National Centre for Excellence in the Teaching of Mathematics

The Education & Training Foundation

Hairdressing & Beauty Therapy

The Maths Pipeline:

Supporting maths in post-16 vocational provision

Resources created as part


MEI
Innovators in
Mathematics
Education


NIACE
The National Voice
for Lifelong Learning

Developed by Mathematics in Education and Industry (MEI) and
The National Centre for Excellence in the Teaching of Mathematics (NCETM).
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Published September 2015

External references

This guide offers links to external websites and resources. At the time of publication all urls provided were correct; however, website addresses may be updated and changed. For each reference, the full name of the publication / resource has been provided to help you deal with any broken links.

foundation.co.uk

Hairdressing & Beauty Therapy

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About this guide

This guide is one of a series aimed at practitioners from a wide range of providers, including FE colleges, independent learning providers and those working in the Secure Estate, who support post-16 vocational learners to develop their maths skills up to and including level 2.

The guides, together with films which aim to stimulate viewers to reflect on their practice, have been created as part of the Maths Pipeline Programme.

As a vocational teacher you are able to provide a practical learning environment in which learners see a real purpose for developing their maths skills, and you can demonstrate convincingly that strong maths skills underpin vocational professionalism. This guide suggests ways in which you can engage your learners' interest and support them to develop their maths skills.

Throughout the guide you will find sections encouraging you to take a look at other websites, film clips or educational research documents. These sections are identified using the icons shown below.

For an interesting website

For an interesting document

For an interesting film clip

The guide is one of five in a series from the Education and Training Foundation (ETF) Maths Pipeline Programme. There are four Guides aimed at vocational teachers working in

1. *Construction and the Built Environment*
2. *Health and Social Care*
3. *Hospitality and Catering*
4. *Hairdressing and Beauty Therapy*

A fifth guide, *Unlocking Maths*, is aimed at specialist maths teachers in the Secure Estate.

The guides are also supported by a collection of films; begin with the clip that introduces the series and then explore the library of films.

Why should I be concerned about developing my learners' maths skills?

Here are four good reasons:

Developing your learners' maths skills can help them progress in their vocational course

When vocational and maths teachers work together, retention and achievement rates for maths and for the vocational subject improve. See You Wouldn't Expect a Maths Teacher to Teach Plastering....

Improving your learners' maths skills increases the employment opportunities open to them.

Maths skills are highly transferable, and improving them will help a learner to become more employable, regardless of whether they stay with their current vocational area.

Maths errors can be costly to any

Think about the wider consequences if people make mathematical errors whilst working in their chosen area of employment or self-employment. Errors can waste time and resources, can lead to dissatisfied customers, and can undermine health and safety standards.

Enhancing your professionalism

The Professional Standards (Statement 16) state that as a professional teacher or trainer you

should demonstrate commitment to:

> *"Address the mathematics and English needs of learners and work creatively to overcome individual barriers to learning."*

Why use a vocational lesson to develop maths skills?

Many post-16 learners view their previous learning experiences in maths very negatively.

The prior experiences of many vocational learners mean that they may have little or no maths confidence. Making maths relevant with authentic learning activities that link to real work contexts, and highlighting where learners have used maths in your lessons have real benefits. The desire to make progress in their chosen vocation provides considerable motivation for learners to master relevant mathematical skills and concepts. Success and enjoyment in a vocational lesson means their expectations will be high. They may be more willing to persevere with challenging maths and maths that isn't directly relevant to the vocational area but is relevant to a Functional Skills or GCSE qualification they are aiming for.

View this film in which learners comment about how learning maths in a vocational lesson has helped them to understand concepts. Notice how Vicky from Intuitions Ltd comments "hairdressers are practical people" and explains how they prefer to learn in a practical way, for example learning about ratio by mixing solutions, or about angles by cutting hair.

In this clip the practitioner uses moments within a busy session to practise and assess maths. As you are viewing the clip, think about the questions below.

- Where are the opportunities for practising and assessing within your practical sessions?
- How can you make the most of these?
- How could you follow up any mathematical misunderstandings?
- Can you work with maths practitioners to anticipate and deal with difficulties that learners might have?

In this clip learners and a practitioner reflect on how learning maths in a vocational setting has helped them improve their mathematical confidence.

- How can you work to build your learners confidence with maths? Could you use this clip to support a discussion with learners about their knowledge and confidence?
- Where can your sessions provide purposeful, practical opportunities for learners to develop their understanding of maths?
- How can you provide opportunities for learners to work together and support each other?

This embedding and contextualising approach is underpinned by research:

'You Wouldn't Expect a Maths Teacher to Teach Plastering…', NRDC, Nov 2006. Effective Practices in Post-16 Vocational Maths, ETF, Dec 2014

Engaging Learners in GCSE Maths and English, NIACE, Jan 2015

Vocational Training and Employability Skills in Prisons and YOI, NIACE, May 2013 Initial Guidance for users of the professional standards, ETF, May 2014

Some teaching ideas

We've introduced a small number of teaching ideas in this section to illustrate approaches which relate maths to your vocational subject and which help learners to understand key mathematical ideas deeply.

Active learning is key; in particular, it can help learners to become aware of and resolve any mathematical misconceptions they may have. Active learning uses strategies such as group work, discussion and open questioning to encourage learners to become reflective, to think mathematically and make links between topics, instead of using memorised techniques or processes. This approach helps students to make connections between their ideas, to understand the interconnected nature of maths and confront common misconceptions and difficulties.

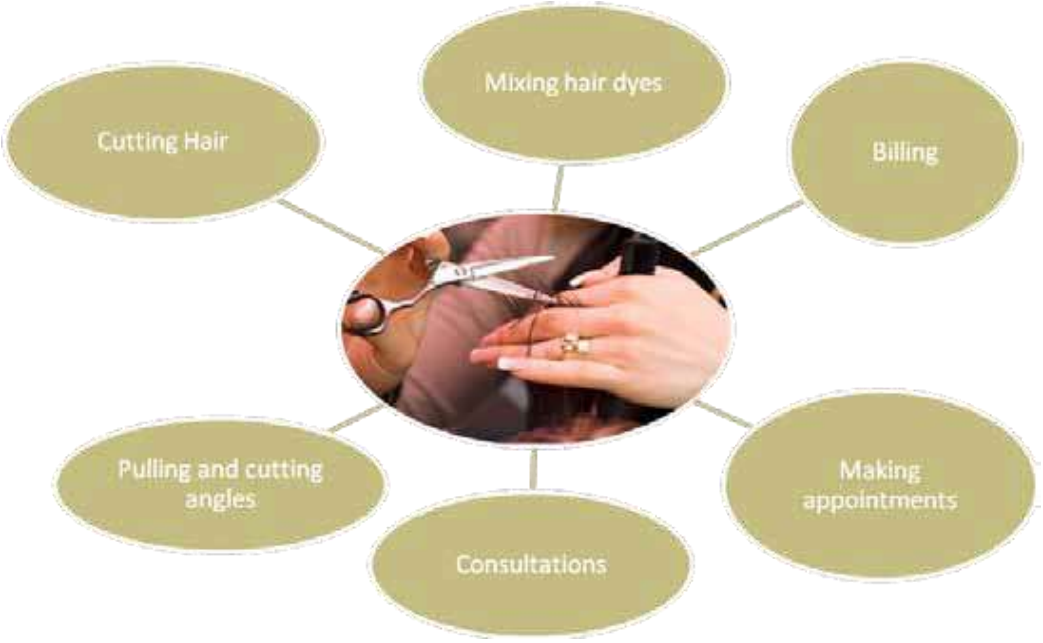
Later sections (see page 9 onwards) describe and respond to some challenges you might face, expand on the principles and research underpinning these teaching approaches, and offer many more teaching ideas.

Picturing the maths in your vocational area

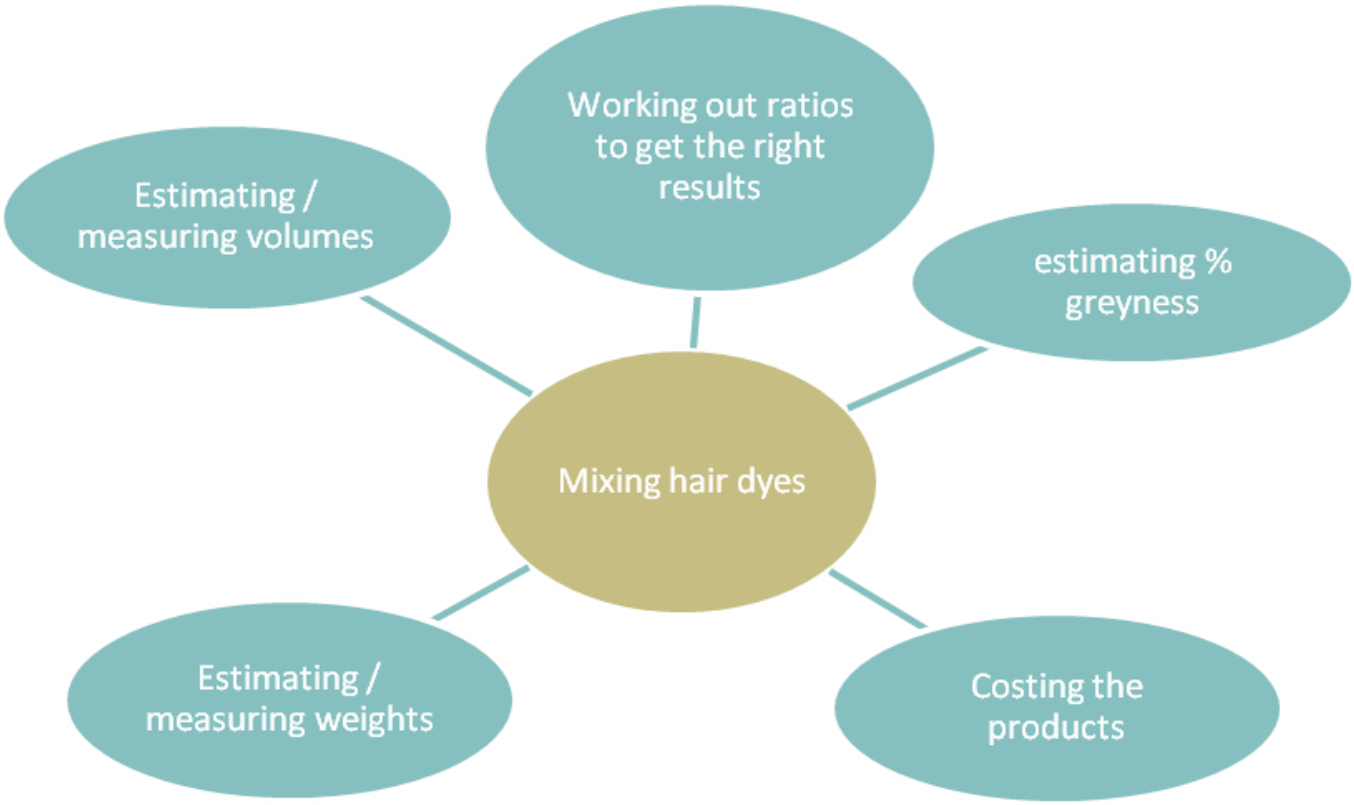
Start with a picture related to hair and beauty, one which your learners can relate to, and ask them to list some jobs/tasks that spring to mind. Then ask your learners to think about the maths they are likely to encounter when performing those tasks.

Here is one example used at a Vitaliser event, run as part of the Maths Pipeline Programme, for hairdressing teachers. You could substitute a picture of towels, colouring solutions or beauty products, shampooing, rollers, a reception desk, an appointment book, etc.

Tasks/Jobs



Maths which underpins one of these tasks: Mixing hair dyes



You could use the 'Picturing' activity as a starter to a more involved activity for example on designing a haircut; costing a treatment; making a decision about whether buying an item of salon equipment will lead to greater profits; or examining a pricing structure, labour rates and timesheets.

Another idea would be to select a photograph of a practical task the learners will be doing in a lesson you are planning. You could use the picture to discuss with learners what maths they might expect to tackle in the forthcoming lesson, and perhaps identify any mathematical areas they are likely to find difficult. This would then inform your planning and would also help the learners to realise that the maths they will tackle in that lesson is vocationally relevant.

Films would work equally well, or possibly, even better than photographs for this kind of activity.

Other learning activities related to your vocational area

The Excellence Gateway website provides a suite of resources which develop learners' literacy and numeracy skills in the hairdressing and beauty context (Search for 'hairdressing'). Areas covered include: reception; stylist and client; using products; working safely in the salon; and giving a good impression. The Excellence Gateway archive provides an introduction to these resources.

This set of resources produced by Cre8ate Maths involve aspects maths in a salon setting. (Register for free with the National STEM Centre in order to download them.)

This interactive tool lets you design your own salon. It can be used to cover areas such as scale drawing, practical design aspects, costing, etc. The tool could also support the work in this booklet from the Hwb Welsh key skills support program.

VirtualSalon is an interactive activity that shows some of the maths involved with running a hair and beauty salon.

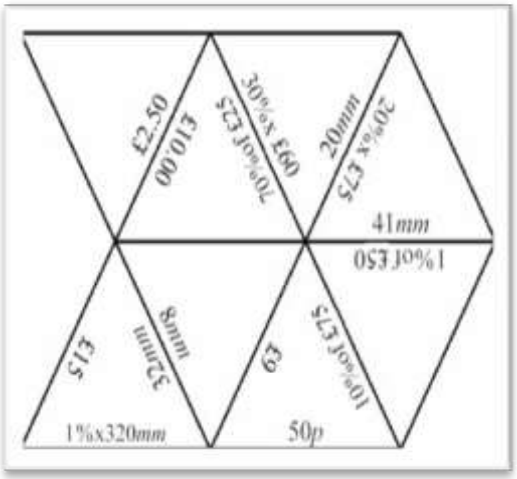
Using vocationally-oriented learning materials helps engage and maintain learners' interest; however, often you will also need to provide support so that learners develop deep understanding of essential mathematical ideas, and develop confidence in their own ability. You could use or adapt the activities below.

Examples of active learning activities that you could use or adapt with learners

Tarsia

Tarsia is free computer software which can be used to quickly produce puzzles like the examples shown below. These puzzles can be used as a lesson starter to get the learners talking about an aspect of maths they are going to encounter in your lesson, to assess your learner's knowledge of the topic and to resolve any misunderstandings or confusions.

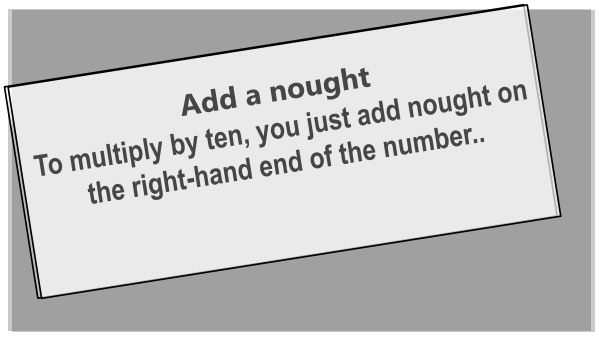
300cm	50m	0.5m	3m
250cm	300mm	4000cm	2m
2000mm	50cm	5000cm	Finish
30cm	40m	Start	2.5m



These puzzles use measurement and percentages, both of which are relevant to hair and beauty; and you can make similar puzzles of your own using other key concepts.

Sometimes true, always true, never true

This kind of activity challenges learners to think deeply about a topic, and also requires them to articulate their thinking. As they are working on the activity, listen to the arguments they are creating, and encourage them to express themselves clearly verbally and on paper; this formative assessment aspect will help identify and resolve any misconceptions.



The idea is that the learners have a collection of statements which they are asked to sort into three columns. Learners may think that this is always true, but if prompted to think further they will discover that it is not true for decimals. This activity can be adapted to cover a wide range of statements.

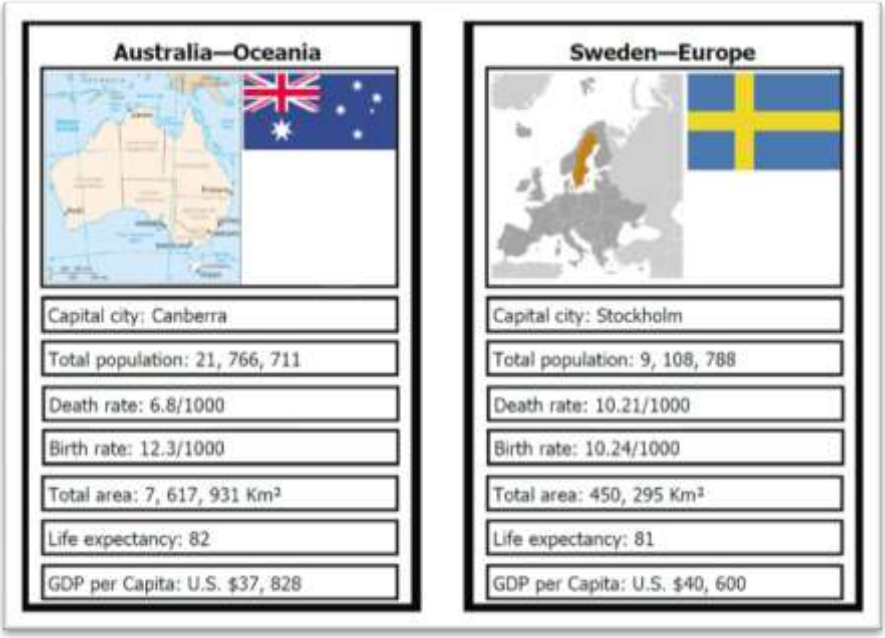
The NCETM website section on Thinking Through Maths contains collections of statements that can be used for a 'Sometimes true, always true, never true' activity.

Top Trumps

This is an adaptation of the popular card game where players compare data on a collection of themed cards. Learners explore a range of mathematical ideas, e.g. small and large numbers, the use of ratio to create statistics like death rate and birth rate, and how statistics like death rate, population and GDP might
/ might not correlate; teachers can choose which ideas to emphasise. Group discussion and peer

support helps learners identify and resolve any mathematical misconceptions.

In the example below the theme is countries, which learners may see as relevant to their everyday life; however, you could use information with a vocational theme for example, information on hair and beauty products, equipment, treatment costs and times, cutting angles etc.



Find a space large enough for all the learners to line up facing you. Give each learner one of the cards. Ask the group to select one of the statistics from the cards, e.g. total population. Now ask the learners to line up in order of total population, from the smallest at one end to the largest at the other end. When they have done this, ask them to read out their population statistic. Get the whole group involved in checking that everyone is in the right place in the line.

Many Top Trump sets are available as free downloads from the TES website. (Search for 'Top Trump maths'.)

Other resources to help learners understand key mathematical ideas

The WisWeb website has some excellent apps to help learners to explore maths topics including ratio, angles, and other aspects of shape. These are maths apps rather than specific vocational apps.

The Virtual Maths website provides lots of interactive activities that link maths to real life problems, including number; algebra; shapes, space and measure; and data handling.

The following sections of this Guide describe and respond to some challenges you might face, expand on the principles and research underpinning these teaching approaches, and offer many more teaching ideas.

What challenges am I likely to face?

Incorporating the development of maths skills as part of your vocational teaching is not without its challenges.

Engaging learners

Your learners may feel quite negative about the prospect of continuing to study maths as part of their vocational course, regardless of whether they are also learning maths in separate lessons. Hands-on activities relating to their vocation can help them to see the relevance of maths to their futures, and so can be very effective in engaging and motivating them.

In this clip Maria explains the importance of maths when designing and communicating hair styles throughout a worldwide chain of salons. She explains how maths is used in mixing solutions and other aspects of the day to day running of the salon.

This clip from BBC Skillswise explains why maths is important in the hair and beauty industry.

Some learners may need to improve their confidence with basic maths

One strategy which has been effective in helping with this situation is pairing struggling learners with a maths mentor from the same maths or vocational class: the examples below show how this approach is being used with learners in the Secure Estate.

This report by NIACE (page 44) explains how at HMP Chelmsford two mentors supported the tutor, resulting in an improvement in the quality of learning and work in the laundry.

The Maths4Prisons Maths Mentor Handbook describes the Prison 'Maths Mentors' project and includes a link to resources designed for mentors, together with resources which prison staff can use to train'Maths Mentors'. The primary purpose of the booklets is to support mentors to work with other prisoners on the wing, in maths classrooms or in industrial workshops.

"I feel as though I am good at maths and would like to pass on any help that I can. The guys know who I am and come and see me on the wing."
Mentor at HMP Littlehey.

This peer mentoring scheme is discussed in a film about teaching and learning in

the Secure Estate in England.

When learners help each other, they reinforce their own knowledge and build their confidence; this also allows you to spend more time with the learners who need extra support. Often if these partnerships start in the classroom they are continued outside the classroom with learners supporting each other outside of lesson time. In the Secure Estate the reverse is often also true; mentors working on the wing often encourage and support other prisoners towards and in the classroom.

Difficult topics

There may be specific mathematical topics which, from experience, you know learners will find difficult. Below are some suggestions of resources to support learners in some of these areas.

Maths4life is a series of booklets providing teaching materials for a variety of topics, including number, time and money, fractions, measurements. (You will need to register with NCETM and set up a free account.)

Maths Everywhere has some excellent short clips to help learners develop their maths skills. The site has three sections; some tools to help with everyday maths (e.g. currency conversion and planning journeys); a set of 'how to do' short clips; and some interactive questions to try. It is also available as an app.

The Skills Workshop is a site where practitioners can upload their own resources. It provides a range of lesson ideas covering many aspects of maths and English. The resources can be filtered by vocational area and level. Look out particularly for the resources which use active learning.

The Excellence Gateway has a large collection of numeracy and vocational learning materials. The Maths Exhibition website brings together some of the most effective maths teaching and learning materials from the Excellence Gateway site.

Working in the Secure Estate

If you are working within the Secure Estate you will have additional challenges such as regime constraints and learners who have additional support needs. The following is an approach taken by one prison:

> *"At HMP Wakefield, teachers provide contextualised learning within prison industries on a one-to-one basis to help learners who are in the separation unit and/or those who struggle with functional skills or have additional learning needs. This type of support is proven to be less disruptive to the prison day and effective at engaging those furthest away from learning and skills."*
> NIACE

This clip shows ways in which learning has been embedded in many aspects of prison life at HMP Swalesdale, and this article discussed how literacy and numeracy have been embedded in the gym there. Similar ideas could work in Hairdressing & Beauty Therapy.

You might get some further ideas from the report Fit for Release, which discusses ways of helping prisoners prepare for life outside the prison.

This clip introduces the ETF Offender Teaching and Learning (Vocational Training) Toolkit, and this clip covers the maths content of the toolkit. Related materials are available on the ETF Offender Learning Exhibition Site.

Meeting the challenges

Working together with maths practitioners

There are benefits to all concerned when vocational and maths practitioners plan work together. Maths specialists can gain an insight into where learners are likely to encounter maths in the world of work, and you get to see how maths is taught to your learners in their maths lessons. You may also be able to get support from the maths specialists in relation to particular maths topics.

This report and the associated case studies describe how embedding works, and the benefits it brings. "You Wouldn't Expect a Maths Teacher to Teach Plastering ... "NRDC, Nov 2006.

Teaching and learning strategies: embedding and contextualising

Some learners may respond better to practical interactive approaches than formal teaching. Try to discuss any maths involved in their vocational tasks; show learners how using maths will help to produce a better solution to a vocational problem, save them work, or avoid errors; and help learners make connections to what they are learning in maths classes.

This booklet from the Maths4Life series examines topic-based teaching. There is a wealth of good advice about teaching approaches, and assessment.

The MEI Contextualisation Toolkit provides a range of guides and resources to support practitioners in making greater use of context in their teaching, including developing their own contextualised resources.

The MEI Maths at Work Guides consists of two documents, one for practitioners and one for employers, which include excellent ideas and advice for integrating maths learning and work experience.

This film shows how a catering practitioner and maths specialist work together to support catering learners at Exeter College; similar ideas would work well in hairdressing and beauty therapy contexts.

Teaching and learning strategies: developing deep understanding of key mathematical ideas

One place to start is Thinking Through Mathematics, which emphasises the interconnected nature of maths, and supports teachers and learners to use formative assessment strategies to identify and address common conceptual difficulties. The mathematics dealt with here is roughly Entry

Level to Level 2.

A related resource, Improving Learning in Mathematics, offers similar approaches for mathematics from Level 1 to Level 3.

Professor Malcolm Swan of Nottingham University, whose research underpinned both *Improving Learning in Mathematics*, and *Thinking Through Mathematics*, identified eight principles for effective teaching of maths.

Teaching is more effective when it …

- builds on existing knowledge
- exposes and discusses misconceptions
- uses higher-order questions
- uses cooperative small group work
- encourages reasoning not 'answer getting'
- uses rich, collaborative tasks
- creates connections between topics
- uses technology in appropriate ways

Take a look at Improving Learning in Mathematics and Thinking Through Mathematics on the NCETM website for more information about these principles and how you can apply them in your own practice.

Initial, diagnostic and formative assessment

Your learners will learn most effectively when you and they develop insights - through initial and formative assessment approaches - into their needs. Maths specialists often carry out initial and diagnostic assessments before learners join a course, and may be able to share the results with you. You can also use informal self-evaluation questionnaires to help you and your learners understand their needs, and often these can be directly related to a topic they are working on. And most of the resources recommended in this guide have strong elements of formative assessment; for example insights often emerge directly from learner-learner or teacher-learner discussions during active learning activities.

The Excellence Gateway has a collection of diagnostic assessments covering all levels (search for 'numeracy diagnostic assessment').

The report, Effective Practices in Post-16 Vocational Maths, ETF, Dec 2014 (page 15) discussed current UK practice in diagnosis and assessment.

The document Approaches to formative and summative assessment of functional skills provides further useful information.

The Excellence Gateway site has some advice on formative and summative assessment. (Search for 'formative assessment' or 'summative assessment.)

Track learners' mathematical progress alongside their vocational targets

This will help you and the learners to see where they are progressing and where they need further support. This tracking could also be linked to a positive incentive scheme. Again, this is an area that your maths specialist may be able to support you with.

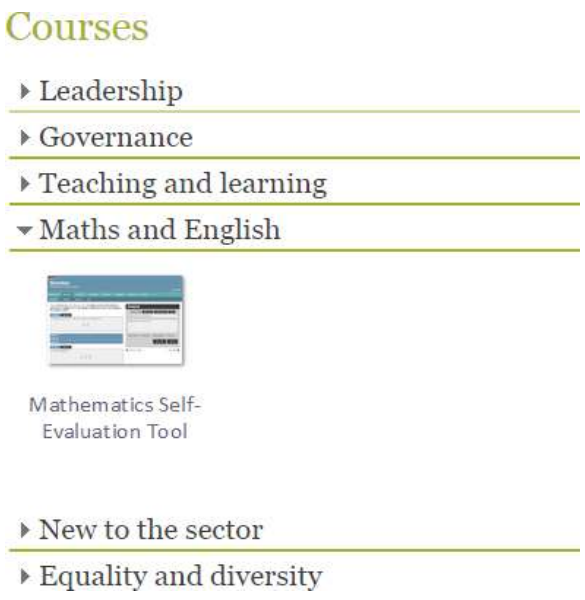
How can I develop my own maths knowledge and skills?

In parallel with developing your teaching strategies, you may wish to develop your personal maths skills.

A quick internet search may yield a good film clip or document which helps. Another approach might be to ask a friend or colleague, maybe someone from your maths department if you work in a college. Some clips of staff working together are shown in the films which link to this guide, and have been referenced earlier:

- YouTube: ETF MPP Hairdressing and Beauty Therapy: Why teach maths in a vocational setting?
- YouTube: ETF MPP Hairdressing and Beauty Therapy: Planning to practise and assess maths in the workplace
- YouTube: ETF MPP Hairdressing and Beauty Therapy: Building mathematical confidence

A comprehensive approach to your continuing professional development is to start with an assessment of your needs using this ETF Foundation maths self-evaluation tool. You will need to start by creating a free account. Once this is done, you can find the self-evaluation tool by clicking on Maths and English under the Courses heading. The tool provides a framework for you to self-assess both your personal maths skills and your teaching skills, and signposts you to further support.



References

External references

This guide offers links to external websites and resources. At the time of publication all urls provided were correct; however, website addresses may be updated and changed. For each reference, the full name of the publication / resource has been provided to help you deal with any broken links.

The references below are split by chapter and section heading.

About this guide

1. The Education and Training Foundation Maths Pipeline http://www.et-foundation.co.uk/
2. YouTube video: ETF MPP Supporting maths in post-16 vocational and Secure Sector provision: An introduction https://youtu.be/EiLhhqE1Rn4
3. YouTube library: Excellence Gateway films to support post-16 teaching and learning https://www.youtube.com/user/excellencegateway/

Why should I be concerned about developing my learners' maths skills?

4. "You wouldn't expect a maths teacher to teach plastering...": Embedding literacy, language and numeracy in post-16 vocational programmes - the impact on learning and achievement (2006) http://dera.ioe.ac.uk/22311/
5. ETF Professional Standards:'Initial Guidance for users of the Professional Standards for Teachers and Trainers in Education and Training – England' http://www.et-foundation.co.uk/wp-content/uploads/2014/05/ETF-Prof-Standards-Guidance-v2-2.pdf

Why use a vocational lesson to develop maths skills?

6. YouTube - ETF MPP Hairdressing and Beauty Therapy: Why teach maths in a vocational setting? https://youtu.be/4QQJErbwpmE
7. YouTube - ETF MPP Hairdressing and Beauty Therapy: Planning to practise and assess maths in the workplace https://youtu.be/IyQrFED4E3E
8. YouTube - ETF MPP Hairdressing and Beauty Therapy: Building mathematical confidence https://youtu.be/Ds3ysfjkwo0
9. See 4
10. ETF: 'Effective Practices in Post-16 Vocational Maths' http://www.et-foundation.co.uk/supporting/research/effective-practices-post-16-vocational-maths/
11. NIACE: 'Engaging Learners in GCSE Maths and English' Feb 2015 http://shop.niace.org.uk/media/catalog/product/e/n/engaging_learners_report_1.pdf
12. NIACE: 'Vocational Training and Employability Skills in Prisons and Young Offenders Institutions' Jul 2013 http://shop.niace.org.uk/training-skills-prisons-yois.html
13. See 5

Some teaching ideas

Picturing the maths in your vocational area

14. See 1

Other learning activities related to your vocational area

15. Excellence Gateway home page featuring a search facility http://www.excellencegateway.org.uk/

16. Excellence Gateway Embedded Learning for vocational areas
http://rwp.excellencegateway.org.uk/Embedded%20Learning/Vocational/Hairdressing/
17. Cre8 Salon online resource in the National STEM Centre e-Library (You will need to register free.)
http://www.nationalstemcentre.org.uk/elibrary/resource/360/cre8-salon
18. Interactive tool to design your own salon http://www.beautydesign.com/salon-planner/
19. Trainer Guide for Key Skills in Hairdressing on the TES website
https://www.tes.co.uk/teaching-resource/key-skills-in-hairdressing-6017522

Tarsia

20. Tarsia on the Hermitech Laboratory - Information on Formulator Tarisa http://www.mmlsoft.com/index.php/products/tarsia

Sometimes true, always true, never true

21. NCETM interactive resource, 'Thinking Through Mathematics'. You need to register free on the NCETM portal https://www.ncetm.org.uk/online-cpd-modules/ttm/contents
22. NCETM Thinking Through Mathematics - collection of statements You need to register free on the NCETM portal https://www.ncetm.org.uk/online-cpd-modules/ttm/teaching-activities/evaluating-mathematical-statements

Top Trumps

23. TES online teaching resources. Enter 'Top Trump maths' into the search term. https://www.tes.co.uk/teaching-resources

Other resources to help learners understand key mathematical ideas

24. WisWeb applets http://www.fi.uu.nl/wisweb/applets/mainframe_en.html
25. Virtual Maths website http://www.virtualmaths.org/

What challenges am I likely to face?

Engaging learners

26. YouTube - NCETM film on maths in hairdressing https://www.youtube.com/watch?v=GQGW6FJWfDM
27. Film on BBC Skillswise - Why are maths and English skills useful in hair, fashion and beauty jobs? http://www.bbc.co.uk/programmes/p00k3yrd

Some learners may need to improve their confidence with basicmaths

28. NIACE report - 'Vocational Training and Employability Skills in Prisons and Young Offenders Institutions' May 2013 (see page 44) http://shop.niace.org.uk/media/catalog/product/v/t/vt_and_es_report_2013_final_1.pdf
29. NIACE - 'Maths4Prisons: Maths Mentor Handbook ' http://shop.niace.org.uk/maths4prisons-handbook.html
30. YouTube - ETF MPP Teaching Maths in the Secure Sector: Developing peer mentoring in the secure sector https://youtu.be/X-R2-zBqNqU

Difficult topics

31. NCETM website - Maths4Life 'Taking the Numeracy Challenge Forward Resources ' https://www.ncetm.org.uk/resources/numeracy_challenge_microsite_resources
32. Maths Everywhere, interactive learning tool http://www.mathseverywhere.org.uk/
33. Skills workshop - Free functional skills and skills for life resources http://www.skillsworkshop.org/contextual?op=or&tid_depth%5B%5D=4
34. See 15
35. Excellence Gateway: Exhibitions website - Raising Standards in Maths http://maths.excellencegateway.org.uk/

Working in the Secure Estate

36. NIACE - Vocational Training and Employability Skills in Prisons and Young Offenders Institutions http://shop.niace.org.uk/media/catalog/product/v/t/vt_and_es_report_2013_final_1.pdf
37. YouTube - Embedded Learning at HMP Swaleside https://www.youtube.com/watch?v=AbRfDOOf-OA&feature=youtu.be
38. Prisoners' Education Trust - Teaching in the gym at HMP Swaleside, 15 May 2013 http://www.prisonerseducation.org.uk/news/teaching-in-the-gym-at-hmp-swaleside
39. Prisoners' Education Trust - Fit for Release, Aug 2012

https://fbclientprisoners.s3.amazonaws.com/Resources/PET_Fit_for_Release_Report.pdf

40. YouTube - Offender Teaching & Learning Toolkit (Vocational Training) https://www.youtube.com/watch?v=2kNpx506-vU

41. YouTube - Offender Teaching & Learning Toolkit (English, Maths, ESOL & ICT) https://www.youtube.com/watch?v=KoCUI0CSJtI

42. Excellence Gateway: Exhibitions website - Offender learning http://offender-learning.excellencegateway.org.uk/

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Working together with maths practitioners

43. See 4

Teaching and learning strategies: embedding and contextualising

44. NCETM - Maths4Life Topic-based teaching Booklet (You will need to register free on the NCETM website) https://www.ncetm.org.uk/resources/8855
45. MEI Contextualisation Toolkit http://www.mei.org.uk/contextualisation-toolkit
46. MEI - Maths at Work, A guide for employers offering work experience as part of 16 to 19 Study Programmes http://www.mei.org.uk/files/pdf/Maths_at_Work-A_guide_for_employers_offering_work_experience_for_16-19_SPs.pdf
47. YouTube: ETF MPP Hospitality and Catering: Vocational and maths practitioners working together https://youtu.be/rZWiBhXHMk4

Teaching and learning strategies: developing deep understanding of key mathematical ideas

48. NCETM - Thinking Through Mathematics: Principles of effective teaching (You will need to register free on the NCETM website) https://www.ncetm.org.uk/online-cpd-modules/ttm/principles-for-teaching-mathematics/principles-of-effective-teaching
49. NCETM - Improving Learning in Mathematics (You will need to register free on the NCETM website) https://www.ncetm.org.uk/resources/1442
50. See 49
51. See 48

Initial, diagnostic and formative assessment

52. See15
53. See 10
54. Excellence Gateway - Approaches to formative and summative assessment of functional skills http://www.excellencegateway.org.uk/content/etf1324
55. See15

How can I develop my own maths knowledge and skills?

56. See 6
57. See 7
58. See 8
59. ETF Foundation Online Learning - Self-evaluation tool http://www.foundationonline.org.uk/

www.et-foundation.co.uk