Advancing Inclusive Education: Strengthening Learning Autonomy with Digital Innovation and Universal Design for Learning

Empowering all learners through innovative strategies.

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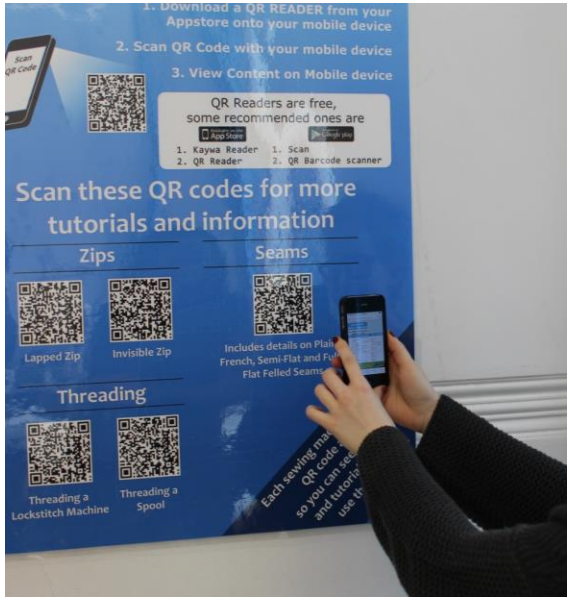

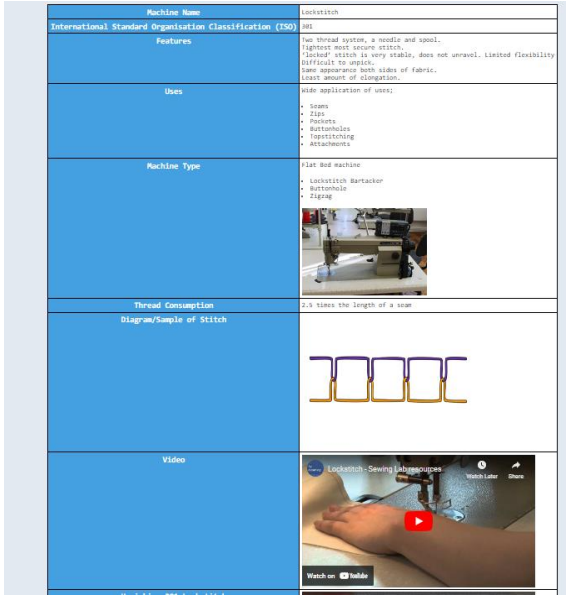

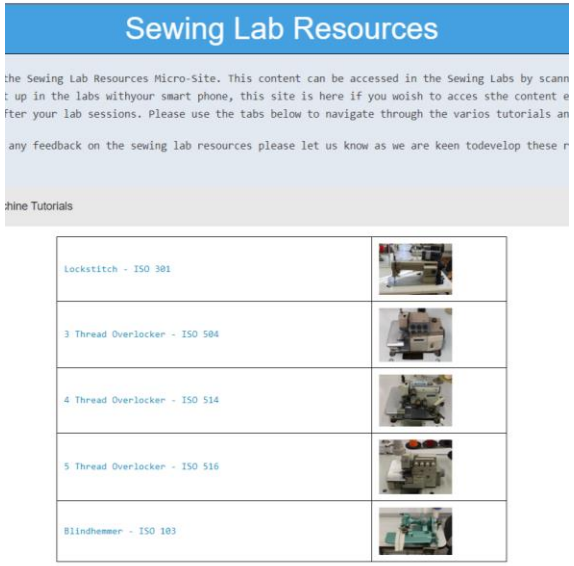

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Introduction to Lisa Taylor

- **Senior Lecturer Fashion Business & Technology at The university of Manchester** in the Department of Materials. An Honorary Fellow of the Institute of Teaching and Learning, and a Senior Fellow of the Higher Education Academy and a Fellow of the Textile Institute.
- **I co-founded and managed** my own eponymous fashion label Lilly Whittingham. Developing from a low budget kitchen table operation to a multimillion-pound turnover design wholesale and retail operation.
- My interests focus on **embedding, sustainability employability and professional skills** into the curriculum.
- As an innovative creative teacher, I was interested in how I could **increase communication, knowledge and understanding** of Garment Production Technology.

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Delivery of Garment Technology Subject Discipline

First and Second-year undergraduate Core Units.

What students learn:

As a senior lecture I provide practical experience for students in their workshops & sewing laboratories. Students learn about and use a wide array of different and complex garment construction and textile machinery leading to garment construction to produce samples for mass industrial production.

Developing key commercial skills required by analysis of the advantages and disadvantages of garment manufacturing techniques, seams and stitch types from sample stage to full mass production.

Students further the development of technical specifications required of a of a sample garment, leading to producible, saleable and profitable garments. Both an analysis and evaluation of the costing and economic elements of garment development and manufacture is undertaken.

Focus:

Embedding **technical skills, employability, sustainability and industry professional skills into the curriculum**, effective design and delivery of technical subjects enabling students to learn how to develop strong understanding and links between the practical work, theory and Industry.

How its Taught:

- Interactive Lectures
- Garment Tech Workshops
- Sewing Workshops
- Fabric & Colour Labs

Mapping the UN SDGs

In support of the university's goal on social responsibility, the QAA and Advanced HE Guidance is used as a framework for incorporating the UN SDGs into the curriculum design.

Promoting Social Integration

This project supports the UN Sustainable Development Goals, **SDG 4: Quality Education** by advancing equitable, inclusive learning environments. Inclusive education promotes social integration, diversity in workshops, helping students to build relationships and work collaboratively with peers.

Access to Quality Education

SDG 12: Responsible Consumption and Production promotes sustainable decision-making in garment technology, helping students and industry professionals minimise fabric waste, energy use, and excess material purchases.

SDG 9 Industry Innovation & Infrastructure By providing technical educational and guidance incorporating digital tools, it adopts sustainable practices circular economy approach in fashion education, ensuring materials are used efficiently and responsibly.

Figure 1: UN SDGs (United Nations, 2015

The Challenges in Fashion Education

- Fashion education often stays in the classroom
- Students struggle to connect learning to real-world practice.

Critical gap:

Linking technology for manufacture with sustainable production activities.

What the research tells us:

- Effective design and delivery of technical subjects is key to enabling students to learn how to develop strong understanding and links between the practical work, theory and Industry. (*Barraclough, N. Ehiyazaryan,E. (2009)*.
- Students need hands-on, real-world exposure *(Jamaludin & Zabidi 2024)*
- Experiential learning improves sustainability competencies *(Kamis et al 2021)*

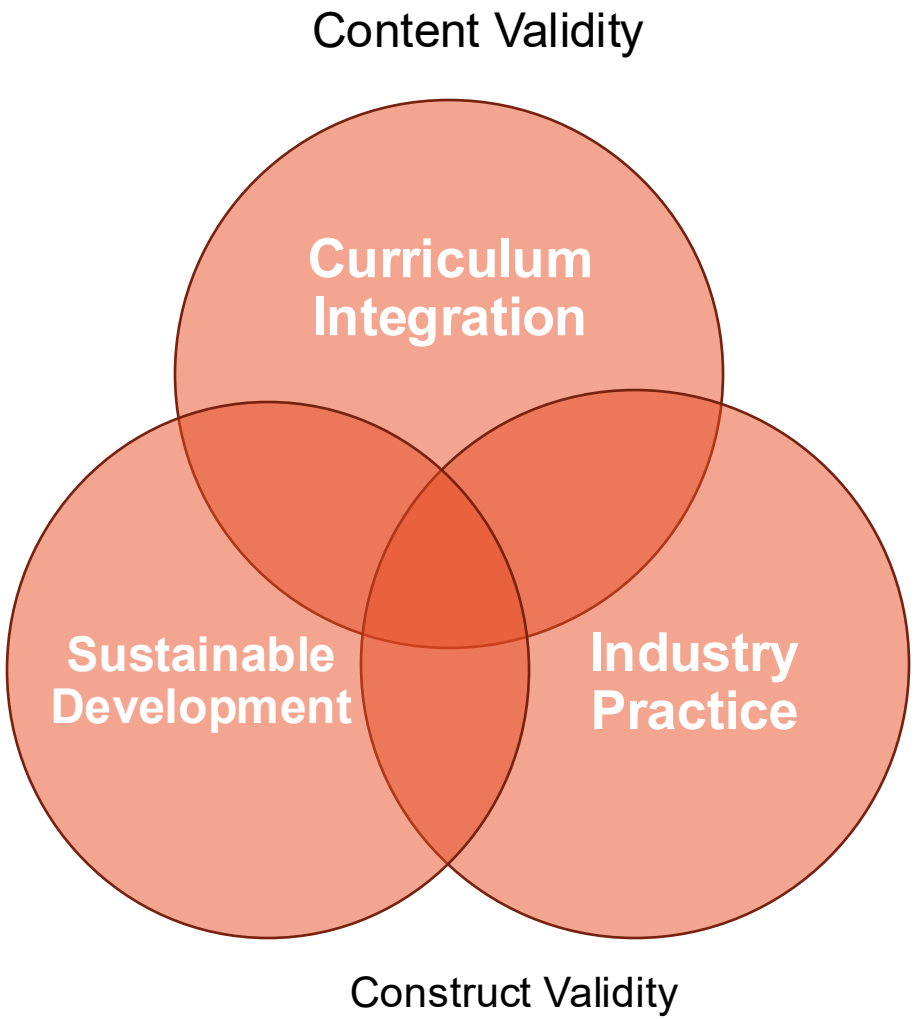


Figure 2: Authors own (2025)

The Response:

Employing the Heinrich & Molenda (1999) ASSURE model as a framework.

- The project focus on one technical unit to enhancing curriculum and teaching practices.
- Initiated **ASSURE** model as a framework to **constructively align** ILOs and TLAs outcomes (Biggs 2003) with creative curriculum design.
- This model assists in a **student-centred approach** to develop a project in this taught subject area.
- **Engage in qualitative research** to identify areas to enhance the learning environment, and flexible support systems to increase widening participation for International and DASS students, student support, T&L scholarship, and guidance.

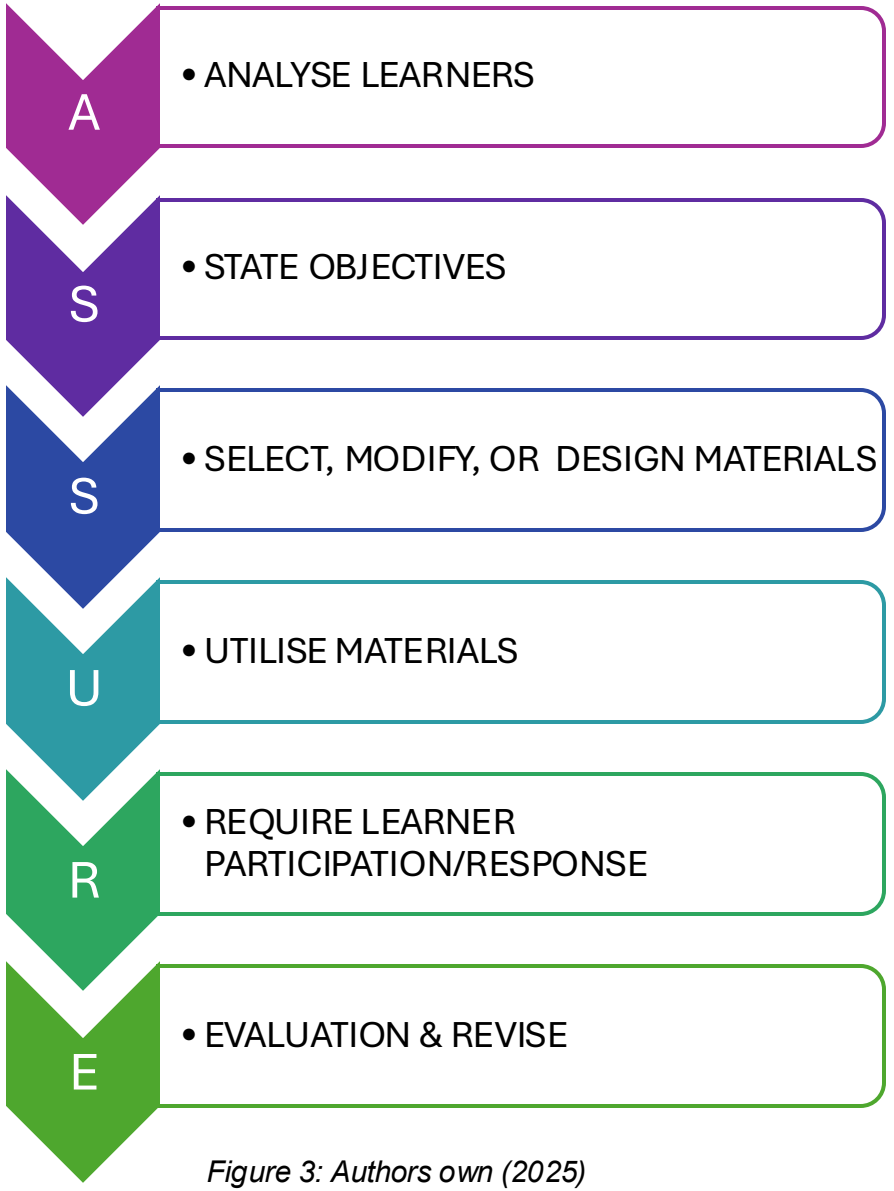


Figure 3: Authors own (2025)

Identifying Issues –

Delivery of Garment Technology Taught Units & Subject Discipline.

Student Cohort-Large student numbers 170 plus, required increase support and widening participation for International and DASS students.

Limited time in workshops- In today's educational landscape, **practical learning experiences are essential** for developing students' competencies.

Complexity- Students found the subject area challenging, learn about and use a wide array of different and complex garment construction and textile machinery.

Repetitive- Engaging student retention and encouraging independent learning can be challenging, burden on academic staff and reduce time spent on explaining basic materials.

Limited Self-directed learning – problem solving and critical thinking, opportunities for this to happen were limited.

Tenuous Links - Responsibility of Garment Technologists to ensure sustainable decisions are actioned.

Identifying Improvements

Effective design and delivery of technical subjects is key to enabling students to learn how to develop strong understanding and links between the practical work, theory and Industry. ***Barraclough, N. Ehiyazaryan,E. (2009)***.

Themes/Objectives:

Identify areas to enhance the learning environment and shaping the curriculum, flexible support systems, increase widening participation for **International and DASS students, student support, T&L scholarship, and guidance.**

Design and develop teaching resources problem solving and critical thinking, facilitate feedback. Resources that had real world applications and impact on sustainable .

Investigate implementing higher-order thinking, *(Bloxham and Boyd 2007)* application-based activities 'TLAs' promote a comprehensive understanding and practical application of course concepts, supporting inclusivity, **deep learning**, evolving from surface or declarative knowledge.

Deliver:

Combining a **blended learning approach** to traditional workshop classroom teaching with **'learn by doing'** and digital online learning.

Increase student agency, attendance, retention, engagement in this unit and reduce passive engagement. *(Biggs 1999)* empowering students within the cohort to build resilience, autonomy, confidence, problem solving *(Biggs and Tang 2011)* and critical thinking, facilitate feedback.

Facilitate this fundamental understanding of garment technology methods. Communication of British BSI and International Standards ISO standards used in industry for technical communication of garment engineering and technical specification packages.

Creating Innovative Teaching Resources:
Implementation of Digital Learning Technologies & **Importance of Inclusive Education**

Universal Design for Life (UDL) Rose and Meyers (1984) model. The principles and framework can be applied to both design of a unit and design of **instructional materials.**

The three pillars/principles ensure that the digital resources **created in this teaching resource** are **accessible, usable and inclusive** of all students attending Garment Production Technology for all learning styles.

- **Access to Quality Education**
- **Fostering Diversity**
- **Promoting Social Integration**

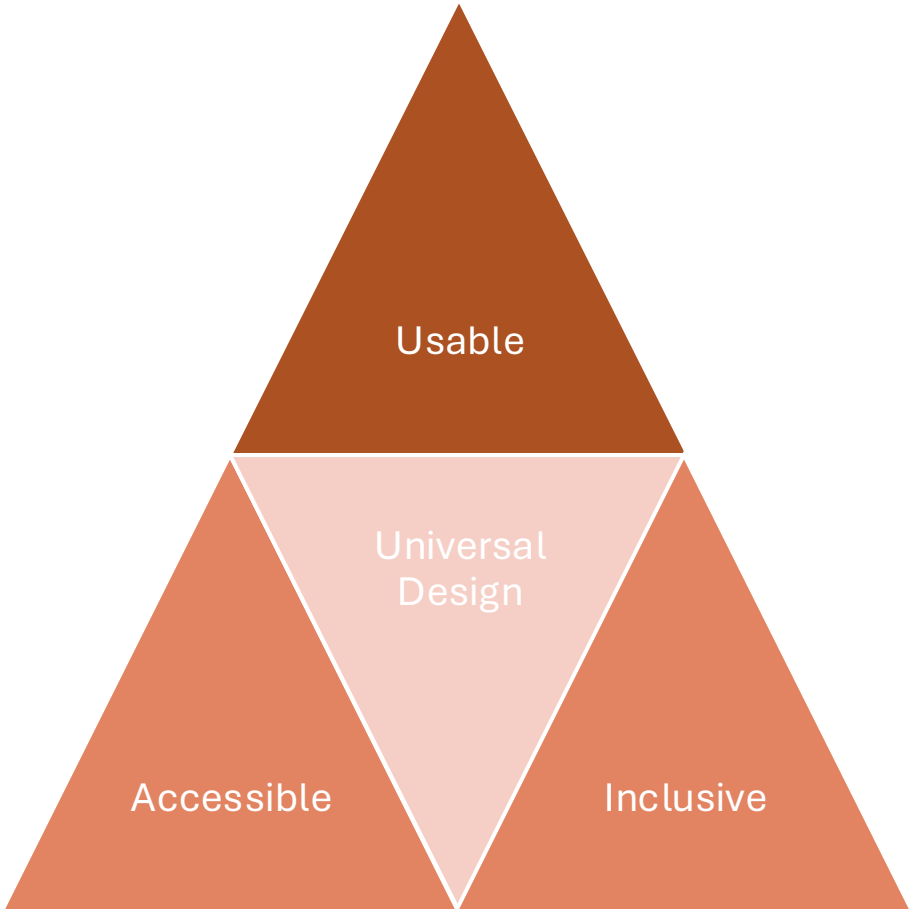


FIGURE 4: Universal Design for Learning 1 (Rose & Meyer 1984)

The four key outcomes for a successful **practical class** are that students acquire:

Technical understanding analysis and application	Students are able to communicate their results	Students are able to apply conceptual understanding to their work. (Rollnick *et al*. 2001).	Students have the freedom to work at their own pace, without having to wait for personal instruction. Especially applicable to International students and DASS students

Create a **dynamic 'user manual' to construct a library of 'How to…?'** for videos of each seam, attachment, stitch type and complex textile machine that students would access in the Sewing Labs. I**ntegrating technology QR codes and an eLearning educational platform** to overcome this area of difficulty when teaching Garment Technology.

This began **a collaborative** project with eLearning staff to create **Digital Learning Materials** that students could access inside a **non-standard teaching environment** by using QR codes.

STEP 1 Designed and Created QR Codes: These **link to Industry standard technical information**, **ISO/BSI numbers**, machine types, and uses. They allow students to access materials on personal devices, enabling learning at their own pace and freeing demonstrators to discuss higher-level concepts.

STEP 2 Designed and **Created Micro Sewing Site:** an eLearning educational platform featuring step-by-step videos of seams, attachments, stitch types, and complex textile machinery. These resources are subtitled for non-English speakers.

Experiential Learning in Action: What Changed for Students…

Implementation Example: **Poster Support & Instructions**

- Poster provides support information
- Recommended QR Readers
- Links to Micro Sewing Site tutorials

Implementation Example: **The QR codes are easily printed attached to machines or physical samples**

QR codes are a great asset in setting health and safety instructions of how a machine is operated. The QR codes enable students to gain knowledge by immediate visual demonstration.

Sewing Lab Resources

Welcome to the Sewing Lab Resources Micro-Site. This content can be accessed in the Sewing Labs by scanning the QR codes set up in the labs withyour smart phone, this site is here if you woish to acces sthe content either before or after your lab sessions. Please use the tabs below to navigate through the varios tutorials and videos.

If you have any feedback on the sewing lab resources please let us know as we are keen todevelop these resources for you

Sewing Machine Tutorials

Lockstitch - ISO 301	
3 Thread Overlocker - ISO 504	
4 Thread Overlocker - ISO 514	
5 Thread Overlocker - ISO 516	
Blindhemmer - ISO 103	

Sewing Machine Maintenance - Threading

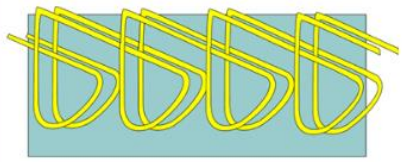
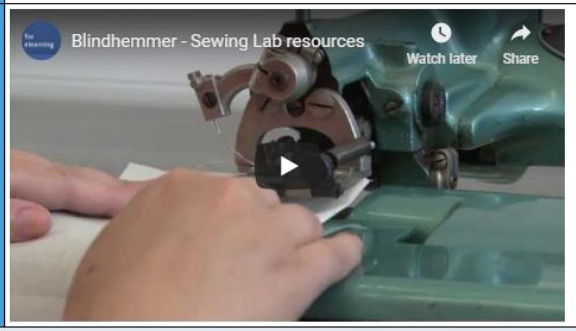
Seams and Zips

Return To Sewing Labs MicroSite Main Menu

Impact: Development of a new resource Example: **Micro Sewing Site**

The Technology captured in a QR code was thus enabling an interactive library of technology to be established accessed on Blackboard.

Sewing Lab Online Resources

Machine Name	Blindhemmer
International Standard Organisation Classification (ISO)	103
Features	1 curved needle thread Good extensibility. Creates an extensible chain stitch . Stitch is formed with one needle thread which interloops with itself on the top surface of the material. The thread passes through the top ply and horizontally through portions of the bottom ply
Uses	Neaten hem line edges on woven's Fabric Hem line is tuned up and sewn along hem line edge on the wrong side of fabric The right side of fabric has the appearance of no stitching or invisible stitch. Used for • Jackets • Blouses • Jeans • Skirts • Trousers
Machine Type	Cylinder Arm 
Thread Consumption	Up to 3.5 metres of thread per seam
Diagram/Sample of Stitch	
Video	

Stitch and Machines Example: **Hemmer**

The QR Code takes students to the micro sewing site ‘Hemmer Machine and stitch formation’ contained in a tabulated format

- BSI and ISO Number
- Features
- Uses
- Machines Types
- Thread Consumption
- Short video ‘How To’ construction methods.

Video tutorial Link

The Technology captured in a QR code was thus enabling an interactive library of technology to be established.

Evaluation of REACH

STUDENT Dissemination: Over **600 UG** students now have access to this **interactive technology**. Micro sewing Site has expanded and is now a **core resource** for all years: Year 1, 2 & 3 each year and accessed several **1,000 times per unit in a semester**. Accessed pro-rata **160,000 times** since the conception.

ACADEMIC : The Garment Technology academic team has grown, now includes **five additional academic** staff, GTAs and a **dedicated technician**, all of whom use this resource in their teaching of the subject discipline.

EDUCATION Dissemination:

Advanced HEA, Teaching and Learning Conference.

Association for Leaning Technology.

ICERI International Conference of Education, Research and Innovation

Data : The **success** of the Micro Sewing Site is **confirmed** by the **analytical data** on Blackboard. Example:

The total number of user **interactions** on the Micro Sewing Site was accessed **18,746** times in 2020-21 (Year 2) **Chart 1 and Image 3**.

In the academic year 2023-24 semester 1 it was accessed **17,455 times** (Year 2) **see Image 4**.

Content Usage Statistics

Access / Day of Week

Day of Week	Hits	Percent
SUN	1552	8.28%
MON	3220	17.18%
TUE	2720	14.51%
WED	2701	14.41%
THU	3488	18.61%
FRI	3836	20.46%
SAT	1229	6.56%
Total	**18746**	

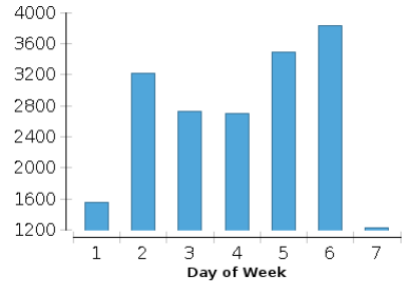
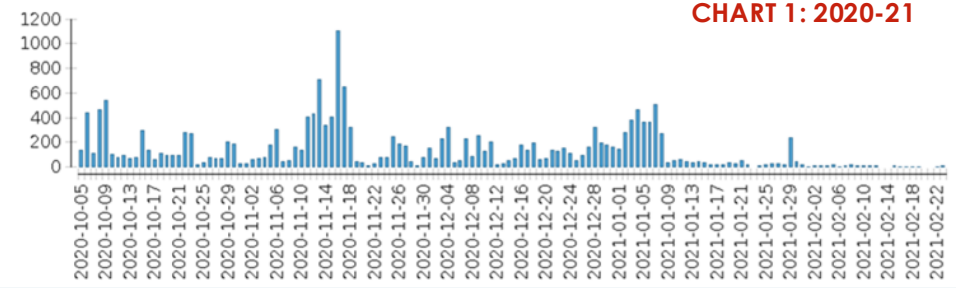


IMAGE 3: 2020-21 student hits 18,746

Content Usage Statistics

Access / Date

CHART 1: 2020-21



Content Usage Statistics

Access / Day of Week

Day of Week	Hits	Percent
SUN	1386	7.94%
MON	2615	14.98%
TUE	4320	24.75%
WED	2285	13.09%
THU	3211	18.40%
FRI	2450	14.04%
SAT	1188	6.81%
Total	**17455**	

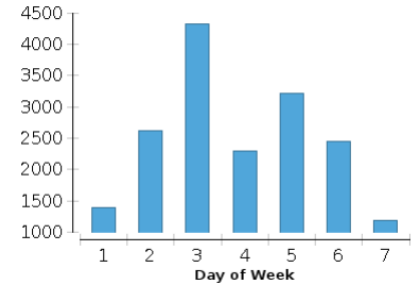


IMAGE 4: 2023-24 student hits 17,455

Teaching Assistant Feedback: *"I find the Micro Sewing Site to be quite a helpful resource, with a lot of easy to digest/ understand information for the students. The website is very easy to use, which makes directing students to the right place easy for us as teaching assistants"* **Daraya Badiel 2024**

Evaluation of VALUE

This is a sustainable technology; no bulky paper manuals are required.

Elevating Practical Skills. Blended learning approach deepens both Student and academic engagement, enabling more time for delivery high quality teaching and no longer low-grade repetitive demonstration. Students benefit from replaying and revisiting teaching resources. *Henderson et al (2017)*

Transition and retention: support independent learning, which a key difference from school; students do not have to wait for guidance, which can frustrate and lead to self-doubt and thus reduce their engagement in the subject matter. Reduce the amount of time demonstrators spend on explaining basic material leaving them available to discuss higher level conceptual material with the students.

Opportunities for discussion, reasoning, interpretation and reflection are very important for Knowledge Building' Hennessy *et al*. (2007) in addition to the practical skills, it enables students to feel comfortable with learning through different media, reflection on own skills. Applying insights to the assessment.

Access resources in a place and at a time where they are of most use to them. They can access on their personal mobile device, giving the students the freedom to work at their own pace, without having to access bulky paper user manuals or wait for personal instruction.

Developing real-world competencies through experiential learning. Enhanced **student identity** as future ethical practitioners. Activities promoted **decision-making, critical thinking, and reflection** beyond the classroom.

Student Feedback:
"Regular use of this resource improves my confidence and efficiency in applying these skills in particularly in designing and crafting textile projects".

"The site is incredibly helpful in completing assignments and projects".

"I hope more students can know about this platform, which will be helpful to our course learning".

"The Micro sewing site, eLearning platform compares favourably to traditional learning methods. It offers flexibility, a wealth of resources, and the ability to learn at our own pace, which enhances the overall educational experience".

IMPACT for HE, Industry & Community

- Deeper connections between the unit content increased participation created a **more vibrant learning cohort**
- **Opportunities to** reflect on skills **contribute to students shaping their learning**
- Strengthened connections between sustainability and industry practice.

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- Relatively inexpensive investment, made available by using largely free technologies, the biggest cost is production, academic time and planning.

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• Future :

- Objectives are to continue to **develop and produce** technical information and increase educational resources.
- Include the student voice in future co created unit content.
- Expose the technical resource available **through Open Education Sites beneficial for all learners globally.**
- Promote content through sustainable fashion platforms, explore innovations in sustainable practice for students, colleagues in academia and fashion industry professionals
- **Artificial Intelligence -**AI in education enables personalised learning experiences by analysing student performance and tailoring content accordingly. **Virtual Reality -**Virtual reality creates immersive learning environments, allowing students to explore concepts in an interactive way. **Adaptive Learning Platforms -**Adaptive learning platforms adjust content based on individual learning styles and progress, enhancing engagement and comprehension.

IMPACT

How students experience the digital technology resources. Examples of collected Undergraduate Student **Feedback (2024-25)**

Ease of Access and Navigation	Content Quality and Relevance	Engagement and Interactivity	Support for Assignments and Projects	Improvement in Practical Skills	Feedback and Self-Assessment	Overall Learning Experience	Recommendation to Other Students
"The site appears to be very accessible on Blackboard, with clear instructions on how to access it, enhanced by QR codes for easy entry which is ideal for a busy lab environment."	**"The content is directly applicable to my coursework and practical assignments. It includes tutorials on different types of stitches, sewing techniques, and machine maintenance, which are fundamental for textile studies".**	"The videos and tutorials are engaging, providing practical, step-by-step demonstrations which are crucial for mastering sewing techniques"	**"The structured and detailed nature of the content, from basic threading to complex sewing techniques, makes this site an invaluable tool for my completing assignments and projects".**	"The tutorials and practical tips provided have a significant positive impact on my practical skills".	"the structured tutorials in place to track progress and provide feedback".	**"platform offers a more flexible and interactive approach compared to traditional textbook methods. The visual and practical nature of the tutorials makes it easier to understand complex techniques".**	"Definitely. The site's comprehensive and user-friendly approach makes it a valuable tool for anyone serious about mastering sewing techniques and textile arts".
"The platform design is straightforward, with well-organised sections and clear labels. Navigation seems intuitive, making it easy for users to find specific tutorials and resources quickly".	"The detailed tutorials and classifications, like the ISO standards for different sewing techniques, suggest the site covers the necessary technical knowledge comprehensively, providing a strong learning base".	**"QR codes and interactive media make the learning process more dynamic and accessible, which greatly enhance the learning experience".**	"The information is segmented into clearly defined sections, making it easy to locate specific tutorials or guidance for various sewing tasks".	**"Regular use of this resource improves my confidence and efficiency in applying these skills in particularly in designing and crafting textile projects".**	"The detailed tutorials allow for self-assessment, as I can compare my work with the standards and examples provided".	Watching the recording class, the instructor guided me step by step in a gentle tone, which filled me with interest in this course.	I hope more students can know about this platform, which will be helpful to our course learning.
Accessing the Micro Sewing Site on Blackboard is straightforward. The link is prominently displayed in the course materials section, making it easy to find and access. The site is user-friendly and intuitive to navigate. The clear layout, with well-labelled sections and a logical flow, ensures that we can quickly locate the information we need.	"The contents of the materials are relevant to our coursework and provide information for wider study". **The content is highly relevant to coursework and assignments. The tutorials and technical information are well aligned with the syllabus, providing essential knowledge and skills. The material comprehensively covers necessary technical knowledge. It includes detailed explanations and demonstrations, ensuring us grasp the core concepts required for our projects.**	"These materials provide enough amount of information. We can understand the content easily".	"When I forget the process of making the skirt, I can always go to this website to review it, which helps me finish my coursework smoothly". The site is incredibly helpful in completing assignments and projects. It provides step-by-step guides and examples that are directly applicable to the tasks at hand. Information and resources are easy to find. The well-organized structure of the site ensures that students can quickly locate the specific information they need for their work.	"Those tutorials effectively improve my understanding of technical concepts" **Using the site has greatly improved my practical skills and understanding of technical concepts. The hands-on tutorials and detailed explanations have boosted my confidence and competence in applying these skills. There is a noticeable improvement in my ability to apply these skills in real-world scenarios, and the practical knowledge gained from the site is effectively transferred to actual garment tech work.**	The feedback mechanisms provided by the site are very useful. They offer constructive insights that help us understand our strengths and areas for improvement. The platform effectively supports self-assessment of progress and understanding. Tools such as quizzes and self-check questions allow us to measure our learning and retention.	Every time I understand some new knowledge points, I am eager to experience the fun of production QH The eLearning platform compares favourably to traditional learning methods. It offers flexibility, a wealth of resources, and the ability to learn at our own pace, which enhances the overall educational experience.	**I will recommend this platform to other students since it's helpful for learning technical knowledge for this course.** I would highly recommend this platform to other students. It provides comprehensive, accessible, and engaging resources that significantly facilitate the learning of garment tech concepts and skills.

Teaching Awards

- Previously Nominated for an eLearning award.

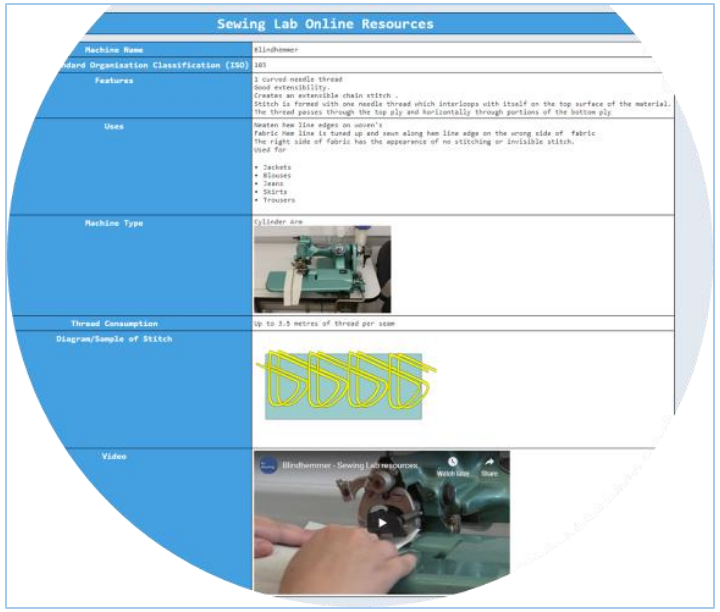
- 2024 Teaching Excellence Award
- **Team Award**:
- Fashion Education and Inclusive Learning Innovators.(FEILI)

- **Inclusive education, flexible learning, digital delivery**, Teaching and Learning Institute University of Manchester.

Thank you for Listening.

If we have time for questions, I have two for you …

- What challenges do you foresee in scaling experiential learning across larger cohorts?
- Have you seen examples of sustainability education working particularly well in your own institutions or industries?



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