Citizen Literacy – Ufi Final Evaluation Report March 2021

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Two Evaluation Reports – Project & Impact

This report contains 2 different report. The first is a project evaluation that looks at the project activities and how they progressed in comparison to the original project aims and objectives contained in the original Ufi Project Initiation Document (PID).

The second report is a rather longer and more reflective account of how the project team developed and interacted with the adult literacy sector and how that experience has impacted on the project team and how they work. This contains discussion about adult literacy theory and how the project has sought to situate itself in this sector in a distinctive manner for future development. As the Business planning section makes clear the adult literacy sector is a large but diverse and fragmented market, so understanding how the project fits in to this is important for the future – hence the length of those discussions and reflections.

Citizen Literacy Project Evaluation

Executive Summary

This project evaluation takes the form of a reflective commentary on the original Ufi Project Initiation Document (PID) aims and objectives agreed between the project and the Ufi. We summarise what we have learned from the pilot process, with some data from user testing, including evaluation of the App from a learner perspective along with user feedback and a brief summary of the results of that. We look at how well the app worked, what kind of things surprised us and what did not go well, or as expected. We also look at what might need to be improved about the project deliverables going into future. We end with a brief discussion of sustainability options and business planning.

Broadly speaking the project has achieved it aims and objectives and the team are planning to launch their first products in summer 2021. The project has succeeded in:

- Creating a smartphone app to support adult literacy learners that uses a range of innovative learning activities including the use of voice and handwriting recognition. Available for both Android and iOS platforms
- A learning design that is based on a credible pedagogic model by experts respected in the adult literacy and ESOL communities
- A web app that provides the basis of a registered teacher app using a subscription
- A sustainable business model to reach the difficult and under-resourced adult literacy sector

Identifying the need

The project set out to find innovative ways to use technology to improve basic literacy skills for adult learners in the workplace and community. Low levels of literacy represent serious challenges to economic growth and personal development (UK government, OECD). A report from UK GOV in 2016 indicated that the economic impact of these skills gaps on employers and employees are much more difficult than poor numeracy to remediate 'on the job'. UK GOV figures indicated that 15% of the working age population had poor literacy skills. The ability to communicate via reading and writing is a fundamental requirement in many modern workplaces. To not be able to; read instructions to operate equipment, sequence processes, follow safety procedures, or to be able to record and transmit information about work related matters via writing has a large impact on individuals and on businesses.

Aims

To meet these needs the project team decided to create a prototype smartphone app that could support adult literacy learners in between face-to-face literacy classes and provide some autonomous learning opportunities using technology – a first for the adult literacy sector.

The educational model underlying the app is based on the ideas connected to the use of 'structured phonics', adapted for adults, developed from ideas originating at a face-to-face literacy course at City of Glasgow College. This approach is based on working with people who are fluent speakers of the English language but cannot read and write. It provides learners with a way of relating the sounds of the language to their written forms. The app features standard smartphone interactivity, plus voice and handwriting recognition for user input – ideas that derived from the original face-to-face course that the app is based on. There are currently, to our knowledge, no other adult literacy products that offer this range of features to their learners and their teachers.

In addition, the educational design goes further than many other current adult literacy approaches (such as memorising word lists) and aims to provide learners with a growing toolkit of knowledge about how the written language works. Thus, the app features a broad range of learning activities that is unmatched in other current adult literacy technology products. These features include:

"A structured and integrated blend of phonics, grammar, alphabet awareness and punctuation for adults just starting out in literacy learning"

Objectives

To meet these project aims the project plan developed three objectives:

Objective 1 Create a Learning Design and a working prototype as a web app

Working closely with adult literacy experts and learners to develop the learning design for the app to provide the framework for the functionality and the user experience in the Smartphone apps. The benefit of creating a web app is speed – it is essentially a web site and makes testing and changing the code very easy. Later the code can be converted to operate on a smartphone, which has been done. In the web app we were able to implement and test all the proposed features including storing progress some personalisation and handwriting and voice recognition.

In this work we used some standard instructional design methods especially ADDIE (Analyse. Design. Develop. Implement. Evaluate.). As the work progressed, we increasingly made use of ideas connected to 'design patterns' which have become popular in instructional design. Simply put - it is the idea that there is a re-usable form of a solution to a design problem. In turn, we started to see more of these patterns in our instructional design which were in turn translated into reusable code libraries.

Objective 1 Outputs / Deliverables / Learnings

- Learning Design developed and agreed, storyboards and user stories etc.
- Web App developed

Learning Design

As we worked through this process with the developers, we developed a simple common terminology to describe the types of activities and interactions in the app. This was facilitated by very rapid 'live' prototyping of different options on-screen held via. This grew as the different activity types were created by the developers in online video calls. This included a mixture of using the Figma collaborative interface tool and increasingly the developers creating JavaScript animations on the fly.

Over a period of time the subject specialist, the learning designer and the developers settled into a routine of using a simple Google doc format to create a learning design textual 'script' that could facilitate discussions and annotations. Rather than traditional story boards this became the main shared design document. This was an efficient method that was enabled by the collaborative frequent live rapid prototyping sessions and close and informal working relationships.

- Learning Design example doc for Lesson 4 – Finished and tidied up

https://docs.google.com/document/d/1ZFZNjgtcWH9myQmMCjsKNtxi1QCJAuT-BO6GjckI1Uc/edit?usp=sharing

- Learning Design example doc for Lesson 4 – A working copy with design annotations and footnotes at end etc

https://docs.google.com/document/d/1QW8Th4mZ7tfcbOBPPJ7dsBywMpKX3w1mO_g7eU7pe50/edit?usp=sharing

Web App

- Working Web App

https://citizenliteracy.com/app/

- Media Content

Media content was created by the project team using a range of digital tools. ‘Explainer videos’ featuring the subject specialist were created and custom graphic objects were also created by a graphic designer. Virtual tutor voices are provided by Amazon cloud services.

Objective 2 Develop a smart phone app that features learning activities based on an existing face-to-face course

Objective 2 Outputs / Deliverables / Learnings

- Smart phone app created and tested and distributed through the Google Play and the Apple App Stores.

Smartphone Apps

Both apps have been accepted into the app stores.

Google Play
https://play.google.com/store/apps/details?id=com.citizenliteracy.citizenliteracyapp

Apple App Store
https://apps.apple.com/gb/app/citizen-literacy/id1557566220

Here is a link to a demo of some of the features and activity types that the app includes:

https://youtu.be/AHpvhvxR3VQ

This short video shows some of the different features and activity types of the Citizen Literacy App as of March 2021. These include: The 2 different virtual tutor voices (Al and Jude) that provide instructions and feedback to the learners. 'Explainer videos' that set the scene and provide support for each learning activity. Listening to the sounds of letters and their combinations. Linking sounds to written letters and their combinations. Blending sounds to make written words (structured phonics). Speaking written words - using voice recognition for learner feedback. Writing words on the screen - using handwriting recognition for learner feedback. Writing sentences (gap filling and right order). Alphabet awareness exercises.

The app captures detailed anonymous user interaction data about their activities in the app which will provide the basis for future analytics services and information dashboards for teachers when a registered version of the app is developed.

The test cycles of the app to date have been using the web app and to date it has been well received by learners and tutors. There is more information about this in the User testing and Feedback section of this report

Learnings have included:

- The benefits of using the free Cordova toolkit to move the web app version (which is really a web site) into a common code bas to distribute to both app stores. Although fiddly at first this has proved really useful.
- From our community engagement activities, it has become clear that many of our prospective learners will have mediated access to this app. We thought this would be the case from the beginning. This means friends, relatives, workmates and mentors will play a major role in getting learners to find the app to install on their phone.
    - However, we know many of our target learners already own smartphone and the app stores both feature voice activated searching. So, learners can be asked to do voice search for the Citizen Literacy App and install it themselves – this greatly widens the potential reach for the app.
- We were initially sceptical about the possible amount of autonomous independent learning that the app could provide for adult beginner learners in literacy. We anticipated that the app would mostly support in class learning between classes – which it does very well. However, the degree of independent learning that has been going on in the user testing phase has made us change our opinion

- Regional English accents have been found to be an issue for some users in the app. We have found that the standards voice recognition services we are using can struggle to correctly identify short words (e.g., pan) spoken on their own without the context of a sentence. This can be very demotivating for a learner; we have developed 2 solutions 1) after 2 goes the system tells the learner the Voice recognition is not working very well today and moves them onto the next activity - transferring the 'blame' to the system. 2) We have developed an Artificial Intelligence solution to be able to 'tune' the voice recognition system to recognise an individual voice pronouncing single words. This has been prototyped successfully and will be integrated into a future version of the app.
- The development of the project team and its wider associates from different projects into a highly effective unit has been notable. Much of this has had to do with an early exercise in creating a public 'White Paper' which built trust and understanding between the team members. It has also been very useful in making our position clear to the large and diverse adult literacy and ESOL sectors that are interested in our work. According to one project member, the working methods of the team have developed to have a lot in common with the famous 'Skunk Works' engineering methods. Where small multi-skilled teams have informal working methods, constant discussion and communication with low hierarchical barriers, minimal bureaucracy and high degree of autonomy is present

Objective 3 Marketing and sustainability development, raising the profile of the Citizen Literacy project and consortium and developing a sustainable business model.

Objective 3 Outputs / Deliverables / Learnings

The main outputs for this objective are contained in the 'Sustainability and Business Planning' at the of this project report.

Learnings have included:

- Creating the public 'White Paper' has also been very useful in making our position clear to the large and diverse adult literacy and ESOL sectors that are interested in our work. This has greatly helped our public perception in these sectors.
- The importance of regular community engagement activities via workshops and the use of social media, email newsletters and online professional networks.
- Access to and use of traditional big media e.g., BBC, Radio, Print Journalism (e.g., TES) etc.
- That community engagement is an operating cost

Deciding where the value (money) can be realised in these sectors has been a challenge we think we have a viable solution now – please see the Sustainability and Business Planning' at the of this project report.

What we have learned.

We have itemised some our learnings above in the context of the project objectives. Other significant learnings include:

Creating a Virtual Learning Environment for low literacy Learners on a Smartphone

We have been exploring how to develop the app into a kind of VLE service for adult literacy teachers and their learners – partly inspired by our exposure to a literacy app development in India by Amrita University (an X prize literacy finalist). Although the Amrita app is very different to ours in technology and approach its use of 'community codes' to potentially enable customised content delivery for different learners was a turning point in our thinking.

We have redesigned the app data structure in JSON to gather even more data points from the learner's activities than previously. In addition to this we have integrated Google Tag manager services into the app. This combination means we now have the ability to track individual learners in great detail in relation to the learning design – either as anonymous users or as registered users. This in turn generates lots of data that needs to be presented to a tutor in an understandable form to help them provide remote feedback and direction to the learners. Some form of Dashboard seems to make sense that can present information via graphics and text that is also somehow linked to a representation(s) of the learning design – perhaps a timeline with LO's for instance

We are exploring how to use AI machine learning look for discovering common patterns in the learner data to help tutors decide what kind of support or intervention might be needed – for instance a learner that is making rapid progress might need some more demanding exercises, while those who are repeating a lot of exercises (a common trend) may also need some encouragement to move on. This would be developed by using direct interviews with learners and their tutors – not just depending on data alone, we have to remember this is a very new field for adult literacy teaching.

Citizen Literacy Gaming Engine

We have the ability of creating a basic literacy 'gaming engine' using our existing tech that uses all the interactivity types we have developed

Analytics

- Using Google Tag manager and Hotjar for analytics

AI

- Practical aspects of modest AI applied to creating adaptive feedback, personalisation and ‘nudging’ techniques for learners

Teacher App

- The realisation that the teacher app is likely a registered product (subscriber busines model) – in the form of a web app – exploring the ability to have teachers create their own custom extensions to the Citizen Literacy app that are relevant to their learners

Digital Asset Management

We have been using a variety of resources to do this: Google Drive. Google Docs. GitHub. Dropbox. MS OneDrive etc. This reflects the diverse nature of the teams working methods. However, keeping track of the assets is tricky. We need to have a way of collecting them together – realistically this will need a human to collect and tidy from the disparate silos into a project archive with a friendly front end.

Amazon Polly

This text-to-speech service has proved very useful and powerful. We have even started using it for video voice overs as it is easier to work with than a human

Blooms 2 Sigma Problem

Through attending an event we became aware of this research by the famous Benjamin Bloom, it has become a big influence on our work:

- Bloom’s 2 Sigma Problem – see https://en.wikipedia.org/wiki/Bloom%27s_2_sigma_problem I came across this at a meeting of researchers to discuss using data in education. Our approach is arguably quite close:
    - Using a mastery learning model – levels to progress through
    - A tutor persona that gives relevant feedback and encouragement
        - With the future addition of ‘basic’ AI this could be powerful
    - Going to keep an eye on this connection as we progress – although need to be careful of not falling into an EdTech hype fest!
    - The original article (via Jstor) makes really interesting reading have downloaded it at this link https://drive.google.com/drive/folders/1Q9CgH-8YfSByrcCFl36YDzlGfE0q_nfd?usp=sharing

Benefits of Modular Learning Design, Code Base, and Data Model

Making the learning design, code base, and data model as modular as possible and some rapid design iteration at the start pays big dividends as we move to production. This has happened organically and because of the way the subject expert,

instructional designer and developers have been working together. In reflection this would be a combo of agile and spiral models of software development, which we did mention in application. From the ADDIE model of instructional design our Design element has been sandwiched between continuous feedback from the ongoing Analysis and Development phases, and that has been very productive so far

Interface tools and Code tools

- Figma for rapid interface collaborative design – very good https://www.figma.com/
- Sass CSS pre-processor https://sass-lang.com/ developers really like it, and it makes the code quicker

Social Supply Chain in the Adult Literacy Market

- Access to a community of end users / learners is really valuable and, in our case, we realise we have 'multiple beneficiaries' between us and them that are in many ways just important if we are to reach our aims – we don't always think of the social supply chain aspect in EdTech environments. Has important implications for our PR. For the avoidance of doubt a list of beneficiaries:
    - Learning providers
    - Tutors / Teachers
    - Learners

Graphical Systems Analysis Tool for Learning Design

We have found this online collaboration tool very useful Miro (https://miro.com) it has a lot of similarities to the traditional post it notes on walls techniques that designers use. In addition, it features many useful tools for showing connections between the parts of a system and adding annotations – all on a virtual 'board' that can be infinitely expanded. We think this has great potential as a collaborative learning design tool

Using Zoom as a Virtual recording Studio

We used our pro zoom account set to HD to create our explainer videos – worked well and saved a lot of time

User testing and Feedback

We undertook a variety of face to face and online community engagement workshops with our Scottish Union Learning partners, the national ESOL organisation NATECLA, Dyslexia Scotland, and a range of Adult and Community Organisations. This and the use of access to existing professional networks helped to spread the word and gave us access to our target tutors and learners. Due to Covid restrictions we had little opportunity to meet physically with our users

67 teachers signed up for in depth testing, providing continuing on useful feedback from the adult literacy & ESOL community on the Test App Web Version (basis of app store version. Some of these were able to work with their learners to capture their feedback. The test and feedback page on the website gave information about how to engage with the process and access to online forms and ways to arrange interviews etc.

Six learners and 19 teachers and advocates also completed educational questionnaires and 8 in-depth interviews were carried out with learners, teachers and advocates. Covid restrictions limited this exercise

Key findings from the user feedback include:

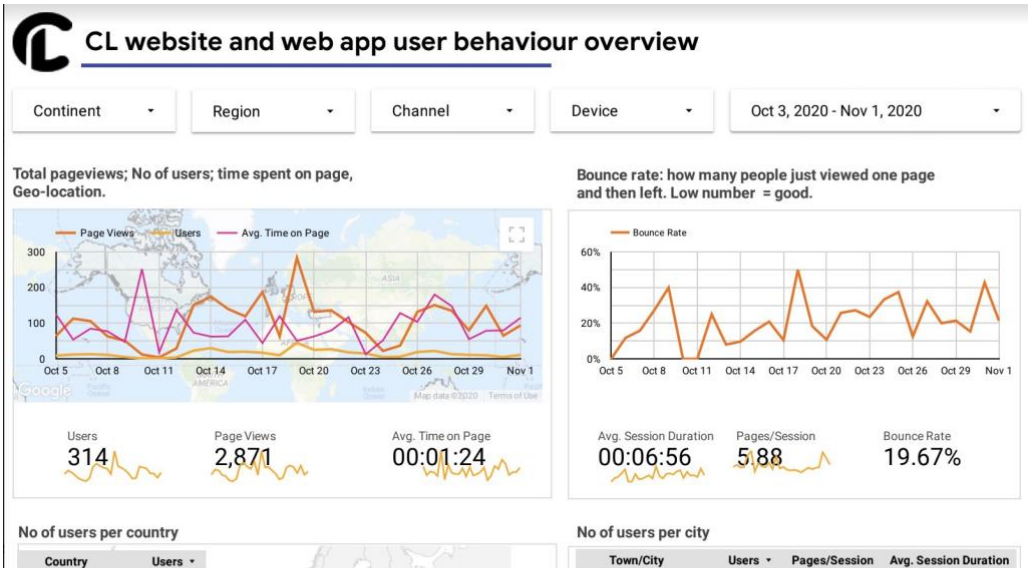
- Opportunity to engage in low-stakes, bite-sized literacy learning is appreciated by beginner literacy learners.
- Flexible opportunities for adults to continuously practise and develop their literacy skills are particularly welcomed by learners, and teachers are able to utilise learners' enthusiasm for the app to devise and in some instances, co-create new blended learning opportunities.
- The critical role of advocates as intermediaries in adult literacy learning.
- The importance of establishing trusting relationships with learners (and their teachers).

Analytics Data used (anonymous) Date period Autumn 2020

We used a mixture of Google tag manager and in-app data points

- Number of users testing the app
- Location of users (country and region)
- Time spent on the app
- Time spent per page of the app
- Average time spent per page
- Average visit duration

This data has enabled us to track examples of an average learner's progress through the app (e.g., how often they engage with the app, how much time they spend on the app, how many activities they complete. Here is a screenshot of a month's (October) analytics for part of the test period:



Learner Engagement with the App

Average visiting times of 7 minutes and 44 seconds to the Beta testing site, coupled with a consistently low bounce rate suggests that beginner adult literacy learners are engaging in bite-sized learning, building a small but significant amount of literacy learning into their everyday routines. On average, it takes learners 1 minute and 22 seconds to complete each task, suggesting that for an average learner on an average visit, 5.65 activities are completed.

This is a promising finding, as it indicates that learners feel able to persist from task to task, and that the app is suitably intuitive in the support and guidance it is providing. It is hard to determine whether the length of time learners spend on the app is consistent with time spent by learners on other educational apps. This is due to the unique context of our work with beginner adult literacy learners, coupled with a dearth of existing apps designed specifically for this cohort.

In-app demographics reveal that the majority of learners who visited the Beta testing pages are based in the UK (1730 sessions), followed by those based in other predominantly English-speaking countries, including Australia (91 sessions), USA (65 sessions), Ireland (54 sessions) and Canada (43 sessions).

All 15 teacher/advocates who had used the app with learners feel that learners find the app easy to use, engaging and that it is supporting learners' literacy development. Learner questionnaires indicate that most agreed that the app is helping them to improve their reading skills, writing skills, and that they are hopeful about developing them further due to the app. Interviews with learner's support and draw out these findings, with learners highlighting numerous ways that they feel their literacy skills have improved. These examples include learning sounds and words that they previously didn't know, going over examples, being able to make mistakes, attempting to read where they wouldn't have before and the app being unique in allowing phonics practise.

Tutor's Feedback

This is some feedback from an. Email from an Adult and Community Education tutor employed by a London Borough Council:

- “The app is great, it fills a big gap and having a fully integrated app and course materials is just what a tutor needs. A lot of good work has previously been done by many people, but resources and materials are distributed all over the internet and in different publications and it’s tiring and time-consuming to find it all and fit it together – a fully integrated course like this solves that problem.
- The structure and the sequence of activities are very good, making it easy for the learner to self-study and progress at a speed which is best suited to him/her.
- It is really good that the app includes a combination of listening to identify a word and speaking a given word. This is missing from many apps.
- I think the app is well designed and should be easy for learners to use in my literacy class. It is welcome that there are no distracting animations, it treats the learners like adults, and having the consistency of using the same app throughout the course will facilitate access, making it much easier for learners to achieve autonomy in study.
- Many of our literacy learners have come to us through our ESOL assessments - so it is good that this course targets that group as well,”

(Donal, Tutor)

Other tutors’ feedback (verbal from interviews):

‘”did love the ‘well done, you’re doing well’ I thought that was great, there was a lot of affirmation throughout it... I think the confidence level will come...by being perhaps scaffolded a little bit with a bit of support’”
(Sally, advocate)

“I liked the encouraging feedback of the ‘well done you're doing great’ I think learners really need to hear that especially if they’re doing it on their own I think this particular that I've been supporting that would be really boosting for him just to hear that”
(Emma, teacher)

“You could see there was an awful lot of pedagogy and thought process and really it came from a really hugely strong base”
(Sally, advocate)

“Again, I've seen it working with students who they thought they’d never be able to learn using a computer or they’ll never be able to learn using an app you know their mobile phone but they can and it just takes a bit of time”
(Blair, teacher)

Learner’s Feedback

(Audio transcriptions)

“I done it [the question] and it said it was right and I felt so relieved so happy inside”
“erm I will go out, we got a shop called (name) the shop down here and I never can remember its name so what I did is I spelled the letters out you know, and I remembered it…I told my daughter she said ‘where are you mum’ and I went ‘I’m in

that shop' 'what shop' and I went 'ok yeah' I was there that's it and I spelled it out read it to her what shop I was in but I felt so good inside"

"The reading part, I will read something now like and if I know it's a mistake I will go over it a few times... I do go through it a couple of times just to read it properly, write it properly"

"I've got a lot better on that app by using it. I can make mistakes on it"

"The app...it makes you think and you can always go back you can say 'alrite I don't wanna know today I'll go back tomorrow' you can go back to it all the time you don't have to go 'oh I'm going to lose it or it's not going to be there anymore"

"my son called me yesterday and he asked how was my learning was getting on and I should get really good he asked me to spell EastEnders and I spelt it without thinking nothing I just felt straight away and thank you thank you thank you"

"My tutor told me about the app and I went into it the first [lesson] and it was brilliant honest and truth I was amazed because all the words what you've been learning are on that, and even if you get it wrong 'please try again' and you do it again and then it makes you think what is the word, like stamp that's what I got muddled up with and erm oh god what is it and I couldn't think and I sat down at the computer and said 'no you have to look at it properly' so I done it and it said it was right and I felt so relieved so happy inside."

The App: What worked and what did not

- Generally, the app has worked as we hoped, apart from some problems with voice recognition for short words
- Due to Covid we did not have as much face-to-face contact with users.

Unexpected Outcomes

There were a number of notable unexpected outcomes that are worth noting for future planning:

- Digital Literacy support: it became apparent to us that the app could and should be a way of developing both textual and digital literacy at the same time. This has been brought into our planning
- Independent learning for low literacy learners: Experience and feedback from users indicate this is more feasible than expected
- Remote team working due to the Covid pandemic has proved very efficient and will be retained to a large extent
- Producing a 'White Paper' was a very effective team building / formation exercise and a strong tool for community engagement
- Finding the limits of voice recognition - system breaks down when posed with single short words

- Game Engine: finding that the activity types we have created provide the basis for a wide range of adult literacy games
- Realising that the app could be adapted into a Virtual Learning Environment for adult literacy learners
- The interest and popularity amongst the ESOL sector.
- The possibility of using analytics to provide a dashboard for teachers and progress information for learning providers

Future improvements

Here are some of the ideas we have had about adding future improvements:

- Navigation – as the Part 1 course is created there will be 30 lessons with 600+ learning activities. How teachers and low literacy learners can navigate around this will be a challenge. Already thinking of the separate teacher app (registered) with a different interface.
- Even for the low literacy learners we are thinking of a range of options because by the time they are at lesson 15 of the part one course we might be able to introduce textual elements to the interface and have text-to-voice assistance.
- Building in digital literacy development to the app seems sensible

Sustainability and Business Planning

This is the complete Business Plan as it appears in the project Final Report.

Product Summary

The finished smartphone App will be free, open access, with no adverts, and no capture of personal data. There are good reasons for this approach from an ethical and educational perspective. Almost by definition many of these users will be on low income so charging for access is not sensible, in app purchases and advertising makes no sense for these users and is highly distracting and so counterproductive to learning. We have designed to the app to use local data storage to store learner scores and progress; hence the learner does not have to register to use the app. We can access learner data anonymously in this system if needed.

After much discussion and market research we have decided that a viable path to economic sustainability is to charge (via a subscription) for teachers / learning providers to access the web app to use in class and to charge for printed Teacher Handbooks and Student Workbooks. This is based on current trials where project tutors are using the web app version in their face-to-face and online adult literacy classes. What we have seen is teachers using their web app to demonstrate things to the class and then ask the learners to work their way through that activity on their smartphones – often remotely. The benefit of the subscription teacher app is that the learners will see exactly the same content in class as they see on their phone. The

app supports a high degree of independent digital learning for these learners – we think this is a first in adult literacy. We also have plans to enable teachers to register their students via the teacher app and monitor student progress via an analytics dashboard. This development would allow teachers and learner providers to supply data about student progress to meet funders requirements.

The teachers also make extensive use of paper-based materials in class because of their flexibility and ease of use and because using handwriting exercises is still an important part of learning to read and write. This is why we are producing printed Student Workbooks, for the learners to use in class and at home.

The Teacher Handbook provides in depth guidance for tutors to deliver adult literacy classes using the app combined with the Student Workbook. This also helps support a hard-pressed community of teachers who are often working in a wide range of contexts with little support or access to suitable adult literacy learning resources. As feedback from a literacy tutor has observed having all these resources together and integrated in one place is a big advantage (please the Feedback and Reaction section above). The curriculum and app are also designed to be flexible – so that they can be integrated into an existing learning provider's activity.

Product Design Plans 1: Curriculum Mapping and Equivalence

The project team plan to create three adult literacy courses with the first course being for complete beginners. This first course will be based on the work undertaken so far during the Ufi Seed project, with input from the two Nesta funded projects – due for delivery in 2021. This will be followed by another two courses. Together the three courses will be approximately equivalent to the reformed English Functional Literacy Skills Entry Levels 1, 2, and 3 qualifications and standards – taking learners up to a level broadly equivalent to a pass at GCSE in English. Because of the ever-changing nature of qualification specifications in the UK home nations and beyond internationally, we have decided to create our courses in such a way that prospective users will be able to easily map our resources to their local qualifications and standards. To help us in this process we are going to use the service of the Scottish Credit and Qualifications Framework. This organisation provides a well-recognised and longstanding service that can map equivalences across national and international qualifications.

Product Design Plans 2: Prison Education

The project team have extensive experience of providing adult literacy services in prisons and are now in dialogue with learning providers about how the App can be adapted for use in UK prison system – via the national 'Virtual Campus' that all prisons have access to.

Product Design Plans 3: Vocational Extensions to Entry Level 1, 2, & 3 courses

We intend to add content to our courses to support learners to use their growing literacy skills to include vocational vocabularies that are relevant and useful to their own working lives. Early priorities for these would be for those working in the care and construction sectors, we would envisage working with sector skills organisations and employers on this initiative.

Digital Literacy

We see textual literacy as a foundational skill to enable digital literacy. Yet there has been little research into the digital habits of low literacy users. Because existing measures of literacy are relatively crude, organisations like UNESCO and OECD have recognised the need to develop a wider interpretation that recognises the specific contexts of the use of literacy skills, this is especially relevant in connection to the use of digital literacies. These emerging approaches move on from the currently dominant 'transactional' measures (important as they are), such as the influential Lloyds Bank UK Consumer Digital Index 2020 Report. This is indeed useful as a baseline report for 'the state of the nation' in terms of digital literacy. But from this it would appear that our target learners should be struggling in the most basic 'foundational level skills' area of digital abilities**.** However, our experience indicates that most of our target learners own and use smartphones and use internet services. Some interact with work computers using a number of different strategies, including getting help.

So, we need to know much more about the actual lived social reality of how our low-literacy learners interact with the digital world and we have begun to explore these topics in our White Paper. From this perspective, one of our educational influences is the work of the Brazilian educationalist Paulo Friere, who stressed the need to make sure we understand where our learners are in reality and start from there.

Our strategy in the Citizen Literacy programme is to combine textual and digital literacy development for adult learners. In the Ufi App project we have begun to build in digital literacy elements, such as customisation and menu choices so that our learners improve both literacies in parallel.

Company Formation

Four members of the project team have come together to form a Community Interest Company (CIC) as a legal formation to take the work forwards as a non-profit company – Companies House Registration SC671958. This company will manage the IP in the Citizen Literacy products. This group are also investigating the viability of setting up a Charitable Incorporated Organisation (CIO).

Market Research & Marketing

Through our own experience working in the adult education sector and with recent market research assistance from the social enterprise consultancy company SIMPACT we know the adult literacy sector is highly both highly diverse and fragmented. It also overlaps with the ESOL sector. Initially we discounted the ESOL market as it is already a very 'noisy' market for EdTech solutions, but from feedback we realised that there was considerable interest in our app and approach for use with ESOL learners who had already learnt to speak English but needed to develop their reading and writing skills.

Initially we see individual teachers buying our products to make their own practice better and less demanding. These teachers will be people who are active in what we could describe as the 'Adult and Community Learning' sector. They operate in a broad range of contexts including:

- Teachers / Tutors employed by local authorities in community education roles
- Volunteers working in adult and community learning settings
- Teachers / Tutors employed by FE Colleges who supply community learning services – sometimes funded by a local authority.
- Teachers / Tutors who are active in third sector settings – like community groups and charities.
- Teachers / Tutors who are working with **E**nglish for **S**peakers of **O**ther **L**anguages (**ESOL**) – in a wide variety of contexts

Priority Delivery Contexts (in no particular order)

- Local Authorities
- FE Colleges
- Third Sector
- ESOL

Eventually, we aim to see purchases by organisations as well as individuals, for instance we have been approached by the Princes Trust. We expect growth to occur both organically through existing community network links and associated social media channels as well as through more traditional 'big media' exposure such as the BBC and Times Educational Supplement. Either way, the project team will have to devote resources to maintaining and building our community engagement strategy in order to build market share.

Market Characteristics: A Long Tail UK / Global Market

This section describes how we see the characteristics of the market based on our research and experience. We observe that it fits a description of a classic a long tail market – large but difficult to reach by traditional methods but can be reached via digital channels.

English Adult Literacy Market

In the UK number of working age adults who struggle with basic reading and writing is estimated at over 15% of the working age population with 6 million plus learners (UK GOV) with similar rates in the rest of the English-speaking nations, e.g., USA has 43 million in the working age population with low literacy skills (OECD & USA GOV)).

Adult literacy learners and their teachers are underserved compared to the school / college sector. Learning providers and their teachers struggle to reach and support these 6 million UK adults and 43 million USA adults. Reasons include:

- lack of integrated digital / paper learning resources to support learners and their teachers.
- shortage of teacher training opportunities in relation to phonics methods for adults.
- general under resourcing of adult education

This is a large and diverse market that includes local and national government agencies, local community colleges and training providers (commercial and community based 'third-sector'). In many ways this market is classic a long tail market – large but difficult to reach by traditional methods. Our target customers have a strong online community presence we can reach through our partners' online networks. All our products are online; with convenience of access as well as product features and pricing being a strong factor. With a low marginal cost of production (including print on demand) we can respond quickly to seasonal variations in demand, like term time dates. In this way we hope to leverage the digital delivery medium to our advantage. We think our integrated combination of digital and paper products to support these learners and their teachers has great potential to reach this market. Initial public engagement exercises in 2020 shows that our partners have excellent adult literacy and ESOL community links that can drive a marketing campaign, amplified by social media and traditional media.

International ESOL market

This is a very large and highly fragmented international market. We have had strong interest and have received to date from ESOL teachers in the UK and elsewhere.

End-Beneficiaries Learners) & Customers

Adult learners will be the end-beneficiaries of our products but not the paying customers. Teachers and learning providers will be the customers for our products. There are over 19,300 ESOL teachers in the UK alone (English UK). Adult Literacy support is largely divided between 238 FE Colleges (AOC), private training providers and third sector organisations. The other main providers are from UK local authority education services. Across the UK this market is highly fragmented.

Serviceable Available Market

We aim for a growth rate starting with 1000 subscribers in the first year doubling every year after that and reaching upwards of 8,000 subscribers by year 4. Geographically the market is global.

Pricing

When the full suite of the course curriculum, app and books are developed we are thinking of the following approach:

- Learner App - free
- Teacher App – for use in class and communicating with learners via their app – circa £5 a month subscription (£60 per annum)
- Teacher training videos - free
- Teacher Handbook – circa £35 via a print on demand service (2 for each course)
- Student Workbooks – circa £ 7 each via a print on demand service (6 for each course)

Timelines and Projections

In this section we sketch out our plans for product and service development and rollout. We describe the characteristics of our target customers and users. How we plan to market our products and services to reach these target customers and users, and the key partnerships and client relationships that we will need to support our business. We conclude with some projections for target revenues and ideas about future business and operating models.

Product and Service Development Timelines

Core Courses

We plan to produce three ‘core’ adult literacy courses that start at complete beginner level and then progress to what would be approximately equivalent to a pass at GCSE level. The three courses would be roughly equivalent to the English reformed functional skills qualifications at Entry Levels 1, 2 & 3. Each course will feature a dedicated smartphone app, student workbook, teacher handbook and training videos. Our level 1 course should be live around July 2021. The next 2 courses should appear in the following 18 months. With all 3 being live in mid 2023.

Course Extensions

In addition to our three core literacy courses, we anticipate creating ‘extensions’ to these courses that can provide a range of customised learning opportunities for different learning contexts. For instance, we aim to have extensions that provide vocationally relevant vocabularies and learning resources for those working in the care and construction sectors. We are also in discussions with organisations involved in prisoner education about how we can technically adapt our app to be delivered inside prisons via the national ‘Virtual Campus’ prison system. These ideas

will be developed as funding opportunities become available over the next 24 months

Training

We also anticipate a growing demand for teacher training in the methods that our courses and apps use, especially in the area of synthetic phonics methods where there is a shortage of training opportunities. We think we can meet this demand through a mixture of pre-created online resources and customised synchronous training sessions.

Target Customers & Final Beneficiaries

Our target paying customers are adult literacy teachers and their employers in what we could describe as the 'Adult and Community Learning' sector. This is a highly diverse and fragmented market compared to traditional school and college contexts, as we have described above in our market research section. Initially we see individual teachers buying our products to make their own practice better and less demanding, followed by organisational adoption. Adult literacy learners will be the final beneficiaries of our products but will not be directly paying customers. Their access to our products will be largely mediated by others such as teachers, relatives, mentors, work colleagues etc.

We have been surprised by the interest shown by ESOL practitioners, this is a large and global market, again we see individual teachers leading on the adoption of our product, followed by some organisational take up.

Key Partnerships and Client Relationships

The Citizen Literacy CIC will be the central driving force in the future development of the business and will manage the IP involved in the products as well as the ongoing educational design, technical development and support. The CIC will continue to collaborate closely with the existing project partners going forwards to co-design our products and seek further development funding. The future development of the core courses are capital intensive activities and will proceed more quickly if we can gain further development funding, this will be easier to achieve if we can draw upon a wide range of collaborators. Our continuing close associate partnerships with TRT ETC Ltd, the Claire Collins Consultancy Ltd., and Scottish Union Learning will give us access to wide range of professional networks, organisations and individuals.

To date, from our current contacts, we can see an emerging pattern of important wider relationships for the CIC to nurture that include: Prisoner education providers. The UK ESOL community via NATECLA. The BBC via Skillswise and Radio5 Live. The Times Educational Supplement TES. The Irish National Adult Literacy Agency NALA. UNESCO. Local authority community education tutors. Further Education College teachers. Third sector and community groups – e.g., the Princes Trust, The National Literacy Trust, Easy Read (Shannon Trust). The Workers Education

Association. Scottish Union Learning. TUC Union Learn (England). This is growing as we reach more users, and our work becomes more widely known.

Marketing

English Adult Literacy

The diverse, fragmented and under resourced nature of the adult literacy market presents a marketing challenge for the CIC. Our experience so far has borne out the value of using existing professional online networks (via twitter, email newsletters, LinkedIn etc). This in conjunction with having a clear web presence and the occasional access to traditional media (TV, Radio, Print) seems to provide our best strategy for the future. When our first products go on sale, we can expect to use these channels and for there to be considerable interest and comment.

The online adult literacy professional community can be a fractious environment with strong views about the different theoretical positions. To date we have managed to avoid being embroiled in these arguments and intend to keep things that way. Another marketing / perception challenge that we face is that our work and approach become misrepresented as being a technical ‘magic’ fix for poor adult literacy. To avoid this, we will need to distance ourselves from the exaggerated hype and political agendas that can be connected to EdTech initiatives – such as ‘tech replacing human teachers.

ESOL

This is a large and diverse global market. Experience so far has indicated a strong interest in our work from this community. Based on our own experience of working in this sector, we expect these customers to adopt the parts of our products that they need in an ad hoc way. We will interact with this market in much the same way as we do with the English Adult Literacy Market

Projections for Target Revenues

When we launch our beginners’ course in mid 2021, we will aim to reach 1,000 paying customers in the first 12 months. In revenue terms per individual product this will break down approximately as shown below, with estimated profit margins per product shown in brackets. NB These are ‘raw’ figures and do not take account of the development costs in creating the products but does include the costs of production delivery using the AWS and other cloud platforms. To be sustainable we need to cover future costs of development and maintenance of the product range our pricing ideas below try to reflect that.

Revenue and Margins per Product

Teacher Handbooks: 2 per course @ £35 each (£17.00)

Student Workbooks: Assuming 5 sets per teacher with each set consisting of 6 Workbooks @ £7 each (£2.50)

Teacher Web App Subscriptions £60 per annum (£55)

Total Revenue & Profit Calculations for 1000 customers Year 1

Profit margin in brackets

Teacher Handbooks: £70,000 (£34,000)

Student Workbooks: Assuming take up of 5 sets per teacher with 6 workbooks in a set:

1000 X 5 X 6 X £7 = £210,000 (£75,000)

Teacher Web App Subscriptions: 1,000 X £60 = £60,000 (£55,000)

Total Revenues for 1000 Customers Year 1

Teacher Handbooks:	£ 70,000	(£ 34,000)
Student Workbooks:	£ 210,000	(£ 75,000)
Teacher Web App Subscriptions:	£ 60,000	(£ 55,000)
Total =	£340,000	(£164,000)

Total Revenues for Target of 8,000 Customers in Year 4

Teacher Handbooks:	£ 280,000	(£ 272,000)
Student Workbooks:	£1,680,000	(£ 600,000)
Teacher Web App Subscriptions:	£ 480,000	(£ 440,000)
Total =	£2,720,000	(£1,312,000)

Future Outline Business Model

The Citizen Literacy CIC works with their close associate partners and the wider adult literacy and ESOL communities to co-design, develop and deliver adult literacy and ESOL products and services to support teachers and their students. All products and services are delivered via cloud-based digital channels to ensure wide geographical reach and to keep operating costs low. The CIC positions itself as part of these communities and as responsive to their needs. Sales will be direct to individuals and learning providers. Prices will be scaled to be affordable and to enable the CIC to continue as a sustainable business to develop new products and services and maintain existing ones. Reaching a position of being able to demonstrate a viable product range and customer base and growing income streams will be our objective to help formulate future plans and identify what kind of operating model we will need.

Future Outline Operating Model

To date our development activities have been funded largely through charitable grants and donation of free labour and CIC members direct funding. This model will continue for some time, but the CIC needs to look forwards to transition to a more sustainable operating model. Part of this is identifying what roles / activities need to be undertaken to keep the CIC operating and the costs of doing so. These roles include: Admin. Educational Content Design. Software Development. Marketing and Customer Relations. Printed Book Design. Product Testing and Maintenance. Costing these activities will help to develop the CIC business planning strategy including pricing and investigating suitable investment opportunities to grow the business.

Adult Literacy Impact Evaluation

Overview: Understanding how the project has connected and adapted to work with the adult literacy sector.

This part of the final report provides a detailed and lengthy reflective examination of how the project partners have developed their working methods over time and how the project has interacted with the adult literacy community in the UK and learnt from that experience. These are important factors for future success due to the fragmented and diverse nature of the adult literacy sector learning providers and the competing theoretical positions about adult literacy support. This part of the report also aims to tease out future development paths based on the rich reflections it contains about this sector.

Literacy Evaluation Rationale

The Citizen Literacy team is made up of specialist literacy teaching staff, phonics specialists, web designers, coders, ed tech specialists and researchers. The Citizen Literacy programme partners are: City of Glasgow College (Lead), Scottish Union Learn, Micro-phonics Ltd., ReachWill Ltd., Claire Collins Consultancy (CCC) Ltd., and TRT etc Ltd (TRT was not a partner for the UfI seed project but joined the team as we moved into the next steps of our work). The themes and learning outlined in this final evaluation report are what have emerged as a result of the team's engagement and participation within the Ufi seed project.

The literacy evaluation of the Ufi seed project is led by the team at CCC. Due to the involvement of the evaluation team with other aspects of Citizen Literacy's work (for example, in relation to user testing and market research), it should be noted that we are participatory evaluation partners, acting as critical friends as opposed to standing completely outside the process.

Our evaluation centres around the following activities:

A. An in-depth analysis of the monthly reports submitted to Ufi by the Project Manager from September 2019 - November 2020. The purpose of this analysis has been to draw out key learning across the lifecourse of the Ufi seed project, from Citizen Literacy's inception, to its present iteration (November 2020).

B. Semi-structured interviews with the Citizen Literacy team, focusing on the four questions below:

    1. How has your engagement in the Ufi seed project informed your work / what has happened with Citizen Literacy?

    2. What have you learnt from being part of the Ufi seed project?

    3. As a result of your participation in the Ufi seed project, what do you feel is possible now for Citizen Literacy?

4. Do you have any further ideas or recommendations that you would like to share?

C. Insight garnered from the evaluation team's weekly attendance at Citizen Literacy team meetings and events.

The key themes outlined below are drawn from our work in relation to A - C (above).

Theme 1: The Ufi seed project as a germinator of opportunities

Central to this theme are the relationships that have been built, inward, across the Citizen Literacy team and outward, into the highly diverse adult literacy sector. The multi-disciplinary, UK-wide relationships that resulted from the seed project enabled us to identify issues and collaboratively develop solutions, both educational and technical. Such issues have become shared problems to overcome together. For example, we identified at the start of the project that social attitudes towards adult literacy learners needed to be brought to the fore and that our values and ethos needed to be clearly expressed so that we acknowledged and addressed taboos caused by linking poor literacy with intelligence. We did this in the form of a white paper, where we pooled our collective knowledge and emergent learning. We identified a common aim across all our partners; to try and provide access to adult literacy development that breaks down social and economic barriers. This is an aim shared by teachers and educational developers in the partnership, as well as union project works and learning reps, some of whom are pictured below.

Union Rep meeting - February 2019 - Union Reps become key stakeholders (Ufi Report, October 2020).

(sub-theme 1a) The Ufi seed project enabled the development of an inspiring and supportive platform for collaborative literacy development work

Through our seed project, the small partnership team began to trust one another and open up about adult literacy development approaches and challenges we have faced prior to this project in putting them into practice. We could draw on our extensive shared networks to learn from the collective expertise of literacy learners and adult literacy teachers.

Working across England and Scotland has enabled us to link our work to a much broader practice base, for instance linking the project to England's Post-16 Phonics Toolkit, which will make it 'easier for future adopters to integrate it into their (English government) standardised courses' (Ufi Report, February 2020).

The process of revising and trying new ideas through regular (weekly) team discussions has created documents, graphics and prototypes that have supported the team to build a mutual understanding of the design ideas and constraints from their different disciplinary perspectives and to develop the app design together. These artefacts act as 'boundary objects' (Wenger) that help people negotiate meaning (Ufi Report, October 2020).

Theme 2: A values-led project

The Citizen Literacy project team have identified our shared values, grounded in social justice and socially just approaches to adult literacy learning. Examples of this are our commitment to equity of experience, regardless of prior educational attainment. This is a critical outcome of our seed project as we have positioned the app as a way of building confidence for learners who have not yet made formal contact with literacy services. We have also positioned it as a resource that learners can use who have accessed literacy classes and need a way to continue learning independently between their taught sessions, so building their self-efficacy.

We are committed to promoting equality and diversity, such as inclusion for learners with dyslexia and other aspects of neurodiversity. While we identified early on that the app would not specifically be aimed at learners developing English for speakers of other languages (ESOL), we have discussed the possibility of developing learning modules in the future with these specific learners in mind.

A series of TES articles outline the values-driven aim and ethos of the project. See, for example; https://www.tes.com/news/phonics-adult-literacy-app-launched.

Theme 3: Tech Reverse - a grounded approach to ed-tech and app design

By 'tech reverse', we mean that the literacy learning requirements of our target audience, and the need for adult literacy learners to develop independence and confidence, have driven the design of the app. This contrasts with other projects the

literacy experts on our group have worked on, where designers have required us to ‘fit into’ existing templates or ‘adapt’ learning approaches because the technical requirements have limitations.

An important example of ‘tech reverse’ is that all instructions for an app aimed at beginner readers and writers would need to be in a non-text based format, which was a novel requirement for the app developers. The subsequent design, based on non-text based instruction is a groundbreaking approach from our coders/ app designers and we are now able to incorporate this into the instructional design, through our plans to slowly introduce some text-based instructions in later lessons, as a way for app users to see their reading development pay dividends and develop more digital literacies.

While novel, sometimes complex and nuanced solutions such as non text-based instructions have been designed, on many occasions the coders/ designers in the team have identified existing technical approaches that can be repurposed for our needs. By way of contributing to the field, codes used within the app have been designed to be malleable/ reusable. An example of existing technology that has been adapted was through the follow on ‘accents’ project, where the app has been trained to recognise and adapt to a wide range of accents.

To ensure that we continue to build solutions based on adult literacy learners’ needs, we have invited expressions of interest from different members of the adult literacy community - teachers, learners and advocates (who will work with learners to understand what difference the app is making to them). To date, we have had 81 such expressions and will be working, through a follow on project, to understand their experiences and continuously improve the app in line with this.

V9 Handwriting screen, V9 Sound recognition, V9 Sound recognition

Image taken from August 2020 report.

Theme 4: A fusion of practice and theory

We have already expressed the fact that the Citizen Literacy project has been collaborative, in so far as literacy and coding specialists have come together and created something driven by learners' needs. Building on this, the seed project enabled us to fuse theory and practice by providing the impetus for us to compare our current knowledge of adult literacy theory (e.g. the use of phonics approaches with adults) with an understanding of learners' needs from different perspectives. This included needs reported by learners testing activities that would be included in the app and union project workers/ learning reps who encounter colleagues who might not feel able/ willing to seek literacy support through 'traditional' (i.e. adult education routes). By using a combination of subject specialist knowledge, technical expertise and experimentation, we were able to 'break down the boundaries of what's possible' (team member in discussion, Nov 2020).

Learning design begins (Ufi Report, September 2019)

We identified gaps in the literatures, especially with regards to adult literacy learners' digital literacy abilities. Our consultations with adult literacy learners showed us that, despite internet access being unequally distributed, most did own a smart phone and were able, through voice to text and voice commands, to manage fairly complex tasks on their phones. We think there is a significant need to undertake wider research in this area.

By way of contributing to emerging theories on adult (digital) literacies, members of the Citizen Literacy team have presented our work at conferences and workshops. These included the 2020 annual English, Maths and ESOL Conference organised by the L&WI with UCL IOE, RaPAL, UCU and NATECLA. We have, in turn, applied learning from others into app design and development. For example, we realised that

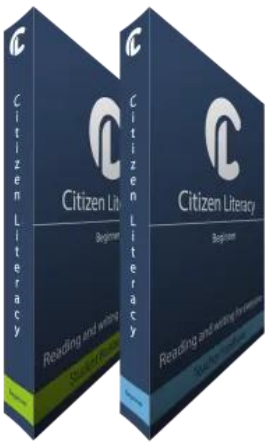
we can enable teachers to customise what their own learners see by letting them create a ‘community code’ that their learners then enter. This also means teachers can send their students messages (Ufi Report, November 2020). The idea came from Amrita University (Kerala, India) who were Xprize literacy finalists and presented at another event we attended.

Theme 5: The Ufi seed project as a collaborative exploration of the capacity and potential of literacy app design.

(Sub-theme 5a) The Ufi seed project as the first (of potentially many) iterations

Each time the team meets (at least weekly), we identify more we could do to further our common aims. We build on our learning each time from the original starting point of the Ufi seed project aimed at supporting literacy development for adults operating below ‘Entry level 1’.

Our current task is to complete the remainder of the 5 lessons that form the backbone of the app (there are approximately 15 activities in each lesson). We have also developed teacher books to enable teachers to use the app as part of adult literacy courses.



(Sub-theme 5b) widening the net

We take small steps to widen our reach, such as planning games learners can do as part of their learning or identifying sectors, such as health and social care and construction, where adults may benefit from access to a contextualised version of the app.

One of our long term aims is to develop activities right up to Level 2 (equivalent to GCSE), whereby learners can develop much more complex spelling strategies. We also hope to develop the app as a ‘virtual learning environment’ (VLE) for beginner literacy learners, using cloud services and a smartphone as the basis for the VLE to operate.

(sub-theme 5c) Generating excitement and momentum for both literacy learning and ed-tech design

Our collaborative approaches to app design are creating excitement in our learning and work communities. Our team have seen that things can change and 'anything is possible', and this is supported by positive feedback from people who have expressed an interest in taking part on the wider testing of the app. By working collaboratively and through the integration of our different skill sets, we have found that the project has had momentum beyond what we were expecting, perhaps because we have the combined expertise to address challenges and solve problems within our team (as opposed to having to venture outside of the team to find a solution e.g. as a group of literacy experts with a technology issue or as a group of tech-specialists needing support with wording or phrasing).

(Sub-theme 5d) Barefoot teachers

We feel strongly that adult literacy development, with the app as a vehicle for learning, can be supported by a wide range of community groups and individuals. To support this, in our materials for 'advocates' (non-literacy specialists), we are trying to improve people's understanding of wider sociological underpinnings of literacy learning and harness community good will to make a difference. We seek to do this by, for example, breaking down social taboos regarding being a beginner in reading and writing. We are also aware of the skills and expertise that can be harnessed within our communities through our work with advocates, who are often uniquely positioned to reach learners who would not traditionally be 'known' to adult and community learning services or other educational providers. The project manager described our advocates as 'barefoot teachers', able to 'reach the hardest to reach learners' and 'able to make connections within their communities that we, as outsiders, would struggle to achieve.'

(Sub-theme 5e) 'Surprises around every corner' and a re-imagining of what's possible

To support this evaluation, we facilitated and recorded a group discussion about our experiences of being part of this project during one of our November team meetings. Some of the comments were as follows:

> "I didn't realise we could do half of what we're doing!"
>
> "Why has this not been done before?"

Outcomes such as this were made possible through the team and their unique blend of skills. Our web developers/ coders, driven by literacy specialists' desire to create meaningful content, took the opportunity to reuse and recycle code, helping streamline app design processes (Ufi Report, November, 2020).

The example below, taken from November's report to the Ufi highlights how the team have been able to re-imagine new possibilities based on their findings from the seed project:

> *We realised that we could create an authoring tool for teachers based on our existing tech and enable teachers to customise what their own students see by letting them create a 'community code' that their students enter. This means that teachers could send their students messages and we could, therefore, create the equivalent of a VLE for beginner literacy learners and their teachers. A teacher could enable individual learners accounts just for their students, an analytics dashboard could display how different learners are doing and enable the teacher to identify people who need help and intervene, by sending a voice message or suggesting other activities. This also means we would have the ability to create a basic literacy 'gaming engine' using our existing tech that uses all the interactivity types we have developed. This has given us the idea for further seed funding: 'Citizen Literacy: Gamer'. Advances in local storage means we can have things like a personal word bank for learners to practice with, etc'* (Ufi Report, November 2020)

Theme 6: Joining the dots and repairing broken links

We have seen through the seed project that we can support, so called, 'hard to reach' audiences and we have the potential to bring together what is currently a dispersed and fractious adult literacy development world. We now see remote learning as a viable possibility for beginner literacy learners and we have a growing understanding of how little is available for training teachers in basic literacy approaches (including phonics). There is also a dearth of resource in relation to the practicalities of teaching reading and writing for adult learners.

> *There is no textbook that tutors could use – this is informing future planning and the shape of future possible collaborations (Ufi Report, September 2019).*

This project has therefore been an important starting point for making connections and joining the dots of disparate literacy practices, as well as supporting beginner literacy learners to access their learning and providing literacy teachers with a textbook and structure for teaching that does not yet appear evident in current adult literacy practice.

Theme 7: Challenging assumptions - lives and practices of adult beginner literacy learners

We have been able to find and fill some of the gaps in the literatures regarding adult literacy learners in the 2020s, such as an understanding of how learners operate in online spaces and the fact that we can't assume that low level literacy and low level digital literacies are correlated. We know that many adult literacy learners can engage with online spaces and navigate instructions on smart phones, as long as we provide non-text based approaches for them to do so. Much of what we are doing is

developing digital literacies, as well as learners' basic reading and spelling, and we see this as a vehicle to support everyday life skills.

Beginning user digital literacy research – Adult Literacy Class with their Smartphones and the project website on the screen (Ufi Report, October 2019)

Theme 8: The potential and power of small, effective teams

Finally, we would like to draw out a key lesson for a project such as this: Relationships are key across a project team and working as a relatively small team has enabled us to build trust and operate with openness, respect and kindness, qualities that are not always acknowledged as keys to success on a project. By meeting weekly online, we have been able to bounce ideas around in 'little and often' meeting spaces and respond in real time to issues such as 'hey, that p sounds like a b!'. Our blend of specialist skills and a shared ethos has meant we have made very effective progress: a mix of phonics, technology, literacy specialist knowledge and project design and management – underpinned by a joint commitment to socially just educational practices, we believe, has made this a project to be proud of.

Progress and New Projects

As a result of the Ufi seed project, the team have been successful in securing additional funding, helping them further develop their ideas. Projects now include:

Ufi App (existing Ufi project)

To develop a prototype smartphone App that adult literacy learners can use to practice exercises between a F2F course, based on an existing course at City of Glasgow College. Using voice and handwriting recognition for user input, together with normal touch screen interactivity. This project has been exploring the technical issues involved, especially of exploiting the existing on-device voice recognition systems (to reduce user costs) and exploring the educational / learning design challenges of transferring some of the intense F2F interactive exercises onto a smartphone platform and environment.

Nesta AI for Good

To improve the accuracy of smartphone voice recognition for a user with a regional accent using single short words. Current systems tend to perform poorly in this scenario. This is using AI tools to 'tune' our App to an individual user's local accent. The intention is to make our literacy Apps more inclusive and useful.

Nesta CareerTech Challenge

To create and develop a short introductory generic adult literacy training course based on the synthetic phonics method, adapted for adult learners, with a team of experts from different organisations. To map this generic course onto English basic skills standards and create a new smartphone app that can support and encourage adult independent learners to gain confidence to consider approaching a local training provider. The app will feature an online tutor persona to guide the learners using voice feedback. This project will also liaise with adult literacy learning providers and community networks to develop a database of literacy learning providers in England. When a learner feels they are ready to approach a local learning provider near them they can ask the app to tell them where the nearest providers are and get directions about how to contact them.

Our team's ideas for next steps include:

- Completing the sessions for the beginner literacy learner course
- A full and rigorous pilot and evaluation of the app
- NESTA/Ufi: - Gamer, Care and Build project ideas
- Vocational application – up to L2
- Specialist iterations for ESOL/ SEND/ dyslexic learners
- Continuing to test the app and acquire user feedback

Appendix: Formative Evaluation report 1

WP10 Evaluation / Critical Friend

(Report)
10.1 First Formative Evaluation

Introduction

This mid-project evaluation aims to identify if the Citizen Literacy (CL) app:
- will meet real learner/ teacher needs
- could be improved (in line with progress so far)
- is progressing according to project aims and plans

The ongoing evaluation also seeks to identify lessons for the team from app target users. The team's internal evaluators (from ccConsultancy) will gather feedback from literacy teachers, support workers, learning reps and, most importantly, learners. While it is too soon to provide such feedback in this report, Diane Gardener (from the project team) introduced the app ideas and prototype to her learners who couldn't believe it will be free.

Formative evaluation: Understanding the nature and scope of adult literacy provision in the UK

- There is no single 'type' of adult literacy provision in the UK. In England, provision is fragmented and patchy and, as such, there is a mixed picture of available provision according to each local authority area.
- Literacy learners can be found in local authority adult community learning (ACL), FE colleges (entry level Functional Skills (FS) courses, adult learning, etc.), in third sector spaces (e.g. for, young parents) and in Job Centre + provision (sometimes offered by ACLs).
- Some areas have an extremely high percentage of ESOL learners attending adult literacy classes (e.g. London).
- There is an important distinction to make between England's Reformed FS quals, where spelling is tested (and phonetic approaches are used as a methodology to help learners with spelling), and the testing of phonic approaches to literacy development (as in the qualification offered in City Phonics courses).

Progress against aims and objectives:

- Progress is broadly on track at present. We acknowledge that this is a seed project and is meant to be small. The Citizen Literacy team are, however, hoping to bid for a larger impact project. Impact projects often develop seed projects and they are very technology orientated.
- Collaborative work between the development team and expert literacy teachers (overseen by Diane) will continue to take place in order to sketch out how each of the lessons will look on the app. Learners will also be consulted as the app evolves.
- There is now a website, a YouTube channel and a Twitter account advertising Citizen Literacy.
- The team still need to develop a generic slide deck for the project, so organisations can use and adapt the app software within their own networks.
- There is a consortium agreement in place between each of the businesses involved in the project. Currently each business involved in Citizen Literacy is standalone. The brand is not owned by the City of Glasgow College (or any other partner). There is an openness to change this arrangement if needs be.
- Citizen Literacy is now trademarked for 10 years.

Emerging themes: A project underpinned by a coherent understanding of literacy development and social justice issues:

- The collective aim of Citizen Literacy is to support literacy development. This is underpinned by a clear understanding of the connection between underdeveloped literacy skills and socio-cultural inequality and how work towards literacy development and social justice are two sides of the same coin. This is illustrated clearly in the CL White Paper.
- The team understand the importance of the affective (emotional) domain when learning and the need for learners to feel ready and able to engage in learning. At the core of adult literacy work is a need to understand and proactively respond to the voice in learners' heads that tells them 'learning's not for me', 'I can't do this', 'I won't feel welcome or accepted in a learning environment'. The app, we feel, will help to break down this affective barrier (see below).
- The team recognise the importance of building in small, manageable steps to success; this critical understanding of adult literacy and the barriers many learners face has been integrated into the very fabric of the app design. For example, exploring the range of speech recognition tools to ensure that the one selected understands a wide variety of accents and dialects (in this instance, the team are using Amazon Polly); having spoken as well as written instructions; using flashing buttons and colours to signify when action needs to be taken. These multi-modal, multi-sensory approaches will support learners (many of whom will be working at pre-entry levels) to actively engage with the app.

The importance of drawing upon tacit knowledge to develop a meaningful, learner-centred app:

- The team have drawn on expert teacher and learner knowledge during the development of the app. This has helped ensure that the technology has been designed in an inclusive and accessible way. For instance, the interface currently has a logo, a home button and a settings section, which will support learners to choose inclusive settings (e.g. the background colour and font). There is a progress bar and a series of lessons which pulse to show the learner which lesson they are on. At the bottom of the screen, there is an animated teacher icon and a question mark that learners can press for more information or for clarification. Each activity is introduced by the animated teacher who shows the learner what to do and then invites them to try the activity. Feedback is given if the learner does not get the answer right, and an opportunity is provided to try again.
- The aim of working with Diane to design each activity has been to elicit tacit knowledge so the development team have a clear understanding of exactly what needs to be made clear for learners on the app. The team have done this by exploring each session of Diane's City Phonics course in detail. This has helped 'to expose and elaborate learning design using tacit knowledge to create technical exercises that support and complement teaching lesson by lesson because there are many and varied interactions between learner and teacher' (John Casey, Feb 2020).
- The highly collaborative approach to the app development and design makes this app very different from other apps, where a project might be passed between educators and developers, as opposed to working alongside one another. The team also aim to make their rationale and design development notes open to all under a Creative

Commons license. This would be incredibly valuable for educators and technical developers alike, helping demystify the process of app development (including its joys and challenges) and (hopefully) supporting the development of other apps to support teaching and learning, and in particular, literacy development.

- **Vignette: A discussion with Diane Gardner, expert literacy teacher:** I asked Diane about her thoughts on the app and how learners and teachers might receive it. She drew on the work of Brown and Brown who designed adult literacy activities based on modern day or current issues: 'they design level appropriate reading opportunities with comprehension questions'. Diane explained the story building activity she had been doing recently with her learners. She asked them to create names from SATPIN and create a narrative. 'During this activity I realised that learners found this very, very difficult because they have never been lost in reading so they have never had chance to develop a story'. In this sense, co-constructing a narrative is to 'open up a brand-new world to learners who may only be used to reading bills or letters or looking at pictures on the back of the newspaper.' In essence 'these activities are rewiring the mind... it's so powerful it blew my mind'. The aim was to build on the story class by class, thus creating reading opportunities as well as the development of narrative and story writing.

An app that has broad appeal:

- The team have a way of working that is very respectful of people's individual skills and expertise. For example, there have been different understandings of best practice for adult-orientated phonics instruction brought to the table, including City Phonics and the English approaches' Post-16 Phonics' (each drawing on many of the same and some different methodological approaches and theoretical frameworks). Throughout, the team have created shared understandings and all agree that the development of the app will benefit learners on different types of learning journeys immensely.
- In many senses, the project can be seen as two worlds coming together; adult literacy and education technology, culminating in opportunities for learners to develop both skills for literacy and digital literacy skills. This is hugely relevant if we are to support learners to develop the skillset required for them to fully participate and be active and engaged citizens.
- This app has unique appeal and is very different from other educational apps, which usually focus on student support or timetabling.

The tip of the iceberg; the app as an indicator of further opportunities for literacy development:

- **Funding bids**: there are several bids going ahead at the moment, these are: 1. Nesta bid: citizen literacy taster. At 2nd stage and linked with DfE re employability. The aim is that people will be signposted to a taster literacy app that introduces learners to the literacy classroom. They will then be signposted through the app to their local service. 2. Nesta Scotland - AI for good. This will focus on accent recognition called Citizen Literacy- accents. Google teachable machine can help calibrate to learner voice and accent. 3. European union/Erasmas - Citizen Literacy- EU. Education Scotland and Learning Link are keen to come in on this bid which is promising. The submission is 24th March and the aim is for 5 countries to work in partnership. 4. UFA seed project on AI and chatbots - citizen literacy tutor. The aim here is to use an app to create a textbook and online support for tutors to develop their phonetic

awareness and practice. 5.There is then the possibility to expand this project - Citizen Literacy tutor through a larger UFI bid. The aim of the citizen literacy tutor app is to address systemic issues in community education. For example levels of teacher confidence in delivering phonics training for learners. 6. National lottery bid. 7. A bid with Glasgow Uni (HDIEPSRC) science, physics and tech research. This would be run as a workshop focusing on skills for data and literacy.

- **Unexpected opportunities to expand and diversify the app**. The app was developed to run on android/iOS for learners to use on their phones away from the literacy classroom. However, it can also work as a web app to use in class on an interactive whiteboard. This provides opportunities to build in extra activities for classes. What seems straightforward for technology orientated people is very innovative for teachers. For example there will be opportunity to play a word (phonemes first then play the word). Activities like this can then be used in and out of class. We want this to be an open app with no restricted access. Another unintended outcome is the handwriting recognition which could be useful for people not familiar with the Roman alphabet. There is potential to develop a second app to help people become familiar with the alphabet.

Suggestions for consideration, further development and improvement:

- Amazon Polly: this is the voice recognition software that the team are currently using. It is the 1st to give tone of voice, as well as present in conversational or news reader style. It is a more human (neural) voice. Currently the accent is American/Canadian however there is potential for learners to be able to calibrate their accent to the app (see notes on Google). There are some problems in recognising short words where there is no context; a way of rectifying this will be developing opportunities for the software to get to know learners' voices. In terms of the interface this has now been developed and is being refined.
- Things to consider: the digital literacy skills learners will build through the app are important. Supporting learners to feel confident to access the app activities will be critical.
- Explanatory videos so learners don't have to remember how to use the app/ manage the activities will be very important, especially for those with underdeveloped literacy and digital literacy skills.

Project Manager's Self Evaluation Report (Feb 2020)

Team formation and White Paper

The project team has settled into good productive working relationships and are open to discussing and evaluating new approaches. The first 2 partner meetings have taken place and there is an interest in discussing longer-term collaborations. An unplanned but productive exercise early in the project was the decision to co-create a 'White Paper', which is similar to a White Paper in academia. This set out the background to the project, its analysis of the adult literacy situation in the UK, the rationale for using synthetic phonics methods with adults, and ideas about future developments. This was deemed a useful exercise because of the very different ideas about Adult Literacy that exist and was a way of providing a quick reference for enquiries about the project that wanted more information. It also acted as statement of intent that could be used in discussions with future collaborators.

Stakeholders

The UK-wide stakeholder mapping exercise is progressing a little more slowly than planned and that is partly due to the highly fragmented nature of Adult Education learning provision, especially in England after the last ten years or so of cuts and reorganisations. The project is however beginning to compile a list of organisations and individuals that will be useful for dissemination and future collaborations. The private providers will take some tracking down but sector associations like HOLEX will help as will our links through UnionLearn who connect members with providers. **(Note from evaluators: The current RaPAL100 project, on which members of the ccConsultancy team are working, is also looking for sites of adult literacy learning across the UK and its findings will be fed into the CL project).**

The recent emergence of English government initiatives for the 'National Retraining Scheme' also provides another source of information. But FE Colleges and Local Authorities are still big players in Adult Literacy and the recent development of devolved combined authorities (e.g. Liverpool and Greater Manchester) give us another source of funders and their links to providers. For FE colleges as providers we are also members of the FE College Blended Learning Consortium which now includes more that 50% of the UK FE college sector – which gives us direct access to the member colleges. We envisage our stakeholder list will also take the form of a graphical map that identifies the links and relationships between the different organisations. E.g. British army Lieutenant-Colonel Nick Mackenzie https://twitter.com/NMackenzie74 in charge of literacy is a follower Opens interesting possibilities for future collaborations perhaps **and the prison service in England support adult literacy learners and may be open to a 'closed' version of the app.**

Technical Strands

Early on, the developers agreed that it would be ideal if they could use as much 'pure and simple' javascript, SQL and PHP as possible – rather than extensive use of software libraries. The rationale for this was that such libraries (particularly the ones associated with server side processes such using node.js) can be both productive for getting results in a short time but act as 'black boxes' to the developers that can make future maintenance problematical – even if they are open source. There is also an issue of such libraries becoming 'deprecated' i.e. no longer supported by their owners, again introducing maintenance problems for the future. Currently the developers are using the popular Bootstrap library for the front end styling, including icon animations and synching with Audio, while the underlying logic is all 'hand-coded'

Technically, some time was initially spent (as planned) in an exploratory phase evaluating different approaches to creating the App for the iOS platform. As was expected this was tricky and after trying some technical options the developers have settled on using the Cordova framework (https://cordova.apache.org/) together with some new Cordova software library components that gave access to the iOS on-device speech recognitions system. This means the code base for both the App platforms is substantially the same and is based on the web App version.

Going forwards, the web version will be used to prototype and test basic functionality and that will then be tested in App forms.

Project Unexpected Outcomes

So far, we have identified the following.

1. The web app can be a separate product in its own right – and as progressive web apps become more mature they might replace the traditional forms
2. The web app as a teaching tool for classroom use with extra features looks very promising and could be a powerful publicity tool
    a. The use of web sockets also open up interesting collaboration opportunities in the future
    b. Google cloud services for voice are developing and need to keep an eye on them
3. User accounts – initially we were not going to have them and rely on standalone installs on the device, partly for GDPR concerns. Now we have decided that we can have anonymous accounts and provide monitoring and feedback on user performance as that will be useful to learners and potentially provide useful analytics in the future
4. Creating a 'White Paper' has been very effective at clarifying thinking between the partners and as a basis enabling future collaboration
5. Chatbots and AI are worth exploring in other related projects

Appendix: Formative Evaluation Report 2

10.2 Second Formative Evaluation (July 2020)

Authors
Claire Collins Consultancy Ltd
Claire Collins and Vicky Butterby
https://ccpathways.co.uk/

Introduction

This second mid-project evaluation aims to identify if the Citizen Literacy (CL) app:
- Development process is on track
- will meet real learner/ teacher needs
- could be improved (in line with progress so far)
- is progressing according to project aims and plans

The evaluation process during the course of this project has been viewed as holistic and developmental, with the evaluating team involved with much of the day-to-day development of the app and resources. Taking this approach has enabled a greater depth of understanding in relation to the project's aims and objectives, as opposed to taking a more 'stepped back' approach to evaluation.

Many of the emerging themes and formative comments from the first evaluation report remain pertinent and as such, are re-emphasised (and in some instances, built upon) within this evaluation report (themes from the previous evaluation have also been attached as an appendix to this report). As the project has progressed there have also been some other interesting findings, which are also shared within this report. Progress against aims and objectives have been updated, to reflect the project's current position. Key challenges are also highlighted within this report, although in each case it must be stated that the team are working hard to find creative and innovative ways of overcoming them.

Understanding the nature and scope of adult literacy provision in the UK

- There is no single 'type' of adult literacy provision in the UK. In England, provision is fragmented and patchy and, as such, there is a mixed picture of available provision according to each local authority area.
- Literacy learners can be found in local authority adult community learning (ACL), FE colleges (entry level Functional Skills (FS) courses, adult learning, etc.), in third sector spaces (e.g. for, young parents) and in Job Centre + provision (sometimes offered by ACLs). This project will not only support learners in this range of settings but also adults who are not currently in learning and for whom the idea of accessing support for literacy is either daunting, seen as inaccessible or undesirable. As such, the project is not only

about the development of reading and writing practices but also about developing confidence and self-efficacy.

- Some areas have an extremely high percentage of ESOL learners attending adult literacy classes (e.g. London). It is not possible to divide people into 'ESOL and non-ESOL' because people's lives are super complex (e.g. perhaps you have been brought up in the UK but your parents/ carers didn't speak English in the home). For this reason, we see this app as having a wide audience, even though we are not aiming it specifically at people for whom English is a second or other language.
- There is an important distinction to make between England's Reformed FS qualifications, where spelling is tested (and phonic approaches are used as a methodology to help learners with spelling), and the testing of phonic approaches to literacy development (as in the phonics qualification offered in City of Glasgow College adult literacy courses).

Progress against aims and objectives:

- Progress is broadly on track at present. We acknowledge that this is a seed project and is meant to be small. The Citizen Literacy team have, however, successfully bid for a larger impact project (NESTA). The successful bid has enabled the team to further develop the work done within this seed project, extending their development of the app and their knowledge and understanding of how the app could be used with entry level literacy learners. In addition, members of the team have been working on a parallel project with Nesta Scotland, on AI. This project has enabled the team to develop some innovative approaches to allow the app to recognise a range of accents and dialects, which have added further to the outcomes of the project being evaluated here.
- Collaborative work between the development team and expert literacy teachers has taken place in order to sketch out how each of the lessons will look on the app. Some learners and literacy teachers have now been consulted as the app has evolved. Initial feedback has been very positive, with surprise expressed that the app is freely available and accessible for all learners.
- A mapping exercise has taken place against the Education and Training Foundation (England) framework, to ensure there is a synergy in message for English and Scottish providers.
- There is now a website, a YouTube channel and a Twitter account advertising Citizen Literacy.
- The team are developing a generic slide deck for the project, so organisations can use and adapt the app software within their own networks.
- There is a consortium agreement in place between each of the businesses involved in the project. Currently each business involved in Citizen Literacy is standalone. The brand is not owned by the City of Glasgow College (or any other partner). There is an openness to change this arrangement if needs be.
- Citizen Literacy is now trademarked for 10 years.

- User testing has begun, with roll out to Union Learn reps taking place in July 2020. Dyslexia Scotland are also providing feedback with their tutors. Literacy specialists within the team have also begun small scale user testing within their organisations and through their networks.
- Modes of collecting learner feedback are in development, including opportunities for in app feedback, as well as feedback from learners via support from their literacy teacher or an advocate.
- Systems are now in place to capture detailed analytic data in relation to user behaviour (how many times a learner attempts each exercise for instance).
- The app has been presented to the National Adult and Community Learning Forum (managed by the evaluating team on behalf of the Education and Training Foundation), with great interest expressed from providers and many signing up to support and promote user testing.
- Project aims and objectives (and initial findings) have been disseminated through attendance at a range of academic conferences and network meetings. Members of the team have also co-written academic papers and have had a book chapter accepted.
- A CRM system is currently being set up to manage communication with stakeholders.
- Preparations are being made for Citizen Literacy to set up as a community interest company.

Emerging themes:

In order to gain a detailed understanding of the impact and influence of the project to date, as well as where any potential challenges lie, we facilitated a series of focused discussions with the Citizen Literacy project team. These discussions were transcribed and thematically analysed (Braun and Clarke, 2013). The themes below were drawn from these discussions, as well as from our day-to-day interaction with the project team as they have been developing the app.

The Ufi project as the very beginning of something – from seed to seedling

- As the team have become more immersed in developing and exploring the app's potential, there has been real excitement about its future possibilities, including the opportunity to scale up the app and make it globally accessible.
- The team appreciated the opportunity the Ufi seed project has given them to explore new possibilities, including opportunities to follow unexpected developments as the project unfolded: '*I like being open to new possibilities... there's no point in doing a tick box project otherwise, you know, you're not open to these things that we've all discovered on this journey.' (Ed tech specialist).*
- The team have been able to use their learning and experience from this Ufi seed project to apply for funding to further develop their work. In this sense, the Ufi projects has quite literally sown the seeds for other, bigger projects

that have capacity to take the app design and development further still: *'It's a big thing we're doing, (laughs), and it's very scary, but if we get it right then it's going to be fantastic, it's going to be amazing.' (Literacy specialist)*

Social justice as a theoretical framework/ philosophy

Building on findings from the previous evaluation, the team have continued to approach their work on this project in ways that centre education as, and for social justice. This has been apparent at various stages of the app's development, as highlighted below:

- Learner-centred approaches that carefully consider learner experience (from initial introduction to the app, to their experience whilst using the app, to how feedback will be collected and shared) have been clearly considered by all team members during the project. Weekly team meetings have ensured that the app developers and literacy specialists have been able to share practice and generate a collective understanding of how the app can be developed and used in practice with pre-entry level literacy learners.

- The importance of developing socially just approaches to literacy learning are understood and appreciated across the whole team. It would perhaps be anticipated that the literacy specialists in the team would construct their practice through this theoretical framework, however such understandings are clearly apparent within the work of the technical specialist team as well. This shared understanding of literacy learning as a critical form of socio-cultural capital for marginalised communities has been integral to the project's success thus far, helping the team to develop a product that is both technologically savvy and user friendly; underpinned by a clear understanding and appreciation of the lives and circumstances of pre-entry literacy learners: '*I'm learning loads, and realising that you know, it's more to do with the help that you can provide with what it is that we're developing for a change, rather than something that's just a bit technological for its own good, you know it really is a real thing this.' (App design specialist)*

- The team are continually exploring how to make the app as inclusive as possible. This includes careful consideration of fonts, backgrounds and formatting, as well as options for settings to be adjusted to meet individual learner need. The literacy lead has also ensured that learners she is currently working with have had opportunity to test the app and provide their feedback. Participatory approaches such as these help learners to feel worthwhile as their insight and suggestions are valued: '*It was really to include my students... because they've never been able to participate wholly umm, in a lot of adult learning, as well as the digital world* '(Literacy specialist).

- The team have been key to reiterate that Citizen Literacy is not just a phonics app, but a way into understanding and actively engaging with language. The hope for the app is that it will help learners develop a sense of confidence and connection to learning, in many instances, before they step foot in a classroom: '*In effect we're offering an understanding and a comprehension of things that we use all the time so that they can start putting pieces together, so that they're not totally lost, because a lot of learners will come to my class um, having had a lifetime of guesswork and lack of confidence, lack of opportunity. And they'll come with a wee bit more confidence, knowledge, and they'll come with knowledge, a knowledge that's backed up with being able to proceed through something they've never been able to do before.' (Literacy specialist).* Rather than viewing literacy learning as a deficit model, where learners must be 'cured' of their illiteracy, the team's outlook and ethos instead model what could be referred to as a 'hopeful praxis' that foregrounds the development of confidence and a sense of worth for literacy learners.

- The team have been keen to ensure that the app and accompanying classroom materials will be freely available and that no personal data about learners will be collected through the app. These decisions reflect the ethical commitment of the team to the welfare of literacy learners throughout the course of the project: '*this is reaching out to people who really need it, it's providing something that's free, no adverts, no personal data captured so this is really nice to do and it's a good exemplar of that way to go' (Ed Tech specialist/ Project Manager).*

Cross skills collaboration leads to innovative design and development

- The project has provided a highly beneficial opportunity for professionals from different professional backgrounds and skill sets to collaborate. This meeting of diverse minds (from coding and app development, education technology and specialist literacy teaching and learning) has been instrumental in the successful creation, development and reflective revision of the Citizen Literacy app so that it is capable of meeting the diverse needs of pre-entry level literacy learners.

- The technical team are now beginning to embed machine learning and intuitive support within the app – such approaches help stretch the imagination of literacy specialists in relation to how support for pre-entry literacy learners can be conceptualised, designed and developed: '*we're always going to have adult literacy issues, literacy issues in general, that's not going to go away. But we are going to get better and better at providing solutions' (App design specialist).*

- During the project, the design team engaged in a process of cognitive task analysis in order to understand not just what literacy specialist teachers do, but how they do it, when, and why. By using such approaches, and by working collaboratively across their specialisms, the team have been able to develop and embed artificial intelligence (AI) approaches within the app that mirrors some of the work tutors would do in face to face scenarios to support learners (especially in relation to the affective domain). The success of such an approach is that the app is able to use AI to inject support specifically at each learners' point of need (the places where a tutor would naturally support a learner in a face to face situation).

- The diversity within the team in terms of professional backgrounds and expertise has supported the opening of new and exciting creative channels of thought around an area of need. The collective makeup of the team and the careful way in which the project manager has blended unique skillsets and expertise together has arguably heightened the success of the project thus far: '*That idea of being worthwhile has pervaded all we've said so far hasn't it? Learning about different people's worlds and bringing it all together' (Literacy specialist/ Evaluator).*

A Paradigm shift in technological approaches

- Over the course of the project, the specialist designers have been particularly animated in relation to what they describe as *'a paradigm shift in technological approaches'*. The potential for the app to embrace machine learning represents a shift from everybody having the same starting and ending points to opportunities for differentiated learning through technology: *'This can actually be more bespoke so it is like you know, the sigma 1:1 more appropriately, and the app can tailor itself, it can learn from you to help you learn. Right so that's a different, that's a paradigm shift in mindset of using technology to help people... It's just making it invisible you know – and that's what I want, intuitive and invisible. That's my MO. Ok, if that helps?' (App design specialist).* Opportunities to develop differentiated learning opportunities through the app was described by the team as a cost-effective way of bringing Bloom's (1984) two sigma problem[1] to fruition.

[1] Bloom argued that for learning to be most successful, a combination of mastery and 1:1 tuition is required.

Challenges

Whilst the project has to date been incredibly successful in reaction to its intended aims and outcomes, it has not been without challenge. Three challenges have arisen in particular in relation to the app development and user testing, outlined below:

Supporting learner engagement

- Learner engagement (and how best to support this) was recognised by the team as a particular challenge, especially in light of Covid-19 and remote working. Connecting with the right people (who will be able to ensure that the app reaches those who most need it) will be particularly important during this time to ensure that a flying start in relation to broadening user testing and eliciting feedback from learners.

- Similarly, the importance of finding and recruiting advocates to connect with learners and introduce the app was highlighted as a challenge during the pandemic: '*I think that the learner, the learner who will really benefit from the app needs somebody to make the introduction. And we've talked about having a significant other person who doesn't need to be a teacher with a capital T, it could be a friend or a partner or a child' (Literacy specialist).* Nevertheless, literacy specialists within the team are well connected within their networks, which will help ensure that community-based advocates are found. The team is also linked with Dyslexia Scotland and Union Learn, whose reps will play an integral advocacy role.

- Keeping learners engaged through the app was also highlighted as a challenge, particularly as the app development team are continually required to think creatively in relation to providing guidance and instruction (due to the literacy levels of learners using the app): '*the writing of a script, that we're going to have two characters that are going to be leading them through. You know, script writing's a challenge (laughs) in its own right. It's not a technological but we have to nail that and get in, make it humorous and engaging with the voices that we have available to us so that's um one of the challenges to come' (App design specialist).*

- A final consideration in relation to learner engagement is in relation to building the app in a way that supports the technologies learners have available to them. Although research tells us that most learners do have access to a phone or other internet enabled device (see white paper report for this project), access to data can be an issue, and learners may have older models (pass me downs) from friends or family members. Accordingly, a balance needs to be struck between developing an accessible app, and an app that has the functionality appropriate for learning within the current context: *'So we're lead to believe a lot of the folk will have maybe hand me downs with regards to mobile devices... it's always written in a way to think that there could be older devices out there, which, if possible, we do want to try and*

support. But we don't want to be in a stranglehold too much trying to support things that are maybe over a certain age' (App design specialist).

Ensuring practitioners and advocates who work with the app and resources echo the ethos within which it was created

- A particularly pertinent and ongoing concern from literacy specialists within the team centres around the ethos and values base of the Citizen Literacy project and app (e.g. it's design and development in accordance with socially just adult literacy practices): *'Because of the social practice model that we advocate very highly, very strongly in Scotland, so um, I'm just, I'm just worried that people will take it and, I don't know, maybe use it incorrectly... it's just so important that we communicate the right thing properly' (Literacy specialist).* The team are still in discussion in relation to the practical steps they will take to safeguard the ethos within which the app was developed (ensuring learners are championed and supported in their learning, as opposed to being viewed through a medical, or deficit model of teaching and learning): *'We've worked hard across the adult literacy field for a very long time not to other our learners, not to give the impression that anyone with an adult literacy need is any less than anyone else, even though we live in a world where the language all around us would 'other' people as if they need to be cured by, of this illness that they have, which is a lack of adult literacy even though we know the extremely negative effects it can have with your confidence and your life. And I think we still need to get it right outside our group in making sure that all those people who are going to talk about the app, and talk about it, do so from a position of knowledge and empowerment, not from a deficit point of view. And I know we've got the skills to do that, I just think we need to keep that really strong in our minds' (Literacy specialist/ Evaluator).* Accordingly, work is ongoing within the team to develop a script or guide for practitioners and advocates, to support them to understand the intention of the app so that they can introduce it to potential learners in ways that empower rather than problem solve.

- Another challenge for the team is to ensure that practitioners and advocates are working within the boundaries of what the app has been designed for. Again, it will be important that communication is clear and the team put out a consistent message regarding who the target audience is for the app and what (and what not) the app is aiming to achieve.

Eliciting feedback and user testing to improve learner experience

- Because the ethical decision not to elicit personal data from learners has been taken by the team, in order to build a demographic picture of who is using the app, the team will be reliant on generating an understanding through interviews with learners facilitated by their advocates. This will also be the

case in relation to collecting in depth feedback from learners regarding the app and its influence on their learning, although the design team have now built some (skippable) star rating response questions into the app that relate to design and usability. The team acknowledge that ascertaining feedback will be a challenge, and the literacy specialists within the team will be heavily reliant upon ongoing support from practitioners and advocates within their networks to find learners who are willing to share their feedback and recommendations.

- Another challenge relates to the difficulties in understanding whether a learner stops using the app because they are stuck, or because they are disengaged. Where text would usually be used to elicit feedback or offer support and encouragement, different ways (e.g. verbal instruction) will need to be devised as through user testing, sticking points are uncovered: *'We've got to consider that text isn't going to be a tool we can use to direct users through the app' (App design specialist).*

Recommendations and next steps

- Continue to foster links with organisations and advocates who support pre-entry level learners to ensure that the app reaches those for whom it is intended (e.g. learners with very limited literacy levels).

- Continue to facilitate collaborative approaches between literacy specialists and specialist app designers to help overcome challenges relating to user engagement and accessibility.

- Develop a guide for advocates, explaining the aims and ethos of the Citizen Literacy app, and how to introduce it to learners.

- Continue to develop a clear and consistent message as the app goes out for user testing about the aims and objectives of the app (and any accompanying materials).

- Develop a format for ascertaining feedback from learners (via practitioners or advocates) so learning from this – especially in relation to sticking points for learners - can be used to further develop the app.

Continuing themes from the first formative evaluation

A project underpinned by a coherent understanding of literacy development and social justice issues:

- The collective aim of Citizen Literacy is to support literacy development. This is underpinned by a clear understanding of the connection between underdeveloped literacy skills and socio-cultural inequality and how work towards literacy development and social justice are two sides of the same coin. This is illustrated clearly in the CL White Paper.
- The team understand the importance of the affective (emotional) domain when learning and the need for learners to feel ready and able to engage in learning. At the core of adult literacy work is a need to understand and proactively respond to the voice in learners' heads that tells them 'learning's not for me', 'I can't do this', 'I won't feel welcome or accepted in a learning environment'. The app, we feel, will help to break down this affective barrier (see below).
- The team recognise the importance of building in small, manageable steps to success; this critical understanding of adult literacy and the barriers many learners face has been integrated into the very fabric of the app design. For example, exploring the range of speech recognition tools to ensure that the one selected understands a wide variety of accents and dialects (in this instance, the team are using Amazon Polly); having spoken as well as written instructions; using flashing buttons and colours to signify when action needs to be taken. These multi-modal, multi-sensory approaches will support learners (many of whom will be working at pre-entry levels) to actively engage with the app.

The importance of drawing upon tacit expert knowledge to develop a meaningful, learner-centred app:

- The team have drawn on expert teacher and learner knowledge during the development of the app. This has helped ensure that the technology has been designed in an inclusive and accessible way. For instance, the interface currently has a logo, a home button and a settings section, which will support learners to choose inclusive settings (e.g. the background colour and font). There is a progress bar and a series of lessons which pulse to show the learner which lesson they are on. At the bottom of the screen, there is an animated teacher icon and a question mark that learners can press for more information or for clarification. Each activity is introduced by the animated teacher who shows the learner what to do and then invites them to try the activity. Feedback is given if the learner does not get the answer right, and an opportunity is provided to try again.
- The aim of working with Diane to design each activity has been to elicit tacit knowledge so the development team have a clear understanding of exactly what needs to be made clear for learners on the app. The team have done this by exploring each session of Diane's City Phonics course in detail. This has helped 'to expose and elaborate learning design using tacit knowledge to create technical exercises that support and complement teaching lesson by

lesson because there are many and varied interactions between learner and teacher' (John Casey, Feb 2020).

- The highly collaborative approach to the app development and design makes this app very different from other apps, where a project might be passed between educators and developers, as opposed to working alongside one another. The team also aim to make their rationale and design development notes open to all under a Creative Commons license. This would be incredibly valuable for educators and technical developers alike, helping demystify the process of app development (including its joys and challenges) and (hopefully) supporting the development of other apps to support teaching and learning, and in particular, literacy development.
- **Vignette: A discussion with Diane Gardner, expert literacy teacher:** I asked Diane about her thoughts on the app and how learners and teachers might receive it. She drew on the work of Brown and Brown who designed adult literacy activities based on modern day or current issues: 'they design level appropriate reading opportunities with comprehension questions'. Diane explained the story building activity she had been doing recently with her learners. She asked them to create names from SATPIN and create a narrative. 'During this activity I realised that learners found this very, very difficult because they have never been lost in reading so they have never had chance to develop a story'. In this sense, co-constructing a narrative is to 'open up a brand-new world to learners who may only be used to reading bills or letters or looking at pictures on the back of the newspaper.' In essence 'these activities are rewiring the mind... it's so powerful it blew my mind'. The aim was to build on the story class by class, thus creating reading opportunities as well as the development of narrative and story writing.

An app that has broad appeal:

- The team have a way of working that is very respectful of people's individual skills and expertise. For example, there have been different understandings of best practice for adult-orientated phonics instruction brought to the table, including City Phonics and the English approaches' Post-16 Phonics' (each drawing on many of the same and some different methodological approaches and theoretical frameworks). Throughout, the team have created shared understandings and all agree that the development of the app will benefit learners on different types of learning journeys immensely.
- In many senses, the project can be seen as two worlds coming together; adult literacy and education technology, culminating in opportunities for learners to develop both skills for literacy and digital literacy skills. This is hugely relevant if we are to support learners to develop the skillset required for them to fully participate and be active and engaged citizens.
- This app has unique appeal and is very different from other educational apps, which usually focus on student support or timetabling.

The tip of the iceberg; the app as an indicator of further opportunities for literacy development:

- **Future Funding bids / ideas**: there are several bits going ahead at the moment, these are: 1. Nesta bid: citizen literacy taster. At 2nd stage and linked with DfE re employability. The aim is that people will be signposted to a taster literacy app that introduces learners to the literacy classroom. They will then be signposted through the app to their local service. 2. Nesta Scotland - AI for good. This will focus on accent recognition called Citizen Literacy- accents. Google teachable machine can help calibrate to learner voice and accent. 3. European union/Erasmas - Citizen Literacy- EU. Education Scotland and Learning Link are keen to come in on this bid which is promising. The submission is 24th March and the aim is for 5 countries to work in partnership. 4. UFA seed project on AI and chatbots - citizen literacy tutor. The aim here is to use an app to create a textbook and online support for tutors to develop their phonetic awareness and practice. 5.There is then the possibility to expand this project - Citizen Literacy tutor through a larger UFI bid. The aim of the citizen literacy tutor app is to address systemic issues in community education. For example levels of teacher confidence in delivering phonics training for learners. 6. National lottery bid. 7. A bid with Glasgow Uni (HDIEPSRC) science, physics and tech research. This would be run as a workshop focusing on skills for data and literacy.
- **Unexpected opportunities to expand and diversify the app**. The app was developed to run on android/iOS for learners to use on their phones away from the literacy classroom. However, it can also work as a web app to use in class on an interactive whiteboard. This provides opportunities to build in extra activities for classes. What seems straightforward for technology orientated people is very innovative for teachers. For example there will be opportunity to play a word (phonemes first then play the word). Activities like this can then be used in and out of class. We want this to be an open app with no restricted access. Another unintended outcome is the handwriting recognition which could be useful for people not familiar with the Roman alphabet. There is potential to develop a second app to help people become familiar with the alphabet.

Suggestions for consideration, further development and improvement:

- Amazon Polly: this is the text-to-voice recognition software that the team are currently using. It is the 1st to give tone of voice, as well as present in conversational or news reader style. It is a more human (neural) voice. Currently the accent is American/Canadian however there is potential for learners to be able to calibrate their accent to the app (see notes on Google). There are some problems in recognising short words where there is no context; a way of rectifying this will be developing opportunities for the software to get to know learners' voices. In terms of the interface this has now been developed and is being refined.
- Things to consider: the digital literacy skills learners will build through the app are important. Supporting learners to feel confident to access the app activities will be critical.

- Explanatory videos so learners don’t have to remember how to use the app/ manage the activities will be very important, especially for those with underdeveloped literacy and digital literacy skills.