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# Lesson Study in Initial Teacher Education: Affordances and constraints in teaching mathematics through inquiry

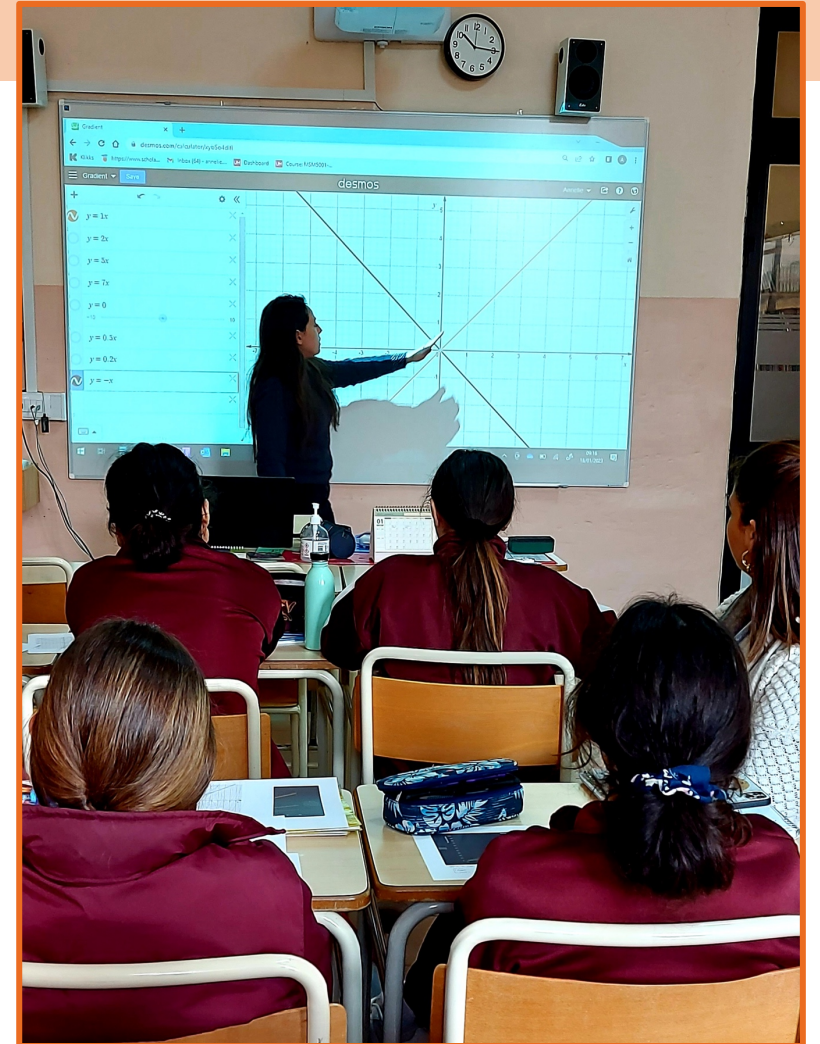
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# Overview of the presentation

- Literature review
- Affordances and constraints theory
- The Lesson Study cycle
- Research context
- Methodology
- Main findings
- Implications
- Conclusions





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## Literature

# Lesson study (LS)

- **An ongoing professional learning approach** widely used in Japan and often attributed as an important tool for the improvement of teaching (Huang, Takahashi & da Ponte, 2019);
- Teachers work together to identify goals for student learning and, consequently, engage in ongoing cycles to **plan, teach, observe** and **evaluate** the research lesson (Lewis & Perry, 2014);
- LS is **a challenging process** for teachers (Yoshida, 2012)
- Prominence is given to **teaching through problem solving (TTPS)** (Takahashi, 2021)

# Teaching mathematics through inquiry

- **Inquiry** is multifaceted and a contested term (Kirschner, Sweller & Clark, 2006) that describes student-centred teaching;
- **Inquiry teaching** includes active, problem-based and investigative approaches;
- **Using cognitively challenging tasks** is essential (Calleja, Foster & Hodgen, 2023);
- Involves **purposeful and thoughtful support and scaffolding** to enhance student learning (Calleja, Foster & Hodgen, 2023).





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## Theory

# Affordances and constraints

- **Affordances**, which describe the environment (in this case a course taught through LS), are opportunities for action in terms of behaviours that are possible at a given moment under a given set of environmental conditions (Gibson, 1977);
- **Constraints** on affordances are conditions for allowable actions; they offer a boundary and guide necessary for certain actions to take place;
- Participants within the course carry their own **perception** of potential for action. This perception, which is relative to the setting and conditions within that environment, depends on their **knowledge**, **skills** and **dispositions**.

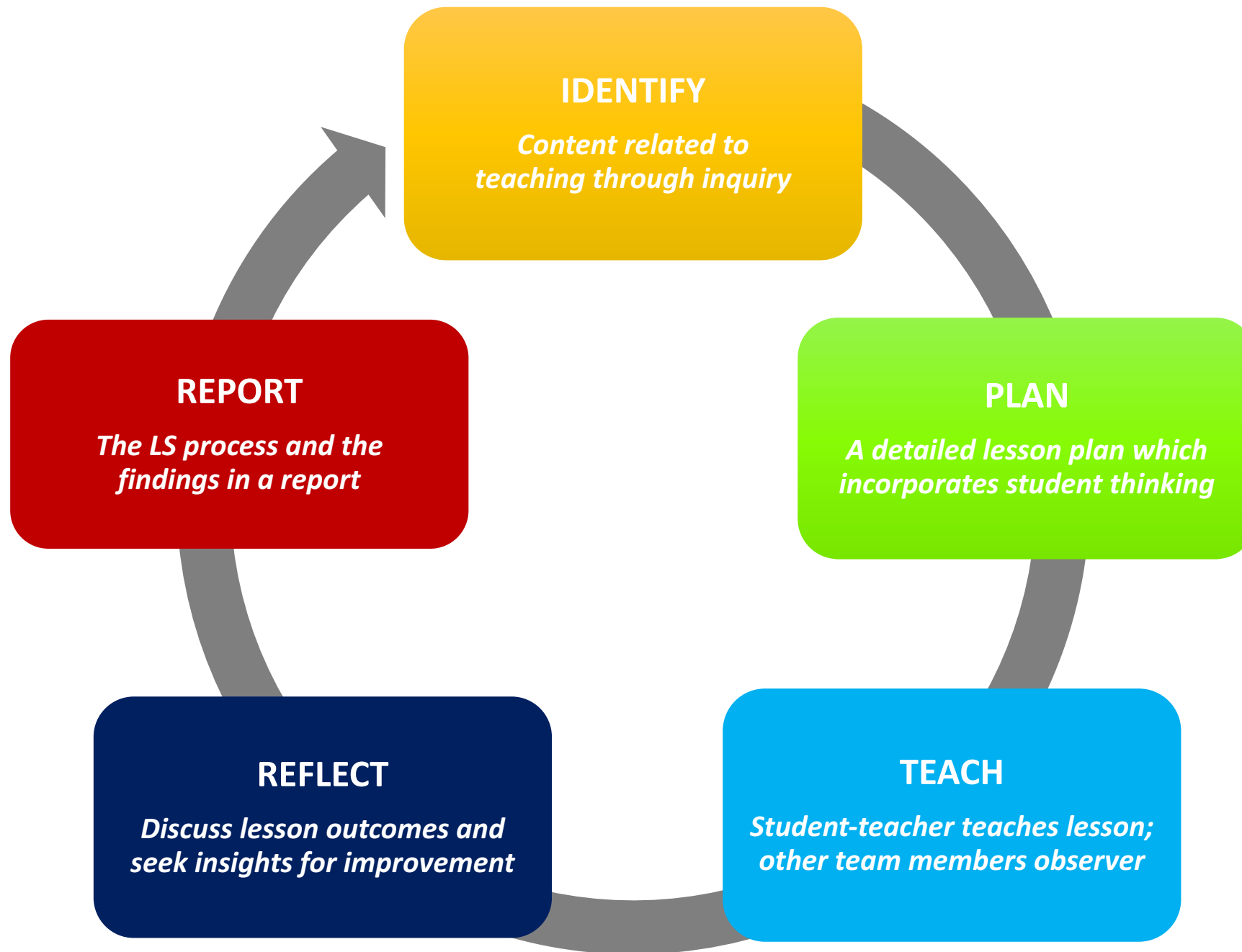


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## The LS Cycle







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## Research context

# The research context

<b>Lesson study</b>	Collaborative Lesson Study Malta ( <a href="http://www.clestum.eu">www.clestum.eu</a> )
<b>ITE course</b>	Master's in Teaching and Learning (MTL) at the Faculty of Education, University of Malta
<b>Participants</b>	Two part-time MTL students ('supply' teachers)
<b>Course</b>	<ul style="list-style-type: none"><li>• Inquiry in the mathematics classroom</li><li>• An 18 hour blended practice-based course</li></ul>

# The research setting and implementation

- Why** A different learning experience driven by my LS experiences and the facility of students' school placement
- Who** Two secondary school pre-service teachers of mathematics working closely with their mentors and a teacher of mathematics
- When** November 2022 to January 2023 (9-week period)
- Where** Lectures at University; practice at their school placement
- What** Learning about inquiry and LS, then putting it into practice - designing a lesson plan, teaching and reflecting on it



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## Methodology

# Methodology

- Case study approach (Yin, 2003)
- Reflective journal
- End-of-course online survey
- Focus group discussion
- Thematic analysis (Braun & Clarke, 2006)





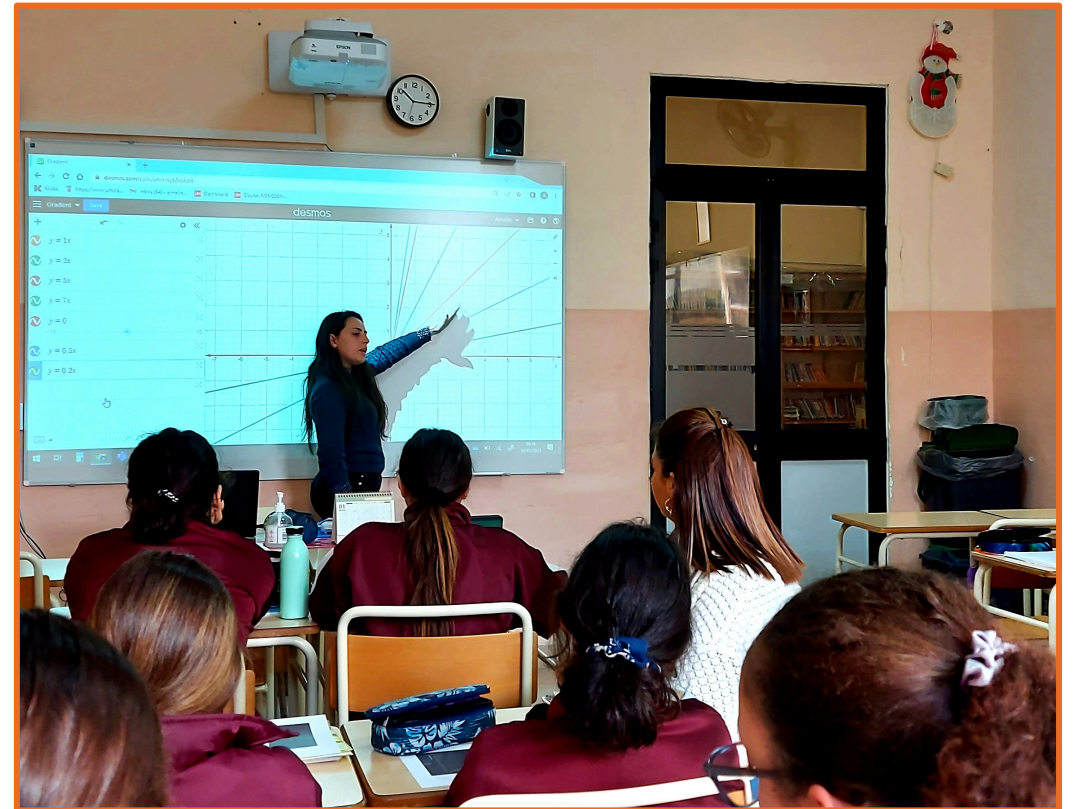
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## Main Findings

# For these two student-teachers ...

- Working with **experienced colleagues** supported inquiry teaching
- Realisation that inquiry can **stimulate student learning, thinking and making connections**; yet challenging to enact (e.g.: final whole-class discussion)
- Learning through LS was challenging; and including **modelling experiences** of LS phases would be beneficial





# Implications

- Problematizing the importance of **planning detailed lessons** based on **carrying out research** that pre-service teachers do with others;
- Understanding that **learning about inquiry teaching** takes time and requires and in-depth study of **TTPS** and how this can support student thinking and learning;
- Considering **alternatives** for doing a LS in which pre-service teachers first get the opportunity to observe **more experienced teachers engage in the process of LS**.

# Conclusions

- Inquiry teaching and LS are **challenging processes and concepts**, particularly for pre-service teachers;
- Pre-service teachers need ongoing **opportunities to collaborate** with more knowledgeable others – their mentors, school colleagues and university lecturers – and **just-in-time support** (Calleja, Foster & Hodgen, 2021);
- Pre-service teachers need **modelling experiences** of inquiry teaching and LS, for example: to learn how to (1) select a challenging task, (2) lead a whole-class discussion, (3) observe a lesson and (4) reflect on their practice.



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Thank you

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