

LEGO as a Learning Enabler

in the 21st Century Preschool Classroom: Examining Perceptions of Attitudes and Preschool Practices

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Abstract

This paper aims to review Malaysian public and preschool educators' perceptions of the role of innovative play in early childhood learning and development through a survey of LEGO as a preschool learning enabler which facilitates and strengthens children's cognitive thinking, interaction, psychosocial skills and creativity. Literature sets up a theoretical framework for the research, and existing learning strategies were reviewed. However, while LEGO is perceived as a problem-solving tool, the survey undertaken for this research shows various negative perceptions of its usage hazards, unstructured use to kill time, and pricing beyond Malaysian families' socioeconomic reaches, suggesting that LEGO has not been elevated to its full potential. Recommendations to enhance the perception of LEGO are discussed, including the design of specialised products, more effective marketing strategies, and corporate responsibility initiatives. Although the current study does not present any specific analysis of how LEGO could be applied in curricula or pedagogical development, there is indication that LEGO could enhance its brand image and appeal for middle-income markets by tapping its attributes as a strategic innovation and quintessential preschool learning enabler.

Keywords: *Innovative Play, Education, Construction, Preschool Learning, Early Childhood Development*

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Introduction

Innovation elements in early childhood education are an understudied area and receive less eminence perhaps due to its overreaching scope. Early childhood education has nevertheless been instrumental in shaping the bedrock of life skills necessary for a child. Studies have determined that for various stages of child development, different stimulations are deemed critical for future wellbeing (LEGO Foundation, 2013). Researchers further argue that half of a person's intelligence potential is developed by age four, and that appropriate stimulations, motivation and activities can have a lasting effect on intellectual and emotional capacities of individuals, including their personalities, intrapersonal skills, and other social behaviors and traits (Rogers, 2011).

Evidence points to the opportunities that digital and technological literacies provide in reforming child development pedagogies, from traditional "culturally curtailed play" to more dynamic, open, "culturally-cultivated" leisure time (LEGO Foundation, 2013:4-5), on the other hand, these changes have also been shown to manifest in certain societies as a factor for increasing solitariness, while the negative issues surrounding exposure of new media technologies to young children, and how computer games are gradually replacing free play, have been heavily debated.

Global communities, families, educators and community stakeholders, must continue to actively voice their concerns about the lack of holistic, environmental stimulation for children living in the digital era, and seek opportunities to help children learn to think, solve problems, make friends, mature emotionally, and to simply have fun. The importance of *all forms of play* in answering these needs must therefore not be lost in the thrilling availability of technological connectivity, or sidestepped.

Significance of the Study

The study determines how objects of play such as bricks and construction activities stimulate and enable child learning in cognitive and socio-emotional development; as well as the responsiveness of Malaysian preschools and kindergartens towards LEGO as an innovative play enabler. The primary objective of research is to determine the extent by which playing with LEGO is perceived as a valuable aid for early child learning and skills development.

Another objective is to establish the role of materials such as blocks and structured playtime in preschool environments as a factor which strengthens socio-communicative abilities. The results are aimed to help educators better understand perceptions about LEGO systems and products as a learning enrichment tool.

The insights provided by research subjects (Malaysia preschool educators) reflect current attitudes, and the possible actions to be implemented to strengthen LEGO's image as an innovative and creative educational product. Lastly, this paper contributes an Asian perspective in cultural research by demonstrating the key

role of early childhood education in the context of current learning issues in the wider, complex environment of 21st-century challenges, and how play affects cultural dimension of literacy.

Literature Review

Developmental psychologists have sought to understand the cumulative processes and benefits that link play with child learning (Diezmann & Watters, 2000:9). The Preschool Learning Alliance National Centre considers that in all aspects of development, physical, intellectual, socio-emotional, play helps children learn to think, to socialise and engage in experiences with other children and adults; these critical dimensions start during infancy and continues through life.¹

Lev Vygotsky, a proponent of situated learning, argued that play, makes a crucial contribution to the development of human cultural environment, whereby associations of symbols and symbolic experiences with culturally defined meanings can be transferred in the form of scaffolding instruction: the learning situation involves initial hand-holding by teachers, but with motivational triggers, students will construct their own thinking and problem solving (Weisberg et al, 2013).² Fostering play as an interactive, enjoyable and voluntary exploration during the most rapid period of children's development from birth to eight years of age is crucial for healthy cognitive, emotional and physical growth (Ackermann, 2004; LEGO Foundation, 2013:13).

Aside from developing motor skills and cognitive thinking, in interactive settings, play sustains children's interest in the context of their emerging power of imagination (Hidi, 2006). Playing with props and objects enable children to learn language and distinguish a range of culturally specific, symbolic representations, enhancing psychosocial development through learning the rules of social engagement and expectations of how to act in society (Weisberg et al, 2013).

Hollanders and van Cruysen argue that creativity and design are essential for innovation: "[Creative thinking] expands available ideas and [good design] increases the chances of successfully commercializing" those ideas. As important as symbolic play, understanding their effects remains elusive.³ Scholars and psychologists acknowledge it as the crucible of cultural information, from visual arts, language, mathematics, science, music, dance, drama and so on (Weisberg et al, 2013).

The concept of play today has evolved from the old way of "adult-supervised and scrutinized" to self-directed and intrinsic; from rule-following behaviors to that which rewards spontaneity and promotes playful behavior (Hirsh-Pasek & Golinkoff, 2003; Rogers, 2011; Smith, 2010). Current research extends to studying the effectiveness of self-regulation in play among pre-schoolers (Berk, Mann & Ogan, 2006), as well as the social benefits of playful engagement through the abandonment of authorial rules and "overly organized games" (DeKoven, 2002; Schell, 2010, cited in LEGO Foundation 2013).

Innovative approaches to early childhood skills learning through play have nevertheless been established in literature. Marketed ideas must understand the “needs, passions and interests of learners,” and their functional purpose must be co-constructed meaningfully (Rogers, 2011:6) between adults and children, and between children.

The benefits of using play equipment and toys to facilitate development of cognitive, physical and spatial abilities are not limited to able-bodied children (Diezmann & Watters, 2000:5). Physical play using objects is found to improve fine motor skills coordination for children living with disabilities (Lee, 2004:74-75).

Australian blindness teacher Heather Field claims that among parents and educators of children born with vision impairment, there exist misconstrued beliefs that playing is not valuable, which hampers efforts to get blind children to move.⁴ She believes blind children can be taught to enjoy recreation using play tools to encourage independent movement. In the field of early childhood intervention, studies by Prof Yanhui Pang at University of Pennsylvania demonstrated that brick playing among children with *autism spectrum disorder* (ASD) increases their social interaction and verbal communication abilities.⁵

Berk, Mann and Ogan reports on the value of play in helping children adjust to a new school’s setting or transitioning from home to school.⁶ Other researchers find play valuable in enhancing learning readiness and removing anxiety (Hirsh-Pasek & Golinkoff, 2003:8), and connect it to success in elementary years.

Free play, according to sociologists, allows children to set goals and solve problems, and derive meaning from their own experiences (Mielonen & Paterson, 2009). As a site of interaction, playtime induces social skills, where self and relational roles are laid out within conditions of possibilities (Rogers, 2011).

Further evidence from ethnography studies involving observations, interviews and writing samples show that exploratory play allows manipulation of surroundings in tandem with language skills development (Mielonen & Paterson, 2009). For social enactments, the schematic field requires the use of language, for instance, a sign that announces a place or instructs; hence, play forebears formal literacy (UNESCO, 1993:21).

Children engage in experiential play through symbolic activities in unstructured spaces, such as forests, gardens and recreational areas, as well as the use of symbolic construction materials (Pellegrini, 2009). Drew,⁷ citing evolutionary psychologist Jerome Bruner’s influential research on human complex learning abilities, note the necessity of play systems that enable channelling of scientific thinking, logical reasoning and artistic creativity, through three-dimensional patterns of problem solving, habits of inquiry, self-discovery and symbolic representation, giving children “first person” experiences of how concepts are formed, manipulated, and what works under different circumstances.⁸

Regarding the role of technological mediums, eminent cognitive psychologist Albert Bandura found that video, photography, television and other mediums facilitate children's observational learning of real-life phenomena (cited in Alexander et al, 2014).⁹ This suggests that creativity in play and interactional activities, when integrated with mediums, are critical in helping children foster social relationships in the present and future scenarios of "one reality," where technological advancement produces a seamless fusion of virtual and physical realms (LEGO Foundation, 2013:42-54).

LEGO Group Innovation Development

LEGO, abbreviated from the Danish *leg godt* which means "play well," was founded in 1932 by Ole Kirk Kristiansen, and since then, the LEGO Group has thrived as a family corporation. The LEGO brick, launched in 1958 evolved into a suite of themed kits and play solutions (Mortensen, 2012).

Among its brand values, sustainability best practices underscore LEGO Group business principles, which emphasise imagination, innovation and creativity, as well as fun, learning, caring and quality, by demonstrating the highest responsibility towards stakeholders, in high standards of testing for LEGO product manufacture (Jensen, 2016). Quality assurance is carried out through R&D, including risk assessment of raw materials during product development, random testing during production and consumer feedback assessment (Lego Group Responsibility Report, 2017).

LEGO Group's Corporate Responsibility principles bespeak deeply embedded ethical values in the company's business foundation (LEGO Group Progress Report, 2012). For instance, LEGO bricks are compatible across time and product lines, and sustained over a lifetime: bricks not passed on to family or friends are often sold second-hand, befitting its concept of *Sustainable Play*:

"I believe that with our products in the hands of children, we are making a significant impact on the future... The physical experience with our toys stimulates [their] imagination, creativity, learning, and helps them develop as the builders of tomorrow. Our operations must be safe for our employees and partners, and as clean and rewarding as possible... for the local communities [that we serve]" (LEGO Group Progress Report, 2012:23).

LEGO DUPLO, at twice the size of standard LEGO bricks, is designed for children aged 1½ to five years. LEGO Serious Play system employs directed, or *convergent*, structural thinking techniques to create solutions, metaphors, represent feelings or identities (LEGO Education, 2012), while *divergent* thinking stimulates flexible ways to manipulate objects in the environment (Ackermann et al, 2009:10) and furthers embed innovation in the development of cultural mind-sets and possibilities (Gauntlett et al, 2010:14-28).

Open-ended materials like LEGO support scholarly and field literature urging for the development of the two facets of innovation in society: creative experimentation and familiarity with problem-solving (Ackermann et al, 2009; Broadhead et al, 2010).

In building or creating, imagining, fantasy role playing and storytelling, play in various forms continuously feed one another, while in the same time, reduces feelings of “self-consciousness and shame” among its actors (Gauntlett et al, 2010:26).

The following section reviews the research methodology involved for this study and discusses the research design and sampling procedures undertaken to address the problems.

Research Design and Methodology

The role of play tool has been extensively studied by human motivational and behavioral theorists through situated learning frameworks (LEGO Foundation, 2013:29-41). This paper sought to determine how LEGO bricks enable children in learning development among Malaysian preschool children (ages commonly range from three to six years). To understand relevant issues, resources were gathered from LEGO official literature, as well as journals about early childhood learning development and literature linking educational methodologies to child development.

A quantitative survey was chosen as the primary research instrument, sampling urban Malaysian public attitudes, supported by qualitative interviews of preschool teachers. Data collection in the form of sequential explanatory mixed-methods procedures was designed to improve recommendations for this study. This mixed-mode methodology of research is helpful for a more critical analysis of behavioral patterns underlying attitudes and perceptions (Boateng, 2016). Primary data, obtained from a survey and interviews, enable ground issues to be examined and interpreted. For this study, interviews were conducted as a supplementary measure to extend quantitative analysis.

Qualitative research is useful in describing the deeper and often unrealized concerns of a constructivist nature, since qualitative phenomenon lends itself to reveal subjective patterns of attitudinal formation and perceptions. Non-numerical, descriptive, with equal parts reasoning and interpretation, qualitative research aims to examine the depth of meaning and feeling to enable careful parsing of cultural thinking pattern behind assumed situations. It also stresses respondents' direct experiences in making meaning of events or circumstances through observations (Boateng, 2016:230-235).

Content analysis is applied to open-ended questions. Respondents' answers provided intuitive depth and grasp of attitudinal formation. Survey statistics form

the framework from which qualitative interviews are analyzed. This instigates the researcher to interpret meanings from attitudinal findings towards understanding the research issue, before commencing discussion to seek rational possibilities for results, and thereon, to provide incisive suggestions for improvement (Northern Illinois University, 2000).

Subject and Sampling Method

The instrument to establish respondents' understanding of the subject for this study is a questionnaire. The target audience surveyed are teachers, with at least one year of experience in teaching children from ages 4 to 6 years (i.e. preschool and kindergarten levels).

Interviews were conducted with three of kindergarten teachers approached in face-to-face contact, and for confidentiality purposes are stated as Participant A (PA), a teacher in mathematics and science; Participant B (PB), a teacher on arts and craft; and Participant C (PC), an English language teacher, to understand teachers' perceptions towards play as part of learning.

Questionnaires were designed to be administered to assess subjects' familiarity with LEGO, and the degree in which it is perceived as a useful tool for child learning. Qualitative interviews enabled explication of the quantitative findings.

Research Design

The instrument applied is a survey questionnaire, research consisting of a series of questions and other prompts for the purpose of obtaining attitudinal information from respondents through a questionnaire. As a means of research, the questionnaire was sent via email, which eschews cumbersome processes such as telephone surveys. Moreover, questionnaires are set to provide standardised answers which enables simplification of data tabulation.

In terms of data collection, the questionnaire was distributed to the targeted research group teaching at kindergartens in Subang Jaya and Kuala Lumpur, via e-mail. The total number of respondents was 103. Both open-closed and open-ended questions were designed to facilitate depth analysis of survey data, which were then collated using Google Drive. The results are discussed in the following section.

Presentation of Data and Discussion of Findings

This section presents, analyses and discusses the findings from the survey and interviews as described in research design. The results are divided into two sections. The first section attempts to explain what play time engenders for Malaysian preschool educators, as well as recording their perceptions about what "learning through play" means. The second section analyses respondents' familiarity towards LEGO products in children's learning and skills development, by discussing the implications of data obtained from the survey findings and interviews. The final section presents a summary of the results.

Play Time in Kindergartens

As shown in figure 1, all 103 subjects responded in concurrence that play time is provided.



Figure 1. Is there any play time allocated for children in the school?

In figure 2, 95 (92%) of respondents agree that while children play, they learn and have fun as well. 3 respondents (9%) think that children are just learning, and 5 (5%) think children only have fun during play. The next question sought to know what activities were provided, asking respondents to rank the most frequent play activities offered, from 1 to 10, indicating least to most frequent respectively. The survey showed that the most popular playtime activity was role playing (performing), followed by drawing, painting, reading stories, solving jigsaw puzzle, and lastly, arts and crafts (crafting).

In the next question, objects of play were ranked for importance as learning enrichment tools, with wooden building blocks, educational games, fun quizzes, educational videos and LEGO bricks as options. 3 respondents chose LEGO as the most important play tool for learning enrichment.

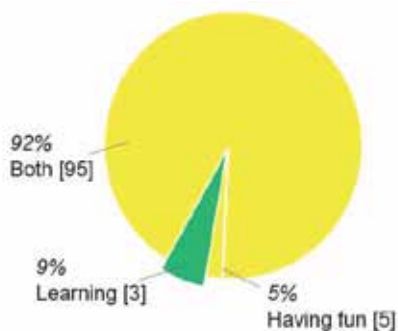


Figure 2. Do you think playing is a part of learning, or that it is just about having fun?

The next question was designed to understand familiarity with the LEGO brand of construction bricks. Figure 3 show 69 (67%) respondents stating LEGO systems are provided in the kindergartens, while 34 (33%) claimed the kindergarten where they teach do not provide LEGO.

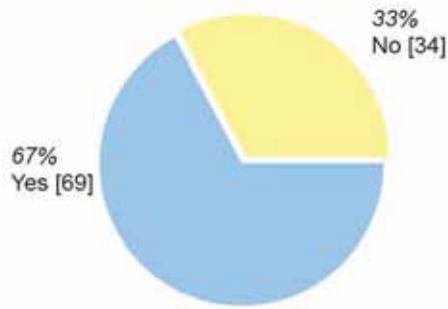


Chart 3: Are LEGO construction bricks provided in the school?

It is apparent from figure 4 that a large proportion of preschools do not provide LEGO for play purposes (84%). Only 18 (18%) of kindergartens provide LEGO in class at least once a week as part of their class learning activity. In most kindergartens, respondents revealed that LEGO play is considered mainly as a “kill-time” activity: children who finish tasks ahead of others, while waiting for peers to finish, and sometimes while waiting for parents at the end of preschool day, would play LEGO.



Figure 4. Does your school provide class times for children to play with LEGO at least once a week?

During interviews, subjects mentioned that LEGO systems and construction sets are too expensive as play equipment, whereby preschools with large numbers of students do not have the budget to purchase or keep enough LEGO sets for students, and these tend to be located in mid-income urban areas.

3 of the participating preschool teachers considered regular LEGO bricks risky for younger children, but most subjects thought LEGO is good for development of cognitive skills, motor skills, creative thinking and socio-emotional dimensions.

Participants were then asked to specify how LEGO benefits children in these aspects. The following responses were recorded:

PA: I'd say it's a choice learning tool, because children are able to learn new ways to solve problems from playing them.

PB: When children play LEGO together they are socializing, they imagine things they

want to create and they seek solutions; this is also able to improve their team work skills.

PC: I observe that for some, there is dramatic language development. Children who would normally answer questions with Yes or No answers speak in full sentences such as:

“Look! I made this bridge.

The troll lives under here.

The Billy Goats are gonna come across.”

Other skills set where participant sees large improvements in, is children’s construction abilities:

PA: Students often come into my class with little ability to build, but after a bit of experimenting with DUPLO, they can assemble a variety of buildings and vehicles. After several months, they work collaboratively to build zoos, cities and farms while practicing taking turns, sharing, and properly using materials.

From figure 5, 90% of subjects acknowledge that LEGO helps to develop children’s creativity, but 10% disagreed.



Figure 5. Do you think LEGO help to develop children’s creativity?

Substantiated in the above mentioned survey figure 5, finally, for the open-ended key question, “*What do you think are the advantages of having LEGO as part of learning?*” the following responses from the participants were recorded:

PC: Through playing with LEGO, they can learn problem solving, communicate with friends, and expand their creative minds.

PA: The children are able to explore new ideas, think logically and improve eye and hand coordination. Construction involve both sides of the brain, and both logic and creative stimulation is provided.

PA: Enhancing so many areas of a child’s development such as fine and gross motor skills, team work, interpersonal development, intrapersonal skills, etc.

PB: Some children don’t like to join other friends. LEGO help them gather together and play together, and while they explore, they actually learn as well.

In summary, qualitative research reveals a clear pattern of evidence that most teachers acknowledge that playing in construction and creative building activities does help in overall early childhood development.

From figure 6, 47 (46%) of respondents strongly agree and 39 (38%) agree that LEGO should design specialised construction kits, with 17 (17%) remain neutral. On the interview session, PB did comment. Asked why, it was mentioned that LEGO's costliness and lack of shareable material content for the hefty price, made it difficult for preschools with greater number of students to purchase sufficient sets.

Several explanations can account for this hesitation. Subjects may only know about the standard LEGO sets available in the market, or work at preschools unable to afford LEGO DUPLO child-safe bricks due to catering to lower- or middle-income urban families. On the interview session, PC stated that LEGO standard bricks are too small for very young children, hence, that they would be vulnerable to choking.

A surprising find is that some local preschools use LEGO as a supplementary toy for children to "kill time," rather than for learning. Furthermore, LEGO is perceived as beyond the level of mid-income families, indicating that lower-income segments of families might not have access or exposure to LEGO as a learning option.

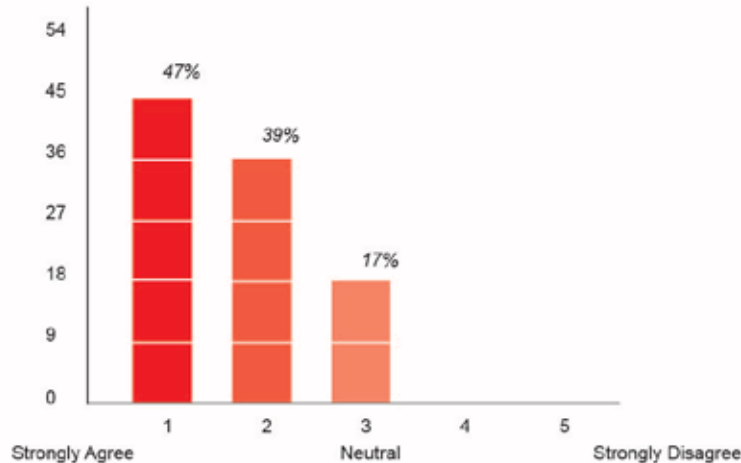


Figure 6. Should specialized LEGO kits be introduced for preschools or kindergartens?

The perception of 'play' as a wasteful element of child development leads to parental disgruntlement about tangible learning results. Participants spoke of parental preference leaning towards traditional, more "serious" forms of academic-based teaching. This finding concurs with studies showing that Asian parents who view play bricks as belonging at home instead of in classrooms, have certain fixed mindsets about play's domestic role rather than its learning function (Lily Muliana & Mohamed Nor Azhari, 2013).

Limitations of the Study

In the process of collecting data, several limitations of this study are acknowledged. Children's opinions towards play time and LEGO were not sought. The researcher also notes that early learning institutions located in other states and non-urban areas of West and East Malaysia, may offer different types of play experiences, unique structured interactions, and outdoor-themed learning using play objects.

Another limitation not addressed is the socioeconomic framing of Malaysian lower- and middle-income families, which affects budget allocations on educational provisions, for e.g. books, videos, computer games, toys, etc.

Current literature is limited in scope on these aspects, hence future research could review underlying assumptions about socioeconomic status in forming perceptions towards play tools necessary for learning development. This could extend into providing stronger data insights on family consumption patterns of play-related products and services among Malaysian social strata, enabling the marketing of educational and play tools to be better targeted to reach every segment equally.

In summing the analysis of findings, the results of this study indicate overall awareness that LEGO help children in all areas of development and should be viewed and treated as an innovative learning tool. Literature supports the importance of promoting innovative systems which uses logic and creativity for better learning outcomes, and both aspects must be tapped experimentally and experientially in adaptation to competitive 21st-century socioeconomic conditions.

Recommendations and Conclusion

Several innovative strategies are necessitated to change local misconceptions towards play, to attain a more holistic perception towards child learning outcomes. To stimulate creativity, lessons using brick color differentiation strategies can improve cognitive skills, language learning, storytelling, and as material basis for arts and crafts projects. Participant observation sessions could be conducted in pre-schools to observe play time to examine the duration and complexity of activities (both organized and unstructured). This generates insights on children's intuitive responses in situated learning.

As LEGO systems gain traction among educators, the future designs of bricks for risk and hazard free play among very young children, particularly in ensuring smaller block parts do not lead to choking. It is thus recommended that LEGO DUPLO be widely introduced in classroom teaching as an enabler for solving mathematical, science-based and spatial problems.

At the market level, consumer research can be implemented through focus groups with target segments. Feasibility studies among preschool institutions could address product, pricing and placement (distribution) strategies of LEGO DUPLO, and

to also ensure the effectiveness of marketing for the standard range of brick- and character-based LEGO systems.

As part of its corporate social responsibility (CSR) programs, campaigns could be launched by local distributors in collaboration with non-profit organizations to promote innovative play and to gather feedback about sustainable designs for children. The manufacturer could partner with teacher training colleges to understand product receptivity among children with cognitive or physical impairments or learning disorders such as autism and Down's syndrome. This could increase support from multiple communities. For example *Braille Bricks*, a non-profit collaboration initiative in Brazil with a global advertising agency shows that inclusive learning agenda and branding can do well by doing good (Braille Brick, n.d.).

Global competitiveness in the provision of sustainable products and services along with environmental concerns, have led many countries to enact sustainability policies. In response, many organizations are increasingly attentive to the concept of sustainable design. LEGO Group must continue to ensure that its business best practices and external partners comply with guidelines of safe manufacturing, as such practices ensures the company's brand image remains at the forefront of consumer expectations.

In summing up, although the roles, objectives, methodologies and designs of play have traditionally been perceived as less merited than scholarly achievement and is underappreciated, many studies found child play has become a new site of cultural capital development for critical 21st-century learning. We concur with the consensus among educators to rethink the notion and potential of play as a site of "huge energy and commitment," and instead, to urge for a collective exploration and sense-making where playing is reinterpreted as relational, co-constructed and inclusive (Rogers, 2011:5-7). Research efforts must be continuously invested to discover other key attributes of play as enablers of learning and innovation in improving Malaysia's social wellbeing to meet the demands of new cultural and consumer markets.

Endnotes

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