Vol.1 No.4 2020
https://doi.org/10.37420/j.cer.2020.040 Communication&Education Review

Research on Sustainable Strategies for Children's Smart Education Tools

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Abstract: *With the rise of wisdom education and the continuous deepening of the reform of the knowledge service industry, children's smart education tools have been expanded in depth, and various types of children's smart education tools have emerged endlessly. This paper aims to focus on the sustainable development of children's teaching tools in the context of smart education. It puts forward suggestions from three aspects: interactive subjects, interactive tools, and smart education environment. It also proposes a child-oriented perspective as the main entry point, smart education tools as the guide, and the current digital educational development trends help children enhance their intelligent learning capabilities and create more matching learning programs and learning paths for children.*

Key words: *Smart education; Children; Education tools; User experience*

Introduction

With the advancement of science and technology and the deepening development of digital education, educational forms, carriers, and media have changed dramatically. From the original traditional teaching mode to the rise of multimedia teaching and online learning methods, various types of smart teaching tools have begun to emerge and extend. To all areas of basic education, new learning paths and intelligent learning tools have been proposed and applied. The generation of smart education tools aims to achieve the collection, integration, processing, analysis, feedback and service of educational information resources through educational carriers, and through this, it will have a positive effect on children's smart education. Among the increasing number of children's smart education tools, how to enrich and innovate children's wisdom education content and management is one of the important directions to achieve the sustainable development of education tools.

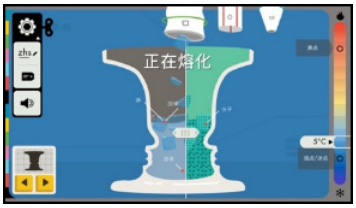
Children's smart education tools

As of June 2019, the proportion of netizens under the age of ten in China accounted for 4.0% (CNNIC, 2019), and the daily contact rate of children's mobile electronic devices is as high as 91.8% (IResearch, 2015), and the trend of smarter educational tools for children is becoming more and more obvious. There are roughly three classifications of smart education tools: software, hardware, and software-hardware combination. After segmenting users for the consumer market, smart education tools that point to specific age groups appear, such as smart tools developed by specialized children groups. For the subdivided age group, the content, presentation form, role and purpose provided by smart education tools have different focuses, but due to overlapping age ranges, common use of smart tools also exists.

Vol.1 No.4 2020
https://doi.org/10.37420/j.cer.2020.040

There are multiple subdivisions of smart education software for children, such as function, analysis and understanding, teaching effect evaluation, model creation, and intelligent learning resource push (Dai, Li, Chen & Kong, 2016). And judging whether software has educational value in the highly popular smart education tool market should be determined by the preset goals of different learners and the functional experience of interactive software. The "2018 Apple App Store China Children's App Statistics Analysis Report" shows that Apps designed for minors accounted for 68.18% in education, an increase of about 10% compared to 2013, covering preschool, elementary and secondary. Most of the 3 age groups are designed for preschool and elementary school children, and the software development in preschool and elementary school is relatively high (Chen & Yang, 2018). As shown in the example of the screenshot in Table 1, the "State of Matter" application places objects at will by learners to discover children's curiosity and creativity, stimulates children's enthusiasm for learning, and enhances children's analytical comprehension ability through game observation. As a kind of early-learning learning software, Dingdong Classroom uses gamified courses and online fun teaching to enhance children's educational experience and stimulate learning interest.

Table 1 Software applications

Classification	Analysis and understanding class	Intelligent learning resource push class
Name	*State of Matter*	*Dingdong Classroom*
Operation interface		

The hardware and equipment of smart education has undergone a new evolution with the advancement of the times. At first, it was purely manual labor (such as chalk writing lesson plans). Then it adopted multimedia technology projection, television and video teaching. Since then, the digitalization of information has been highly developed. The Internet, multimedia classrooms, and smart mobile devices have entered the classroom, and education hardware facilities have been upgraded until the concept of smart education is derived. Hardware equipment jointly shares digital resources. Realistic learning tools are combined with virtual digital carriers to form educational content. Multi-channel association, with extremely strong openness, interactive service, and rich media. In the current educational classroom and teaching environment, the principle of cross-integration and parallel use is gradually being adopted, that is, the mode of merging both software and hardware to create a smart classroom. Take Langlang Education Group's R & D products as an example (as shown in Table 2). This product provides comprehensive smart education solutions, combining software and hardware to form an integrated teaching mode, and providing Langyun interactive intelligent hardware, smart teaching software, and teaching resources. This sets up a smart teaching scene and manages the smart education platform with a "cloud + end" architecture.

Table 2 Smart education comprehensive solution

Wisdom dimension	Educational tools	Contents (evaluation index)
Smart software	Langyun software resource library	Includes teaching, drawing board software, park management, bear kids playground (application)
	Langlang cloud class (for teachers)	Improve professional skills of preschool teachers, adopt online + offline training
Intelligent hardware	Interactive intelligent tablet	Configure Langyun smart teaching software resources
	Intelligent kindergarten brand	Rich and expanded teaching formats, remote control through Langyun management platform, intelligent content management
	Intelligent class brand	Multi-touch intelligent interactive terminal to realize one-stop service for class information
	Intelligent broadcasting system	Intelligent partition output control, personalized demand management
	Langyun intelligent access gate	Intelligent attendance equipment to achieve cloud management and data synchronization update
Education resources	Gamification kit	Use the spirit of play throughout the curriculum to improve children's hands-on ability
Management platform	Park management	Cloud management, cloud office, rich teaching courseware resources

Analysis of children's smart education tools trend

Xiaolin Liu divided wisdom education into two research orientations. One is the research orientation of education supported by intelligent technology in the context of information technology; the other is the research orientation of promoting students' intelligent growth from the perspective of phenomenology (Liu & Huang, 2016). We aim to discuss the use of smart education tools in the knowledge service industry, which belongs to the former category. At present, children's smart education tools are developing towards intelligence and integration of online and offline education systems.

Intelligent

With the advancement of the times and the development of science and technology, digital literacy has become popular, educational tools have moved from a single to multiple intelligences, intelligent technologies have enriched and expanded interactive content and presentation forms, and given tools new functions through technology. Smart education tools include smart learning terminals and smart learning physical environments. Only when the hardware system and software system are combined can the "wisdom" be highlighted (Zhou, Sun, & Yu, 2017). Children's wisdom education tools are a type of creative tools, which not only contain complex and multi-functional intelligent tools directed at children, but also simple

Vol.1 No.4 2020
https://doi.org/10.37420/j.cer.2020.040

application tools, such as the display and production of Power point or Keynote. The use of simple office software can also achieve the purpose of wisdom education Improve the perception of experience between interactive subjects (teachers and learners), interactive tools (various types of software and hardware), and interactive environments (classroom environments), and generate application scenarios for educational tools. From this point of view, the intelligent trend should include the intelligent connection between related things in addition to the intelligent attributes of the hardware product and the software product itself.

In the development of the informatization construction of smart education tools, it presents the extensive features of focusing on hardware construction and light software applications. In the areas of object segmentation, demand investigation, refined management and teaching, and the use of big data technology for personalized analysis and diagnosis relatively weak (Su, 2015). In the practical application of children's smart education tools, more attention is paid to the experience and use of the target users. Under the mainstream trend of tool intelligence, the intelligent integration of dynamic education resources should be realized to develop children's intelligent learning capabilities.

Systematism

The pre-knowledge service era is the result of the transformation of information services, showing the three major directions of technology, information and digitalization. The post-knowledge service era requires renewed ideas, expanded horizons, and promoted the transformation of knowledge services from the combination of technology and humanities, multidisciplinary interdisciplinary, and intellectualization (Ke, 2019). The richness and multi-dimensionality of children's education content has led to the construction of multi-channel interactive layers for children's smart education tools. The aim is to provide children with diverse and comprehensive wisdom education in the digital information age. It is based on the nature of children and their own initiative to help children form a certain sense of systemic thinking and rules in the development of systematic wisdom education. At the same time, children's self-experience, participation, use and even visual perception in the current educational environment are improved to provide non-interventive and service-oriented activity paths for children's intrinsic spiritual growth, so that children's personality is developed.

Systematic wisdom education tools can promote children's in-depth processing of knowledge and information. An immersive wisdom education environment can better help learners understand complex concepts, help children feel the entire process of education content, and interact with surrounding education environments and related things. The output of fragmented thinking stimulates synesthesia and stimulates children's critical thinking to improve the learning experience.

Sustainable strategies for children's smart education tools

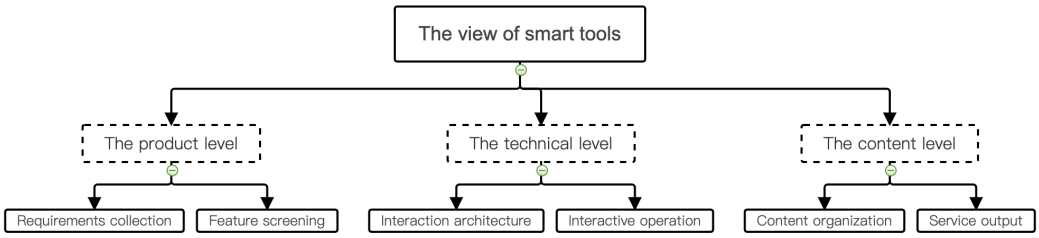
The purpose of smart education in the information environment is to use appropriate information technology to build a smart learning environment (technical innovation), use smart teaching methods (method innovation), promote learners to carry out smart learning (practical innovation), and implement the concept of smart education (innovative ideas) (Zhu, 2014). The sustainable development of children's smart education tools is essentially a sustainable product strategy for wisdom education tools. It explores the value chain

of educational tools from multiple perspectives, such as smart educational tools, educational environment, curriculum design, etc., to understand the potential needs and competition points of the children's knowledge service industry.

Instrumentality

The core of children's wisdom education tools is to provide quality education services based on the actual needs of the target group. Therefore, meeting the learner's tool needs is the first consideration. As shown in Figure 1, its instrumentality is composed of the utensil (product) level, the technical level, and the content level, forming a consistent view of smart tools. Tool requirements are the initial motivation for users or learners to choose smart education tools. Children's smart education tools should take tool requirements as the starting point and collect demand for the target population in order to lay the operational foundation for subsequent function screening, and then content Implementation and optimization of information, interaction architecture and user experience.

Figure 1 The view of smart tools



The dimension of the tool may affect the dimension of the resource. The evaluation of the tool should pay more attention to its use effect (Liu, 2013). Therefore, the matching degree of educational tools and the value of product use need to be taken into account by users. Refusing to over-respect instrumental rationality, but to achieve a coupling between instrumental rationality and value rationality.

Data

EDUCAUSE and the New Media Consortium (NMC) released the 2017 "Horizon Report-Basic Education Edition" predictive analysis technology will become one of the important development trends in the next 2-3 years, that is, the data will be converted into executable information. Teachers use big data indicators to adjust curriculum and teaching methods in a timely manner, use data to predict student learning outcomes, strengthen intervention or adjust the curriculum, and even develop new strategies that are conducive to student progress (Freeman, Adams Becker, Cummins, Davis, & Hall Giesinger, 2017). Utilize sufficient data analysis to facilitate the development of children's wisdom education tools, promote the use of big data in education tools to help scientific analysis of education data, respect children's subjective status in the development of wisdom education, and help interpret children's true potential Intent to expand children's wisdom teaching model.

Vol.1 No.4 2020
https://doi.org/10.37420/j.cer.2020.040

Visibility

The visibility of children's wisdom education tools includes aspects such as content information, screen layout, interface interaction, learning architecture, color matching, and three-dimensional interaction. Activating the visual channel can fully mobilize the enthusiasm and initiative of learners to interact with the learning content, which is conducive to improving learning efficiency. Transform the learner's inherent needs into a visual guidance process or interface, drive knowledge visualization, help children quickly and accurately understand knowledge concepts, and reduce cognitive load.

The friendly visual presentation of smart education tools can subtly attract children's attention, enhance the children's sensory experience and the visual form of aesthetic education tools (aesthetic cognition), promote children's spontaneous cognitive observation and guide children to conduct spontaneous expression. Using this explicit function, consciously establish the "wisdom" of children's smart education tools, flexibly use design thinking and experiential thinking, intervene in children's cognitive habits, and achieve a visual design layout that meets children's emotional association.

Interactivity

Smart education tools rely on smart information technology, of which interactive functions are an important form of interaction for smart tools. The interactive interface's fun, interactivity, and instant feedback function promotes the interactive technology from "external grafting" to "internal growth" (Zhu & Xu, 2019), Good interactivity needs to focus on the emotional design of the interactive interface of children's smart education tools and enhance the feedback of the interactive interface, so that online interaction and offline experience are connected to form a closed loop, build a good interaction cycle, and improve the user stickiness of the child group. At the same time, get a good user experience.

The interactive design of children's smart education tools should focus on the form and aesthetics of the instinct layer, design the functional interaction utility of the behavior layer as the design foundation, and design the emotional memory awakening of the reflection layer as the design goal (Yin, 2015), In order to help form a good implicit interaction between the interaction subject and the interaction tool.

Pleasant

Children's cognitive development is imbalanced. The development and design of children's smart education tools should fully refine the target user's age level according to children's cognitive development, such as infants, infants, toddlers, primary schools, and middle schools. The core of the child-oriented education concept is through the development and use of smart educational tools, and based on emotionalization and empathy, the children's needs and personal emotional expressions at different ages are explored. It is recognized that each child is an independent one. Providing humanized and personalized education services to help children gradually build a self-cognitive structure. Strictly speaking, teaching tools only help children understand the diversity and complexity of the world. Smart educational tools provide an entry point for equal dialogue, and the emotional extension of smart educational products can inject sustainable vitality.

Conclusions

The integrated education system of online interaction and offline experience is an important development direction of smart education. The use of AI, VR, big data analysis and other technology-driven personalized teaching promotes a variety of smart education products. It proposes more matching learning programs and learning paths for the development of children's education. The sustainable development of smart education tools should be explored from multiple perspectives such as interactive subjects, interactive tools, and smart education environments.

First of all, for interactive subjects (mainly teachers and parents), teachers and parents should make full use of the diversity and creative creativity of smart education tools, pay attention to the evaluation and learning activities of smart education tools in a smart education environment, and meet the needs of individual children. Mainly, actively select appropriate teaching methods, teaching content and teaching forms, innovate educational paths, promote the personalized development of children's thinking, and help children adapt to smart learning models. Secondly, the development and use of new-type children's smart education tools should cultivate correct interactive cognition, take children's needs and cognitive development as the starting point, avoid catering to technological development, over-respect the smart tools, use smart technology reasonably. Establish in-depth teaching of intelligent environment and realize in-depth interactive experience, so as to enhance the innovation and creativity of intelligent education tools. Finally, in the context of smart education, scientifically evaluate the analysis data provided by the smart education tool, use the data reasonably to explore more teaching resources, create a smart learning situation, and develop children's smart learning ability.

Acknowledgements

The authors acknowledge Industry-University-Cooperation Collaborative Education Project of the Ministry of Education of China (Grant: 201901155013); Key research base of Humanities and Social Sciences in Sichuan Universities "Rural Early Childhood Education Research Center" (Grant: NYJ20190605); Sichuan Province 2018-2020 higher education talent training quality and teaching reform project "Build a talent training system of ‘three fusions and four creations’ of design science integrating ‘industry, specialty and entrepreneurship’" (Grant: JG2018-583); Research projects of education and teaching reform in Xihua University (Grant: xjjg2017073); Industrial product design teaching team support project of Xihua University (Grant: 05050034).

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