

# Full Body Technologies Supporting Motor and Sensory Development in Children

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# Introduction

# What is a Full Body Technology and why is it useful?

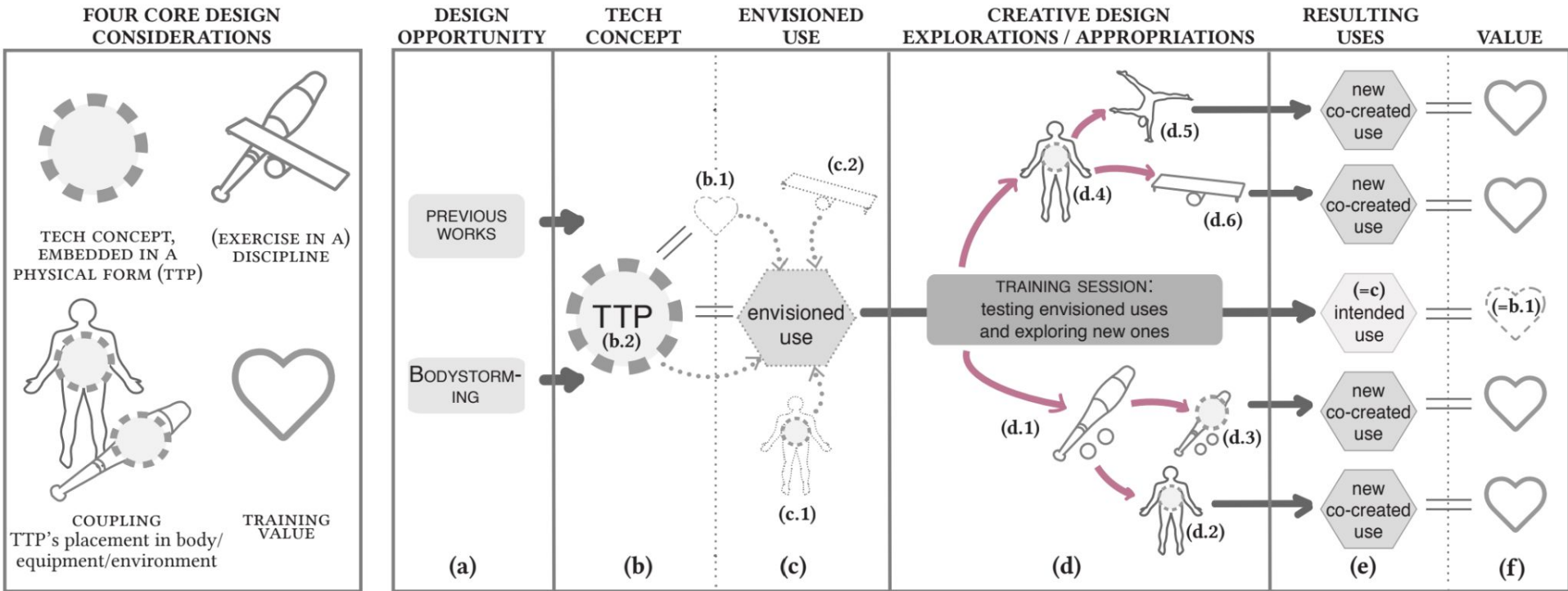
- Benefits of using full body technologies in training
- Using co-design techniques to develop and implement full body technologies

- **Background**
  - Co-Design
  - Somatosensory Technology: Training Technology Probes
  - Bodystorming/Embodiment
- **Circus Training**
  - Technologies
  - Results
- **Theater Training**
  - Co-Design Methods
  - Results
- **Conclusion**

# Background

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Co-Design



Overview of the Co-Design process. Taken from Vidal et al., 2020

# Somatosensory Technology: Training Technology Probes (TTP)



Somatosensory technologies are full body technologies designed to target motor and sensory skills.

- Training Technology Probes (TTPs) are a subset of somatosensory technologies
- Used to stimulate motor and sensory development
- Improves understanding of body movement

# Bodystorming and Embodiment

# Bodystorming and Embodiment

- Body awareness
  - Creates stronger awareness and understanding during movement
- Promotes connection between body and surroundings
- Promotes connection between body and mind
- Using physical experience to connect the senses

# Full Body Technologies in Circus Training

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# Study Set Up

- Six week circus training camp
- Seven children ages 9-12
- Four researchers, three instructors
- Two hour sessions—30 minutes of warm-up, 1 hour of training, 30 minutes of reflection
- Feedback received from participants, instructors, and videos taken during training sessions

# Requirements of Design

- SAFE Framework
- Versatility
- Interesting and engaging for users and those around them

Technologies

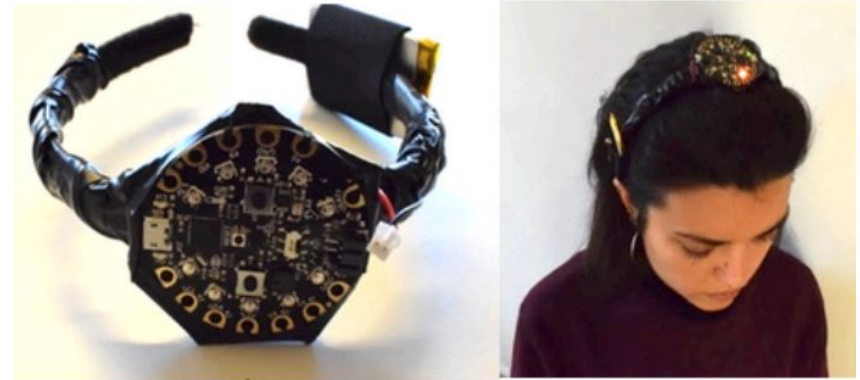
# FrontBalance and TopBalance TTPs

- Adafruit Circuit Playground Board (CPB)
- LEDs and Sound for visual and auditory stimuli



**FrontBalance TTP**

Taken from Segura et al., 2019



**TopBalance TTP**

Taken from Segura et al., 2019



# Blower TTP

- LEDs and Sounds provide stimuli
- Microphone is used to measure breathing



**Blower TTP**

Taken from Segura et al., 2019



Participants using the Blower TTP during training.  
Taken from Segura et al., 2019

# Laser TTP

- Does NOT use a CPB
- Provides visual stimulus



Laser TTP

Taken from Segura et al., 2019



Participant using the Laser TTP during training. Taken from Vidal et al., 2020

# Results



Participant using the FrontBalance TTP during training. Taken from Vidal et al., 2020.



Participant using the Blower TTP during training. Taken from Vidal et al., 2020.

# Full Body Interaction Technologies in Theater Training

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# Study Set Up

- Three part study each with a group of 12 children
- Each part implements a specific part of the co-design method used
- Two researchers and two instructors in each part
- Feedback provided by participants, instructors, videos and pictures taken during the training sessions, and interactions with the prototype

# Requirements for techniques

- Must engage the children with their environment
- Must encourage interaction between mind and body
- Chose the Thinking for Embodied Co-Design technique (Think4EmCoDe)

# Co-Design Methods



# Full Body Interaction Co-Design Method (FUBImethod)

There are five steps:

1. Defining context: Part 1
2. Awakenyng body awareness: Part 1
3. Translating embodied awareness: Part 2
4. Prototyping the embodied experience: Part 2 (Only researchers and game designers)
5. Understanding the embodied experience: Part 3

# Think4EmCoDe

Has ten standards or goals:

<b>Degree of Achievement:</b>	<b>High</b>	<b>Middle</b>	<b>Low</b>
<b>Design Goals</b>			
Play Practice	X		
Emergence	X		
Contingency		X	
Playful Engagement	X		
Social Dialogue	X		
Embodied Memory	X		
Developmental Scaffold	X		
Reflective Imagery	X		
Embodied Awareness		X	
Situated Relationality		X	

Analysis of the Signifying Space Technique following the FUBImethod standards. Based on Shaper and Pares, 2021

# Results

# Signifying Space Technique

- Embodied memory: stronger understanding and recollection of embodiment
- The camera improved understanding of scenes and locations

<b>Degree of Achievement:</b>	<b>High</b>	<b>Middle</b>	<b>Low</b>
<b>Design Goals</b>			
Play Practice	X		
Emergence	X		
Contingency		X	
Playful Engagement	X		
Social Dialogue	X		
Embodied Memory	X		
Developmental Scaffold	X		
Reflective Imagery	X		
Embodied Awareness		X	
Situated Relationality		X	

Analysis of the Signifying Space Technique following the FUBImethod standards. Based on Shaper and Pares, 2021

# Body Shadows Technique

- Performed very well for embodiment and embodied understanding
- Improved the connection between mind and body
- Promoted significant interactions with surroundings



The initial planning and acting out of the BodyShadows technique. Taken from Shaper and Pares, 2021

Conclusion

## Goal:

Stimulate motor and sensory development through the implementation of technologies during regular practice.

# Results:

## Needs:

- Versatility: allows children to explore their creativity
- Repetition is key
- An environment that allows children to feel equal and confident

## Drawbacks:

- Children who are recurring participants can cause the new participants to feel at a disadvantage



Questions?

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# References

- Cuiying Wu. 2020. The Application of Somatosensory Technology in Cooperative Play.
- Elena Márquez Segura, Laia Turmo Vidal, Luis Parrilla Bel, and Annika Waern. 2019. Circus, Play and Technology Probes: Training Body Awareness and Control with Children.
- Elena Márquez Segura, Laia Turmo Vidal, Luis Parrilla Bel, and Annika Waern. 2019. Using Training Technology Probes in Bodystorming for Physical Training.
- Laia Turmo Vidal, Elena Márquez Segura, Luis Parrilla Bel, and Annika Waern. 2020. Training Body Awareness and Control with Technology Probes: A Portfolio of Co-Creative Uses to Support Children with Motor Challenges.
- Marie-Monique Schaper and Narcis Pares. 2021. Co-Design Techniques for and with Children Based on Physical Theatre Practice to Promote Embodied Awareness.