The Leaking STEAM Pipeline

650,000 secondary education

300,000 passing math & science

30,000 taking upper level math & science

25,000 apprentices

10,000 pursuing engineering degrees

9,000 Engineers
STEAM Education

The Arts

Improve student

❖ Inquiry and Design
❖ Collaboration
❖ Creative thinking

The Design Museum

Serves 60,000 learners per year

❖ Digital Design Workshops
➢ Graphic Design
➢ App Design
➢ 3D Printing
Our Goal

To aid the Design Museum in its efforts to motivate student engagement in STEAM fields by updating current digital design workshops and developing a lesson plan for a new coding workshop.
Objectives

1. **Develop an evaluation framework** for workshop effectiveness according to stakeholder views.
2. **Assess the effectiveness** of the Design Museum’s current workshops.
3. **Recommend changes** to lesson plans and create **pre- and post-visit** modules for the Design Museum’s current workshops.
4. **Create a proposal for a new workshop** according to the evaluation framework.
5. **Pilot and assess** our new workshop based on the evaluation framework.
Evaluation of Effective Lessons

Expero Framework:

**Desired Outcomes** vs. **Existing Outcomes**

- **Desired Outcomes**:
  - Students collaborate
  - Lessons involve the museum's collection

- **Existing Outcomes**:
  - Students work individually
  - Lessons are disconnected from the museum

- **Students gain an understanding of Design Thinking**
Findings - Desired Outcomes

**Workshops should**

- Be unique to the Design Museum
- Provide a real-world application of what students learn in school
- Emphasise teaching design rather than technical skills
- Combine technical skills with students’ passions
- Inspire students to ask questions after the workshop
Students examine different examples of graphic design

Students consider a widespread issue they are passionate about

Students design a poster that expresses their views
Workshop is not unique to the Design Museum

Workshop does not inspire students to ask questions about design
Recommendations - Graphic Design Workshop

1. Include additional posters from the Design Museum’s collection
2. Provide students with questions prompting them to consider the design process
App Design Workshop

- Students examine different apps and UI elements
- Students create an app that responds to a user
Findings - App Design Workshop

❖ Workshop is not unique to the Design Museum

➢ Does not involve the museum's collection
➢ Just as effective if taught elsewhere
Provide students with an example of a user interface related to the museum

➢ Website
➢ City mapper

(app displayed in DMU)
3D Printing Workshop

- Students examine objects in the museum’s collection
- Students consider problems based on potential users
- Students improve the design of an existing product
Workshop fails to combine technical skills with students’ passions

- Lecture is very technical
- Prompt for hands-on learning is restrictive
Recommendations - 3D Printing Workshop

1. Revise the lecture section
2. Prompt students to think about which material would be best to use for their product
3. Incorporate additional handling objects from DMU exhibit
4. Additional prompt for more advanced students
Deliverable - Coding Workshop

- Teaches how designers create user interactions within the digital world through coding
- Students utilise sensors on a Micro:bit to create an Internet of Things device
Deliverable - Coding Workshop

- Micro:bit
  - Microcontroller with sensors
- MakeCode
  - Block coding environment
Deliverable - Coding Workshop

- Piloted hands on portion
  - Advanced students
  - Beginner students
Deliverable - Modules

Pre-Visit Modules
- Review knowledge
- Introduce workshop

Post-Visit Modules
- Refresh knowledge
- Enhance skills learned
Social Outcomes

**Individual Effects**
- Interesting and engaging workshops
- Unique approach to STEAM education
- Motivate engagement in STEAM fields

**Local Effects**
- Increase in museum and workshop interest

**Global Effects**
- Increase in qualified STEAM workforce
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The Design Museum

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References


[10] Photo taken by the team.


References

[13] Photo taken by the team.


[18] Photo taken by the team.


