CAMBRIDGE

Cambridge Partnership for Education

The Falaj Project

A case study exploring ways for Omani teachers to combine digital content and platform functionality to support efficient and effective planning and teaching in hybrid contexts.

The Falaj Project مشروع الفلج

Innovation in Digital Teaching الابتكار في التدريس الرقمي

Contents

1

Context

Since 2017, Oman has invested significantly in implementing the Cambridge Curriculum for Maths and Science using Cambridge resources. These educational reforms are key to implementing the Vision 2040 strategy by equipping Omani children with the knowledge, skills and values they need to succeed in the 21st century.

However, in order for this curriculum to translate into real benefits for Omani children, students need to experience student-centred Active Learning experiences. This means learning experiences where they "think hard", use inquiry to drive their own progress towards learning outcomes, and where teachers have the opportunity to assess continually what learners have understood and adapt their teaching accordingly.

Since schools moved online due to Covid-19, teachers have faced new challenges to embed this student-centred Active Learning approach.

> "There is currently a conflict between Cambridge Curriculum goals and remote learning"
>
> **–Teacher Innovator, Falaj Project**

In 2020, the Omani Ministry of Education made a national adoption of Google Workspace for Education from Grade 5 onwards, giving many teachers access to a shared online space, collaboration tools and an ecosystem of innovative apps.

Teachers also have digital versions of the Cambridge textbooks in PDF format. However, the design of these resources has not yet been optimised for use with Google Workspace.

The Falaj Project aimed to consider ways that teachers can continue to implement the Cambridge Curriculum in remote and hybrid contexts by combining Cambridge content with Google Workspace tools to create opportunities for student-centred Active Learning experiences.

March – June 2021, project collaborators conducted a series of live workshops, a research review, and specially developed prototype resources. A group of 10 teacher innovators was appointed by the Ministry to take part in the workshops, respond to surveys and to evaluate digital prototypes demonstrated by Cambridge and Google.

This project takes its name from Oman's Falaj system, where channels of water flow smoothly and efficiently across the country. Similarly, an effective digital teaching approach could flow into schools throughout Oman.

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Summary

KEY CHALLENGES FACING OMANI TEACHERS

- Designing digital solutions that work for teachers with diverse needs
- Bridging gaps in infrastructure - devices, connectivity, skills
- Limitations with current digital content - functionality, digitisation, access
- Absence of some simple digital content like videos and simulators

KEY INSIGHTS FROM OMANI AND INTERNATIONAL RESEARCH

- Designing solutions for diverse teachers
- Digital content
- Professional development

RECOMMENDATIONS

- Take an iterative, user-centred approach to investment
- Digitise existing content
- Source basic new textbook-aligned content and tools
- Invest in sustained professional development programmes

3

Key challenges

Workshops with Omani teacher innovators explored the main challenges they faced in embedding student-centred Active Learning in an online environment since school closures. The main themes that emerged were:

Challenge 1: Diversity of teachers' needs

Designing digital solutions that will work for a diverse community of teachers.

Feedback from teacher innovators was very varied. For example, some felt that the prototype lessons were too basic, whereas others felt that they were full of new ideas.

Overall, the teachers and supervisors displayed a wide range of digital skills, attitudes to using digital technologies and access to infrastructure. This diversity is in line with international research on the key challenges of successful technology adoption.

Challenge 2: Bridging gaps in infrastructure

Limitations with connectivity, access to devices, limited digital skills.

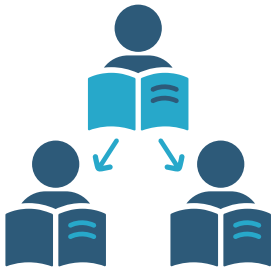
Most teachers mentioned challenges with connectivity, access to devices and digital skills of both students and teachers.

Challenge 3: Digital content

Many teachers struggled to engage students online with the current content.

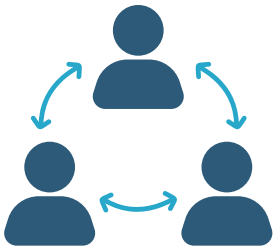
The teacher innovators expressed a strong desire to continue delivering the Cambridge Curriculum by using student-centred, Active Learning

pedagogies. However, they reported challenges in achieving that with the current Cambridge resources, shared in PDF format:



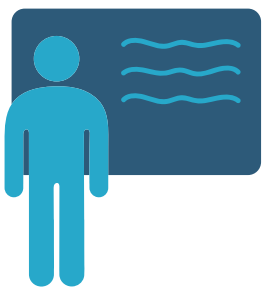
Student engagement
This is harder to achieve online and attention spans are shorter. Some textbook activities felt too long to use online and were hard to adapt because PDFs are not editable.

Limited opportunities for interaction
The PDF format alone offered limited opportunities for students to share their thoughts, interact with the content or get immediate feedback from the teacher or peers. This was especially the case for inquiry-based activities like practical science experiments.



Most teachers are still using the print textbooks every day to understand the curriculum objectives, success criteria and to get ideas for activities and questions.

However, in order to overcome the problems around attention span and interactivity, teachers reported independently converting digital resources into more flexible formats that can be adapted and used with interactive tools. This presents its own challenges of:



Teacher planning time has reportedly multiplied by three times, from 30 minutes per lesson to minimum 90 minutes per lesson. This extra time could be spent on refining and adapting resources for their unique students or engaging in professional development.

Once teachers have spent time and effort converting PDF resources into more flexible formats, these lessons are not currently being consistently shared in a central place where all Omani teachers can find them quickly, adapt them easily and benefit from each other's work.

Images and other assets from resources could be used in ways that may be in breach of rights agreements.

The functionality in Google Workspace could be exploited even more – even among those whose levels of digital confidence are likely to be significantly higher than average Omani teachers, the use of games on Jamboard games was not yet widely used.

Challenge 4: Missing some basic curriculum-aligned digital content and niche functionality

Teachers are currently spending planning time searching for high-quality, curriculum-aligned, Arabic language digital content to supplement the PDFs. This includes simulators and "explainer videos". While some of this exists, for example through MoE initiatives like the Mawrid channel, teachers reported the risk of gaps in provision and a risk that they may end up having to use sub-optimal content and risk confusing less-confident students. Some subjects like Maths also reported specific issues such as functionality for presenting graphs and equation symbols.

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Key insights from research

Research review into international and Omani research around K12 teaching online conducted by Ryan Irvan, PhD candidate, Faculty of Education, University of Cambridge.

Research insight 1

Teachers' needs and preferences around the use of technology are diverse.

If these needs are not fully understood, teachers can face barriers to using the technology effectively such as training or infrastructure. This may stop ministry investments from translating into positive impact for students.

Helpful ways to overcome this include thorough user research on teachers' needs and continual evaluation and adaptation of interventions in an iterative way. Solutions can be co-created alongside teachers and other system stakeholders. This means starting with smaller investments in pilots to understand potential barriers to usage and how to overcome them, before scaling up gradually.

Many tools have been developed over the past decade to analyse teachers' use of technology such as the Teacher Technology Survey (TTS)[1]. This characterises the nature of technology use in the classroom and aims to measure:

- Teacher perceptions toward school professional development
- Perceptions of technology support within a school
- The frequency of teacher and student use of technology
- The integration of technology into the classroom

Ministries can use this type of data to plan tailored interventions and training that will have a discernible impact based on realistic assumptions about access to technologies rather than planning interventions around broad concepts or unrealistic technological requirements.[2]

[1] Hogarty & Kromrey, 2000 | [2] Kimmons, Graham, & West, 2020

Several studies suggest that a helpful way to overcome these challenges is to implement new digital initiatives gradually, through continuous cycles of evaluation, implementation and reflection.[3]

With this iterative approach, ministries start by analysing users' needs before designing a simple solution with users and other stakeholders in the ecosystem, implementing it, re-evaluating it and adjusting it if needed. The intervention should only be extended to new user groups once the ministry is confident that the right conditions are in place for teachers to use them effectively e.g. completing professional development or updating school policies.

Since it is helpful for stakeholders across the system to work together (teachers, parents, EdTech companies, ministry leaders, headteachers), several studies recommend using frameworks like the SAMR framework to create a shared language around teaching and learning using technology.[4] The SAMR model, for example, demonstrates how technology can be used to support learning at four different levels of sophistication and it affirms that all of the levels have value.

Level of technology application	Explanation	Example For a Grade 5 lesson on space discoveries and the role of misconceptions in scientific thinking.
Substitution	Replacing traditional activities and materials – like in-class lectures or paper worksheets with digital versions. There is no substantial change to the content, just the way that it is delivered.	Teacher screenshares a PDF version of the Cambridge textbook on a Google Meet video call. Learners can see the questions on the textbook page as a visual prompt as they have the class discussion.
Augmentation	Incorporating interactive digital enhancements and elements like comments, hyperlinks or multimedia. The content remains unchanged, but students can take advantage of digital features to enhance learning.	Students are asked to watch a video about space discoveries before answering the questions in their textbooks. Students research space discovery using a list of public websites.
Modification	Instead of replacement or enhance ment, the design of the task is altered and, thanks to technology, more ambitious outcomes can be achieved.	Students work in pairs to create a Google Slides presentation using the collaborative software. They can feed back on each other's work and check in on the work of the other groups in real time to get more support and rich feedback. Learners then present their presentation to the class and peers complete a quiz on the presentation using Google Forms. The student analyses peers' answers to understand which areas need to be clarified and they update their work.
Redefinition	Learning is fundamentally transformed at the "redefinition" level, enabling activities that were previously impossible in the classroom.	Learners record a video of their presentation for future generations of learners to reinforce their understanding of the topic in future. The final section of their presentation includes a live interview with a space scientist from another country, using automatic subtitle translation.

[3] Atabek, 2020; Niederhauser, D. S., Howard, S. K., Voogt, J., Agyei, D. D., Laferriere, T., Tondeur, J., & Cox, M. J., 2018
[4] Cherner & Mitchell, 2021 and Trust, 2017

Research insight 2

Teachers need digital content to be curriculum-aligned, centrally accessible, structured but editable.

For example, a UK study shows how planning interactive online lessons has increased teachers' average planning time and how having access to high quality digital lesson content could help to streamline parts of the planning process.[5]

> International research from the World Bank also proposes that structured lesson materials with rich teacher guidance is one of the most promising ways to embed new pedagogies successfully, where this is supported by ongoing training and monitoring.[6]

However, it is key that these templates are flexible, as effective teaching approaches may vary by subject, grade level, types of content, infrastructure available, mode being taught (remote/hybrid), class learning gaps and types of task to name only a few variables.[7]

In the Omani context, several papers mention experiments with ready-made modules and templates in higher education which might also offer valuable lessons for K12 content development.[8]

An evaluation on the use of e-books showed some promising results on students' self-efficacy and learning motivation.[9] However, it would be important to research whether the e-book format offers enough flexibility.

Research insight 3

Professional development is key to impact.

A wealth of research, including in the Omani context, emphasises the value of high-quality and continuous EdTech training in schools throughout the implementation and evaluation of new digital initiatives.[10]

[5] Public First, 2021 | [6] World Bank, 2020 | [7] Ellis-Thompson et al., 2020
[8] Muthurmana, Veerasamyb & Al Hazaizic, 2020; Osman, 2020; Mohammed, A. O., Khidhir, B. A., Nazeer, A., & Vijayan, V. J, 2020
[9] ElAd & Al Musawi, 2020
[10] Ellis-Thompson et al., 2020; Wilson, Ritzhaupt, & Cheng, 2020; Al Musawi's, 2018; Atabek, 2020; Ottenbreit-Leftwich, Liao, Sadik & Ertmer, 2018; Wilson, Ritzhaupt & Cheng's, 2020

This is supported by international research such as the World Bank's report on *Cost-Effective Approaches to Improve Global Learning*,[11] which says that investing in textbooks or devices without training is likely to be a "bad buy" that is unlikely to translate into improved student learning.

Despite the recognised importance of professional development to technology adoption, a systematic review of teacher professional development and digital competencies revealed a lack of teacher training in several contexts[12] and recommended an increase in teacher educational technology training in the areas of:

Professional development also needs to take into account teachers' beliefs and attitudes towards EdTech and towards their role as a teacher. A systematic review of teachers' pedagogical beliefs in 2017[13] found that teachers' beliefs and values influenced their classroom technology use and vice versa.

Professional development programmes need to be tailored to different starting points of technology skills, confidence, mindsets and usage contexts so that they can be effective for diverse groups of teachers.[14]

Furthermore, a sustainable training strategy needs to be embedded across the system in a consistent way, involving initial teacher training and considering the use of a framework of standards for digital competencies such as the International Society for Technology Education (ISTE) standards in teacher training suggested by some Omani experts.[15]

As well as offering teachers professional development, some research found that teachers benefited from experimenting with technologies through trial and error.[16] Therefore, it is valuable for teachers to have time set aside for experimenting with new technologies and engaging with professional development to give the changes the best possible chance of taking hold.

[11] World Bank,2020 | [12] Fernández-Batanero, Montenegro-Rueda, Fernández-Cerero & García-Martínez, 2020
[13] Tondeur, Van Braak, Ertmer & Ottenbreit-Leftwich's, 2017
[14] Cambridge Partnership for Education, 2021; Wilson, Ritzhaupt and Cheng, 2020
[15] Smith, 2017; Trust, 2017; El Din and Ibrahim, 2020
[16] Tondeur, Van Braak, Ertmer & Ottenbreit-Leftwich, 2017

5

Recommendations

Although Oman is hoping to return to face-to-face teaching in September, there is potential for technology to continue playing an important role in preparing Omani students for the 21st century workforce[17] and there is much to gain by consolidating some of the benefits that EdTech has brought over the past year.[18]

> The Falaj Project aimed to be both innovative and practical, prioritising practicable ideas over broad concepts or unrealistic technology requirements.

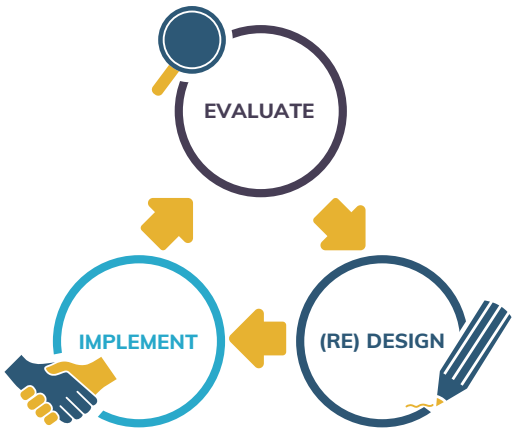
The following recommendations seek to establish feasible goals using a digital ecosystem that is readily available in Oman.

Recommendation 1

Take an iterative, user-centred approach to investment. Seek to understand trends such as:

Infrastructure: Connectivity and devices.
Skills: Teacher and student confidence and training.
Beliefs: Attitudes towards technology and its role in teaching.
Results: Any data around student progress over the past year.
Experiences and ideas: key challenges experienced and ideas for solutions.

When planning investments in new content or tools, consider the following cycle of gradual iteration:



[17] Baby & Saeed's, 2020 | [18] Al Saidi, Al Hinal & Al Mushaifri, 2020

EVALUATE

-Assess existing technology infrastructure and conduct further research about teachers' existing capabilities and needs.

-Work with teachers to pre-empt any barriers to adoption.

-Define how educational objectives are met in the proposed innovation.

(RE) DESIGN

-Design or adapt solutions to overcome adoption barriers with stakeholders from across the system such as headteachers, teachers, parents, students, technology companies, supervisors, trainers and ministry officials.

-Design teacher training and support systems for parents and students.

IMPLEMENT

-Deliver products and platforms to end users.

-Provide training, support and communication for all affected stakeholders.

-Plan a date at which to start the cycle at the "evaluation" stage again.

Recommendation 2

Digitise existing content.

This could save teachers time and support them to successfully continue to embed the current and make the most of functionality that has already been invested in.

Recommendation 3

Source basic new textbook-aligned content and tools.

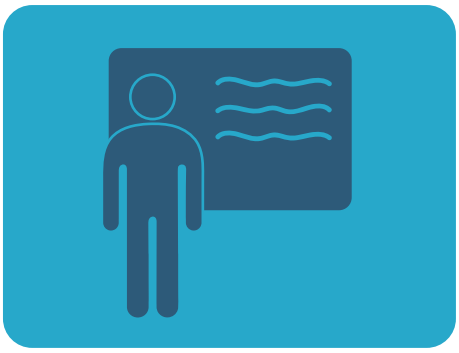
Exploring ways to make high quality, textbook-aligned topic videos available to teachers through different means could save teachers time and ensure they can successfully continue to embed the curriculum with high quality materials.

Recommendation 4

Invest in sustained professional development programmes.

Ensuring that all teachers are offered continuous professional development on effective use of technology for remote and hybrid teaching, and that training is high quality and differentiated to their levels of skill/attitudes to technology, could help ensure equity of learning experiences across the country and ensure investment into content and platform translates into improved results.

Consider ways to give teachers more time to engage with professional development and trial and error experimentation.



Consider how training should be incorporated into initial teacher training and how to ensure consistency.

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