University of Applied Sciences and Arts of Southern Switzerland
Master of Advanced Studies in Interaction Design

SUPSI

Educational Language Learning Toy

Strengthening learning through play in early childhood

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Educational Language Learning Toy

Definition

1.1 Research Topic

The early childhood years are a vital and productive time for language learning.
Research shows that infants and toddlers can easily learn additional languages due to their heightened neuroplasticity, the brain's capacity to form new neural connections and new brain cells throughout life.

What science tells us is that reaching the potential we do have is strongly determined by what happens to us when our brains are being developed, from birth through about three years of age.

Dr. Susan Curtiss, Professor of Linguistics at UCLA, who studies the way children learn languages, notes that ...the power to learn language is so great in the young child that it doesn't seem to matter how many languages you seem to throw their way...They can learn as many spoken languages as you can allow them to hear systematically and regularly at the same time. Children just have this capacity. Their brain is just ripe to do this... there doesn't seem to be any detriment to... develop(ing) several languages at the same time.

Young Children learn a language not in isolation but by consistently interacting with others and by being "involved" in conversations that fit into everyday activities. Being exposed to a rich vocabulary with lots of different words and real sentences contributes to faster language acquisition.

There are several psychological benefits of learning a second language. Studies by Harvard University confirm that learning additional languages increases critical thinking skills, creativity and flexibility of the mind in young children. Research indicates that children who are exposed to a foreign language at a young age, achieve higher levels of cognitive development at an earlier age (Byalistok & Hakuta, 1994, Fuchsen, 1989).

Much of Montessori theory surrounding learning supports the idea that the mind develops best through the use of senses, particularly through the use of hands. Maria Montessori observed that anything that could or should be learned must be placed in our hands first. This also applies to language, words and grammar. For instance, the moveable alphabet is a tool within Montessory that guides a child towards writing as he visibly creates words from letters. Furthermore, she believed that language learning is driven by a child's social environment including interaction with peers and adults.

Past efforts in digital language learning have ignored the physical environment and in most cases failed to address all the sensory experiences. It is known that the act of moving is memory-friendly, and therefore there is a strong correlation between movement and long-term memory retention.

Caption: Um eu feum zzrillan veliquissim zzrilis del dio conullutem doloboreet in vel.

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Play has been called the “work of children” because it is through play that children learn to interact with the environment, discover their interests, and acquire cognitive, motor, speech, language and social-emotional skills (American academy of Pediatrics, 2007). Children learn through experiences they have with objects and people. It is through play that they make sense of their world.

When parents engage in playful activities with their children, they have an opportunity to facilitate and reinforce the growth of language skills that are important for later social and learning experiences.

There are many ways children learn language through play. In short, children learn by watching, listening, exploring and manipulating things around them, imitating others and by creating and formulating their own words, sentences and thoughts.

I intend to explore how to strengthen language learning through play, taking into consideration the physical environment and its learning potential. Additionally, I shall look at the human interactions appropriate for child learning.

1.2 Research Question

With the above in mind, it is now possible to form research questions and hypothesis.
1- How might we pair language learning with action and moving, instead of sitting still at a desk for better long-term memory retention?
2- How can we help children to acquire language through playing and using their motor skills so it becomes part of their uptake (long-term memory)?
3- How might we engage children to learn and use language in a communal way?
One hypothesis is that language acquisition happens subconsciously, while having fun through active play. The idea of “learning” no longer means rote memorisation, sitting still, forced repetition, or passive hearing but instead involving kids and their senses in different ways and let them explore and discover the language so they are able to build confidence and respond to the new language.
The second hypothesis is that learning in context through physical interaction with other people in a communal way, leads to better learning and retention.

In addition to the primary research questions I intend to look at the particular interactions of the tangible learning toy to make it naturally and seemlessly fit the learning environment created.

1.3 Research Aim

The research will focus on playful educational exercises and activities around language learning.
It will focus on young children interacting with a screenless tangible interface and with

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real world objects, people and spaces around them.
The project goal is to bring interaction design and digital technology to educational language learning toys that can be used to support children natural learning. I plan to design a toy which children can include in their daily exercises.
The research consists on interviews to different professionals in the areas of education, psychology, linguistics and instructional design as well as observational studies.
I intend to explore alternatives to the traditional classroom methods for language teaching, and the existing digital ones, where constructed games is at the center of the learning experience across the different spheres of the child's life: home, school and community

The goal is to explore whether a do it yourself approach, combined with the child's sense of touch, physical movement and social interaction leads to children remembering and learning better when active play or some type of physical activity is involved. Furthermore, as part of the research, I will explore key interaction modalities to be used with the physical device. I will look at interactive tangible technology to leverage conventional classroom toys/ games.

1.4 Research outcome

For the research outcome I intend to design two or three specific learning exercises or activities to be used with an physical educational toy for young children to be able to hear and recognise or respond to sounds, vocabulary/phrasing in a foreign language.

The goal is to guide them to express their thoughts, feelings and actions better through the use of words as this will prepare them to build confidence when communicating.
It will probably consist of a kit, which kids can build together with parents or teachers.
The whole concept can be summarised as a kit with different elements, that children can construct and customise to fit the learner and their situation.
I can imagine that the kit uses computer vision to identify vocabulary and goes beyond by constructing phrases and varying them using traditional teaching techniques. It may gain the ability to listen and comprehend but I don't expect to reach that stage within the scope of this thesis.

The toy may receive input by an interactive touch surface. I would add such a touch surface rather than buttons. The computer vision will be used to react to a single dominant object that matches the vocabulary of the exercise.

Educational Language Learning Toy

State of the Art

2.1 topics and disciplinary areas.

This section provides a basic overview on how young children learn through play. I want to understand a bit deeper how children acquire language skills, through the interaction with the physical environment, using sensory skills such as audio, visual and tactile. I have researched the qualities of existing tangible educational toys for children aged 3 to 6 years old, including the materials they are made of.

Additionally, I have analysed their key interactions as well as their learning, entertainment and physical developmental potential. Furthermore, I have also researched how teachers from Montessori schools as well as Waldorf introduce language to their young students and the types of games and activities they use.

Benchmark research: I also searched and analysed already existing products, mainly tangible toys and digital apps that introduce language skills. In my research, I analysed the qualities of:

- Physical toy design
- Learning Stage/Child Age
- Entertainment Value
- Educational Value
- Cultural Context (I.E. star wars theme)
- Longevity (very conservative change wise)
- Interactions for Child Motor Skills
- Illustrations (style influenced by child recognition, consistency with other products, fashion)

2.2 design solutions

Product research - tangible educational toys

Educational developmental toys create **endless** opportunities for learning through play and fun. From the day they are born, children are constantly learning. And the best way to learn is when they are not aware of it. They learn through using their senses, observing others and playing. In that sense, toys are tools that help children learn about themselves, their environment and the skills they need in life. Educational toys effectively stimulates learning. They can help develop a particular skill, or teach a child about a particular thing. They also provide fun.

Before analysing some of the existing products in the market, let's take a look at some of the qualities of educational developmental toys.

In a nutshell, a good toy is one that is fun for your child and suitable for his/her age, developmental needs, and personality. It is also one that provides time for unstructured play and inspire imagination.

Generally, it also has one or more of the following qualities:

- **Fun**. Any learning through play is enjoyable.
- Educational toys help in **sensory development**. They can help children develop fine motor skills.
- They retain a child's interest - the child will want to play with them over again
- Educational toys can help grow a child's

Play doh fun tube for 3 to 4

IQ – through memory retention, motor skills development, coordination, and even literacy and numeracy.

- Educational toys can strengthen social and emotional development – playing with others, sharing, bonding, taking turns, leadership and teamwork; all of these build confidence.
- **Challenges but doesn't frustrate**. A toy should be just on the margin of the child's growing capacities.
- **Can be used over and over again** . Toys that are designed to be played with in only one way inhibit imagination and creativity, and teaches a lack of influence on the world around them leading to passive consumption. A simple cardboard box can become just about anything your child wants it to be (house, car, store counter, boat, bed), and it can be pushed, pulled, crawled into, driven or painted.

Below is a list of some educational toys that currently exist in the market appropriate to 3 to 6 years old children and a brief analysis of their characteristics and educational value:

Play doh fun tube

Dr. Roberta Golinkoff, author of Becoming Brilliant: What Science Tells Us About Raising Successful Children, notes "Kids learn from feel. At this stage, they're really learning how things feel and what textures are all about. Their own agency is always present because they can turn that into a spider, a bear, whatever they think it's supposed to be. As a parent, don't say things like, 'Oh that doesn't look like a spider.' Ask, 'What is that?' and let them tell you."

Pros

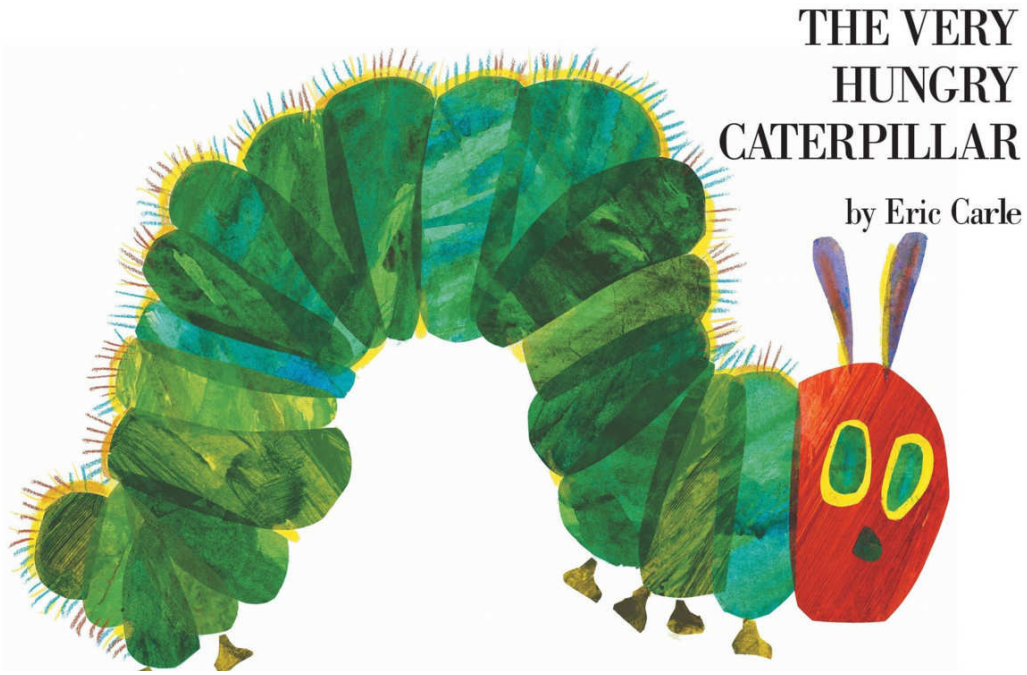
Encourages fine motor skills

Tons of opportunity for creative play

Variety of shapes and colors to play with

Cons

Hard to clean



The very hungry caterpillar by Eric Carle

The very hungry caterpillar by Eric Carle

According to Sachs, a clinical child psychologist, as children develop their language skills, they can begin to understand basic rules of grammar. They may know that plural words end in 's,' for instance, but cannot yet grasp complex rules. "For example, a three-year-old may say 'gooses' instead of 'geese,'" he says. Reading books together with parents can further improve language abilities. Sachs recommends letting your child turn the pages of the book himself while you read.

pros

Nice colorful illustrations targeted at young children

Good introduction to days of the week and food vocabulary

cons

It teaches reading and counting but not sounds

Main Interaction only by turning the page

Wooden Puzzles

Wooden Puzzles

Wooden puzzles are a wonderful toy for toddlers and helps them to develop important cognitive skills such as matching and spatial awareness. The specific type of puzzle will be dependent on the age and ability of the child.

Pros

Encourages hand- eye coordination

Cognitive development: Children learn to memorise something such as where a piece will go or fit. Teaches children to identify shapes, colors and associations.

Vision: While working a puzzle, a child will have to look at the puzzle carefully. This sharpens their ability to identify certain things with their eyes such as shapes, colors and sizes.

Large wooden pieces makes it easy for young children grab and handle

Cons

Pieces can be lost

Not so challenging after a certain age

Melissa & Doug Band in a box

Melissa & Doug Band in a box

Music is a wonderful tool for encouraging language development with toddlers. In addition to learning important components of language such as rhythm and rhyme, music also has been proven to use many different parts of the brain. Finger plays, simple songs, and exposure to various musical instruments are all excellent ways to promote language development!

Pros

Helps children develop a music ear

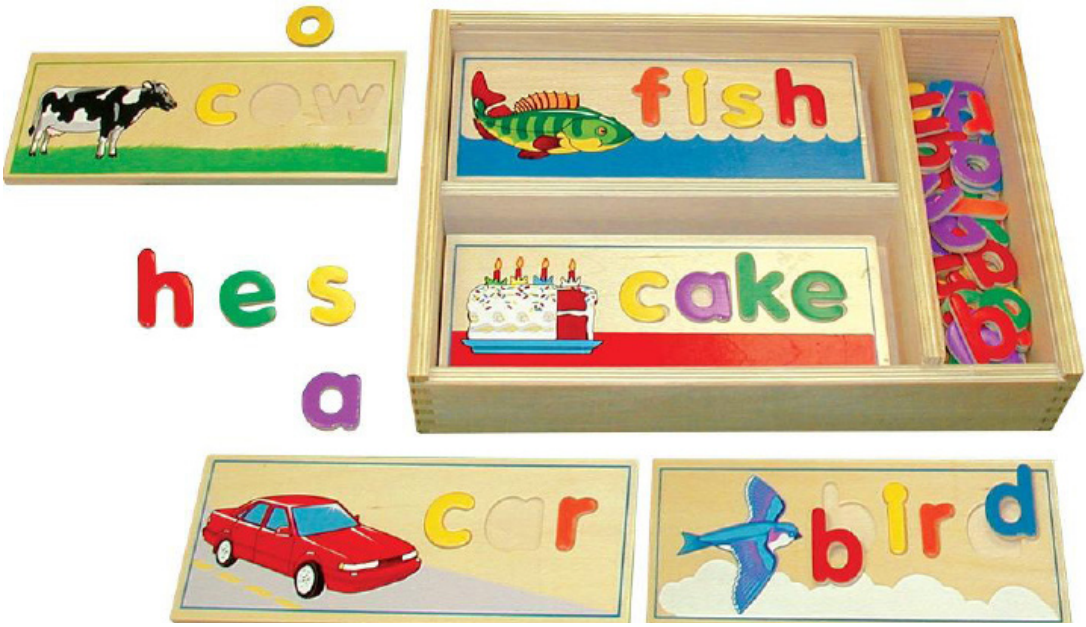
Allows children to explore through play

Light weight and durable

Perfectly sized to fit into the hands of toddlers and grown up children

Cons

Not so good sound quality



Melissa & Doug see & spell

Melissa & Doug see & spell wooden educational toy

This toy is for children to learn new words. It has over 50 highly colorful wooden letters that are arranged in ways that will help the kids to generate new words and in turn memorize them for an adequate learning process. While playing this game the sight is being developed coupled with vocabulary building and swift motor skill development.

Benefit

The puzzle board increases children awareness and attention to detail that will now and later be useful in the child's development.

Pros
Comes in a compact storage case
Increases spelling, sight-reading vocabulary and fine motor skills
Three letter and four letters word made easy

Cons
Choking hazard

When I grow Up

When I grow Up. Fabric Busy Book

This kinaesthetic book allows children to learn through interactive play, visual stimulation and tactile sensation. Some of the skills young children can master include buckles, zips, snaps, looping, velcro'ing and buttoning developing sensory, fine motor skills and pretend play

Pros

Hands on activities in the book encourages motor skills development

Interactive- each page contains an exercise that requires physical interaction

Good for learning about shapes, colors and textures

Sound toys for Language Learning

After analysing different educational toys on the market, I've narrowed my research to educational sound toys that are screen free and aim at teaching language skills among others to inform my design goals.
These toys teach language and listening skills by providing interactive audio.

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Timio

Timio is a kickstarter project that was funded this year by a parent and it raised over 80,000 Euros. It is an educational audio toy and music player for children. It's screen free and consists of interactive content discs that support five languages.

Children tap a picture on the disc to play sounds. The audio player asks questions to reinforce learning. Each disc activates different content from the Timio's library to teach vocabulary, nursery rhymes, stories, music instrument sounds etc. Each disc has a different purpose/content. e.g to teach animals, colors, the alphabet etc
The discs magnetically attach to the player, so children can easily insert it by themselves.

Key benefits of Timio

- Screens have been associated with addiction, sleep disorders, vision and other issues. Timio has no screen
- No setup required and no buttons (not technically correct). Children can do it by themselves by placing a disc and tapping an image to listen to the audio content
- It helps develop motor, auditory, visual, cognitive and speech content in 5 different languages.

Disadvantages

- Fixed vocabulary which means that eventually it becomes repetitive

https://www.kickstarter.com/projects/fattal/timio-educational-audio-toy-and-music-player-for-c/description