UCET Research & International Symposium
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What is the scope for collaborative research projects between UCET members?

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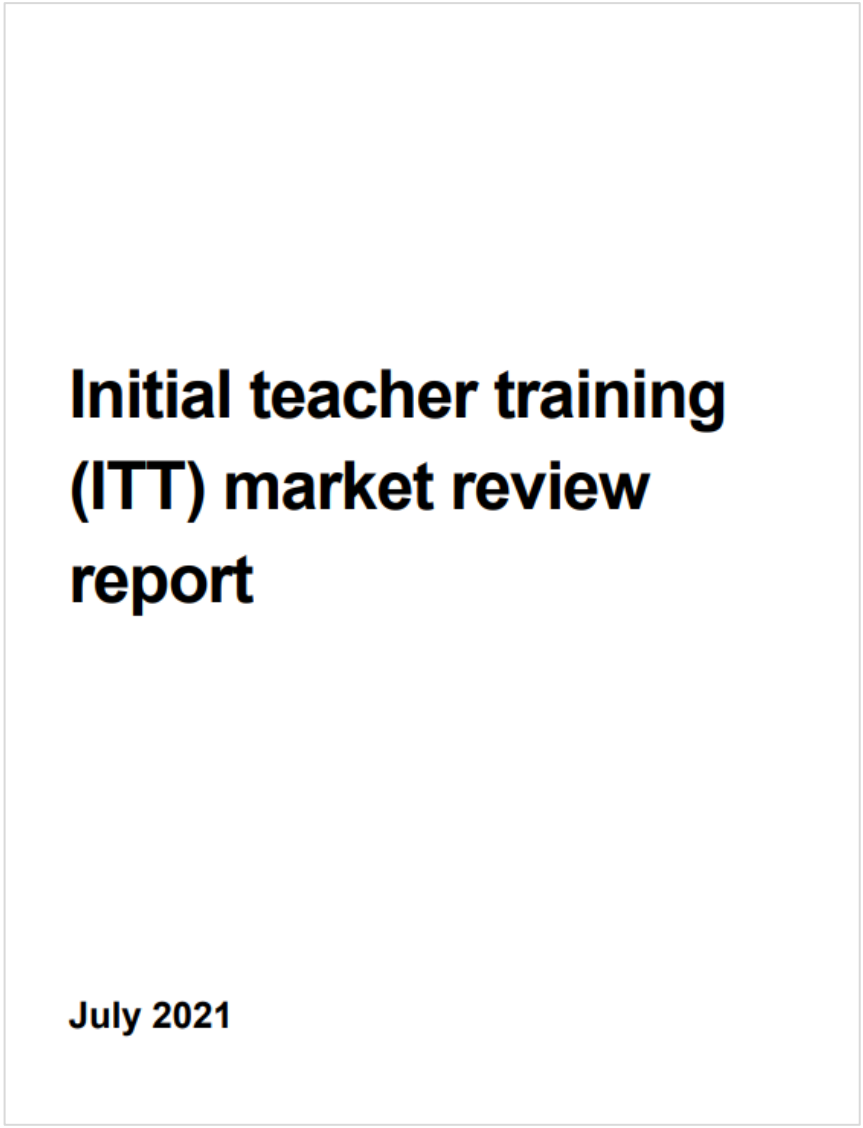
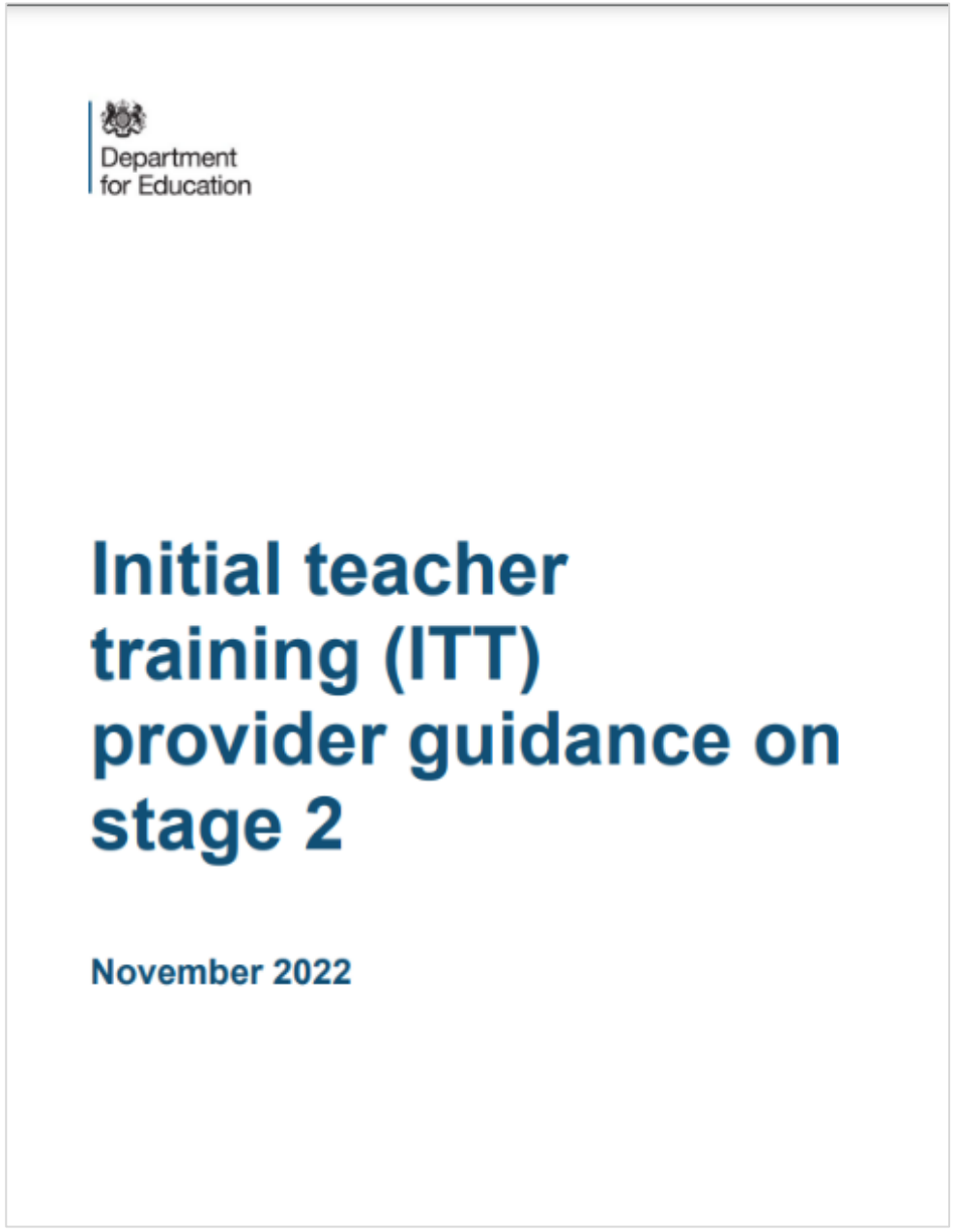


A central aim of intensive practice placements is the consolidation of trainees' understanding of **how research and evidence inform and shape practice.** Crucial to the effectiveness of intensive placement periods will be the input of experts with deep knowledge and experience of the specifics of the curriculum dimension which is in focus.

Paragraph 42



[Intensive training and practice] provides an opportunity to intensify the focus on specific, pivotal areas. Intensive training and practice should also build powerfully the link between evidence-based theory and practice. This means that intensive training and practice will need to be led and supported by an appropriate range of experts.

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Nelson & Campbell (2017, p. 132)

"'evidence' constitutes a range of types and sources of knowledge and information, including professional expertise and judgement, as well as data and research. Indeed, despite the considerable debate about 'gold standards' of research methodologies, **the most frequently used sources of 'evidence' are often derived from professional experiences and colleagues rather than original research studies.** […] we need to consider carefully the accessibility, appeal and capacity to use a range of evidence from, in and for practice."

Nelson, J., & Campbell, C. (2017). Evidence-informed practice in education: meanings and applications. *Educational Research*, *59*(2), 127-135. Link.

Whereas the outcomes of research might **play a role in professional judgement**, they can **only ever assist professional judgement and action but can never dictate what should be done**. Educational practice consists of situations that in a sense are always new and unique.

(Biesta, 2007a)

G. Biesta (2007). Bridging the gap between educational research and educational practice: The need for critical distance. *Educational Research and Evaluation*, 13 (3), 295-301

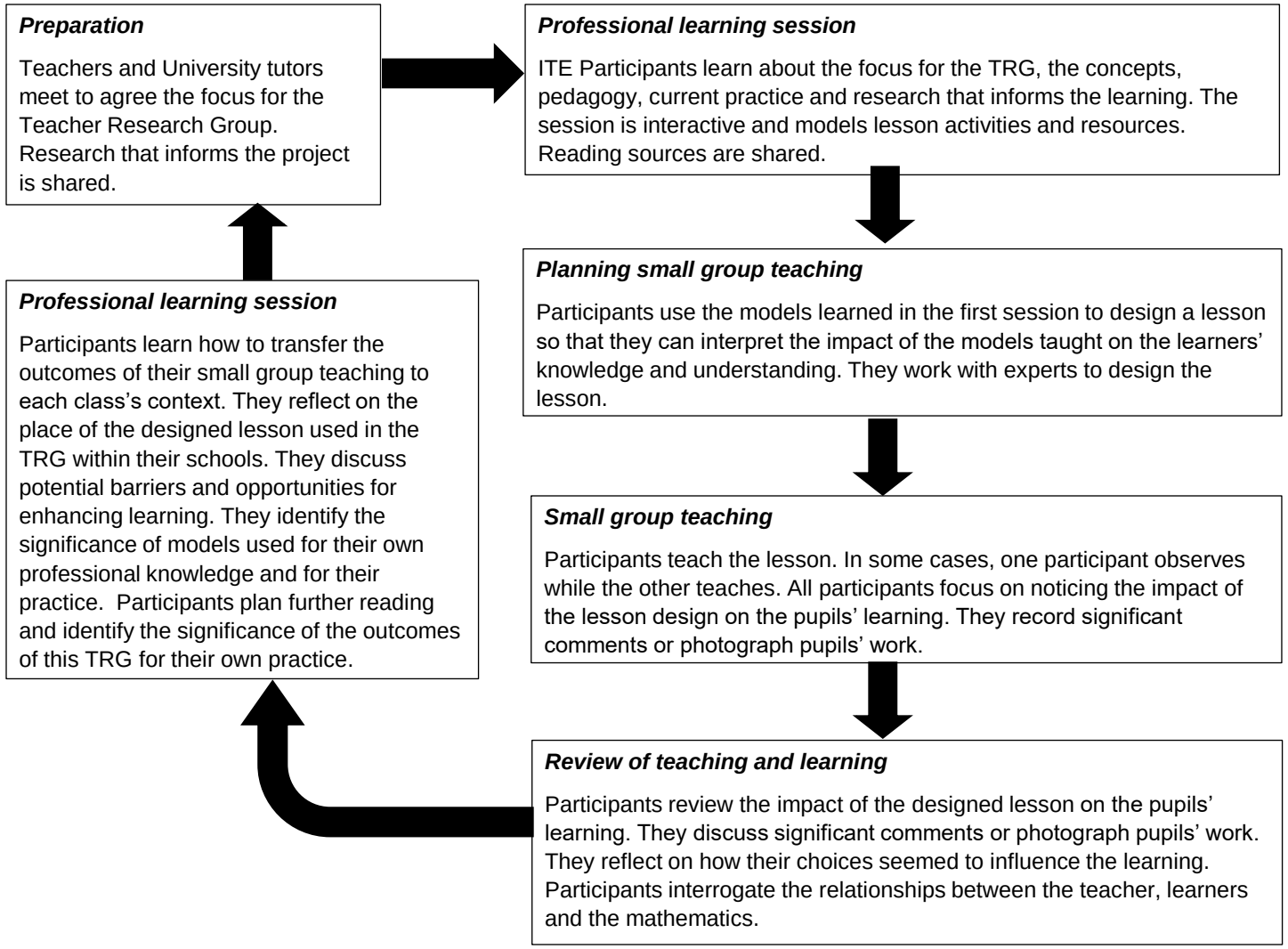
Research cannot supply us with rules for action but only with hypotheses for **intelligent problem solving**. Research can only tell us what has worked in a particular situation, not what will work in any future situation. The role of the educational professional in this process is not to translate general rules into particular lines of action. It is rather to **use research findings to make one's problem-solving more intelligent**.

(Biesta, 2007b)

Biesta, G. (2007b). Why what works, won't work: Evidence-based practice and the democratic deficit in educational research. *Education Theory, 57*(1), 1–22.

- Transformative teacher professional earning. Zeichner, 2003
- Teacher education globally. Darling Hammond, 2017
- Boundary crossing and boundary objects. Akkerman & Bakker, 2011
- UCET Four dimensions research informed TE. UCET, 2019.
- Expansive teacher education. Engeström & Sannino, 2010.
- Teacher Educators as practitioners and academics (troublesome). Ellis, 2013.
- Performativity, governance and surveillance. Perryman, Maguire, Braun & Ball, 2018

A Model of a Collaborative Lesson Research Cycle or Teacher Research Group



The collaborative lesson research cycle is aligned with Engestrom's Expansive Learning cycle and is influenced by

- models of transformative teacher education (Darling-Hammond, Cochran-Smith & Lytle)
- lesson study in mathematics (Baldry and Foster) and
- Teacher Research Groups and Lesson design (Swan & Burkhardt)

Initial Teacher Education in Mathematics
Using Research to Inform Lesson Design and Teaching in Algebra

Queen's Park High School

University of Chester

iTE

1) Preparation

Teachers and University tutors meet to agree the focus for the Teacher Research Group. Research that informs the project is shared.

Curriculum leaders and teachers were concerned about pupils algebraic fluency, especially for middle to lower attaining pupils. The Head of Mathematics and university ITE tutors were keen to develop the use of visual and concrete representations of algebra.
The ITE tutors wanted a safe environment for the ITE students to trial the use of algebra tiles before using them in the whole class context. The HoD and ITE tutor agreed the focus for a Year 10 lesson.

2) Professional learning session at University

Participants learn about the focus for the TRG, the concepts, pedagogy, current practice and research that informs the learning. The session is interactive and models lesson activities and resources.

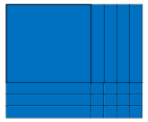
The university ITE tutor had designed and trailed lessons in schools using algebra tiles and shared these with the ITE students. They were taught the principles behind the design of the tasks and how research that informed reasoning from known facts and making connections between multiple representations expressions. They were given insight into research that informs difficulties associated with learning algebra in secondary school. Teachers were immersed in model tasks and interrogated how these tasks might be used in their school context. Teachers explored the use an enactive representation of a variable to model a reasoned, connected understanding the structure of linear and quadratic expressions. Initially teachers focussed on equivalent expressions, with a view to applying visual and concrete representations to many aspects of equations, expressions, sequences and functions eventually.

3) Planning small group teaching: Lesson design

ITE Participants use the models learned in the first session to design a lesson so that they can interpret the impact on the learners' knowledge and understanding. They work with experts from school/university to design the lesson.

ITE students are encouraged to designed a lesson with the aim of making equivalent expressions accessible. They are taught a support-challenge model of differentiation aligned with the principles of teaching for mastery. Support was derived from the use of the tiles. Challenge was designed through rich questions that deepened the current learning (not accelerate onto new content) and allowed pupils to interrogate the structure of expressions. ITE students use the narrative of the lesson that they had experienced to them to adapt their own lesson design.

$x^2 + 7x + 12$



Use this image to convince me that
$x^2 + 7x + 12 = (x + 3)(x + 4)$

4) Small Group Teaching

Participants teach the lesson. In some cases, one ITE participant observes while the other teaches. All participants focus on noticing the impact of the lesson design on the pupils' learning. They record significant comments or photograph pupils' work.

ITE students taught the lessons to all pupils in Year 10. They recorded how pupils translated the concrete model into pictures on paper as well as recording the pupils' emotional response to changing the context for learning algebra. Key features of the lesson were noted during the lesson or as soon as the lesson ended. The university ITE tutor and experienced teachers were on hand to support the teachers in dealing with difficulties at the point that they were exposed.

5) Review of teaching and learning

Participants review the impact of the designed lesson on the pupils' learning. They discuss significant comments or photograph pupils' work. They reflect on how their choices seemed to influence the learning. Participants interrogate the relationships between the teacher, learners and the mathematics.

Initially, ITE students reflected on behaviour and engagement in the lesson. Discussions then focussed on their responses to difficulties and managing unforeseen questions/difficulties. ITE tutors discussed when they would introduce negative terms and the value of reversing the direction of the tile. Teachers shared how they had used simulations of the tiles using mathsbot.com. and were able to share the context for learning for some of the Year 10 pupils that the ITE students had noticed a specific responses to the learning. Examples of positive outcomes for pupils who do not always engage in lessons were shared. ITE students discussed potential resistance to using the tiles for higher attainers.

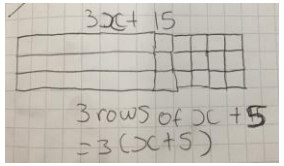
6) Further Professional Learning

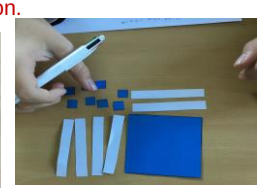
Participants learn how to transfer the outcomes of their small group teaching to the context of the placement school. They reflect on the place of the learning models used in the TRG within their classes that they share with mentors and class teachers. They discuss potential barriers and opportunities for enhancing learning. They identify the significance of these models for their own professional knowledge and for their practice. Participants are given further reading.

ITE students connect the principles from the project with their ongoing teacher education.
In particular the principles of:

-Connecting with learners' prior knowledge.
-Making connections between representations.
-Support-challenge as a model for differentiation.

They were encouraged to apply the TRG outcomes to their school-based learning placements.





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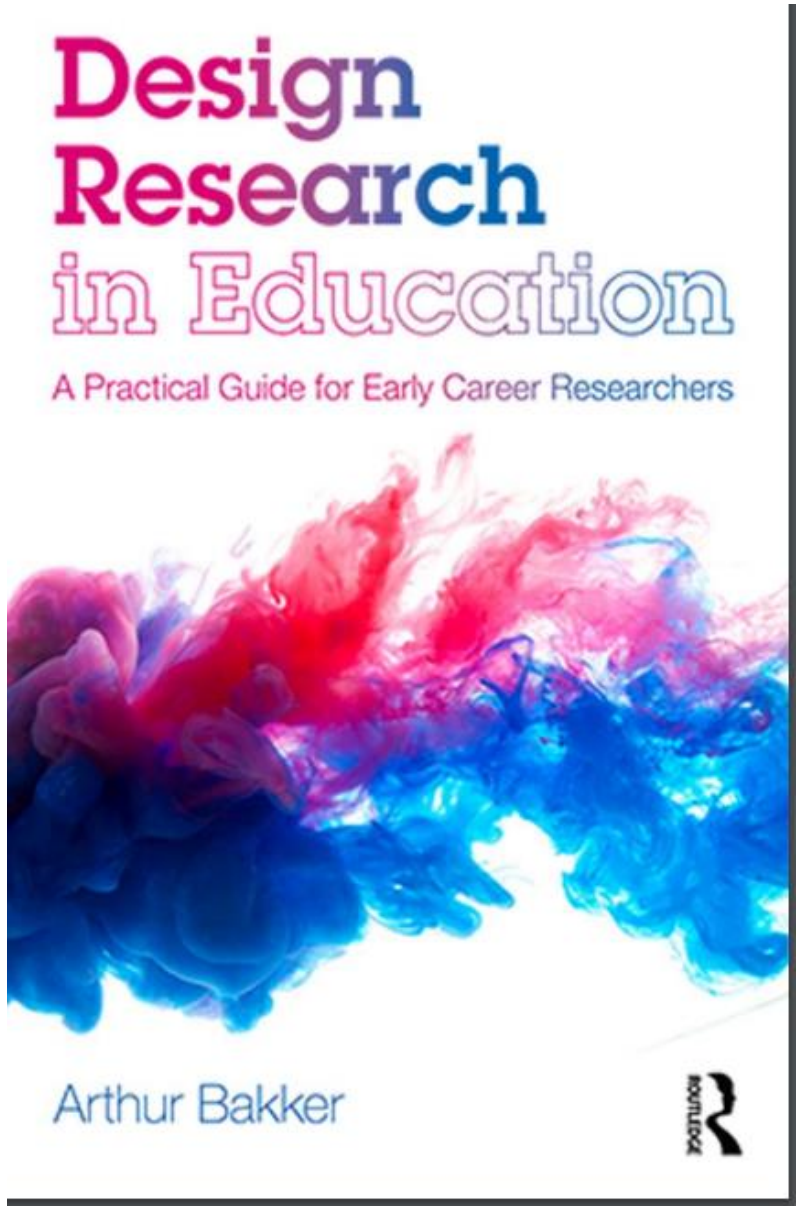
Much educational research is about analysing and explaining an existing state of affairs. Design research is different. It is transformational in that it challenges the status quo, through the design and implementation of novel experiences and materials. It is also impact focused in that it goes on to study how designs function and mutate in the hands of teachers with contrasting styles, beliefs and commitment.

Malcolm Swan, 2010



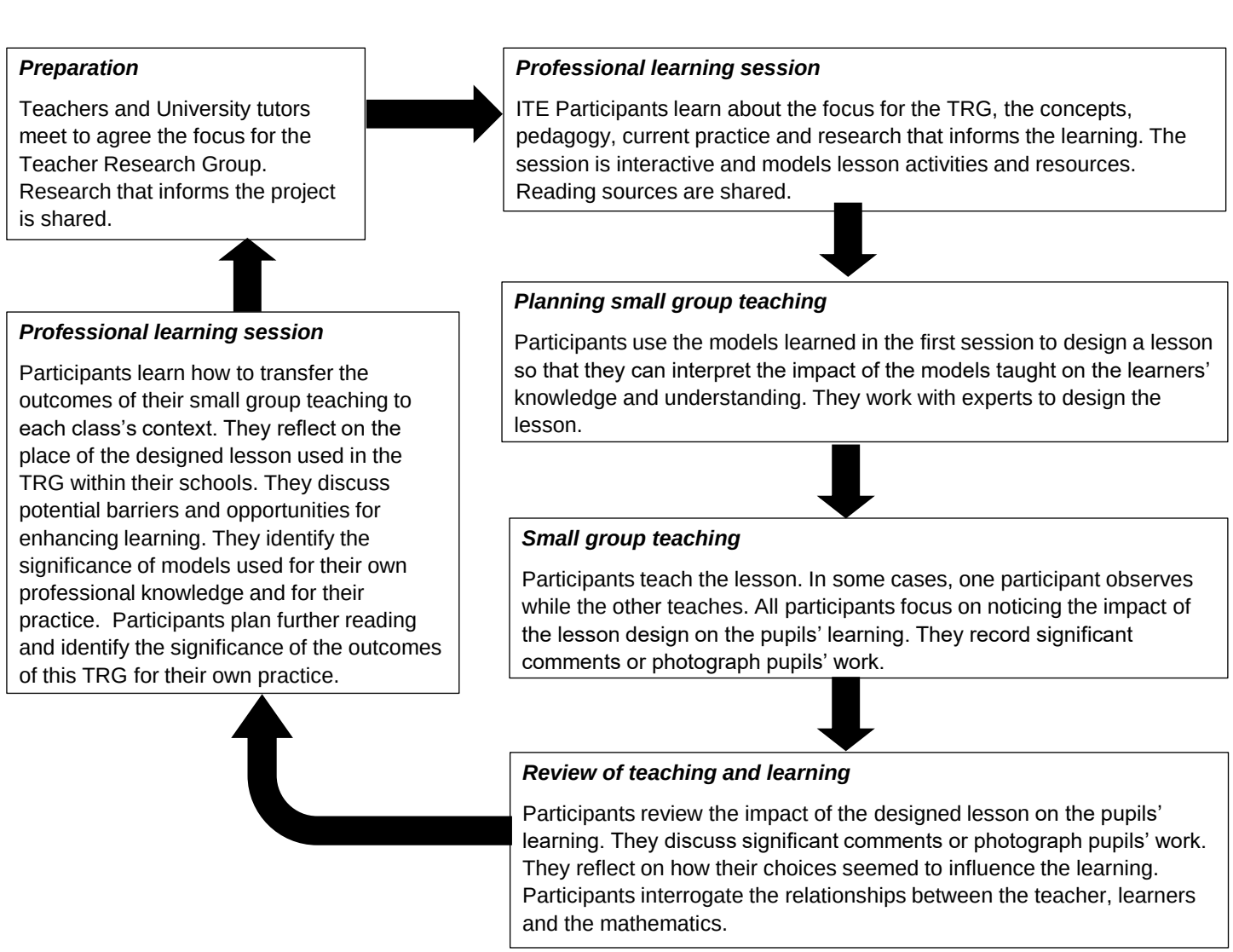
Characteristics of Design Research

"The first characteristic is that its purpose is to develop theories about learning and the means that are designed to support that learning. The second characteristic of design research is its interventionist nature. The third characteristic is that design research has prospective and reflective components that need not be separated by a trial or so-called teaching experiment. The fourth characteristic is the cyclic nature of design research: Invention and revision form an iterative process. The fifth characteristic of design research is that the theory under development has to do real work."

Design research takes three phases:

1. Preparation and Design
2. Teaching Experiment
3. Retrospective Analysis

Bakker, 2018



Beginning teachers experience collaborative enquiry, expansive learning, researcher and research user.

Teachers experience collaborative enquiry, expansive learning, researcher and research user, strengthened partnerships & further lesson design.

Teacher educators experience collaborative enquiry, expansive learning, researcher and research user, strengthened partnerships & authentic PL materials inform programmes.

Teacher educator as [design] researcher collaborative research and publications, researcher identity.
Access and Participation Plan?