia Storytelling-toys in Light of Individualist and Social Aesthetics' (Gulden, 2016), provides further evidence of how toys are played with by children in modern society. Exploring the theme of media tie-ins, where a product is associated with a film or cartoon for example, Gulden's research into the kinds of play children undertake with various toys shows the effects merchandising can have on a child's play experience. The paper concludes that playthings branded with specific media identification have limited scope for play, as the narrative is already defined. However, toys without these associated themes offer open-ended play, which is linked to creative thinking and developing children's imagination. This has powerful implications for product designers, as the connection between a toy or game with a recognised media entity can increase the perceived value in the child's view, but also impede the ability for a child to engage in the benefits of unconstrained imaginative play. The challenge for those working in the lucrative transmedia toy industry, is to find ways of producing items that both allows for the recognition of the brand that the marketing requires, as well as investing the product with the opportunities for self-initiated play themes that are vital for creative play and children's development. Research that demonstrates the benefit of this to the companies that sell these toys, could make an important change to this substantial section of the play market.

Also using the idea of open-ended play to tackle another

modern issue, is 'Designing Playful Interactions for Social Interaction and Physical Play' (Bekker et al., 2009). A regular concern that surrounds the issue of play in today's society is the amount of time children spend indoors playing with computers and other devices, and the lack of outdoor physical activity children engage in that was more common in the past. This has implications for the health, well-being, and social skills of children, and in this article the authors Bekker, Sturm, and Eggen propose utilising interactive technology to encourage participation in leisure and activity outside. The article presents three principles to support this vision; motivational feedback, defining own rules, and social interaction opportunities. It offers a range of cases where interactive play objects utilise these values by taking advantage of the possibilities available through modern technology, and the appeal that this already has for children. Through investigating these cases and the values put forward in this paper, and most importantly the concept of open-ended play that runs throughout, inspiration can be gained to take design projects into completely new directions. This emergent field is an exciting arena for designers to change the existing nature of play experiences for children, and to contribute towards promoting a healthier environment.

Awareness of what the advances in technology can enable product designers to do, is the central tenet of 'Designing for Emerging Technologies: UX for Genomics, Robotics and the Internet of things' (Follett, 2014). This book edited by Follett, covers a wide spectrum of material regarding current and future developments in areas, such as telecommunications, architecture, wearable, and musical instruments that offers all kinds of revelations for aspiring product designers. However, it is the chapter by Kudrowitz that has the most direct information for those looking at designing toys and games. This section contains guidance on both the prospects and the challenges that face toy designers in terms of the industry and innovation. The writer highlights how issues, such as safety, seasonal pressures, intellectual property, and the dominance of large companies can affect what designers can do in this area, but also provides many

examples of what is possible for creative usage of new technologies. Also, the advice given on looking out for interesting things, or approaching usual things from a different angle, is particularly useful for those looking to create innovative toy products. However, as is pointed out here, the key is to make sure the design focus is on the play value rather than the novelty value of the technology. Technological advances will only ever have more influence on people's lives, and designers of playthings can benefit from having a greater understanding of the engineering aspects of product design, and especially in what may become possible in the future.

An in-depth look at the design process for a specific toy that uses a new technology is provided by Rosales, Arroyo, and Blat in their paper, 'FeetUp: A Playful Accessory to Practice Social Skills through Free-Play Experiences' (Rosales et al., 2011). This text illustrates the creation of a play concept involving footwear that lights up and makes noises, when both shoes are off the floor. Also touching on the concept of free play, this work outlines the development of a design innovation from research and ideation, through to iteration, prototyping, and evaluation. The writers describe in detail their experience of taking their idea of encouraging open play, physical exercise, and social interaction, by having children participate throughout the process including brainstorming and testing. This document is useful for others seeking to design play products, as it offers an insight of a structured system for involving children in the design method as well as showing how to analyse a product in regards to a difficult notion like free play.

Another helpful example of depicting the design process for a toy is 'Towards Understanding of Play with Augmented Toys' (Sridhar et al., 2017). Sridhar, Nanayakkara, and Huber demonstrate in this paper, how augmenting traditional play blocks with interactive lighting features changes the play behaviour of the children using them. The writers employed the Play Pyramid devised by Kudrowitz and Wallace, to evaluate their product 'Sparkubes'. Through this endeavour, they could assess the play value of their toy and analyse the activity of the children they observed playing with their product. The

literature shows that adding the interactive element afforded different play styles and more complex involvement with the product. This paper presents to toy designers how applying a measured design tool for framing the play experience, can benefit the designer by allowing them to understand how alteration to features changes the type of play that children will have with a play object.

Seeking to make the case for better designed toys that apply to the needs of the digital age is '3 Ways to Design Toys that Boost Kids' Creativity' (Russell, 2012). In this online article, Andy Russell proclaims the importance of creative thinking and how this skill will become even more necessary for the children of today, as they make their way into adult life. The writer states that designers must promote imaginative play through the toys they make, to foster creative development and divergent thinking, in order to equip children for modern life. To achieve this, the page gives three means to reimagine play products. Firstly, to ensure that play is open ended to allow children to create their own stories and produce their own content. Secondly, to engender family play activities that would support collaborative participation. And lastly, to create opportunities for social learning with children feeding back to each other in online communities. Often, creative play activities are linked back to the traditional toys of previous generations, but this article gives the designers of playthings avenues to explore in light of present conditions and possibilities.

Having some sense of the psychological setting that applies to the design of play products can be advantageous for designers, and 'Toy Stories' by Benson (2006) provides a basic overview of matters relating to psychology regarding play and toys. In this article, the writer offers a backdrop to the studies and psychological research in this field, and particularly useful for those who want to gain more information in this area, provides references for those who are currently exploring this issue. The article points out that toys are invested with meaning, and that controversies occur when this collides with other parts of culture or society that might hold other meanings. From this text, it is possible to find direction to many

matters connected to play, including gender differences, social roles, and stages of childhood development, as well as education, policy making, and parental involvement. The page also specifically addresses toy making and design, indicating ethical dilemmas, profit making, and exploitation. This article is a good starting point for any toy designer wishing to discover more about how psychology views the world of toys and playthings.

Providing toy designers with simple but useful information, the Toy Industry Association have released a Toy Inventor and Designer Guide (2014). This manual presents answers to many of the most common questions that are posed by aspiring toy designers. Covering various areas that a designer of toys needs to know, like marketing, legality, manufacturing, and distribution, with links to a variety of facilities and institutions. Although specific to the United States of America, the advice presented is of general use to designers, however, a similar work for British or European designers would be of use. The toy industry serves a massive global market, and any designer wishing to create successful play products need to be aware of all the components that it is formed from.

### 3. Discussing the Findings

The main findings were that the field is dominated by large corporations often supplying cheap products that tended towards the latest trend or fashion. Catalogues of existing play products offer plenty of scope for research, but information on production methods and manufacture is neglected. Also, these publications are curated to the taste of the editor.

By no means exhaustive, this literature review covers most of the main areas pertaining to the field of designing for play. It contains a cross section of various works on the matters relating to the industry, the marketplace, psychology, education, culture, and research associated with toy products. Though some of the descriptions for the products are merely descriptive, the author's passion for designing playthings comes through in the chapter summaries (Uffelen, 2010; Fishel, 2001).

The literature also includes material from different

sources, such as printed publications, journals, papers, and websites. The texts were reviewed regarding whether the content provided useful information on the design process, products in general, and the nature of play. The literature was also analysed in terms of what inspiration it offered, regarding a design project that was being undertaken parallel to this study (Klanten & Ehmann, 2009; Russell, 2012; The Toy Association, 2014).

Much of the research being carried out is based around gender or purchasing, and more research dedicated to design itself could prove insightful. Emerging and future technologies are changing the nature of how play is perceived, and how it is experienced, and designers need to be equipped for this trend (Follett, 2014). Frameworks that contextualise and support the design process specific to play design are emerging, and further advancement in this area would greatly improve the quality of product design for toys and games (Early Years Matters, 2017).

One of the most common themes that arose was the need to improve designing to enable more creative and open play (Gulden, 2016; Montola et al., 2009). An important element is the necessity to raise the standard of education for designers of playthings and create tools specific to this discipline.

More awareness of the industry is required, particularly in regards to the environment and working conditions, to ensure ethical products. In the main, information on the topics of play, products, and design are available, and a great deal of it offers some inspiration. However, the instruction and advice is disparate and unconnected, and an attempt to collect it into a single place would benefit designers and lead to be better designed quality play products (The Toy Association, 2014).

## Conclusion

Play is the right of every child, and it is crucial to children's development. Although play seems obvious, it is notoriously difficult to define. However, the benefits of play are well researched and documented. The global toy making industry produces an astonishing amount of material and turns over a staggering amount of money.

But there is a great deal of displeasure at the quality of these items, and often, it seems that children have too many toys but a lot of them are not good enough. Children deserve better, and toy makers have a responsibility to ensure that the designs for these products are better. Through a review of the literature it is clear that in many instances, the information regarding designing for play products is available, but that this is not adequate for the situation, and too many poor quality toys and games are still being foisted on children. To solve the problem, the design of play products must be recognised as a distinct discipline or practice in its own right, with its own methods to ideate, develop, and evaluate products. Also, the designers in this field should be educated to understand the nature of play, the needs of the child, and how to produce items that add value to children's experience of play. Most significantly, the designers of play products must understand the principle of creative play, and provide open ended products that spark children's imagination and inspire creativity. The first step to achieving this, would be to collect all the useful information that exists into a single definable space that all designers could use and share. This would cover every aspect of designing quality play products, and motivate the designers of playthings to ensure that their creations bring joy to the children that play with them.

## References

- [1]. Bekker, T., Sturm, J., & Eggen, B. (2009). Designing playful interaction and physical play. *Personal and Ubiquitous Computing*, 14(5), 385-396.
- [2]. Benson, E. (2006). *Toy Stories* [online]. Association for Psychological Science. Retrieved from <https://www.psychologicalscience.org/observer/toy-stories>
- [3]. Besio, S., Bulgarelli, D., & Stancheva-Popkostadinova, V. (2017). *Play Development in Children with Disabilities*. Berlin. De Gruyter: Open Ltd.
- [4]. Csikszentmihalyi, M., & Rochberg-Halton, E. (1981). The Meaning of Things: Domestic Symbols and the Self. *Contemporary Sociology*, 12(4). Cambridge: Cambridge University Press.
- [5]. Early Years Matters. (2017). *News from Early Years*

Matters. Retrieved from <http://www.earlyyearsmatters.co.uk/>

- [6]. Edward, S. (2010). *Beyond Child's Play: Sustainable Product Design in the Global Doll-Making Industry*. Amityville: Baywood Publishing Company.
- [6]. Fishel, C. (2001). *Designing for Children: Marketing Design that Speaks to Kids*. Gloucester: Rockport Publishers.
- [7]. Follett, J. (2014). *Designing for Emerging Technologies: UX for Genomics, Robotics, and the Internet of Things*. O'Reilly Media, Inc.
- [8]. Frost, J. L. (1992). *Play and Playscapes*. Albany, NY: Delmar G.
- [9]. Gielen, M. (2010). Essential concepts in toy design education: Aimlessness, empathy and play value. *International Journal of Arts and Technology*, 3(1), 4-16.
- [10]. Gulden, T. (2016). Plenteous and limited play, transmedia storytelling- toys in light of individualistic and social esthetics. *International Journal of Play*, 5(1), 77-92.
- [11]. Hastrich, C. (2011). *The challenges of creating toys: Idealism, play and commercial design* [online]. Bouncing Ideas. Retrieved from <https://bouncingideas.wordpress.com/2011/11/12/the-challenges-of-creating-toys-idealism-play-and-commercial-design/>
- [12]. Klanten, R., & Ehmann, S. (2009). *Play All Day: Design for Children*. Berlin: Gestalten.
- [13]. Kudrowitz, B. M., & Wallace, D. R. (2010). The Play Pyramid: a play classification and ideation tool for toy design. *International Journal of Arts and Technology*, 3(1), 36-56.
- [14]. Mertala, P., Karikoski, H., Tähtinen, L., & Sarenius, V. (2016). The value of toys: 6–8-year-old children's toy preferences and the functional analysis of popular toys. *International Journal of Play*, 5(1), 11-27.
- [15]. Montola, M., Stenros, J., & Waern, A. (2009). *Pervasive Games: Theory and Design*. CRC Press.
- [16]. Rosales, A., Arroyo, E., & Blat, J. (2011). Feet Up: A playful accessory to practice social skills through free-play experiences. In *IFIP Conference on Human-Computer Interaction* (pp. 37-44). Springer, Berlin, Heidelberg.
- [17]. Russell, A. (2012). *3 ways to design toys that boost kids' creativity* [online]. Fast Company. Retrieved from <https://www.fastcodesign.com/1669691/3-ways-to-design-toys-that-boost-kids-creativity> [Accessed 6 June 2018]
- [18]. Salen, K., & Zimmerman, E. (2004). *Rules of Play: Game Design Fundamentals*. Cambridge. The MIT Press, Cambridge.
- [19]. Sridhar, P. K., Nanayakkara, S., & Huber, J. (2017). Towards understanding of play with augmented toys. In *Proceedings of the 8<sup>th</sup> Augmented Human International Conference* (p. 22). ACM.
- [20]. The Toy Association. (2014). *Toy Inventor and Designer Guide* [online]. The Toy Association. Retrieved from [http://www.toyassociation.org/App\\_Themes/toyassociation\\_resp/downloads/resources/TIAToyInventorDesignerGuide.pdf](http://www.toyassociation.org/App_Themes/toyassociation_resp/downloads/resources/TIAToyInventorDesignerGuide.pdf)
- [21]. Uffelen, C. (2010). *Toy Design*. Braun Publishing, London.

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