Digital Storytelling and Sustainable Systems Education for Children: Reflections on Participatory Learning

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Introduction

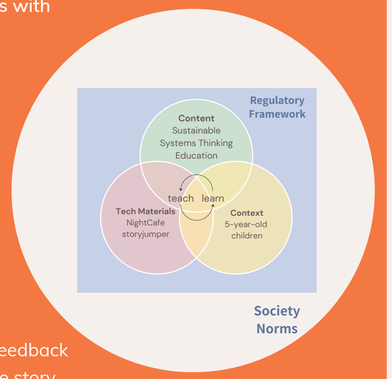
Systems thinking helped students connect their learning to real-world problems, improve their decision-making, and consider the unintended consequences of their choices.
Complex systems are all around us, we may want to focus on systems thinking early on.
while systems thinking is integrated into the primary education curriculum in Taiwan, it is absent from the curriculum for early childhood education.
This has prompted researchers to contemplate how systems thinking can be extended from elementary schools downwards to kindergarten in Taiwan's education.

Objective

Through the curriculum designed by this study, the researcher has established the following four learning objectives for the learners.
1.Students can create behavior over time graph by themselves.
2.Students can deduce linear behavior through discussion
3.Students can describe the interactive relationships within the feedback loop drawn by the teacher.
4.Student and teacher can co-construct a audio book which is include systems thinking diagrams.
5.The child is actively concerned about SDG 15 Life on Land.

Methodology

This study is an action research project. Through theoretical curriculum design, the researcher conducted five consecutive experimental teaching sessions with two five-year-old children in a kindergarten in Taipei.



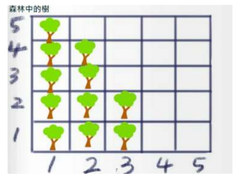
- **Content:**
  Based on Fisher(2023), lead children to discussed the sustainability issues presented in the storybook "The Last Tree", using visualized systems thinking diagrams to explore the theme of "SDGs15" from a macro perspective.
- **Context:**
  This sustainability systems thinking course was conducted with two five-year-old children in a kundergarden in Taipei.
- **Technology Materials**
  Use the software **"StoryJumper"** as an electronic whiteboard, create visualized system diagrams, including behavior overtime graphs and feedback loops. Use the software **"NightCafe"** for AI-generated images to create story illustrations for the digital audiobook.

Related literature

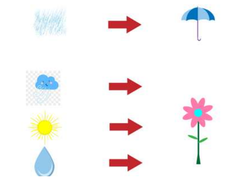
Fisher, D. M., & , S. T. A. (2023). Systems thinking activities used in K-12 for up to two decades [Conceptual Analysis]. Frontiers in Education, 8.
O'Byrne, W. I., Stone, R., & White, M. (2018). Digital Storytelling in Early Childhood: Student Illustrations Shaping Social Interactions. Frontiers in Psychology, 9, Article 1800.
Lisenbee, P. S., & Ford, C. M. (2018). Engaging Students in Traditional and Digital Storytelling to Make Connections Between Pedagogy and Children's Experiences. Early Childhood Education Journal, 46(1), 129-139.
Sweeney, L. B., & Sterman, J. D. (2000). Bathtub dynamics: initial results of a systems thinking inventory. System Dynamics Review, 16(4), 249-286.

Use the book "The Last Tree" aligned with SDG 15 to conduct a sustainable systems course.

With the aim of enhancing the children's impression of the story plot and increasing their enthusiasm for the activity.



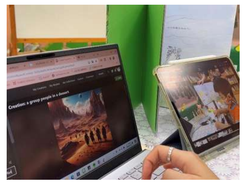
Building the concept of coordinates with childrens.



Recognize common symbols in systems thinking through visual diagrams.

Children using toys brought from home to demonstrating the story.

Teacher combines the story content with the feedback loop.



Students discribe the story plot and scenes and teacher generates AI illustrations based on the prompt words (laptop).

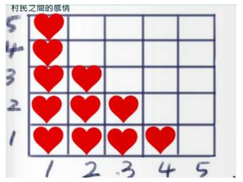
Students assign tasks (voice acting, background music) (iPad).

storyjumper

The audiobook 《A Great Idea》

Students create behavior over time graph by themselves.

Students try to explain the feedback loop using the story content.



Students drew a behavior over time graph based on the story's plot.

Results/ Findings

1. **This course effectively enhances teacher-student interactions and increases children's engagement and enthusiasm. It achieves a balance between digital integration and emotional connection.**
2. **Positive peer interactions are enhanced, and each learner can find a role in the digital storytelling activity.**
3. **Five-year-olds are naturally able to perceive changes through trend charts. However, with guidance, they understand how "actions" influence these changes.**
4. **Guiding children through feedback loop is challenging, confirming the viewpoints presented in Fisher, D. M., & S. T. A. (2023).**