Fostering learning, engagement & critical thinking skills:
A student created interactive HTML5 resource

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Background

Currently, there is no dedicated **Analytical Chemistry** course in the School of Chemistry (SoC) at the University of Glasgow (UofG). This ChAMPS (Chemistry Analytical Methods, Practice & Scholarship) project focuses on **Chromatography** and began with a review of the SoC curriculum to identify which components of chromatography are taught and how (labs or lectures). It was identified that a limited number of chromatographic techniques are introduced in the SoC and that all, bar one, are delivered in the teaching labs.

Chromatography (Technique)	Chemistry Lab	Expt	Lecture Module
TLC	Synthesis-1	7	none
	Synthesis-2	6	
	Organic-3	7	
Column	Organic-3	4	none
GC & GLC	Physical-3	C	none
HPLC	Quantitative-2	2	none
SEC	none		L4/Polymer/ Dr. Bernhard Schmidt

The lab manuals contain some background theory and practical applications of the different techniques, but there is no further training apart from hands-on training. A niche was identified for this project where a learning and teaching resource, focused on different aspects of chromatography, could support a deeper understanding of this area of analytical chemistry.

Pedagogy & Aims

Due to the COVID-19 pandemic, many courses and programs are taught online. It is a significant trend for the development of online education. Based on the theory of pedagogy in active learning and gamification, online learning can improve a particular study skill or course strategy of students [1] and it also engages learners in a way that motivates and encourages perseverance during games [2] and through a multimedia approach [3].

Aims:

Create an interactive e-resource to support understanding of chromatography intended to support undergraduates in:

- **Lab learning** by being closely linked to the lab methods
- **Lecture learning** as a stand-alone learning resource

Design Principles

Multimedia approach to communication (combine video, audio, text, illustration)

Visual appeal: Beautiful to capture the people's attention; clear and tidy content.

Engaging: Interactive elements make the information more interesting and the information becomes more memorable.

References:

[1] Simon LE, Genova LE, Kloepper MLO, Kloepper KD. Learning Postdisruption: Lessons from Students in a Fully Online Nonmajors Laboratory Course. Journal of chemical education. 2020;97(9):2430-8.

[2] Gressick J, Langston JB. The Guilded Classroom: Using Gamification to Engage and Motivate Undergraduates. The journal of scholarship of teaching and learning. 2017;17(3):109-23.

[3] Richard E. Mayer & Roxana Moreno (2003) Nine Ways to Reduce Cognitive Load in Multimedia Learning, Educational Psychologist, 38:1, 43-52

[4] Images on this graphic: https://basicmedicalkey.com/chromatography-and-extraction/

[5] Images from topper: https://www.toppr.com/ask/en-hk/content/concept/partition-chromatography-245013/

Creation Process

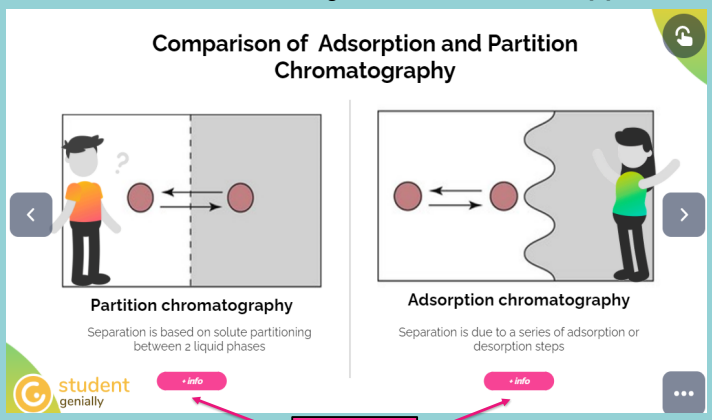
1. Content Development: Focused on techniques used in labs. Curated relevant information and media for inclusion.

2. Storyboarding: Mapped how to logically present the content. Decided order and planned connections between topics.

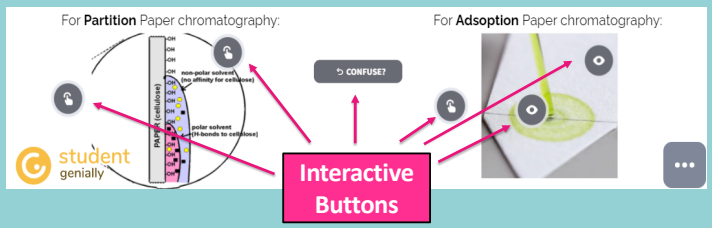
3. Building: Platform must be online, interactive, asynchronous, accessible outwith Moodle - HTML5 offers this. Thus, Genially chosen to create this educational e-resource.

The e-Resource

The **Chromatography e-resource** is accessible via a single link to the Genially-created resource. It consists of linked pages and linked additional information. Images and external content (websites/videos) can be uploaded as well, as shown with external images embedded into this slide [4].



These **Info Hotspots** hide extra information and create an uncluttered slide. However, students have easy access to important content by simply clicking the button, promoting exploration and autonomy in the learning process. A variety of **Interactive Buttons** are available and can be used to label images, provide references, link to websites, and link to other sections within the learning unit. The slide below demonstrates the volume of additional information that can be shared without overwhelming the user by virtue of these interactive links.[5]



Sneak Peek

Scan this QR code to visit a **Trial Version** of the e-resource or go to:
https://view.genial.ly/62038e4599cf2800182d8be0/presentation-sneak-peek

SCAN ME

Further Work

- Evaluate E-Resources (Survey about the user experience)
- Quantitative Analysis and Qualitative Analysis of the result
- Disseminate findings and use to underpin further development

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