



GATSBY CURRICULUM DESIGN GROUP REPORT

Group: Engineering and manufacturing

Date of report: October 2026

Colleges involved: Lakes College, Windsor Forest Colleges Group, Blackburn College, New College Durham, Wiltshire College & University Centre, Cambridge Regional College, South Essex College, Wirral Metropolitan College, Hopwood Hall College, Middlesbrough College, City College Norwich

Context or problem being addressed

Many learners start college without having the GCSE grades or prior knowledge needed to move straight onto a level 3 programme, such as a T-level. While level 2 qualifications provide an important stepping stone, the transition can still be challenging, particularly in technical subjects and mathematics. Learners may also have fewer opportunities to develop the practical skills and workplace behaviours needed for their next step.

These challenges can affect progression to level 3 programmes, apprenticeships, higher education and employment. Colleges, employers and higher education providers all recognise the need to improve student preparation at level 2.

Purpose (summary)

The group is developing an enhanced level 2 engineering and manufacturing study programme that provides learners with a stronger foundation for progression. The work focuses on:

- Defining the core knowledge, skills and behaviours learners need for successful progression.
- Embedding mathematics into practical engineering and manufacturing projects and activities.
- Developing a programme model that reflects employer expectations and supports progression to level 3 programmes, apprenticeships and employment.

What is different or innovative about this work?

The group started by asking a different question: what do learners need to succeed beyond level 2? Instead of designing the curriculum around the qualification, members worked backwards from the knowledge, skills and behaviours learners need to progress into level 3 programmes, apprenticeships and employment.

A key feature of the work has been embedding mathematics into practical engineering and manufacturing projects. This approach means learners use their mathematical knowledge because they have to apply it in real engineering and manufacturing contexts, instead of it being treated as a separate subject.

Colleges have worked together to develop and test ideas, creating a shared approach that can be adapted to different settings.

Activity to date

- Senior curriculum leaders agreed the project's priorities and overall direction.
- Curriculum leads from participating colleges worked together in dedicated task and finish groups focused on mathematics and practical technical skills.
- Initial proposals for enhancing level 2 engineering and manufacturing programmes have been developed and shared.
- The next phase of work, including pilot activity, has been agreed.

Outputs that can be shared at this stage

- Summary presentation on project-based delivery (see [Appendix 1](#)). Produced by the working group, this presentation explains the approaches they developed to embed practical and work readiness skills into the curriculum. It also outlines the group's work with employers to design and test project-based activities, alongside feedback from working group members and recommended next steps. The group will continue to refine the approaches before piloting them in participating colleges.
- Sample mathematics resources for project-based learning (see [Appendix 2](#)). The working group has developed a series of teaching materials that integrate mathematics into practical engineering and manufacturing activities. The initial focus has been on algebra, differentiation, statistics and trigonometry, with examples linked to automotive, electrical and electronic, mechanical, and welding and fabrication engineering activities. The group also explored how AI can be used to support the development of teaching resources. The next stage is for all participating colleges to integrate the materials and pilot them during the next academic year.

Impact or early insights

The group has shown the value of starting with the outcomes learners need to achieve and then designing the curriculum around them. By agreeing on a shared set of progression outcomes, colleges have developed a consistent approach to preparing learners for level 3 programmes, apprenticeships and employment.

Embedding mathematics into practical engineering and manufacturing projects has been a particular focus. Early feedback suggests this helps learners better understand the relevance of mathematics to engineering and manufacturing

contexts, with several colleges reporting higher engagement and better attendance than with more traditional classroom-based delivery.

The group has also developed the concept of employer-set projects at level 2, building on successful examples already used in colleges. Early feedback from learners and employers has been positive, and the longer-term aim is to create a shared bank of employer-endorsed project-based learning resources that colleges can adapt to meet local needs.

Colleges have valued the opportunity to develop the curriculum together. Sharing ideas, agreeing common progression outcomes and testing approaches collaboratively has helped shape curriculum design and has created opportunities for joint activities, including inter-college competitions and shared delivery.

Implications and transferability for other providers

The group's experience offers several practical lessons for colleges looking to strengthen level 2 engineering and manufacturing programmes.

The starting point should be progression. By agreeing on the knowledge, skills and behaviours learners need for level 3 programmes, apprenticeships and employment, curriculum design becomes much clearer and more purposeful.

Employers should be involved from the outset. Their input helps ensure programmes reflect current industry expectations, while their involvement in projects, delivery and assessment makes learning more relevant and creates opportunities for placements and apprenticeships.

The group also found that embedding mathematics in practical engineering and manufacturing projects helps learners understand why mathematics matters. Rather than it being taught as a separate subject, applying mathematics in real engineering and manufacturing contexts can increase students' engagement and strengthen both their technical and mathematical skills.

Finally, collaboration between colleges has been one of the project's greatest strengths. By sharing ideas, developing resources together and testing new approaches they have reduced duplication and produced better outcomes than any college could have achieved alone.

Next steps

The group has made good progress in the six months since it was formed, and some members want to continue this collaborative work. Potential areas of focus for this continued collaboration include:

- Creating an ongoing network to share development and to pilot resources. The network would also facilitate staff visits between colleges.
- Further development of a shared resource facility to enable colleges to share resources and approaches more easily.
- Collaborative testing of new delivery approaches, with a particular focus on project-based learning, employer-set projects at level 2 and inter-college competitions.
- Further roll-out of real employer-led projects to support skills development by working with another regional employer group.

Want to find out more?

Colleagues interested in further information or collaboration are encouraged to email Gatsby at TEN@gatsby.org.uk

APPENDIX I: PRESENTATION ON APPROACHES TO PROJECT-BASED LEARNING

Please see the [Practical Technical Skills Development](#) presentation.

This presentation, produced by the working group, explains the approaches they developed to embed practical and work readiness skills into the curriculum. It also outlines the group's work with employers to design and test project-based activities, alongside feedback from working group members and recommended next steps.

APPENDIX 2: LIST OF RESOURCES DEVELOPED FOR MATHEMATICS DELIVERY

Discipline based

- \Discipline based\Automotive\Level 2 Automotive Engineering - Maths Through Practical Tasks.docx
- \Discipline based\Automotive\Level_2_Automotive_Maths_Worked_Examples_Presentation.pptx
- \Discipline based\Automotive\Scheme_of_Work_Level_2_Automotive_Maths.docx
- \Discipline based\Automotive\Tutor_Marking_Scheme_Level_2_Automotive_Maths (2).docx
- \Discipline based\Electrical & Electronics\Level 2 Electrical & Electronic Engineering - Maths Through Practical Tasks.docx
- \Discipline based\Electrical & Electronics\Level_2_Electrical_Maths_Worked_Examples_Presentation.pptx
- \Discipline based\Electrical & Electronics\Scheme_of_Work_Level_2_Electrical_Maths.docx
- \Discipline based\Electrical & Electronics\Tutor_Marking_Scheme_Level_2_Electrical_Maths.docx
- \Discipline based\Mechanical Engineering\Level 2 Mechanical Engineering - Maths Through Practical Tasks.docx
- \Discipline based\Mechanical Engineering\Level_2_Mechanical_Maths_Worked_Examples_Presentation.pptx
- \Discipline based\Mechanical Engineering\Scheme_of_Work_Level_2_Mechanical_Maths.docx
- \Discipline based\Mechanical Engineering\Tutor_Marking_Scheme_Level_2_Mechanical_Maths.docx
- \Discipline based\Welding & Fabrication\Level 2 Welding & Fabrication - Maths Through Practical Tasks.docx
- \Discipline based\Welding & Fabrication\Level_2_Welding_Fabrication_Maths_Worked_Examples_Presentation (1).pptx
- \Discipline based\Welding & Fabrication\Scheme_of_Work_Level_2_Welding_Fabrication_Maths.docx
- \Discipline based\Welding & Fabrication\Tutor_Marking_Scheme_Level_2_Welding_Fabrication_Maths.docx

Math topic based

- \Math topic based\Algebraic Methods\Level 2 Transition Maths - Introduction To Algebraic Methods Through Practical Tasks.docx
- \Math topic based\Algebraic Methods\Level_2_Transition_Maths_Algebra_Worked_Examples_Presentation.pptx
- \Math topic based\Algebraic Methods\Scheme_of_Work_Level_2_Algebraic Methods _Maths.docx
- \Math topic based\Algebraic Methods\Tutor_Marking_Scheme_Level_2_Algebraic Methods _Maths.docx
- \Math topic based\Differentiation\Level 2 Transition Maths - Introduction To Differentiation Through Practical Tasks.docx
- \Math topic based\Differentiation\Level_2_Transition_Maths_Differentiation_Worked_Examples_Presentation.pptx
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- \Math topic based\Differentiation\Tutor_Marking_Scheme_Level_2_Transition_Differentiation.docx
- \Math topic based\Statistical Methods\Level 2 Transition Maths - Introduction To Statistical Methods Through Practical Tasks.docx
- \Math topic based\Statistical Methods\Level_2_Transition_Maths_Statistics_Worked_Examples_Presentation.pptx
- \Math topic based\Statistical Methods\Scheme_of_Work_Level_2_Transition_Statistics.docx
- \Math topic based\Statistical Methods\Tutor_Marking_Scheme_Level_2_Transition_Statistics.docx
- \Math topic based\Trigonometry\Level 2 Transition Maths - Introduction To Trigonometry Through Practical Tasks.docx
- \Math topic based\Trigonometry\Level_2_Transition_Maths_Trigonometry_Worked_Examples_Presentation.pptx
- \Math topic based\Trigonometry\Scheme_of_Work_Level_2_Transition_Trigonometry.docx
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