Competition-Based Learning:
In Higher Education





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Glasgow Caledonian University

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Senior digital Design consultant
WSP



Agenda:

Designing for engagement
Case Study
Workshop
Conclusion



Have you ever heard a lecturer complain they had too much student engagement?

What do you currently do to engage your students?

GCU Glasgow Caledonian University

University for the Common Good

In 2001, I had too much Engagement

Negative
Unexpected
Chaos!



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WorldSkills a prime example of...
Glasgow Caledonian University



Scottish college named 'Best in UK' for...
FS FutureScot



WorldSkills a prime example of...
Glasgow Caledonian University



WorldSkills a prime example of...
Glasgow Caledonian University



The gains from Gdansk - WorldSkills UK
WorldSkills UK



teamuk #worldskills #proudmoment...
LinkedIn



WorldSkills Ireland 2026: Michael...
LinkedIn



Michael McGuire - Autodesk Certified...
Architecture Social



Michael McGuire | BIM Expert, Digital...
Udemy



igitalconstruction #bim #worldskillsuk...
LinkedIn



WorldSkills | Autodesk
Autodesk









Michael McGuire's Published Paper:...
LinkedIn

What I use to:

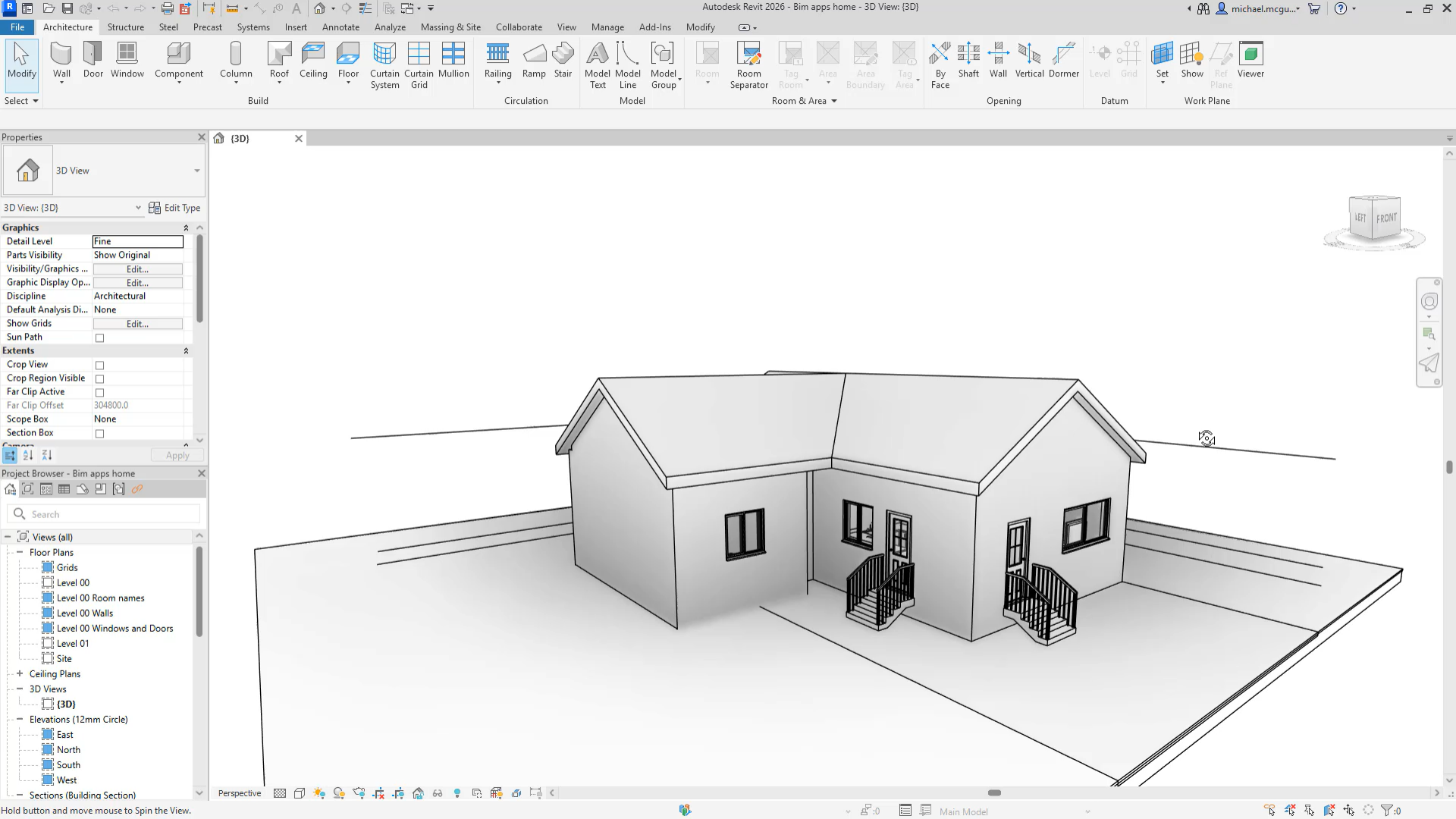
Spark interest
Stimulate curiosity
Increase engagement



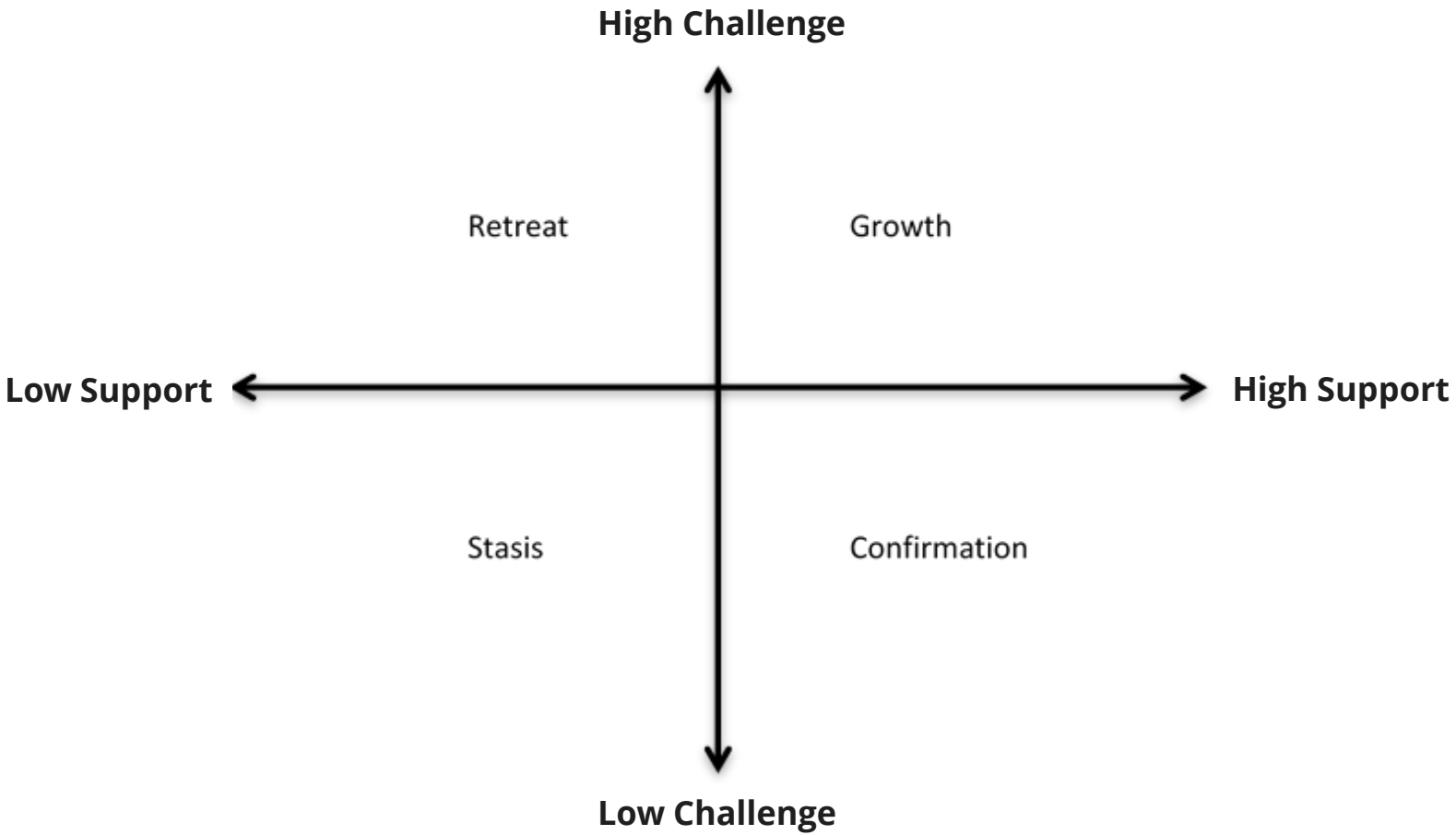
Incentives


worldskillsuk
Team UK
DAIRY MILK
Freddo
BIG TICKET SAVINGS
5

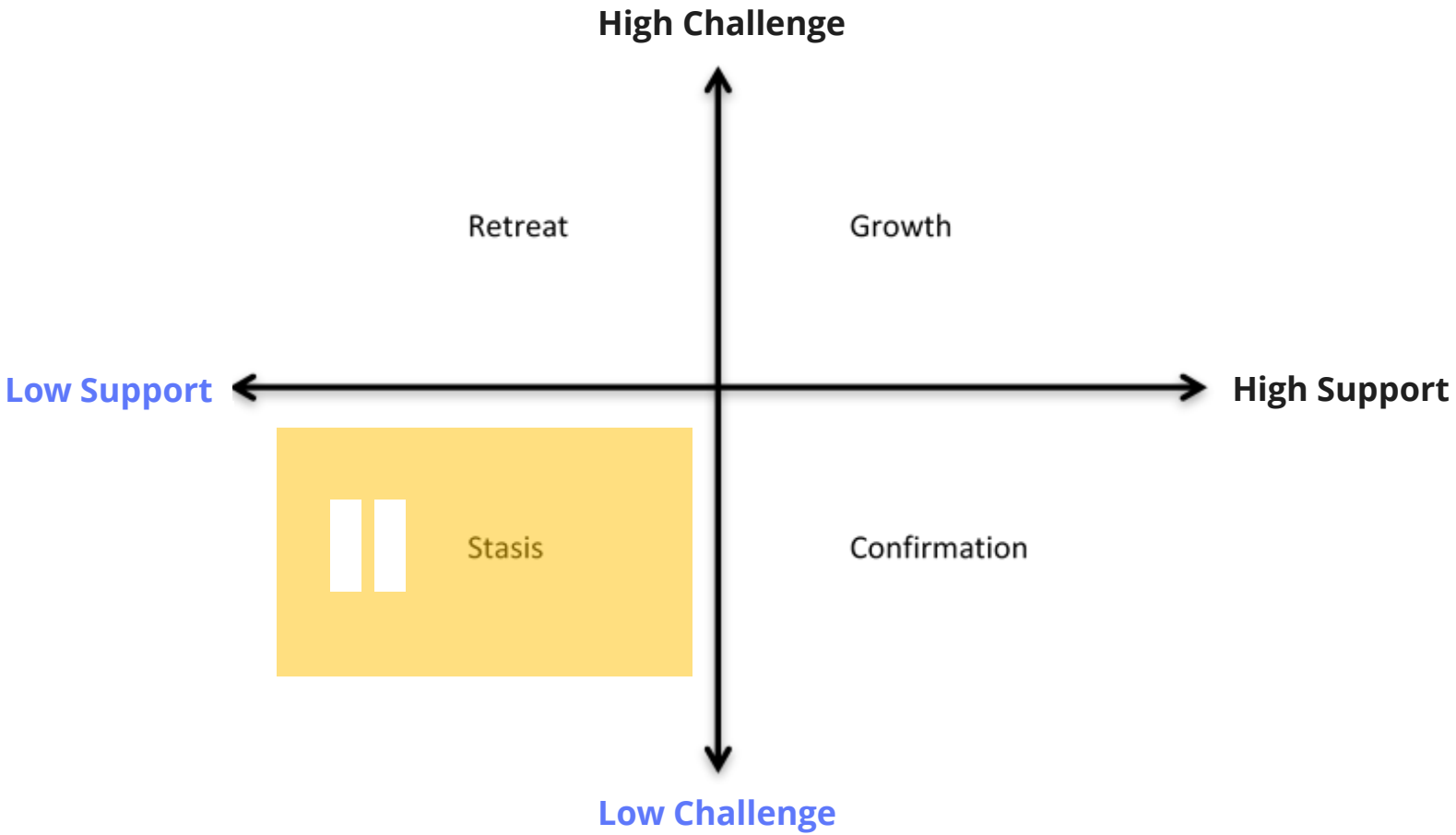
Step 1: Module


Autodesk Revit 2026 - Bim apps home - 3D View: {3D}
michael.mcgu...
File
Architecture
Structure
Steel
Precast
Systems
Insert
Annotate
Analyze
Massing & Site
Collaborate
View
Manage
Add-Ins
Modify
Modify
Select
Wall
Door
Window
Component
Column
Roof
Ceiling
Floor
Curtain System
Curtain Grid
Mullion
Build
Railing
Ramp
Stair
Circulation
Model Text
Model Line
Model Group
Model
Room
Room Separator
Tag Room
Area
Area Boundary
Tag Area
Room & Area
By Face
Shaft
Wall
Vertical
Dormer
Opening
Level
Grid
Datum
Set
Show
Ref Plane
Viewer
Work Plane
Properties
3D View
3D View: {3D}
Edit Type
Graphics
Detail Level
Fine
Parts Visibility
Show Original
Visibility/Graphics ...
Edit...
Graphic Display Op...
Edit...
Discipline
Architectural
Default Analysis Di...
None
Show Grids
Edit...
Sun Path
Extents
Crop View
Crop Region Visible
Far Clip Active
Far Clip Offset
304800.0
Scope Box
None
Section Box
Apply
Project Browser - Bim apps home
Search
Views (all)
Floor Plans
Grids
Level 00
Level 00 Room names
Level 00 Walls
Level 00 Windows and Doors
Level 01
Site
Ceiling Plans
3D Views
{3D}
Elevations (12mm Circle)
East
North
South
West
Sections (Building Section)
{3D}
LEFT
FRONT
Perspective
Main Model
Hold button and move mouse to Spin the View.

Step 2: Support


High Challenge
Retreat
Growth
Low Support
High Support
Stasis
Confirmation
Low Challenge

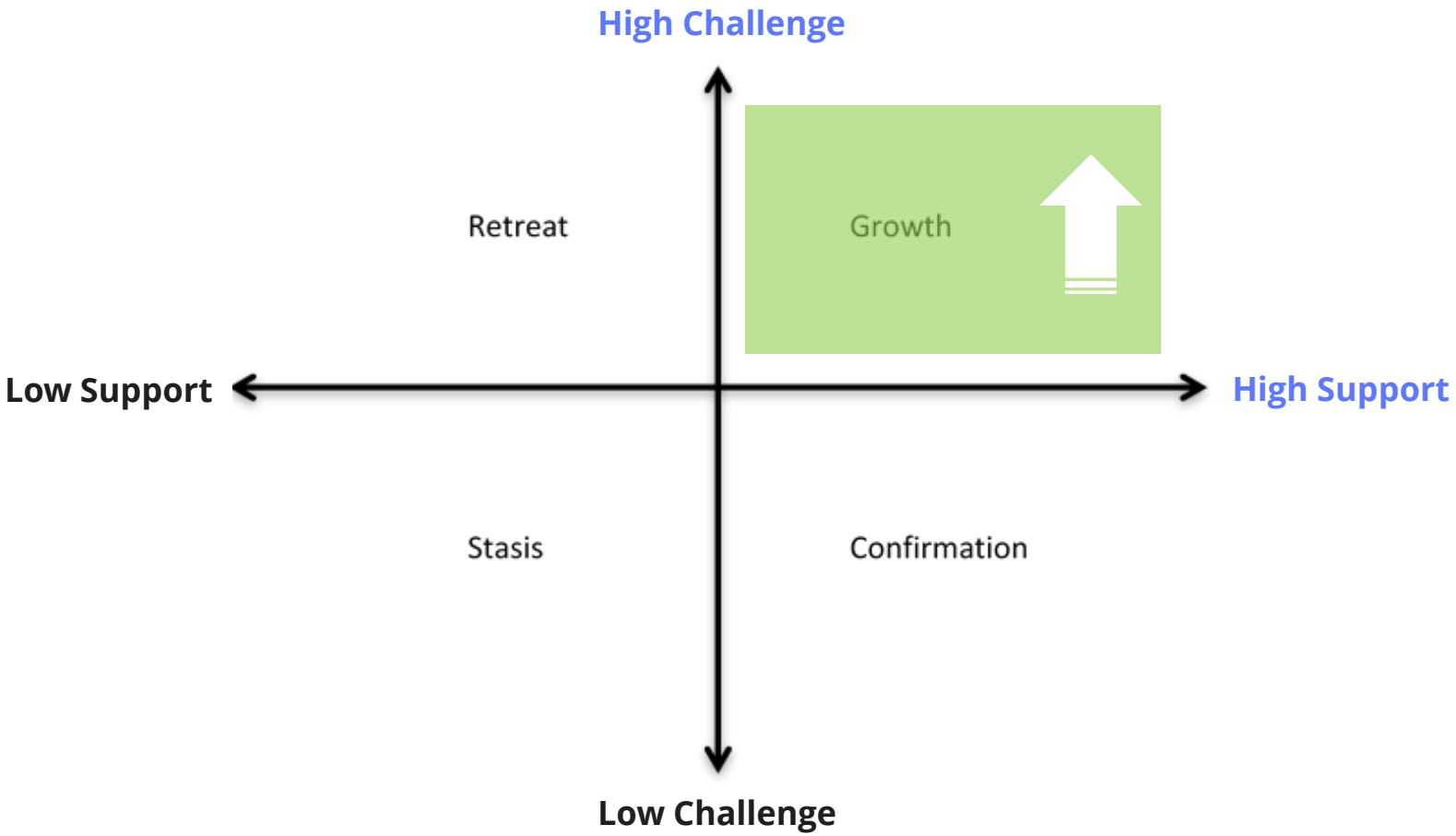
DALOZ 1986


High Challenge
Retreat
Growth
Low Support
High Support
Stasis
Confirmation
Low Challenge

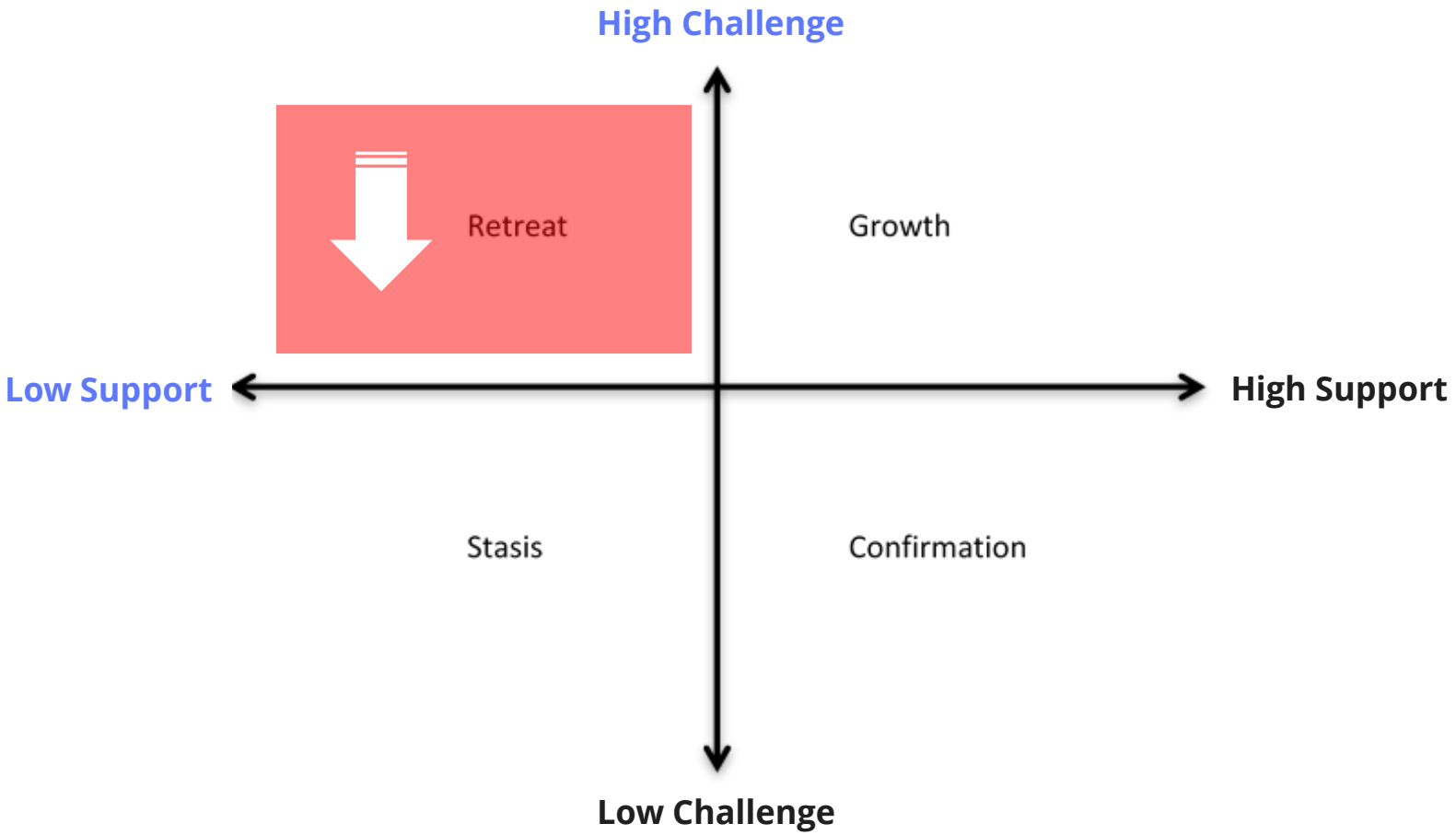
DALOZ 1986


High Challenge
Retreat
Growth
Low Support
High Support
Stasis
Confirmation
Low Challenge

DALOZ 1986


High Challenge
Retreat
Growth
Low Support
High Support
Stasis
Confirmation
Low Challenge

DALOZ 1986


High Challenge
Retreat
Growth
Low Support
High Support
Stasis
Confirmation
Low Challenge

DALOZ 1986

The Task Instructions

Virtual Competition Preparation
WorldSkills BIM & Digital Construction Competition
Regional & National Level

Michael McGuire: Lecturer, New College Lanarkshire (UK)

AUTODESK.



BIM Execution Plan

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BIM360 Common Data Environment

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Regional & National Level

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A1.2 Setting Up The CDE (BIM360)

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A1.3 Collaborate To BIM360

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A1.4 Managing Structural Worksets

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A1.5 Linking Geospatial Grids

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A1.8 CopyMonitor Level and Grid

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A1.9 Coordination Review

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A1.8 CopyMonitor Level and Grid

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A1.9 Coordination Review

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A1.12 Validate The Project Info. Model

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B1.20 Assigning Classification Info.

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B1.23 Adding COBie Data To PIM

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B1.8 CopyMonitor Structural Floors

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C1.2 Navisworks Hard CLash Detection

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Regional & National Level

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C1.8 Navisworks Sharing Clash Info.

Virtual Competition Preparation
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HND Computer Aided Architectural Design and Technology Student at New ...
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Autodesk AutoCAD Certified User was issued by Certiport to Monika Matusik.

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Open all Close all

Instructions: Clicking on the section name will show / hide the section.

Module 1 : BIM Fundamentals

- Lessons
- Practice Assessment 1
- Practice Assessment 2
- End of Module Assessment 1

Restricted Not available unless:

- The activity **Practice Assessment 1** is complete and passed
- The activity **Practice Assessment 2** is complete and passed



Module 2 : Advancing with BIM

- Lessons
- Practice Assessment 3 - Uniclass2015
- Practice Assessment 4 - Naming
- Practice Assessment 5 - BIM Execution Plan
- End of Module Assessment 2

Restricted Not available unless:

- The activity **Practice Assessment 3 - Uniclass2015** is complete and passed
- The activity **Practice Assessment 4 - Naming** is complete and passed
- The activity **Practice Assessment 5 - BIM Execution Plan** is complete and passed



Module 3 : BIM Coordination

- Lessons
- Practice Assessment 6 - Collaboration
- Practice Assessment 7 - Clash Detection
- End of Module Assessment 3

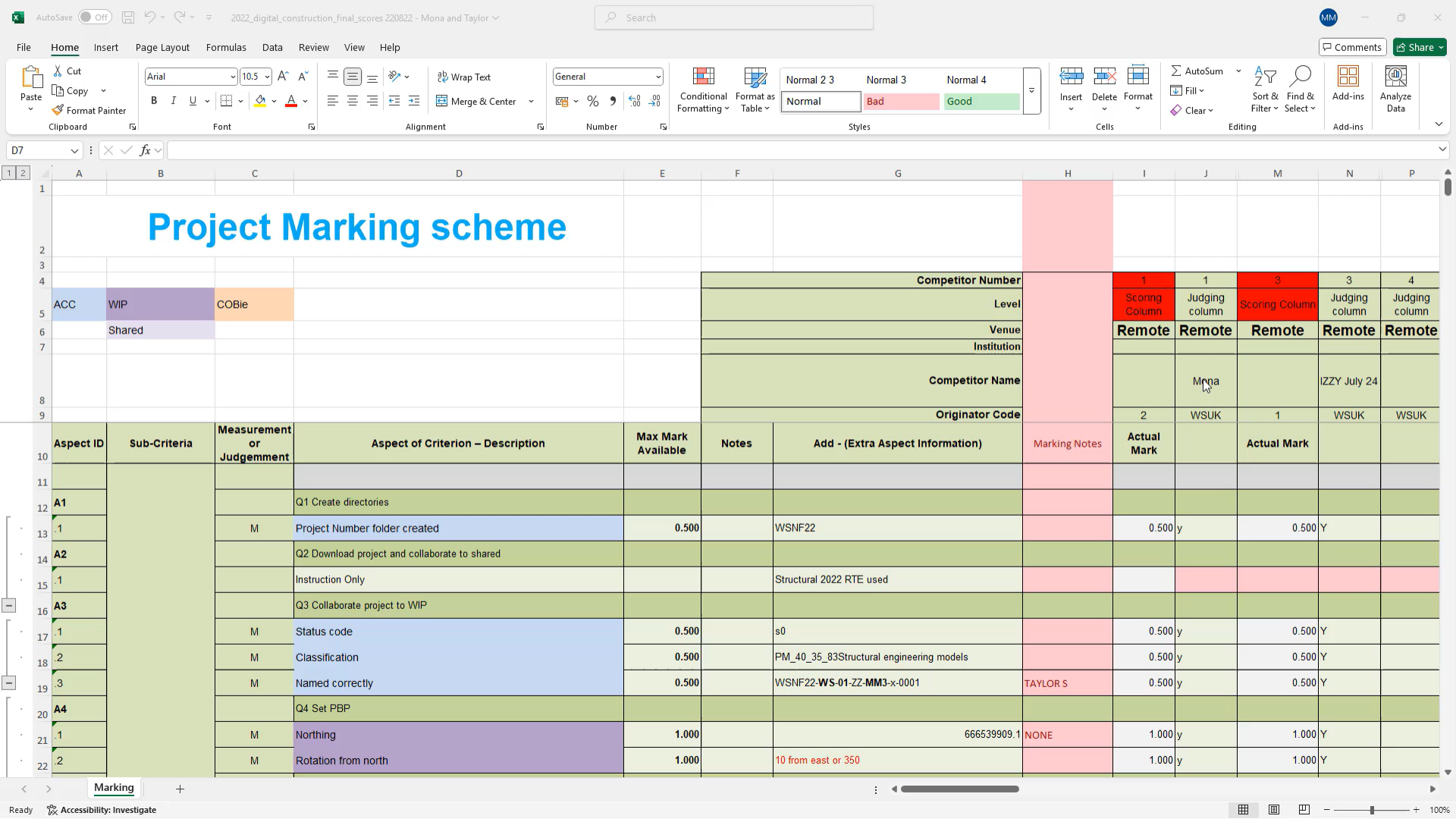
Restricted Not available unless:

- The activity **Practice Assessment 6 - Collaboration** is complete and passed
- The activity **Practice Assessment 7 - Clash Detection** is complete and passed



Module 4 : BIM Standards

Step 3: Marking and feedback



Project Marking scheme

ACC	WIP	COBie
	Shared	

							Competitor Number	1	1	3	3	4
							Level	Scoring Column	Judging column	Scoring Column	Judging column	Judging column
							Venue	Remote	Remote	Remote	Remote	Remote
							Institution					
							Competitor Name		Mona		IZZY July 24	
							Originator Code	2	WSUK	1	WSUK	WSUK

Aspect ID	Sub-Criteria	Measurement or Judgemment	Aspect of Criterion – Description	Max Mark Available	Notes	Add - (Extra Aspect Information)	Marking Notes	Actual Mark		Actual Mark		
A1			Q1 Create directories									
.1		M	Project Number folder created	**0.500**		WSNF22		0.500	y	0.500	Y	
A2			Q2 Download project and collaborate to shared									
.1			Instruction Only			Structural 2022 RTE used						
A3			Q3 Collaborate project to WIP									
.1		M	Status code	**0.500**		s0		0.500	y	0.500	Y	
.2		M	Classification	**0.500**		PM_40_35_83Structural engineering models		0.500	y	0.500	Y	
.3		M	Named correctly	**0.500**		WSNF22-**WS**-**01**-ZZ-**MM3**-x-0001	TAYLOR S	0.500	y	0.500	Y	
A4			Q4 Set PBP									
.1		M	Northing	**1.000**		666539909.1	NONE	1.000	y	1.000	Y	
.2		M	Rotation from north	**1.000**		10 from east or 350		1.000	y	1.000	Y	

Marking

Edit Möbius component

Component | Feedback

Maple-graded:

Weighting 10

Answer 253.4

(referenced when grading as $ANSWER)

Grading Code:

```
if (($ANSWER)-($RESPONSE))=0 then 1
elif abs((($ANSWER) - ($RESPONSE))/($ANSWER)) <= 0.01 then 0.8
elif abs((($ANSWER) - ($RESPONSE))/($ANSWER)) <= 0.05 then 0.5
elif abs((($ANSWER) - ($RESPONSE))/($ANSWER)) <= 0.10 then 0.25
else 0
end if;
```

Expression Type: Maple Syntax - e.g. diff(2*f(x),x)

Text/Symbolic entry: Text entry only

Optional:

Maple Repository:

Maple Repository

Plotting Code:

Custom Previewing Code:

Cancel | Update

Table 1. Categorised types of automated feedback provided to students during competition-based tasks.

Feedback yype	Illustrative comment
Growth-oriented feedback	You're making real progress here and would pass the exercise. There's room to improve the model accuracy, but this is a solid foundation. You are showing a great level of knowledge of the software tools. If you'd like to retry and improve, add some dimensions and check the accuracy of the model. See video lesson 3 for support in how to do this.
Reflection prompt	Even if this attempt didn't fully meet the brief, your effort shows clear thinking. What would you try differently next time? How could adding dimensions improve the accuracy? See video lesson 3 for support in how to do this.
Emotionally regulating prompt	It's completely normal to feel uncertain when working with unfamiliar tools, this is a natural part of mastering something new. What matters is that you're engaging, experimenting, and taking steps forward. If you're unsure about model accuracy, revisit video lesson 3 and take the opportunity to retry. Each time you try the exercise strengthens both your knowledge and your skill.
Specific actionable guidance	To strengthen your model, try adding aligned dimensions to improve precision. Focus on key reference planes, walls, windows, and levels. Then recheck the measurement accuracy using the guide in video lesson 3. This will help ensure your model meets both technical and visual standards.

McGuire, M. (2026). Feedback, reflection and psychological safety: rethinking assessment for student well-being in higher education. *Assessment & Evaluation in Higher Education*, *51*(3), 532–556. https://doi.org/10.1080/02602938.2025.2548590

Building Element	Measurement	Full Marks	Half Marks	Quarter Marks
Rooms	Volume	Exact	±5%	±10%
Walls	Length & Area	Exact	±5%	±10%
Windows	Cost	Exact	±5%	±10%
Floors	Area	Exact	±5%	±10%
Doors	Cost	Exact	±5%	±10%
Stairs	Material Volume	Exact	±5%	±10%
Roof	Area	Exact	±5%	±10%
Ceilings	Quantity	Exact	—	—

Step 4:

Reflect

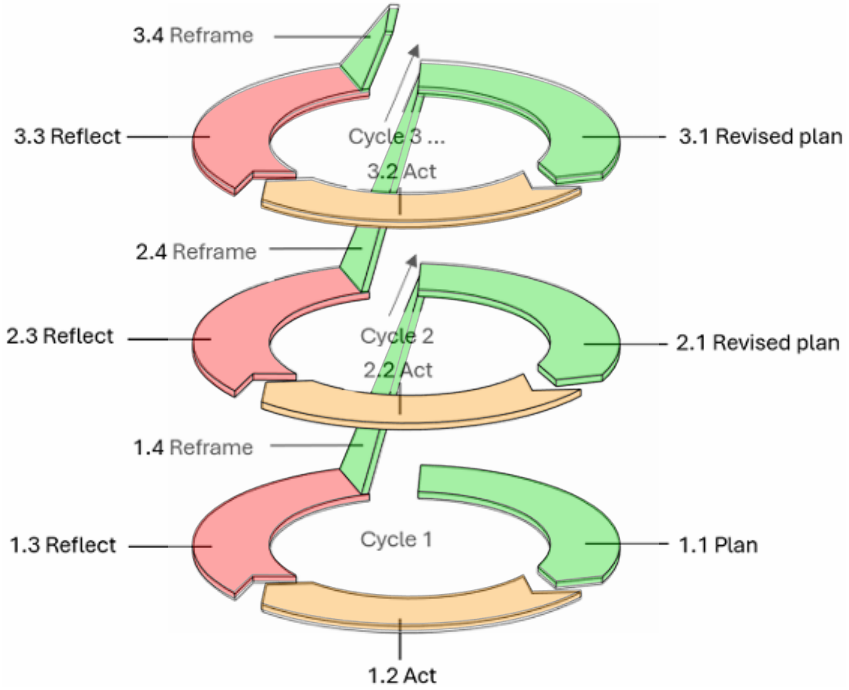


Figure 1. Adapted model of Lewin (1946) action research spiral. This visualisation emphasises the cumulative and iterative nature of the research process. The upward trajectory of the spiral symbolises the progressive refinement of the feedback-centric CBL model across time.

McGuire, M. (2026). Feedback, reflection and psychological safety: rethinking assessment for student well-being in higher education. *Assessment & Evaluation in Higher Education*, *51*(3), 532–556. https://doi.org/10.1080/02602938.2025.2548590

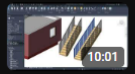
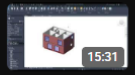
Channel content

Your channel
Michael McGuire

- Dashboard
- Content
- Analytics
- Community
- Languages
- Content detection
- Earn
- Customisation
- Audio library
- Settings
- Send feedback

Inspiration | **Videos** | Shorts | Live | Posts | Playlists | Podcasts | Courses | Promotions | Collaborations

Filter

Video	Notices	Visibility	Date	Views ↓	Comments
 8:07 9 ground floor floor and ceilings Add description	–	Unlisted	20 Sept 2024 Uploaded	1,085	0
 8:08 12 roofs 1 Add description	–	Unlisted	20 Sept 2024 Uploaded	1,024	0
 5:16 13 T shaped roofs Add description	–	Unlisted	20 Sept 2024 Uploaded	989	0
 10:01 10 stairs Add description	–	Unlisted	20 Sept 2024 Uploaded	971	0
 15:31 11 1st floor level Add description	–	Unlisted	20 Sept 2024 Uploaded	911	0
 7:39 8 ground floor doors and windows Add description	–	Unlisted	20 Sept 2024 Uploaded	734	0
 10:51 6 creating accurate extenal walls to given dimensions Add description	–	Unlisted	20 Sept 2024 Uploaded	687	0
 17 Rooms	–	Unlisted	20 Sept 2024	678	0

Advanced mode

Report
Audience retention

Controls

9 ground floo...

20 Sept 2024 – 29 Jul 2026
Since uploaded (lifet...

Chart options

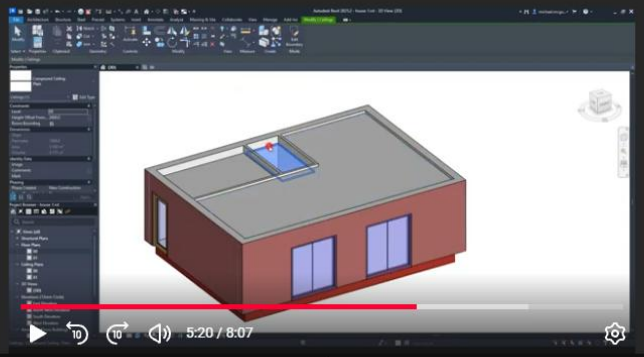
Type
Audience retention

Segments
All

Audience retention

Shorts views are counted differently from 31 March 2025

1/2



3:57
Average view duration

48.7%
Average percentage viewed

Chart guide

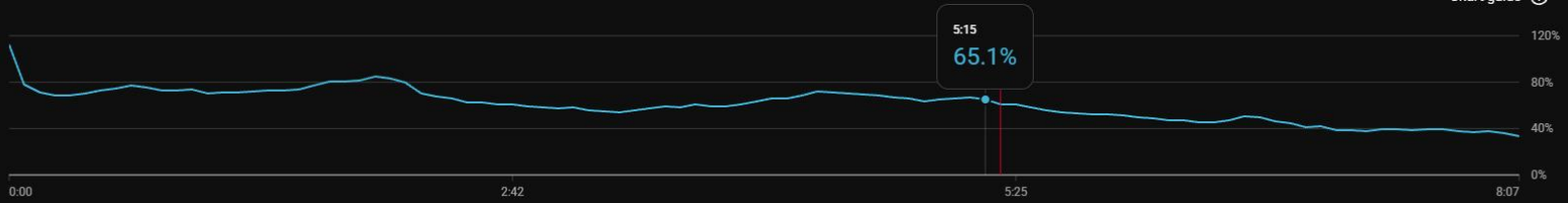
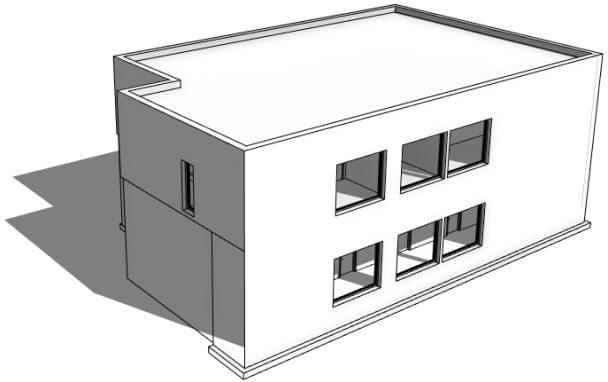
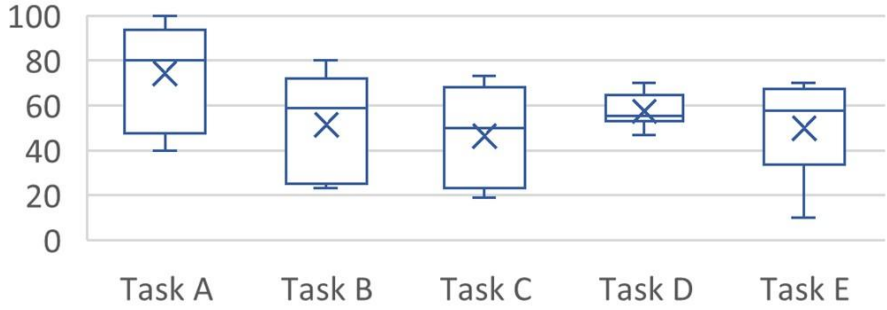


Table 5. *Time-and-motion analysis for three implementation cycles (Build, Extend, Maintenance).*

Cycle	Cohort Size	Manual Marking (hours)	Preparation (hours)	Net Saving (hours)	Equilibrium
Build Cycle (2023)	24	12	12	0	24 submissions
Extend Cycle (2024)	298	149	11	138	22 submissions
Maintenance Cycle (2025)	296	148	3	145	6 submissions





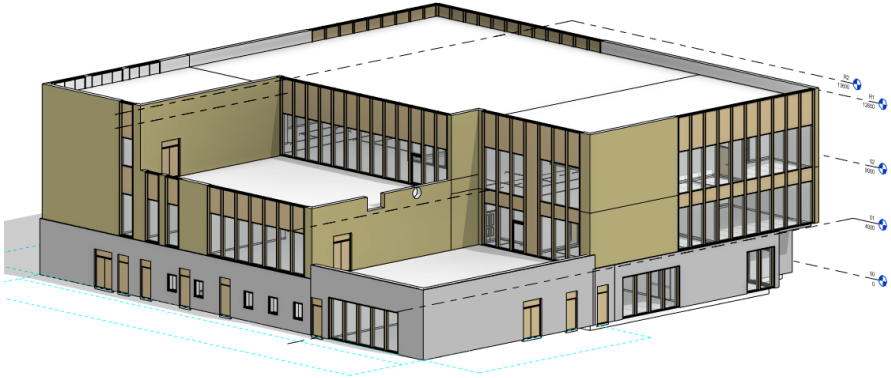
*Number of columns: 2018: **16** / 2021: **46***

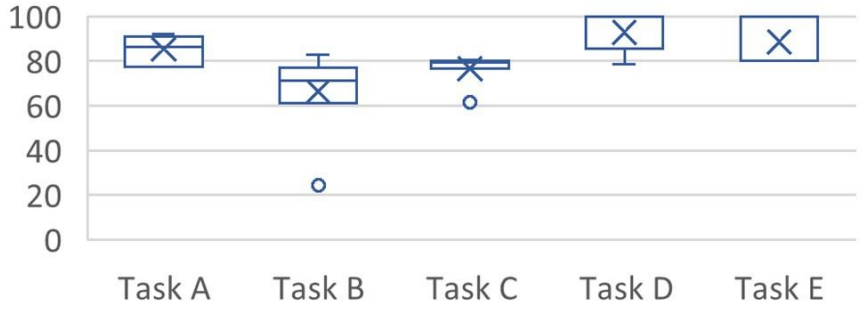
*Number of beams: 2018: **48** / 2021: **369***

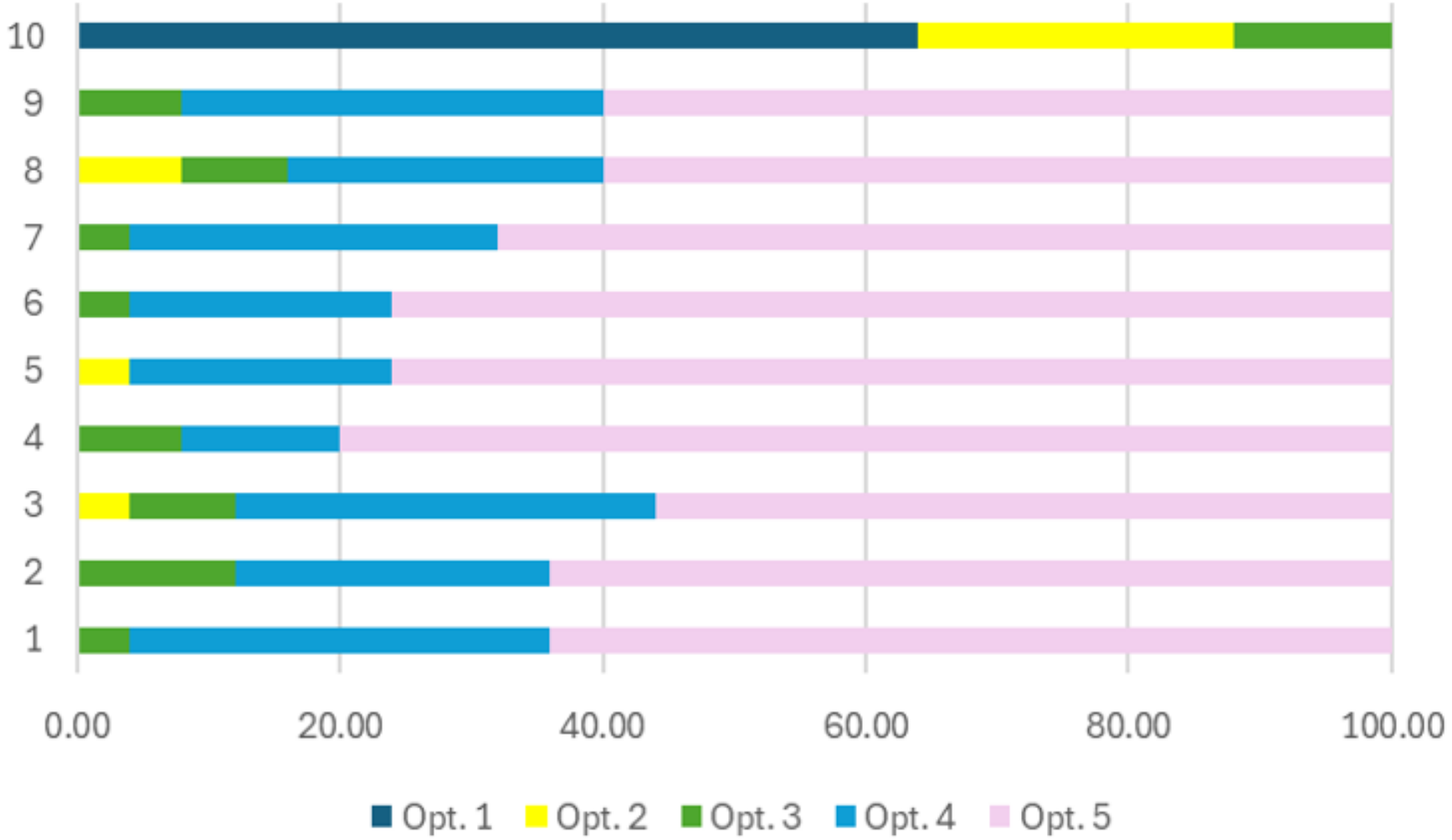
*Time given: 2018: **2** hours / 2021 : **4** hours*

*Number of rooms: 2018: **40** / 2021: **125***

*Time given: 2018: **8** hours / **12** hours*






10
9
8
7
6
5
4
3
2
1
0.00
20.00
40.00
60.00
80.00
100.00
Opt. 1
Opt. 2
Opt. 3
Opt. 4
Opt. 5

“Students taking part in the competition **attended more than they needed to**. If I could assign **150% to attendance,** I would. They attended every class-based session, but also put in time outside of class that those not taking part did not.”

“They stopped asking me and others for help as they were getting quicker **discovering it by themselves.“**

“Every student who participated has become **more enthusiastic and more engaged during sessions**, as well as in their own time outside of class.“

“**Retention was improved** as the learning was not abstract... students had a clear reason or 'why' to remember.”

“I learned quicker... **I wanted to do well and spent more time on this module** than others as a result.“

“was the best thing I did in 4 years of university.”

“I have loved this way of learning. I am constantly trying to beat my own score.”

“It definitely engages you more as it makes you challenge yourself and want to do well and it is something that you can keep track of to see if you are improving.“

“Definitely learned more and much quicker. I find the traditional lecture style classes boring.“

“Working under pressure makes you think of the most efficient ways to reach the desired effect.“

“When you see yourself improving... it motivates you to keep going.”



© Charlie Mackesy. From The Boy, the Mole, the Fox and the Horse (Ebury Press/HarperOne).

Workshop

Step 1: Select module

Workshop

Step 2: Select staff



Step 3: Build your support



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excellence at work

What learning resources are available?

Worldskills UK







1 Industrial Mechanics Information
2 Network Cabling
3 Manufacturing Team Challenge
4 Mechatronics
5 Mechanical Engineering CAD
6 CNC Turning
7 CNC Milling
8 Mobile Applications Development
9 IT Software Solutions for Business
10 Welding
11 Print Media Technology
12 Wall and Floor Tiling
13 Autobody Repair
14 Aircraft Maintenance
15 Plumbing and Heating
16 Electronics
17 Web Technologies
18 Electrical Installations
19 Industrial Control
20 Bricklaying
21 Plastering and Drywall Systems
22 Painting and Decorating
23 Mobile Robotics
24 Cabinetmaking
25 Joinery
26 Carpentry
27 Jewellery
28 Floristry
29 Hairdressing
30 Beauty Therapy
31 Fashion Technology
32 Pâtisserie and Confectionery

















33 Automobile Technology
34 Cooking
35 Restaurant Service
36 Car Painting
37 Landscape Gardening
38 Refrigeration and Air Conditioning
39 IT Network Systems Administration
40 Graphic Design Technology
41 Health and Social Care
42 Construction Metal Work
43 Plastic Die Engineering
44 Visual Merchandising
45 Prototype Modelling
46 Concrete Construction Work
47 Bakery
48 Industry 4.0
49 Heavy Vehicle Technology
50 3D Digital Game Art
51 Freight Forwarding
52 Chemical Laboratory Technology
53 Cloud Computing
54 Cyber Security
55 Water Technology
56 Hotel Reception
57 Additive Manufacturing

58 : Digital Construction / BIM

59 Industrial Design Technology
60 Optoelectronic Technology
61 Rail Vehicle Technology
62 Renewable Energy
63 Robot Systems Integration

Step 4: Automate marking and feedback

Building Element	Measurement	Full Marks	Half Marks	Quarter Marks
Rooms	Volume	Exact	±5%	±10%
Walls	Length & Area	Exact	±5%	±10%
Windows	Cost	Exact	±5%	±10%
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Stairs	Material Volume	Exact	±5%	±10%
Roof	Area	Exact	±5%	±10%
Ceilings	Quantity	Exact	—	—

Step 5: Select your incentives

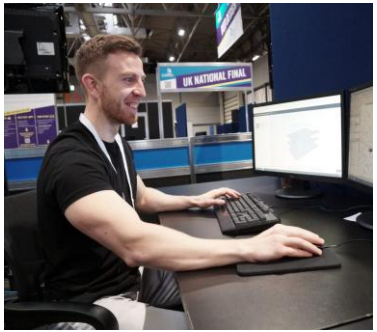
Step 6: Launch, and enjoy the engagement!



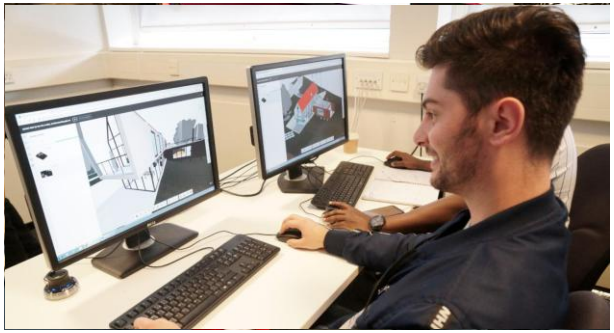







UK NATIONAL FINAL







Worldskills Lyon 2024 Digital Construction




SAMSUNG
HUNGARY
MALAYSIA
JAPAN
GERMANY


Good Luck Izzy
I'm so very proud of you
Love Papa xxx
Best of luck at the world finals! Love from The Stoney's
Good luck Izzy! Love Dean.
Good luck Izzy
Go Pow!! Good Luck Izzy!! Love Mama xx
Good luck Izzy
Best of Luck Izzy
worldskills uk
excellence at work.


AND
BUILDING TECHN
DIG AL CONS RUCTI
2
1
3