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AI Facilitated Tools Turn into the Alma Mater in Language Acquisition Process: A Study from Infancy to Toddlerhood

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Abstract:
In today's early childhood education environment, AI is an essential component in helping infants to toddlers acquires new languages. The purpose of this paper will be to focus on how we can use AI based tools to assist in early language development by creating interactive, adaptive and multilingual environments for children to learn language. The research examines how AI based applications, smart devices, speech recognition technology, and digital media platforms can provide children with greater access to vocabulary development; listening comprehension; pronunciation; and communication.

The target audience is age appropriate digital content delivered via YouTube; Amazon; Netflix; and Info-bells cartoons to provide children with a way to learn languages while also being connected to cultural identities. In particular, through the use of regional or mother tongue languages like Telugu; Tamil; Kannada; and Hindi through these same platforms; provides children with additional connections to their identity and heritage when learning a language.

The research outlines how AI can provide advantages and disadvantages to educators working with young children. Important factors including cognitive development theory, language learning and communication principles will be discussed in relation to the use of AI in education. Although AI may provide many types of personalized instruction including repetition, instant feedback, and multiple modes of engagement; concerns exists about overuse of screens, privacy issues, inequitable access, ethical concerns, or inequitable access. The research supports the idea that AI can assist in developing a first language if it used efficiently and managed responsibly by a parent (or responsible adult).

Keywords: Artificial Intelligence, Language Acquisition, Toddlers, Early Childhood Education, Digital Learning

Introduction:

The rapidly growing Field of AI has influenced a number of aspects of human life, and this has begun to occur specifically in relation to the provision of education. In addition, there have been notable advances over the past few years in respect of the influence of AI on Early Childhood Education and Language Acquisition. Language development is one of the critical aspects of a child's cognitive and social growth as it provides the basis for how a child expresses and learns, as well as how they develop a sense of self-identity; the early childhood experience of a child will typically determine their future success to develop these attributes. Traditionally, language development has relied on human to human interaction in the immediate environment and home environment. However, with the introduction of AI-Based Applications and Digital Platforms, major changes now exist in early learning through these AI enabled tools.

There are now some AI Applications that are supporting children with language learning from very young ages due to the means of access, adaptability and interaction with these digital tools that provide children with opportunities to develop language skills and emerge as competent and confident individuals. AI Applications such as iPlayer, YouTube, Amazon, Netflix and Infobells introduce language vocabulary (basic words) and sound structure through content appropriate for children of that age by using multi-modal (audio-visual) formats, repetition, and engaging storytelling to enable children to learn to identify and imitate language forms. Through the use of multi-lingual resources, children have the opportunity to learn and interact with both their mother tongue and the regional language of the region which further supports the development of a child's linguistic and cultural capabilities.

The application of AI also raises big issues for early childhood education. For example, AI technology can provide young children with personalized opportunities to learn and can provide immediate feedback to children; however, this also raises concerns about too much exposure to screens, the security of data collected by these systems, and the reduction of one-on-one human interaction. Therefore, it is

essential to look at both the pros and cons of using AI for learning at this pivotal moment.

This study will specifically examine the use of AI-based products as a form of language learning in order to critically evaluate whether or not these products effectively address the needs of caregivers and educators.

Review of Literature:

The advent of artificial intelligence (AI) to the field of early childhood education has led to increasing interest in the role of language acquisition. The evolution of language learning can be better understood by examining language development from a scientific perspective. For instance, Noam Chomsky proposes that children are born with an innate ability to learn a language simply because they have an innate component that allows them to do so. Conversely, Lev Vygotsky believes that social experiences and the environment provide children with the experience they need to learn how to speak and communicate using language. Products that use AI-based interactive technology can provide children with an opportunity to develop their vocabulary and pronunciation as a result of the feedback they receive when using interactive tools to engage in interactive exchanges with robots through AI-based technology.

Additionally, the use of AI for language acquisition may also be beneficial because it utilizes phonetics as an effective means of teaching children vocabulary, which means that the AI product will use speech-recognition technology to assist in the acquisition of a child's vocabulary. In addition, Patricia Kuhl states that AI-based language acquisition support will allow children to learn through multiple methods such as audio-visual content in multiple languages and, therefore, be able to acquire vocabulary faster than if they did not have access to such tools (Kuhler 2004). According to Seymour Papert, technology can enhance children's learning experiences by creating a greater degree of engagement in learning and through experiential-based opportunities for children to explore their world, (1993) Experts have analysed the impact of digital media on early learning. According to Ellen Wartella, educational media can enhance the language development of toddlers by providing them with appropriate representation. (Wartellus&al. 2013). Children can engage with various languages in familiar settings thanks to culturally rich and linguistically varied content on platforms like YouTube and Amazon. However, screen time exposure and its effects on cognitive and social development have also

been a source of concern. The American Academy of Pediatrics recommends supervised and restricted screen use for young children (AAP 2016). Data privacy and unequal access to technology remain major challenges in the widespread use of AI tools in early education. Despite the potential of AI-aided tools for early language acquisition, their effectiveness depends on careful use and parental involvement, as suggested by literature.

Research Methodology:

This study employs a qualitative and exploratory research approach to investigate how AI-facilitated tools serve as 'alma maters' in early language acquisition from childhood through adulthood. Observing patterns in how children learn language is the primary goal of the design, while not measuring the outcomes numerically. This means it will give us a deeper understanding of how children interact with digital technologies.

Secondary data will be captured from studies and articles in academic journals, books and reports about early childhood and language development. (In addition, the observation of some of the videos posted on sites such as YouTube, Amazon, Netflix and Infobells will be used to assess the reading of language by infants.) In addition, as discussed in some of the existing case studies, the results from this study may also include parental reporting.

To select the appropriate AI tools and digital content for young children, purposively sampling is the method of choice. The resources will be multilingual and/or culturally contextualized for the purposes of developing the child's language acquisition skills within an Indian context.

Analysis tools:

In this article we analyze various aspects of using artificial intelligence in the teaching and acquisition of languages to children. We utilize a thematic approach to identify common themes regarding the child's learning outcomes, engagement levels, and challenges they face when acquiring a new language through content analysis. as a result of this process, we provide a systematic and meaningful explanation of how artificial intelligence supports children in acquiring their first language at an early age.

Framework for Theoretical Model:

The framework for this theoretical synthesis uses major ideas around language development and acquisition from authors in the areas of language learning, cognitive development, and educational technology.'". Our framework is primarily based upon Chomsky's theory of how children learn their first languages through their use of a Language Acquisition Device (LAD), and Vygotsky's theory of Social Interaction in relation to the acquisition of language through social interaction between children and adults. In addition, we utilize Piaget's theory of cognitive development to provide a more comprehensive account of how children actively create their understanding of and knowledge about the world around them. By using artificial intelligence as an interceding tool, the framework provides enhanced interaction and feedback along with increased opportunities for increased levels of engagement, and aligns technology with early childhood language acquisition

The use of artificial intelligence (AI) in early childhood education:

The concept of AI refers to the use of new technologies to understand, adapt, and respond to the learning styles of infants and toddlers. Infants learn how to speak primarily through their environment and are taught language by repeating words and interacting with their caretakers during this phase. Learning with AI-powered tools promotes a child's learning abilities by providing individualized and fun experiences designed for a child's skill level and rate of learning.

Some examples of how AI systems can provide children with the ability to communicate in a human-like manner include speech recognition software, apps, and smart devices. The ability of an app, smart device, or program to identify a child's voice, respond to simple words, and reinforce the repeated sound is essential for developing a larger vocabulary and more precise pronunciation. In addition, through its ability to offer ongoing, non-judgmental feedback, AI technologies provide children with the means for trial and error in a safe environment while they develop their learning skills.

Adaptability is an essential aspect of utilizing AI for the purpose of early childhood education. AI can provide adaptive content through analyzing user behaviour in order to help children learn by repeating or simplifying words or sounds that they are having difficulty with. An individualized program improves self-esteem

and is also helpful when working with children who experience slow language development.

Another critical facet of learning is engaged multi-modal learning. The use of audio, visuals, and tactile elements through the use of AI can create an enhanced learning experience through the increased use of multisensory experiences (e.g. nursery rhymes, animation clips, and storytelling platforms) that result in better recall and understanding of what has been learned. The use of AI technology for learning multiple languages also serves to promote cultural identity.

Lastly, the responsible use of AI in early childhood education cannot be overstated. While AI can provide many advantages and opportunities for children to learn, they cannot replace the importance of face-to-face interaction, which provides the primary means for developing emotional and social competence. In addition, parents or caregivers must also be actively involved with their children, to ensure both meaningful connections and equal exposure during their child's screen time.

Language Development in Infants and Toddlers (0–3 Years):

The process of developing language develops between birth and age 3 years old. It is an evolving and gradual one that takes place through interaction with the environment and also through readiness to learn biologically. The first stage of developing language is prelinguistic communication which includes different way to communicate before actually talking (i.e., crying, cooing, babbling, etc.). The first sounds that children make (or cry) are not done by chance, but rather they show children their first experiences of sounds and patterns that they find in their environment. By the end of their first year, infants will know how to respond to simple commands. They also recognize a few meaningful words (e.g., Kaama, Paapa, Bow, and Booboo) before they can verbally use them.

As toddlers continue to develop they will develop more advanced language skills. They usually produce their first word in this stage of development and then move onto combining two words together in a meaningful way, which indicates they have developed more complex grammar and syntax. There is considerable and rapid vocabulary expansion during this stage of development. The vocabulary that a toddler develops is usually developed through repetition, imitation of other people, and through interaction with caregivers.

Developing a language involves listening, watching and taking part in conversations throughout the day; therefore, social interaction is crucial during early language development.

1) AI in the modern-day provides children with even more opportunities for rich experiences through hearing and interacting with other children while participating in everyday learning and playtime.

2) The main component is human connection; therefore, it is through building an emotional connection with and communicating with other children that infants develop their language skills. These are key ingredients to developing language skills at the earliest stages of an infant's development.

AI-Facilitated Tools for Language Learning:

AI-powered tools are a key component of early childhood language development, such as for babies and toddlers. Language learning through AI tools allows children to participate in interactive activities related to hearing, seeing, and responding by integrating multiple sensory components, which is similar to experiences in face-to-face conversations.

Types of AI Tools:

There are several types of AI tools that are employed in early language acquisition. Common game types offered in mobile applications geared toward toddlers utilizing rhyme and storytelling. Voice assistants and other smart devices process the speech of young children, making verbal communication possible. Young children can practice their pronunciation through AI-powered speech recognition technology that evaluates and helps them correct their pronunciation.

In what way do these tools accomplish this goal? Video-based platforms also provide animated and rhyming-based content that teaches vocabulary and sentence form in a fun way. These tools are also used to assist children in learning multiple languages; thus, a child can learn his or her native language and more than one additional language at the same time without having to spend much time developing skills in any of them.

Features and Functionality:

AI tools provide a means of making learning fun and effective. Personalization is a key portion of the AI system design, whereby the AI system changes how it provides assistance based on the amount of time it takes for each child to make progression and the rate at which they learn. Children remember and reinforce words and sequences through early repetition in a multimodal approach to learning through sound, images, and animation. Many different types of interactive features (e.g., quizzes, voice prompts and tactile experiences) keep children engaged while using different tools.

Examples:

Early language development can be supported by various AI-based applications and platforms. Rhymes, stories, and vocabulary lessons in local languages are available on various educational video platforms. Among the interactive apps are those that offer game modes with matching words, colouring, sequencing, and storytelling capabilities. Assistants with speech recognition encourage children to inquire and recite phrases.' The digital cartoon platforms are for toddlers and provide culturally relevant content to help children link language learning with everyday experiences. A supportive and enriching environment for early language acquisition can be created by using these applications with parental guidance.

Language Development Under the Influence of AI:

Today's term for "Alma Mater" is Artificial Intelligence while AI tools serve as companions who introduce language (as well as other forms of communication) in meaningful ways from infancy through adulthood. As children explore the sounds, words, and expressions associated with language in a positive and supportive learning environment provided by AI tools, they develop an increased level of comfort using those languages to express them. AI systems do not remain locked into one set of patterns or methods; instead, they change over time based on the developmental level of the child so that not only do they learn but also have plenty of opportunities to learn through repetition.

One of the biggest benefits of adapting content with AI is that it offers a personalized approach to learning. With the use of AI tools, the app can monitor a child's responses, pace, and preferences. If a child has difficulty pronouncing some

words, the app will provide alternatives that are simpler and more familiar multiple times throughout the process. This individualized learning experience allows a child to learn in an environment that is based upon their cognitive abilities, which results in more confident and retained memory.

Interactive Learning Model: The use AI of to create an interactive learning atmosphere allows for more interactive learning experiences that include visual, auditory and tactile stimuli. Incorporating elements such as children's anime videos, children's songs via the play app, or children's story-telling provide children opportunities to engage, rather than merely listen as a bystander. Providing children opportunities to visualize and act with the worlds they are learning allows them to connect vocabulary to meaning, which makes it easier and more fun for them to learn a new language.

Speech recognition Feedback: Children are able to utilize speech recognition technology to practice pronouncing words and receive instantaneous feedback on their pronunciation. In other words, artificial intelligence can identify mistakes when a child is pronouncing a word and provide feedback to improve a child's speech so it is correct. The continuous feedback loop creates constant improvement for listening and speaking skills that are critical in the development of language acquisition during early childhood development.

Cognitive and social development: is supported by AI tools, which can help improve problem-solving, memory retention, and basic conversational skills. Through guided experiences, children are taught how to interpret turns, express their emotions effectively, and comprehend social norms. Early childhood development is also encouraged and language development aided by AI.

Benefits of AI in Early Language Acquisition

AI can give children lots of help learning language when they are young (under 3). When a child learns through AI, they can use a personalised learning experience that considers their own learning pace and ability to learn and also uses things like repetition, images, and sound to help with word development (e.g., building vocabulary, producing words, and developing listening skills). Additionally, interactivity (e.g., using voice recognition to give feedback) promotes involvement

in the learning process and makes it fun to learn. AI helps the child develop his/her linguistic skills as well as keep his/her cultural identity alive by providing access to many different languages, including the child's first language. AI also provides parents with structured, user-friendly ways to help their children's learning at home.

Challenges and Limitations

Teaching languages to young children using AI has benefits and also many issues that need to be addressed; therefore, there are a number of points those teachers and parents should pay attention to regarding the use of AI to help enhance children's language acquisition. Here are some of the most significant concerns:

Ethical Concerns - There is concern regarding how technology could impact children's minds and whether or not it will take the place of human interactions during the learning process.

Screen Time Issues - The increasing amount of time children spend in front of a computer or other digital devices could potentially harm their physical health causes lack of focus and could negatively affect social skills development as well.

Data Privacy - Many AI applications collect user data, which raises concerns related to the safety and potential misuse of children's personal information.

Accessibility - Limited access to digital devices or unreliable internet connections can create unequal opportunities for children to take advantage of the benefits provided by AI-based learning tools, as well as hinder their access to these tools.

Data Analysis Interpretation

In this study, qualitative and descriptive approaches were used to investigate the data based on patterns identified while examining how toddlers interacted with AI-assisted devices. Data from different digital platforms (YouTube, Amazon, Netflix and Infobells cartoons) was analysed to find out how they also contributed to language exposure of children prior to their entering school. The analysis indicates that children develop new vocabulary and pronounce correctly due to repeated viewing of visual/audio content, as well as through listening/interaction with the AI (both through voice recognition and interactivity).

In examining the differences among the responses of infants and toddlers based on age, infants primarily responded to audio and visual stimuli while toddlers began imitating words andbeginning to form simple phrases. Patterns identified in the data show that the children that had been exposed to multiple languages in AI form had a greater ability to recognize a regional language.However, limitations of the research also include the effects of passive learning through the use of screens and reduced parental participation.

Findings and Discussion

The research demonstrates that tools that use AI enhance children's first language learning through creative, personalized interactive environments. When toddlers are presented with structured digital content, they develop their vocabulary, pronunciation, and listening comprehension skills. Platforms that provide nursery rhymes, stories and interactive videos significantly help children develop their communication skills.

The study discusses that AI tools serve as "digital teachers" that help toddlers learn to speak; however, these tools cannot replace the quality of human relationships and interactions when children are learning to communicate. Children still need to learn to communicate through emotional attachment and the application of language within real-world events. Although AI customizes the learner's experience by providing opportunities for practice and reinforcement, excessive use can cause the child to have less social interaction and suffer from overloaded cognitive processes. Therefore, the success of using AI for teaching children to speak depends upon the amount of usage balance.

Implications for Education and Parental Guidance with Appropriate Guidelines

Researchers have found that AI tools are beneficial for integrating into early childhood education as long as thoughtful application occurs. By utilizing AI-based applications, educators can use these types of technology for literacy and language development through storytelling, phonics practice, and interactive communication activities. The use of these types of tools also serves as a means to circumvent barriers to multilingual education while exposing children to both the world's languages and their region's languages.

For parents, the best method for helping children is through co-viewing. Co-viewing is when parents watch, listen to, and experience media with a child. Doing so benefits the child the most if a parent encourages them to repeat what they watched or heard, talk about what they watched or heard, and relate the content to everyday life.

Recommendations:

According to the research, AI tools should not be the main way to teach young children language development, but they can be used to help them learn. Schools need to have structured methods of teaching students using computer-based or artificial intelligence with personal relationships. Developers of educational materials must create their materials in a way that is culturally appropriate, multilingual, and interactive for babies and toddlers.

Parents are responsible for monitoring how much time their children spend using technology and ensuring that the digital experiences for their children are age-appropriate and educational. Governments and educational agencies also need to support the use of computers by establishing guidelines to limit screen time for children and protect their safety from cyberbullying and/or exposure to inappropriate images, as well as to increase access to computers for low-income children so that all students have equal access to AI tools for language development. Using a balance of AI and face-to-face interaction will result in successful language acquisition and maintain the emotional and social components of early learning in children.

Conclusion

The purpose of this report is to describe how AI is becoming more common as an "Alma Mater" for children when they first learn or develop their first language; that is, when a child begins learning their first language from birth until about age 3 years.Some of the key aspects of AI that help promote the acquisition of a child's first language are: 1) The use of AI to interact with children (through apps); 2) The ability of children to interact with digital media platforms, such as TV and video games, and to use other forms of interactive media to develop their language, pronunciation, and listening abilities; and 3) AI-produced or associated tools are commonly used and can provide additional exposure to multiple languages while helping to make connections to the child's culture through language learning.

However, while AI serves as a way of supporting child language acquisition and development, it cannot replace opportunities for children to have interactions with people in their environment, such as parents, caregivers and family members. In order to develop and acquire their language holistically, children need social interactions with others, as well as physical and emotional connections with others.Therefore, AI should be viewed as an educational tool that assists in the acquisition and development of a child's language and not as a replacement for parents, caregivers or family members.

Empirical studies will provide a basis for assessing language development outcomes by studying the interaction between children and artificial intelligence (AI) within real-time environments. When comparing various socioeconomic and cultural groups, researchers will gain additional insights into the accessibility and efficacy of these tools. Additional research may also examine the ethical implications associated with AI, long-term cognitive effects, and the role of AI as a tool for assisting in special education. A guide for safe, balanced use of AI tools in early childhood settings would also be a beneficial direction for future research.

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