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**FOLLOW-UP RESEARCH RELATED TO
SCIENCE KIDS – A PRESCHOOL SCIENCE
PROJECT**


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Learning in Science and Mathematics
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Swedish Preschool

- Preschool in Sweden is a voluntary school form for ages 1-5 years, entailing education and play
- A Municipality must provide for all children aged 1-5 years
- Cost is nationally subsidised, 86% of 1-5 year-olds take part
- A national curriculum regulates educational activities, goal-directed and prescribes science



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Why Science in preschool?

Science Education in need of reform
(Fullan, 2007, Jidesjö m fl., 2009, Tytler, 2007, Dede, 2010, ...)

National curriculum revised 2011 – specific about science

Societal perspective – needs, attitudes and future choices
(Osborne & Dillon, 2008; Swedish Schools Inspectorate, 2010/2016/2018)


Children as *becoming* and *being*
(Qvortrup et al. 1994; Hallén 2003; Fleer, 2013; Thulin & Redfors, 2017)



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Background of project

- Swedish School Inspectorate (2018) concluded that in Swedish preschool, science is often treated as single 'happenings' without context or connection to other content areas.
- The *Science Kids* project was financed to develop science education in preschool from a societal perspective through cooperation between preschools and science centres.
- A municipality interested in research in collaboration to improve the quality of science teaching in preschool.



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Aim and research questions

We aim to develop knowledge about the processes associated with developing material for preschool science teaching, particularly how work team participation in *Science Kids* can contribute to professional development in relation to science teaching in preschool.

Research questions:

- How can participation in a project like Science Kids contribute to the professional development of work teams regarding science teaching?
- What kind of science can be identified?
- What questions related to science do children ask, and how are these discussed by work teams?



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Design of study

Science Kids

- The non-profit association BUNT, leads the project *Science Kids*, which aims to develop science teaching in preschool based on children's questions.
- Free web-based teaching materials are developed in collaboration between science centres and preschools.
- Three work teams participate, each with a group of ten children (3-5 years old).
- The structure of Science Kids will be repeated in four periods: autumn 2022, spring 2023, autumn 2023 and spring 2024.
- Each period consists of several teaching visits by the process leader from the Science Centre.
- The first visit is organised around pre-selected science materials.
- Children's questions and interests are noted, and science content for the following visits is chosen.

Research

- Cooperation with a mid-size municipality taking part in Science Kids to analyse experiences made.
- Empirical data is collected in collaboration with two preschools in the municipality.
- The empirical data consists of
 - pre- and post-surveys and focus groups with the work team and the municipal lecturer.
 - the process leader's documentation
 - follow-up interviews with the process leader, the municipal lecturer, and the principals.



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Science content in *Science Kids*


Force and movement
Jumping and throwing

Robotics
Programming of robots and themselves

Magnetism
Play with magnets

Temperature
Thermometer, cold-warm, molecules

Nature
Insects




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Study I – Aim and research question

Aims to analyse experiences of science teaching and aspects discussed by the work team during focus groups.

- How can participation in a project like *Science Kids* contribute to the professional development of work teams regarding science teaching?




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Tentative themes

Ongoing thematic analysis (Braun & Clark, 2022) has given tentative themes and codes to use for analysis of professional development

- Science teaching – challenges**
 - Difficult, abstract content, teacher knowledge, time constraints, materials, ...
- Science teaching – opportunities**
 - Children interested, fun, children use decontextualised language, finding out, teacher positive, ...
- Aspects of preschool science**
 - Experiment, repetition, nature, physical sciences, being-becoming, spontaneous-planned, group-size, digital tools, ...
- Collaboration and communication**
 - Children's questions, hypothesis, parents, teacher collaboration
- Science Kids and other science projects**
 - Pros and cons of *Science Kids*, NTA (*Science for all*), own projects




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Study II – Aim and research question

Aims to analyse what kind of science appears during *Science Kids* in terms of seven curriculum emphases (Roberts, 1982)

- Which curriculum emphases can be identified in focus-group discussions and questionnaires?




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Curriculum emphases

Roberts (1982) seven curriculum emphases

- Solid foundation**
 - learners getting a stable foundation for future studies.
- Correct explanation**
 - factual knowledge, scientific explanations, concepts and correct terminology.
- Everyday coping**
 - benefits children can derive from science to handle everyday life.
- Science, technology and decisions**
 - science in society and how science knowledge can inform decisions.
- Self as explainer**
 - to be able to explain and enjoy exploring encountered science phenomena.
- Scientific skill development**
 - scientific methods and procedures to enable learners to investigate phenomena.
- Nature of science**
 - how science works, what characterises scientists and scientific knowledge.



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Tentative conclusions – Study I

- Initially, only one preschool teacher from the work team took part in the Science-Kid sessions. However, the non-present work team members felt "outside" and the strategy changed.
- Means for successful science teaching are put forward more often than challenges.
- The work teams are positive about taking part in the Science Kids project.
- The children are described as interested, having fun ...
- Work teams stress the use of de-contextual language and science concepts.
- Communication is highlighted within the work team, with children, and with parents.
- The work teams need knowledge support, could be amended by planned web resource.



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Tentative conclusions – Emphases

We can conclude that categorised statements involve all seven curriculum emphases, but to different extent

- Foremost *Scientific skill development* and *Self as explainer*, also *Solid foundation* and *Correct explanation* (i.e. correct concepts)
- Statements categorised as *Everyday coping* and *Science, technology and decisions* are foremost about the lack of these in *Science Kids*
- Statements related to *Nature of Science* are there, but the image of the researcher becomes somewhat stereotypical, e.g. the use of lab coats and other props.



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Suggested discussion

- The importance of involving all staff rather than sending someone who is expected to "share".
- The Science Kids activities tend to become something 'extra', not part of the everyday activities or themes.



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Thank you!



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