Edge Hill University | Faculty of Education

Intensive Training and Practice (ITAP)

Year 2 BA (Hons) Primary Education with QTS (Part-time)

Variation in Mathematics

Programme Leader: Elizabeth Dunn, dunne@edgehill.ac.uk
ITaP Lead: Lorraine Healy, Healyl@edgehill.ac.uk

Edge Hill University | Faculty of Education

What is Intensive Training and Practice ? (ITAP)

Intensive practice is a way of helping trainee teachers to get better that involves:

- Focussing on a **particular aspect of teaching** for a period of time.
- A co-ordinated set of activities **that link the theory and practice of teaching**.
- Multiple opportunities for a **trainee to practice and receive feedback.**

A five day intensive practice unit focussed on a particular aspect of teaching.

It will include centre based and school based support and a range of opportunities to practise and receive feedback.

Variation in Mathematics

- This ITaP has a focus on using variation within mathematics teaching and recognising links to theory.
- Trainees will be using their knowledge of small steps in learning and prior knowledge of the CPA approach to ensure learning episodes are carefully sequenced. This supports pupils in developing a deep conceptual understanding and making connections within mathematics. An example of this could be to consider what changes and what stays the same when exploring properties of rectangles through a range of carefully selected images, or in carefully sequencing an approach to column addition in number.
- Trainees, in centre-based training, will gain an understanding of presenting the mathematical concept in different ways using concrete resources, visual images and considering examples and non-examples. They will also consider careful sequencing of questions and activities to expose the mathematical structures.
- During school-based training, trainees will have the opportunity to observe and put this approach into practice.

Edge Hill University | Faculty of Education

The Five Big Ideas that underpin teaching for mastery are all interconnected.

'Variation involves looking at a concept through different representations, starting with one and then adding more to consider the concept from different perspectives.
Concepts are presented coherently to engage pupils in mathematical thinking, to reason and make connections.
Choosing calculations that pupils are already fluent in reduces overload and learning is made accessible to all pupils.'

NCETM 2024

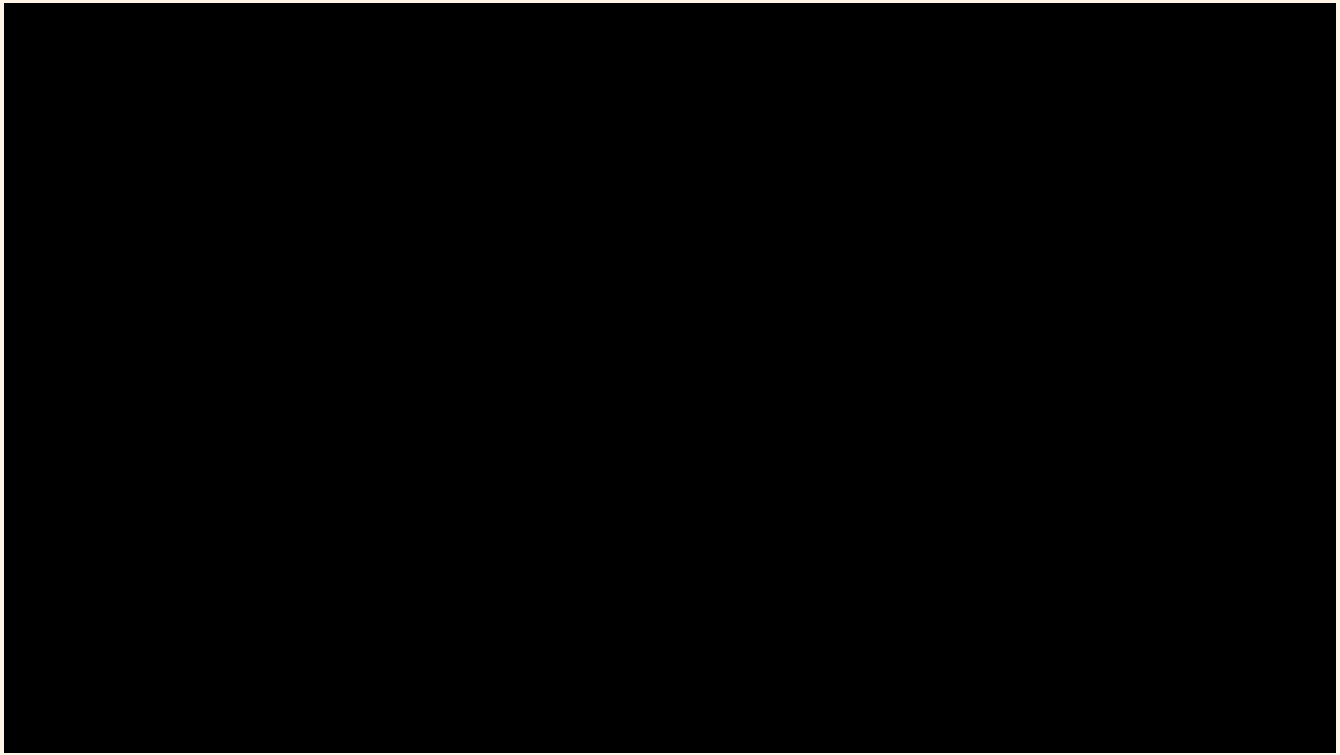
Variation in Mathematics

- According to NCETM, 'The benefit of using variation is enormous: you can improve the progress that children make and the quality of learning. Ensuring depth of understanding and making lessons accessible to all children means that more pupils make good progress and become confident mathematicians. Using variation relieves cognitive load, so children have space to make deep and lasting connection.'

Dr Debbie Morgan, the NCETM's Director for Primary, explains why variation is one of the most powerful ideas in the teaching of maths.

Edge Hill University | Faculty of Education

Debbie Morgan, the NCETM's Director for Primary

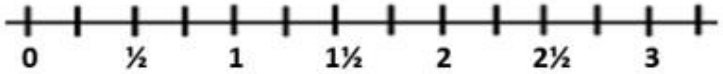


Edge Hill University | Faculty of Education

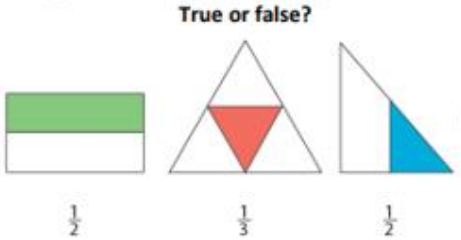
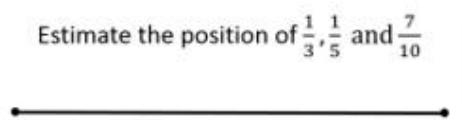
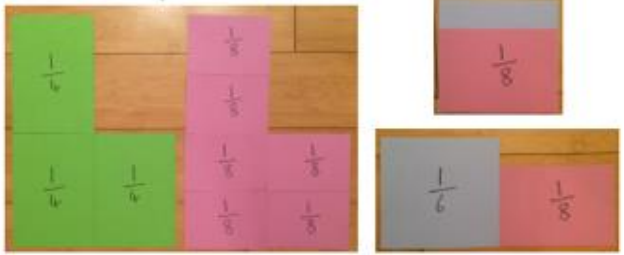
Progression in Variation

Progression in Visual Representations in Fractions, Decimals and Percentages

Year 2

Use halves and quarters as counting numbers, going over 1	Modelled with fraction cards and on a number line.  

Year 3

Simple unit/non -unit fractions represented in a range of ways; different fractions compared including equivalence	Identify fraction of shaded shape; position fractions on a number line; use fraction cards to show equivalence and compare fractions.   

Edge Hill University | Faculty of Education

Progression in Variation

Progression in Visual Representations in Fractions, Decimals and Percentages

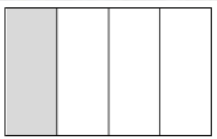
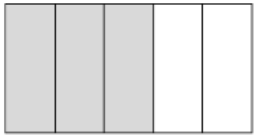
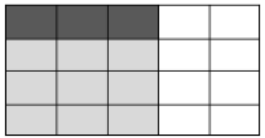
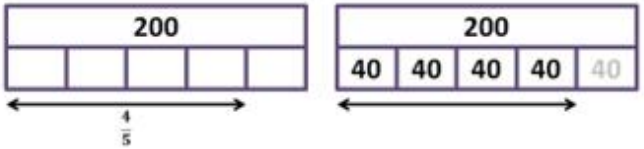
Year 5

Compare and order fractions, find equivalent fractions, add and subtract fractions.	Fraction cards used to compare, show equivalence and model calculations.   *Example: ¾ + ½*   
Find decimal equivalents for quarters, fifths and tenths, relating to division	Dividing length of a metre ruler into two/four/five equal parts. 

Edge Hill University | Faculty of Education

Progression in Variation

Year 6

Multiply and divide unit fractions and simple non-unit fractions	Area model diagrams to model a fraction being divided or multiplied by a fraction (modelled in two steps). $\frac{1}{4} \times \frac{1}{3}$  $= \frac{1}{12}$ $\frac{3}{5} \div 4$   $= \frac{3}{20}$
Calculate percentages and fractions of quantities	Bar model visualises finding fraction/percentage of quantity and finding the whole given a percentage/fraction. Shown step-by-step. $\frac{4}{5} \times 200$  40% of a number is 60. What's the number? 

Edge Hill University | Faculty of Education

ITaP Model Structure

INTRODUCE	ANALYSE	PREPARE	ENACT	ASSESS
Learning about the theory of teaching and learning	Using representations to analyse expert teaching	Using approximations to practise and get feedback	Receiving support to apply learning in the classroom	Tracking trainees' growing knowledge and skills

Framework informed by Grossman, P. (2018) (ed) .Teaching Core Practices in Teacher Education

Edge Hill University | Faculty of Education

Pre ITAP training	In Year 1, trainees will have had sessions on the CPA approach and be familiar with this. They will have also completed their introductory professional practice.			
Wednesday 7th May	**WB 19th May**	**WB 2nd and 9th June (depending on school holidays)**	**WB 16th June**	**WB 23rd June & 3rd July***
DAY 1 Centre-based	**DAY 2 School-based**	**DAY 3 School-based**	**DAY 4 School-based**	**DAY 5 School-based/Centre-based**
INTRODUCE/ ANALYSE	**PREPARE/ ENACT**	**ENACT**	**ENACT**	**ASSESS**
Learning about the theory of teaching and learning. Using representations to analyse expert teaching.	Using approximations to practice and get feedback.	Receiving support to apply learning in the classroom.	Receiving support to apply learning in the classroom.	Tracking trainees' growing knowledge and skills.
Seminar (2 hours) Variation seminar – PED2033 Maths tutor	Use of 'walkthrus' to plan for small steps in learning. Observing expert teaching in KS1 – Focus on variation. How variation is used to develop conceptual and/or procedural understanding Expert KS1 teacher	Team teaching – KS1 Opportunities for rehearsal and subject specific feedback.	Observing expert teaching – KS2 – focus on variation. How variation is used to develop conceptual and/or procedural understanding Expert KS2 teacher	Team teaching – KS2 Opportunities for rehearsal and subject specific feedback.
Reading (1 hour) A reading given from one of the key texts.		Reflection with mentor or another expert colleague Discuss outcome of lesson with above colleagues in supporting the understanding of variation in KS1.		Reflection with mentor or another expert colleague Discuss outcome of lesson with above colleagues in supporting the understanding of variation in KS2.

Structure of School-based phase of ITP

Whilst there are key experiences and components to the school-based phase of the ITaP, schools have autonomy with regards to when these take place.

All components within each phased need to be completed by 3rd July 2025

Edge Hill University | Faculty of Education

Prepare/Enact School Based Experiences

WB 19/5/25	W/B WB 2nd and 9th June 2025 (depending on school holidays)	WB 16/6/25	WB 23/06/25 & 03/07/25
Observing expert teaching in KS1 Observing expert teaching in KS1 – Focus on variation. **Focus:** How variation is used to develop conceptual and/or procedural understanding **Co-planning and research -** Trainees to work alongside the KS1 teacher to plan for the following week.	Team teaching – KS1 Opportunities for **rehearsal and subject specific feedback**. **Reflection** with mentor or another expert colleague - Discuss outcome of lesson with above colleagues in supporting the understanding of variation in KS1.	Observing expert teaching – in KS2 Observing expert teaching in KS1 – Focus on variation. **Analyse** : ow variation is used to develop conceptual and/or procedural understanding **Co-planning and research** - Trainees to work alongside the KS2 teacher to plan for the following week	**Team teaching – KS2** Opportunities for **rehearsal and subject specific feedback** **Reflection** with mentor or another expert colleague - Discuss outcome of lesson with above colleagues in supporting the understanding of variation in KS2

Edge Hill University | Faculty of Education

Reflection School -based

Following their observations of variations in mathematics in school (using observation proformas from ITaP mentor manual)

Observation of variation within mathematics		
	Key Stage 1	Key Stage 2
What did you notice about the sequencing of questions e.g. in independent activities? How did this support a deeper understanding of the concept?		
How did the teacher adapt the representations, questions and explanations of the concept for specific pupils? Please provide specific feedback on any adaptations for pupils with any additional needs or pupils with SEND.		
If an additional adult was available, how did they support the lesson?		

Edge Hill University | Faculty of Education

Mentor Guide Reflections

Following the trainees' experiences of using representations in their teaching… Centre -based

•Give an example of when variation was used effectively to impact on pupils' conceptual or procedural understanding.

•Give an example of how you used variation in your teaching. What impact did it have? Would you change anything in the future?

Edge Hill University | Faculty of Education

Links to ITTECF

Links to ITTECF

High expectations

Learn that…

3. Teacher expectations can affect pupil outcomes; setting goals that challenge and stretch pupils from their starting points is essential.

How Pupils Learn

Learn that…

LT7 - Where prior knowledge is weak, pupils are more likely to develop misconceptions, particularly if new ideas are introduced too quickly.

Learn how to build on pupils' prior knowledge by:

e) Linking what pupils already know to what is being taught (e.g. explaining how new content builds on what is already known).

f) Sequencing lessons so that pupils secure foundational knowledge before encountering more complex content.

Subject and curriculum

Learn that…

LT 3 - Ensuring pupils master foundational concepts and knowledge before moving on is likely to build pupils' confidence and help them succeed.

Learn how to…

Deliver a carefully sequenced and coherent curriculum, by:

LHT (c) - Working with experienced colleagues to accumulate and refine a collection of powerful analogies, illustrations, examples, explanations and demonstrations.

LHT (d) - Using resources and materials aligned with the school curriculum (e.g. textbooks or shared resources designed by expert colleagues that carefully sequence content).

LHT (e) - Being aware of common misconceptions and discussing with expert colleagues how to help pupils master important concepts.

Classroom Practice

Learn that…

2. Effective teachers introduce new material in steps, explicitly linking new ideas to what has been previously studied and learned.

6. Questioning is an essential tool for teachers; questions can be used for many purposes, including to check pupils' prior knowledge, assess understanding and break down problems.

Edge Hill University | Faculty of Education

Links to ITTECF

Learn how to...
Stimulate pupil thinking and check for understanding, by planning activities around what you want pupils to think hard about.

Adaptive Teaching
Learn that...
LT2 Pupils are likely to learn at different rates and to require different levels and types of support from teachers to succeed.
Learn how to...
Provide opportunity for all pupils to experience success, by:
(g) Adapting lessons, whilst maintaining high expectations for all, so that all pupils have the opportunity to meet expectations.
(h) Balancing input of new content with the revisiting of prior learning so that pupils master important concepts.
Meet individual needs without creating unnecessary workload, by:
LHT (k) Making use of well-designed resources (e.g. textbooks, manipulatives).
(l) Planning to connect new content with pupils' existing knowledge or providing additional pre-teaching if pupils lack critical knowledge
p) Applying high expectations to all groups, and ensuring all pupils have access to a rich curriculum.

Assessment
Learn how to...
Check prior knowledge and understanding during lessons, by:
g) Prompting pupils to elaborate when responding to questioning to check that a correct answer stems from secure understanding.

Edge Hill University | Faculty of Education

Research Links

Links to Theory and Practice

ASKEW, M. 2011. *Transforming Primary Mathematics*, Routledge.

DAVIDSON, A. 2019. Ingredients for planning student-centred learning in mathematics. *Australian Primary Mathematics Classroom*, 24(3), pp. 8–14. Available at: https://search-ebscohost-com.edgehill.idm.oclc.org/login.aspx?direct=true&db=ehh&AN=138323622&site=ehost-live&scope=site (Accessed: 27 March 2023)

EDUCATION ENDOWMENT FOUNDATION. 2021. Improving mathematics in the Early Years and Key Stage 1. Available from: https://educationendowmentfoundation.org.uk/education-evidence/guidance-reports/early-maths

EDUCATION ENDOWMENT FOUNDATION. 2022. Improving mathematics in Key Stage 2 and 3. Available from: https://educationendowmentfoundation.org.uk/education-evidence/guidance-reports/maths-ks-2-3

GALLAGHER, M. A., PARSONS, S. A. and VAUGHN, M., 2022. Adaptive teaching in mathematics: a review of the literature. *Educational Review*. 74 (2), pp. 298-320. Available from: https://doi-org.edgehill.idm.oclc.org/10.1080/00131911.2020.1722065.

NEWELL, R., 2023. *Mastery Mathematics for Primary Teachers.* Sage. *London.*

NCETM, 2024. The Five Big Ideas – Variation. Available from: https://www.ncetm.org.uk/features/the-five-big-ideas-variation/

OFSTED, 2023. *Coordinating Mathematical Success: The Mathematics Subject Report.* [Online]. Available from: https://www.gov.uk/government/publications/subject-report-series-maths/coordinating-mathematical-success-the-mathematics-subject-report

WATSON, A. and MASON, J. ,2006. Seeing an exercise as a single mathematical object: using variation to structure sense-making. *Mathematical Thinking and Learning*, 8(2), pp. 91–111

Edge Hill University | Faculty of Education

On completion of the ITaP, trainees should:

- Have a greater understanding of how variation is successfully implemented, within the classroom, to ensure pupils have a deeper understanding of taught concepts.

- Know how to plan a sequence of variations to provide practise in different contexts to deepen mathematical understanding, recognising what stays the same and what has been changed.

- Have a greater understanding of the progression of maths skills being taught and what prior learning is needed before introducing a new concept.

Edge Hill University | Faculty of Education

Quality Assurance – Lead Mentor

- During the ITaP school-based days, one of the Lead Mentors will meet with trainees to quality assure to delivery of the ITaP experience.
- A Lead Mentor will contact schools and trainees directly to arrange an online drop in with the trainee.**This will take place WB 9th June –16th June.**
- Visits are non-judgemental and the focus is to look for ways to improve the ITaP experience for both our trainees and partnership schools.

Edge Hill University | Faculty of Education