



Working with employers (to develop and deliver workplace numeracy)



Total People Ltd.
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Project Steering Group

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This resource has been produced as a result of a grant awarded by LSIS. The grant was made available through the Skills for Life Support Programme in 2010. The resource has been developed by practitioners. The contents should not be compared with commercially produced resources, although in many cases it may have comparable or better learning outcomes.

Introduction

At the start of this project in January 2010, Total People was already enjoying successful delivery of Adult Numeracy (and Literacy) classes at Bentley Motors:

- Four Numeracy Level 2 classes delivered to around 25 learners
- Two intakes of learners
- High achievement and retention rates
- Flexible approaches (structured classes, one-to-ones, blended learning and test-only option)
- Maths topics contextualised to life situations
- Union Learning Representatives fully involved and active in promotion, initial assessments and end testing
- Relationships establishing with Bentley's Production Training Department and in-house administration staff
- High proportion of learners coming with low self-belief and confidence and yet achieving

Total People was also making considerable inroads regarding embedding amongst its own Vocational Trainers and Assessors:

- Health and Social Care team embracing an embedded approach
- Contextualising/Embedding awareness raised across the Company
- Closer working relationships between Skills for Life Tutors and Vocational teams
- Shared good practice via the Effective Practice Project

The Project

Total People wanted to take its Embedding/Contextualising approach to Maths into the workplace, to explore the impact this may have on the learning experience, outcomes and learner confidence.

The initial focus of the project was on:

1. researching into opportunities at Bentley to contextualise and/or embed Maths
2. designing and delivering contextualised/embedded Maths
3. designing a resource to measure impact on learner confidence

Whilst these three steps were followed, it became apparent in the early stages of the project that much could be learned and shared from the approach we took.

The Product

The product then is **A transferable win/win approach to delivering Maths in the workplace**. It is a tried and tested set of building blocks towards successful Maths, from firm foundations of successful relationships within the workplace. This building metaphor has been used to present a visual model for the approach, showing the three essential pillars holding up the win/win approach.

Examples of employer engagement materials, contextualised resources and impact measurement questionnaires are also included.

Who's it for?

Skills for Life Managers or Tutors wanting to adopt a win/win approach to delivering Maths in the workplace.

A transferable, win/win approach to delivering Maths in the workplace.

Choose the right Tutor

Can communicate at a variety of levels

Intuitive and empathetic

Experienced and qualified in teaching Maths to adults

Allow the Tutor to own and lead the project

Give the Tutor a voice (trust)

Research

Involve all key people

Find the benefits for all involved

Where's the Maths in the job?

Where's the Maths in team meetings?

Where's the Maths in any in-house training?

Embed/Contextualise only where there's genuine value added

Employer defines own embedding requirements

Don't contextualise for the sake of it

Measure the impact

Foundations = relationships

Training department, ULRs, Management, Learners, Steering Group, Maths Tutor, Administration

Pillar 1 – Choose the right Tutor:

Can communicate at a variety of levels:

- Learners
- In-house trainers
- Union Learning Representatives
- Administration staff
- Remains conscious of being a guest of the Employer

Intuitive:

- Behaves as a guest
- Sensitive to Employer's priorities and pressures
- Able to adapt own expectations of the project
 - Tutor's idea of embedding could be far from Employer's
- Able to detect and dispel unease at any level
 - Barriers
 - Defensive behaviour
 - nervousness

Experienced and qualified in teaching Maths to adults

- Comfortable with adult learners
- Enjoys working with adult learners
- Has insight into their expectations
 - To be taught well
 - To see the relevance of the Maths
 - To be treated as adults
- Experienced in embedding and contextualising Maths

Allow the Tutor to own and lead the project:

- Carries out the research
- Talks to all parties (learners/Union Learning Reps/in-house trainers/admin. support)
- Involves all key people in the steering groups
- Recognises where manager to manager talk is necessary
- Plans and delivers the Maths

Give the Tutor a voice (trust):

You have already chosen an experienced Tutor whom you know has the qualities to communicate at all levels.

Allow the Tutor to use his/her experience and judgement to decide the best approach to delivering Maths for this employer.

Pillar 2 – Research:

Involve all key people

- Hold regular steering groups
- In-house trainers
- Union Learning Reps
- Learners
- Behave as a guest
- Build relationships
- Take a genuine, open approach
- Listen effectively
- Arrange Manager to Manager meetings as necessary



Find the benefits for all involved:

- What would **really** help the Employer?
- How can you make the ULRs' lives easier?
 - Can you make it easier for them to promote Maths?
- How can you involve the ULRs in the project?
 - Promoting and recruiting learners
 - Equip them with more information about the course and qualification
 - Involve them in Initial Assessment and testing
- How can you help the in-house trainers?
 - Train the trainers in specific Maths topics?
 - Supplementary Maths worksheets?
 - Team teaching?
 - Embedding?
 - Tread softly – it's their area of expertise!



The job:

- A day in the life of a learner?
- What counting do you do?
- Where do you use fractions or percentages?
- Where do you use decimal numbers?
- Where do you use measurements?
- Where do you use charts or graphs?

Team meetings:

- What's a typical team meeting like?
- What types of numbers are used?
- What information is shared?
- How is it shared (posters?)

In-house training:

- What courses are run in-house?
- How much Maths is involved?
- Specifically, what Maths is involved?
- Where might learners struggle with Maths on your courses?
- How could the Maths classes complement or enhance the learning in your training sessions?
- How can I support you in the delivery of Maths in your training?
- Listen effectively

See Appendix 1 for a copy of the presentation *Effective Maths in the Workplace* for engaging Employers in Embedding Maths.

Pillar 3 – Embed/Contextualise only where there's genuine value added:

Employer defines own embedding requirements:

- Let embedding be defined by the Employer
- Our idea of embedding may be vastly different from the Employer's idea
 - Where to embed
 - What to embed
 - How much to embed
 - How much easier does embedding make the trainer's job?



- Ask open questions to determine embedding opportunities:
 - Where is there Maths in the course?
 - Where do learners struggle?
 - What would make your training sessions easier?
 - How else could you support your learners with Maths outside the training sessions?
 - How could I help you?

See Appendix 1 for a copy of the presentation *Effective Maths in the Workplace* for engaging Employers in Embedding Maths.

Don't contextualise for the sake of it:

Don't get obsessed about the need to put the Maths in a work context.

Only contextualise Maths sessions where there's a real opportunity to enhance understanding of Maths in the workplace.

Whilst contextualising Maths can increase awareness of the relevance of specific Maths skills to the workplace, soft feedback and in-class observations indicate that adult learners grasp the Maths just as well when applying their skills to life-related scenarios.

Examples of contextualised sessions in Appendix 2:

Number Activity

Fractions, Decimals & Percentages Activity

Measure the impact

- How has contextualised learning affected learners' awareness of Maths at work?
- How has it enhanced understanding of the Maths?
- How has any embedding helped the in-house trainers?
- How has involving the ULRs helped them in their roles?

See Appendix 3 for resources for measuring impact:

Contextualised Practice Test Questions

Course Impact Questionnaire

Lesson Impact Questionnaire

Lesson Impact – Soft Feedback

Appendix 1
Employer Trainer Engagement
Presentation

Effective Maths in the Workplace



Adult Learners

'It is important to accept this fundamental truth. Almost all adult learners come freely to classes: this is one of the main features that distinguishes them from children who, by statute, have to receive education from five to sixteen ... **the implication of this is that they are also free to leave.**'

Jenny Rogers, 'Adults Learning' (1997)



What is embedding?

'Embedded teaching and learning combines the development of literacy, language and numeracy with vocational and other skills.

The skills acquired provide learners with the confidence, competence and motivation necessary for them to succeed in qualifications, in life and in work'.

Skills for Life Strategy Unit, DfES 2003



Embedding (Context)

In order to increase the required rate of improvement in the literacy and numeracy skills of adults, provision will need to be delivered "both through specific basic skills qualifications and 'embedding' functional literacy and numeracy within other qualifications".

Leitch review of skills: Prosperity for all in the global economy – world class skills



There's no fixed model...



Full embedding doesn't work...

"... where one teacher had responsibility for teaching both subjects, learners **were less likely to succeed** with their literacy, ESOL, or numeracy qualifications. In fact, learners taught by non-specialist Skills for Life teachers were **twice as likely to fail** in these circumstances. It also reported that learners benefit from being taught by teams of staff each with their own different areas of expertise **working closely together.**"

The National Research and Development Centre for Literacy and numeracy (NRDC)



You don't have to be S4L specialists...

"You wouldn't expect a maths teacher to teach plastering, so why expect a plastering teacher to teach maths?"

LSC, September 2007

... *but teamwork is essential!*



Total People's Model

Developing and supporting S4L within vocational programmes

Underpinning knowledge (contextualised where possible)

Vocational Tutors

S4L Tutors



Group Activity

Why should we embed?

Think about:

- Statutory requirements
- Benefits to learners
- Benefits to Production Trainers
- Benefits to ULRs



Why embed?

- Attitudes/Retention/Achievement
 - Coping with the BIT NVQ
 - Helps understanding
 - Relevance!
- Funding

"... there will be an increased emphasis to deliver Skills for Life through an embedded approach."

Learning and Skills Council, September 2007

- Inspection



When can we embed?

- Training sessions
- Assignments with feedback
- Reading material (including slides)
- Exercises
- Portfolios
- Workplace observations
- Progress Reviews



Relevance and Motivation

Adult learners expect:

1. To be taught
2. To work hard
3. The **work to be related to the vocation**
4. To be treated as adults

Ian Reece and Stephen Walker: A Practical Guide to Teaching, Training and Learning (1994)



When can we embed?

During the entire learning journey!



Initial Assessment

An effective Initial Assessment should:

- Identify the learner's current ability levels and areas for development
- Identify the correct programme for the learner
- Help us to plan embedding into our vocational programme



Embedding Maths 2 Scenarios

- You are an Associate studying B.I.T. NVQ Level 2.
- Your Initial Assessment result for Maths is **Entry Level 3**.

Scenario 1:

- Your NVQ Tutor has handed out a continuous improvement assignment involving taking measurements and **calculating percentages**
- As the **Entry Level 3** learner, what's your reaction and how do you feel?



Embedding Maths 2 Scenarios

Scenario 2:

- Your NVQ Tutor has handed out a continuous improvement assignment involving taking measurements and **calculating percentages** **AND has made it clear the rest of the session will be spent showing you how to do the Maths.**
- As the **Entry Level 3** learner, what's your reaction and how do you feel?



Embedding Training Sessions

- How do I **evaluate** the success of embedding in a training session?
- How do I **plan** embedding into a training session?



Evaluating Training Sessions

- From a recent training session, use:
 - Your training materials
 - Profile of learners' S4L abilities
 - Session plan
- What went well/not so well?
- Why?
- Record on your session plan



Evaluating Training Sessions

- What levels are your learners at?
- Does your session cater for all levels in your class?
- What could you change?
 - In-class support?
 - Maths expectations?
 - Feedback?



Planning Training Sessions

Using your list of what could be improved:

- Prioritise
 - What will have the most impact?
- Implement a change
 - Rewrite a resource?
 - Integrate S4L into an exercise?
 - Plan support strategies for in-class? exercises
- Show embedding in your session plan



Summary

- Definition of embedding
- No 'one size fits all' approach
- Researched reasons to embed
- Initial Assessment results matter
- Benefits to all involved



Summary (continued)

- Embedding requires planning
- Embedding requires support strategies
- Embedding requires teamwork
- Embedding should be recorded
- Embedding involves the entire learning journey



Further reading

- www.sflip.org.uk
 - fact sheet & embedded learning material
- www.lsc.gov.uk
- www.nrdc.org.uk
 - Research projects
- www.dcsf.gov.uk/readwriteplus/
 - nosmapping
 - embeddedlearning
 - raising standards



Further reading (continued)

- <http://rwp.qia.oxi.net/embeddedlearning/>
 - Embedded materials for vocational areas



Appendix 2

Examples of contextualised sessions

Numeracy Level 2 at Bentley

Application of Skills

Week 2



Question 1

In a recent 5s Audit, a team of Associates has worked out a way of saving time on their stage of the assembly line. They measured time spent on this activity before and after the improvements.

This table shows the data relating to the Audit before and after the improvements were put into practice.

	Before Improvements	After Improvements
Cars worked on per day	3	3
Time spent on each car	67 minutes	62 minutes
Time spent collecting & setting up parts per car	29	25 minutes

:

a) Calculate the total time in hours and minutes to set up parts **and** work on each car **before** improvements (show all workings out).

b) Calculate the total time in hours and minutes to set up parts **and** work on each car **after** improvements (show all workings out).

c) Based on a 5 day week, calculate the **total time** (in hours and minutes) **per week** for setting up and working on all the cars **before** improvements.

Numeracy Level 2 at Bentley Application of Skills Week 2



d) Based on a 5 day week, calculate the **total time** (in hours and minutes) **per week** for setting up and working on all the cars **after** improvements.

e) Based on 48 working weeks in a year, calculate the **total time** (in hours and minutes) **per year** for setting up and working on all the cars **before** improvements.

f) Based on 48 working weeks in a year, calculate the **total time** (in hours and minutes) **per year** for setting up and working on all the cars **after** improvements.

g) Based on an average rate of pay of £15 per hour, calculate the **yearly** cost **before** improvements.

h) Based on an average rate of pay of £15 per hour, calculate the **yearly** cost **after** improvements

Numeracy Level 2 at Bentley Application of Skills Week 2



i) Calculate the **annual savings** after the cost saving improvements have been put into place

Question 2

A recent poster briefing compares actual and planned overhead costs for the last three months:

MONTH	PLANNED OVERHEAD COSTS £s	ACTUAL OVERHEAD COSTS £s
October	1.2 million	1.3m
November	0.78 million	0.64m
December	0.97 million	1.06 million

a) Calculate the **total planned** overhead costs for the three months

b) Calculate the **total actual** overhead costs for the three months

c) For each of the three months, calculate the difference between **planned** and **actual** overhead costs and for each month state whether **over or under budget**

Numeracy Level 2 at Bentley

Application of Skills

Week 2



Question 3

On the Chassis X assembly line, one task costs £27 per car plus £1.76 per wheel fitted. Five cars are processed per day.

Using the following sum, calculate the cost per day.

$$5 (\text{£}27 + 4 \times \text{£}1.76)$$

Question 4

The management team uses different formulae to calculate the total costs of different processes on the assembly lines.

- a) Using the formula below, calculate the total costs for this process, **when 16 cars are built**:

$$C = 77 + 32n \quad \text{where } C = \text{total cost in } \text{£} \text{ and } n = \text{number of cars built}$$

- b) Using the formula below, calculate the total costs for this process **over 5 days, when 17 cars are built**:

$$C = 5(77 + 32n) \quad \text{where } C = \text{total cost in } \text{£} \text{ and } n = \text{number of cars built}$$

Numeracy Level 2 at Bentley

Application of Skills

Fractions, Decimals and Percentages



Question 1

In a recent 5s Audit, a team of Associates has worked out a way of saving time spent on an activity on the assembly line. The activity normally takes 2 hours per car. The team can cut back the time by 15%.

- What is the new time, in hours and minutes, per car after the 15% cut back in time? *Show all workings out.*
- What is 15% as a fraction in its simplest terms?
- What is 15% as a decimal number?

Question 2

A recent poster briefing compares actual and planned overhead costs for the month of January:

MONTH	PLANNED OVERHEAD COSTS £s	ACTUAL OVERHEAD COSTS £s
January	780,000	819,000

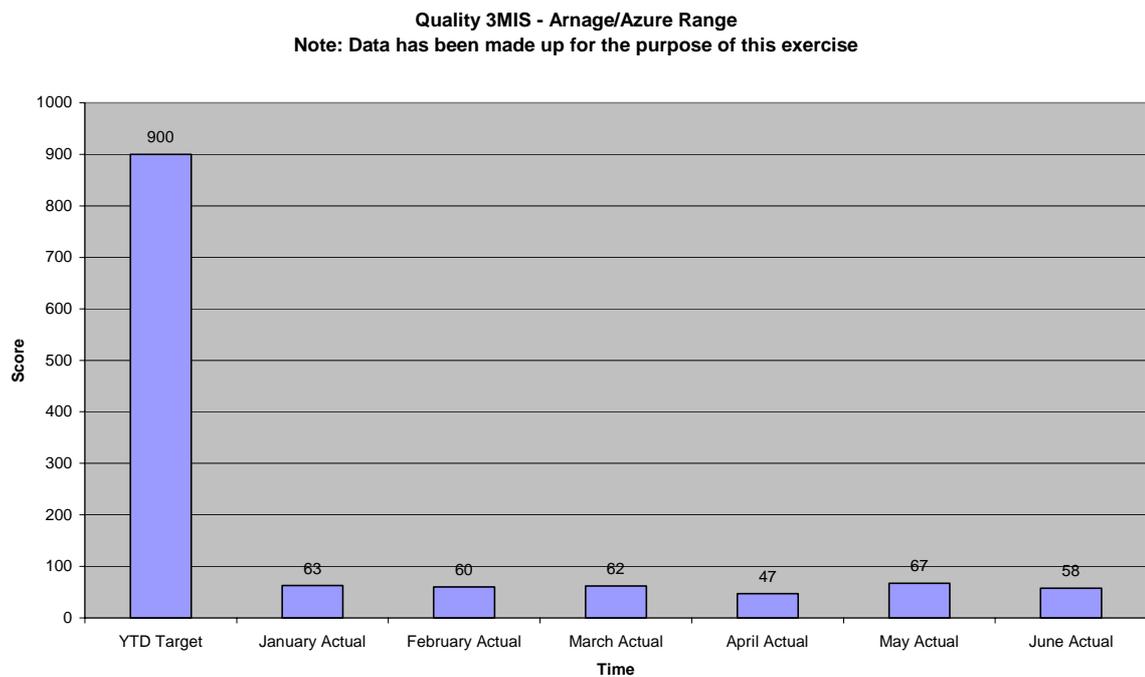
- The actual costs have increased by **approximately** what **fraction** of the planned costs?
- What is this as a percentage?
- What is this as a decimal number?

Numeracy Level 2 at Bentley Application of Skills Fractions, Decimals and Percentages



Question 3

The Quality section of a recent Company Key Goals poster shows the following chart:



- a) **Approximately** what percentage of the *Year to Date (YTD) Target* has been reached so far?

- b) What is this as a fraction?

- c) What is this as a decimal?

Numeracy Level 2 at Bentley

Contextualised Practice Test Questions



Question 1

A team of Associates has a Kaizen cost saving idea. They have worked out that they can save £7 per day plus £1.75 per car. They calculate the **weekly** cost using the formula:

$$C = 5(7 + 1.75n)$$

Where n = average number of cars worked on per day.

What is the weekly cost saving when the average number of cars worked on is 4?

- A £7
- B £8.75
- C £12.75
- D £70

Question 2

In a recent poster briefing, it shows that the Company has spent £7.4m less than planned on overheads this year.

What is another way of writing £7.4m?

- A £7 400
- B £740 000
- C £7 400 000
- D £740

Question 3

On the Chassis B assembly line, one task costs £16 per car plus 97p per wheel fitted.

Which is the correct method for calculating the total cost per car after all four wheels have been fitted?

- A $\frac{4 \times 97 + 16}{100}$
- B $4 \times 97 + 16$
- C $(16 + 97) \times 4$
- D $\frac{4 \times 97 + 16}{100}$

Numeracy Level 2 at Bentley Contextualised Practice Test Questions



Question 4

In a 5s Audit, the target score is 95%.

What is 95% as a fraction in its simplest or lowest terms?

- A $\frac{9}{5}$
- B $\frac{95}{100}$
- C $\frac{19}{20}$
- D $\frac{100}{95}$

Question 5

In the 5s Audit, the target score is 95% and the actual score is 87%.

What percentage increase is required to reach the target score?

- A 95%
- B 8%
- C 87%
- D 13%

Question 6

On a 5s Audit sheet, the score is 84 out of a possible 102 marks.

Approximately what percentage is this?

- A 80%
- B 8%
- C 70%
- D 20%

Numeracy Level 2 at Bentley Contextualised Practice Test Questions

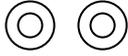


Question 7

In a cost-cutting exercise, a count was taken of the number of faulty washers over a five week period:

The results have been displayed in a pictogram.

Faulty Washers

Week Number	Number of faulty washers
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	

What is missing from the pictogram?

- A A title
- B A key
- C A label on the horizontal axis
- D A label on the vertical axis

Numeracy Level 2 at Bentley Contextualised Practice Test Questions



Question 8

The Production Training team has kept a record of the number of packs of A4 paper used over a six month period.

	Jan	Feb	Mar	Apr	May	Jun
Number of packs of A4	6	4	5	6	7	5

What is the mean (to the nearest whole number) of packs used over the six month period?

- A 6
- B 7
- C 33
- D 5

Question 9

Team members on assembly line X have measured minutes wasted on a single activity over a ten day period.

Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri
2	3	2	2	5	1	6	4	2	3

What is the range of time wasted?

- A 30 minutes
- B 5 minutes
- C 6 minutes
- D 1 minute

Question 10

A Team Leader wants to draw up a poster to show how attendance has varied over the last twelve months.

Which is the most effective way to display this information?

- A a pie chart
- B a table
- C a scatter graph
- D a line graph

Appendix 3

Resources for Measuring Impact

Numeracy Level 2 at Bentley



Following on from four successful Maths courses at Bentley, we are introducing a slightly different approach to the course this time. We would be grateful if you could help us to measure the impact by filling in this questionnaire twice: at the beginning and the end of the course.

Please tick one box for each question.

1. Generally, how confident are you in your Maths abilities?

0	1	2	3	4	5	6	7	8	9	10
not at all confident					very confident					

2. Generally, how confident do you feel about supporting others with their Maths?

0	1	2	3	4	5	6	7	8	9	10
not at all confident					very confident					

3. How much Maths do you use in your job role?

0	1	2	3	4	5	6	7	8	9	10
not at all					Maths is a big part of my job					

4. How much do you need Maths to take part in Bentley's team briefings?

0	1	2	3	4	5	6	7	8	9	10
not at all					Maths is essential					

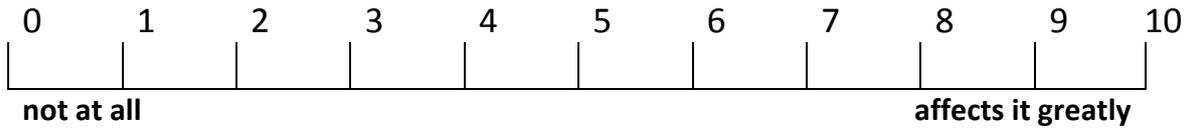
5. How confident are you in taking part in these team briefings?

0	1	2	3	4	5	6	7	8	9	10
not at all confident					very confident					

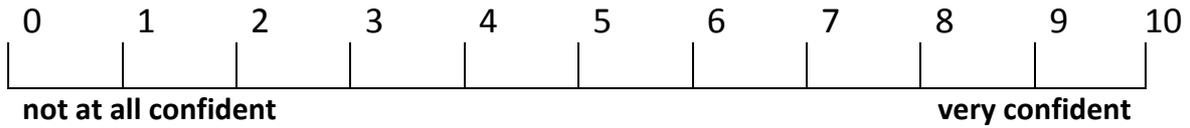
Numeracy Level 2 at Bentley



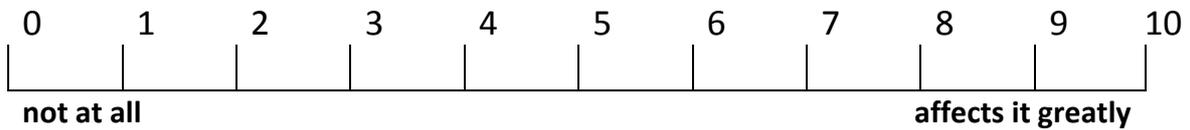
6. How does your confidence in Maths affect this?



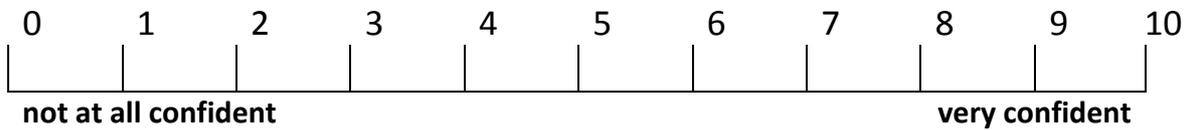
7. How confident are you in understanding Bentley's audit scores?



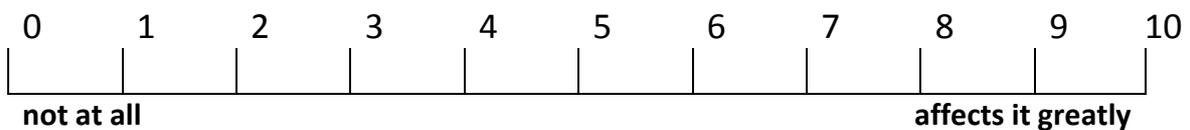
8. How does your confidence in Maths affect this?



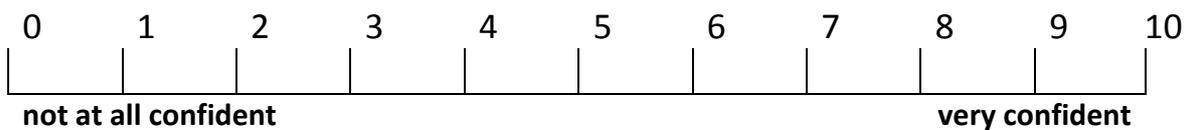
9. How confident would you feel today about applying for courses (at work or outside work)?



10. How does your confidence in Maths affect this?



11. How confident would you feel today about applying for a different job at Bentley?



Numeracy Level 2 at Bentley



12. How does your confidence in Maths affect this?

0	1	2	3	4	5	6	7	8	9	10
not at all					affects it greatly					

13. Have you done or are you currently doing the Business Improvement Techniques (BIT) NVQ at Bentley?

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

If you answered 'yes' to above, please complete the rest of this questionnaire

14. How much Maths is involved in the BIT NVQ?

0	1	2	3	4	5	6	7	8	9	10
no Maths at all					Maths plays a big part					

15. How confident are you/were you in doing the BIT NVQ?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident					Very confident					

16. How does your confidence in Maths affect this?

0	1	2	3	4	5	6	7	8	9	10
not at all					Affects/affected it greatly					

Thank you very much for doing this questionnaire.

Numeracy Level 2 at Bentley



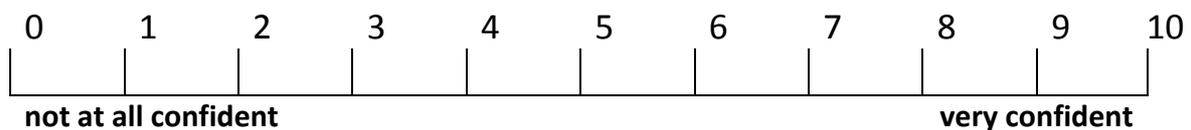
We would be grateful if you could help us to measure the impact of teaching this Maths skill by filling in this questionnaire at the beginning and the end of this topic.

<p>Name:</p> <p>Date:</p> <p>Maths skill(s) covered:</p>

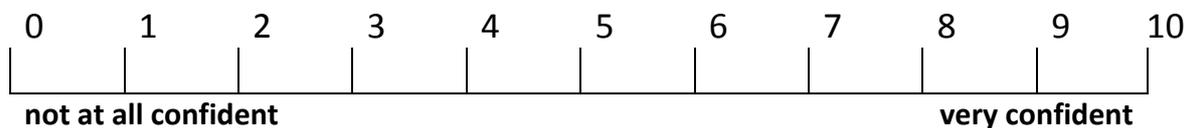
Please tick one box for each question.

Before this particular Maths skill has been taught:

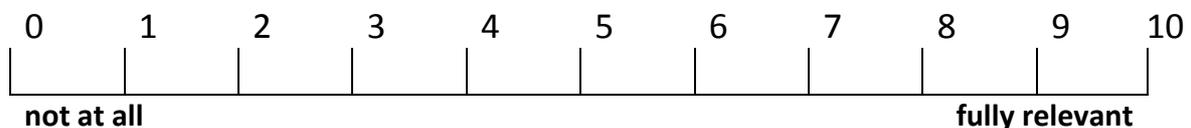
1. How confident are you in this particular skill?



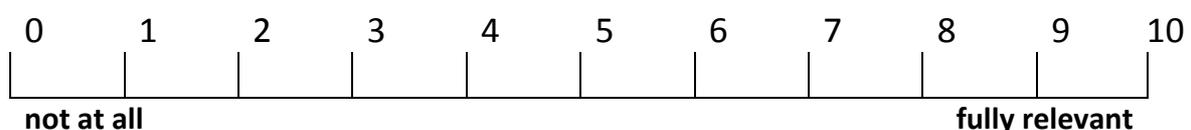
2. How confident would you be in helping someone else with this particular skill (at work or at home)?



3. How relevant is this particular skill to your workplace?



4. How relevant is this particular skill to any other training you have done or are doing at Bentley?

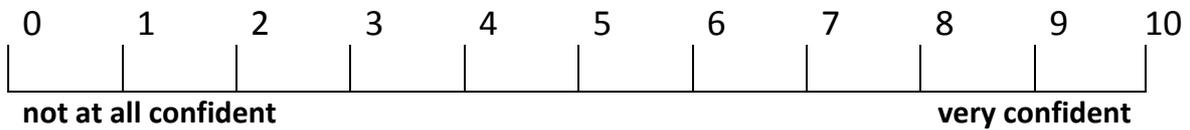


Numeracy Level 2 at Bentley

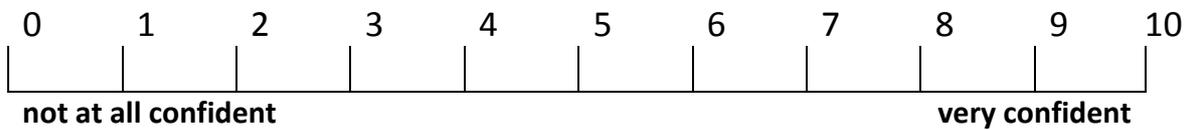


After this particular Maths skill has been taught:

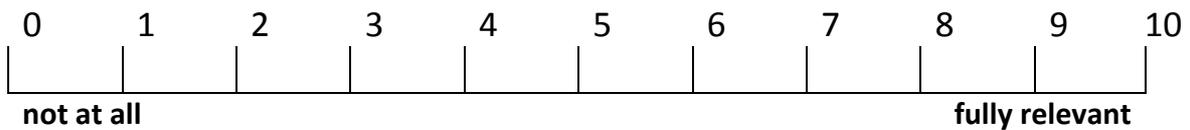
5. How confident are you in this particular skill?



6. How confident would you be in helping someone else with this particular skill (at work or at home)?

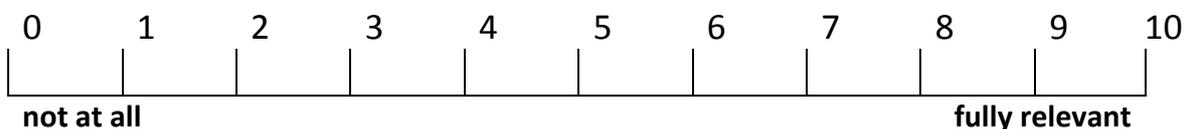


7. How relevant is this particular skill to your workplace?



Please give examples:

8. How relevant is this particular skill to any other training you have done or are doing at Bentley?



Please give examples:

Thank you very much for doing this questionnaire.

Lesson Impact Learner Questionnaire

Numeracy Level 2 at Bentley



Week Number:

Date:

Maths skill(s) covered:

How much have you enjoyed the last two lessons on this particular skill?

What did you like?

What could have been done better?

How might you use these particular skills outside work?