

# A Method for Assessing the Development of Children under Six Years of Age

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**Abstract.** In this paper we propose a method for monitoring and evaluating the development and early education of children under the age of six by using historical and cultural heritage objects. We begin with outlining several problems identified in our research and then describe the internals of our method. Last, we define an architecture for and describe the characteristics of an online platform for managing the full process assessing and improving skills of young kids.

**Keywords:** e-Learning for Kids, Children Development, Skill Improvement

## 1 Introduction

Children development refers to the sequence of physical, linguistic, mental, and emotional changes that occur in a child from birth to maturity. In that process, the children are progressing accordingly to their parents' genes and the events that took part during prenatal life. Kids' evolution is also greatly influenced by the environment and their way of living. Children development (What is Child Development?, n.d.) can be proactively tracked and enhanced - both through established practices and through software applications designed to educate and develop children in certain age groups.

The development of a child includes the full range of skills it uses in real life:

- Knowledge - the ability to learn, solve and tackle different problems
- Social interaction and regulation of emotions - interaction with others and mastering self-control
- Speech and language - Understanding and using language, reading and communicating
- Physical skills - fine motor skills (finger) and gross motor skills (whole body)
- Sensory awareness - the registration of sensory information for use.

It is important to observe the development of young children – even though many believe that kids are progressing at the same pace, this is far from being the case. By checking the development at certain stages of a child's life, it is ensured that it is going "on the right path". If certain "age requirements" are not met, that would indicate a deviation from the normal development path. Even the smallest abnormality may be an indication of a possible future problem or a diagnosis.

Problems in children development may arise as a result of genetics, prenatal circumstances, the presence of a specific diagnosis or medical factors, the lack of opportunity or exposure to beneficial stimuli, etc (Childhood Developmental Problems, 2010). A specific assessment can provide greater clarity on progress issues and concerns, identify and clarify the problems and create plans to tackle these challenges.

For overcoming the development challenges, the ease and speed of learning, as well as minimizing the differences that occur between the ability of the child and those of its peers, their confidence, and the disappointments they might face, are crucial.

## **2 Assessment Games**

To evaluate skills and abilities of children, reveal missing knowledge and propose steps for improvement, we designed a framework for monitoring and analyzing the level of individual and groups of children. This will be tracked by using assessment games, some of which contain historical and cultural heritage artifacts. Cultural Heritage is an expression of the ways of living developed by a community and passed on from generation to generation, including customs, practices, places, objects, artistic expressions and values. Showing such objects to kids at early ages has many advantages – it will awaken their interest for traditions, present them something unique that they have not seen before, and allow them to take part in their cultural heritage preservation.

The games which will be used for evaluating the development and skills of children in different age groups, with children being assessed on three levels - fluent, in process of mastering and not in command. Skills are divided into several categories – fine motor skills, gross motor skills, phonological skills, game and social skills, for yourself and others, sensory skills, stages of language, written communication (CASRC, 2008).

Fine motor skills are skills related to finger movements and hand skills such as writing, cutting, opening lunch boxes, tethering the shoes, and so on. The development of these skills is based on age-appropriate physical skills.

Gross motor skills (physical) are those that require the entire body movement and which are associated with high tension in the muscles of the body in order to perform everyday functions such as standing, walking, running, and standing upright. Here, too, include eye-arm coordination as ball handling skills (throwing, capturing, kicking, etc.).

Phonological skills are the knowledge of sounds and how they go together to compose words.

The game is a volunteer engagement in self-motivated activities that are usually related to pleasure and enjoyment. The game is a vital activity for children in different developing age groups, offering them learning new skills and understanding, and finding their place in the world.

Social skills are skills that children use every day to interact and communicate with others.

Self-care skills are the everyday tasks undertaken in children's daily activities (including eating, brushing teeth, etc.).

The organization skills includes the ability to determine which tasks need to be accomplished, when and how. Part of the organization is understanding the requirements

of the task. Organization is an important skill and requires that both day-to-day activities and academic tasks be followed.



**Fig. 1.** Games for assessing fine motor skills with cultural heritage objects

Sensory skills determine the way the brain gets, organizes and responds to sensory input to behave in a meaningful and consistent way.

Stages of language are the main means of communication between people is the language-typical human phenomenon. It is a kind of code we use to convey or express our own feelings, thoughts and desires. Language is not an innate ability, it is assimilated in a certain sequence. It is related to the social development of man. The earliest stage in speech formation is from birth to sixth month. The child develops physically, and the brain develops at a particularly rapid pace. Hearing plays a leading role in mastering speech: the child hears the human voice while listening to the world around him, learns to use sounds and words in communicating with adults.

There are two main areas of the language:

- Recipient language (understanding): Understanding the language
- Expressive language (using language): Using language through speech, log in or alternative forms of communication to communicate wants, needs, thoughts and ideas.

Written communication includes components of the physical execution of handwriting, writing, spelling, grammar, and storytelling.

### **3 A Methodology for Assessing the Development of Kids**

The assessment games will be used for monitoring the development of children and their skills, as well as drawing conclusions and making suggestions – both based on practices and software applications designed to educate and develop children under the age of 6. It will prepare a plan that can be tracked, managed and updated by administrators and users (parents and educators), allowing for sharing and tracking information and development data for children under the age of 6.

That method will be used by parents, educators and medical personnel to assess the real development and skills of kids. It will also provide guidance for the individual development of children by offering and refining a personal plan. In this way, the development of the child can be actively enhanced through both traditional practices and software applications designed to educate and develop children of early age. The assessment process includes accepting input from parents and pedagogues through the games and delivering results in key areas of development - fine motor skills, gross motor skills, phonological skills, gaming and social skills, self-care and surrounding skills, sensory skills, language and written communication. The simplified and straightforward actions that need to be undertaken make it easy to use, fast and reliable.

That evaluation system can also be used with different settings for different purposes, as it provides individual results and information about the skills and flaws of children under 6 years of age. By using this method for assessing development, we will also uncover likelihood of delay in problematic categories. Research has shown that early identification and intervention in potential developmental delays are essential for kids. This is another reason for the need of an effective and accurate assessment system for children's development and skills.

#### **4 Conclusion and Future Work**

In this paper we described a method for evaluating how young children development is undergoing, which can be used by parents, teachers and medical personnel to track and propose improvements in individual children's learning process. Recent research in the area shows that mobile applications for educational purposes can help them acquire key knowledge and skills, by teaching them to think, live, work and succeed in the real world (O'Hare, 2014). For that reason, to implement that methodology, we are designing an online platform for monitoring, assessment and suggesting improvements for different skills and activities required for each stage of development of young kids. The system will collect feedback for each child, collected by the games described previously, and if needed, will propose an individual action plan. The main content will include cultural heritage objects (Draganov, et al., 2015; Luchev, et al., 2016), bringing it to kids' everyday activities and stimulating their interest.

The platform will be integrated with other educational software for kids like mobile applications, which will provide statistics as well as offer individual learning scenarios for the children that use it. For instance, a kid who cannot write its name, can be offered to get help from his kindergarten teacher, as well as practice a mobile game for learning the alphabet. That action plan will be manageable by the platform administrators and users. For defining the skill types and categories, a taxonomy, stored in an ontology can be used (Paneva-Marinova, Pavlova-Draganova, Draganov, & Georgiev, 2012). It will allow storing all relationships between them in a way that will help easily derive sequences, combinations and substitutes for activities needed to acquire a specific knowledge or skill. All of the functionalities of the platform should be exposed through a set of publicly accessible application programming interfaces, for integrating it with other external systems in various learning scenarios.

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