



# TELE PROJECT REPORT



Candidate Number: 215709

## **Literacy Notification**

This student is registered with Disability Advice and has a Specific Learning Difference, health condition or disability which impacts their literacy skills.

Their work should be marked in accordance with marking guidelines from the Handbook for Examiners.

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## Intro

The purpose of this report is to show the process of creating a technology enhanced learning environment and how it can be used to innovate on the current methodologies of teaching and apply different theories of learning and theories of motivation. I also chose to create this TELE because of a personal connection. I only discovered I was dyslexic during the January of my last year of my degree and it explained why so many aspects of learning hadn't worked as well with me with the conventional teaching method. While my above average ability hid my dyslexia, I always found learning to be dull, not stimulating and just generally difficult to focus on, finding my mind to wander frequently while studying. I often thought back to how during my younger years how certain topics just made sense to me and I had trouble to explain how something work and then struggled when learning a new topic that didn't immediately make sense to me. This duality of learning showed that I was struggling to grasp new concepts through the teaching in classrooms and had actually taught myself many of the easier topics by playing games at home. For example, when learning my times tables, I found the simple multiplications very easy. The 2-, 3-, and 5-times tables felt natural, but the harder times tables took me a very long time to grasp, and it was only when my teacher turned it into a game that I started learning. Dyslexia makes knowledge processing and remembering things that are visual and audible harder and so conventional teaching methods are much less effective. This does not mean however that only learners with dyslexia suffer from not working well with conventional teaching and that the learning experience ultimately comes down to the individual.

## Background Research

The first thing I needed to do was to properly understand how conventional teacher led learning worked, how we process the information and how different people (like those with specific learning difficulties) could learn more effectively with a more hybrid approach.

The most prominent conventional teaching method is teacher led. This is where the teacher leads the lesson from the front often with PowerPoints or from a whiteboard. It is on the student to remain engaged with the learning and to absorb as much of the learning as possible from the teaching (Promethean, 2020). This methodology does not help learners who have shorter attention spans or have specific learning difficulties such as dyslexia as they struggle with information processing, knowledge recall, maintaining focus and performing mental calculations (The British Dyslexia Association, 2010). Moving away from teacher led learning and adopting a hybrid approach to learning where the teacher can cover a topic in a classroom and the student/learner can take that information away with them and practice the topic to reinforce the learning through methods such as gamification. The addition of a gaming element in a learning environment is shown to improve knowledge retention, the desire to learn, reinforcing positive behaviours (Dodson, 2021). Gamification can also lead to a sense of community among learners who share the environment, such as a classroom of students who compete on a competitive score board or have the ability to customise their own avatars.

Human nature drives us to want to challenge ourselves, push ourselves to complete a task and do it as fast as possible (Dodson, 2021). Gamification amplifies all of these natural drives and turns them into powerful motivators for learning. The combination of the virtual stimulation with our natural reaction provides a more powerful learning experience. This method also plays on other senses that the human body naturally relies on such as kinaesthetic, the feeling of touch (British Dyslexia Association, 2017).

## Design/Development/Implementation Process

Starting from the beginning of the design process, the first thing that was needed was to brainstorm different ideas to pursue and to select which idea I felt was most needing innovation (Appendix A). The first thought I came to related back to my previous experience of learning maths. Mathematics is one of the few lessons that during my whole time of studying felt as though it was only taught as a teacher at the front of the class telling us information, followed shortly by a page of questions to answer. There were a number of ideas and using the worksheet from week two allowed me to explore how each of the topics could have been adapted into a technologically enhanced learning environment. I decided that the maths idea was the most appropriate as I both had first hand experience in the situation and also found during research that it needed innovating.

It was important at this point to begin to understand how the intended user would use the learning environment and what would be impacting them. I took to looking up the national curriculum for key stage one and key stage two to know what topics would be covered at this age range and then how these topics could be turned a technology enhanced learning environment. For this purpose, I started to build up a persona (Appendix B). Creating the persona helped to solidify what it was the learning environment should be aiding.

While creating the persona, it was important to also consider what technology the intended user had easy access to. While a VR or haptic feedback tool would have provided a more immersive experience, it would be unfit for students in primary school to acquire the means to use the environment and so the use of a desktop seemed the most appropriate. A simple desktop application / website means that the TELE is more available for the learner both at schools, libraries, or at home.

The earliest design came from a storyboard designed to imagine a persona using the software for an average session (Appendix D). The storyboard deliberately avoided using any colours as it would be

shown to peers to get some feedback on what colours should be used in the design to encourage younger children to use the environment. It was the general consensus that brighter colours attracted attention better and made it seem more vibrant. With this in mind I began to prototype the environment and made each page a vibrant colour (besides the customisation page as I needed a colour that was far from all of the customisation options to make them pop out more than the background). At first the topics page featured the lists of topics from what the national curriculum listed, but with the next round of feedback I wanted to know how to make the currency feel more appropriate for the intended user. A lot of the feedback was to make a currency instead of just a points system. The justification for using a currency instead was to feel more like a reward for the tasks and to almost just make it feel more in theme with the rest of the software. Everything is maths centric and so having a currency that reflected that was much more appropriate and so the points system was replaced with a digital currency represented by dice. (All the feedback appears in Appendix E)

### Final Prototype

For the final prototype I opted for a blue background on the topics page to make the environment happier as it looks like clear skies. The topic list features a series of different colours to attract the attention of the learner and to invite them in. There is a profile picture in the top right where the user can go to spend their currency on cosmetic items.

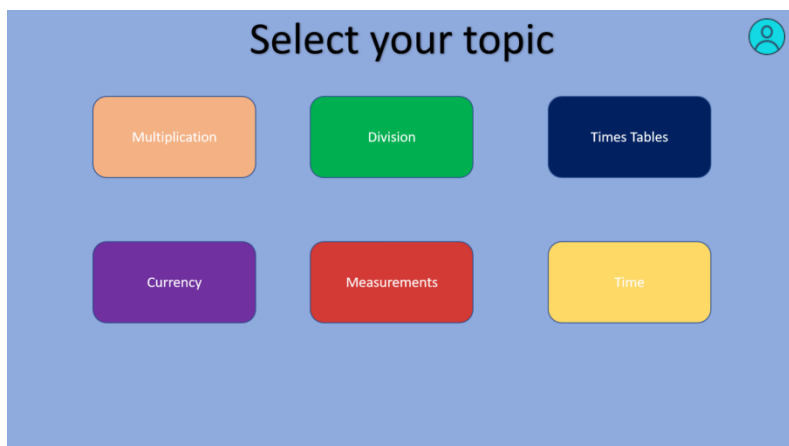


Figure 1 - Topics page

Inside of the customisation page, there are a number of colours that the user can choose to make their avatar wear. It was intended to have the avatar an important aspect of each game, this mid-fidelity prototype made it difficult to include the avatar into the game world but this is intended to be included in other aspects of the environment to give the user the feeling that they are physically in the world, learning with their avatar.

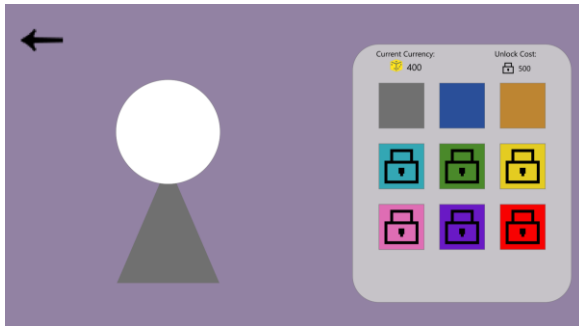


Figure 2 - customisation page 1

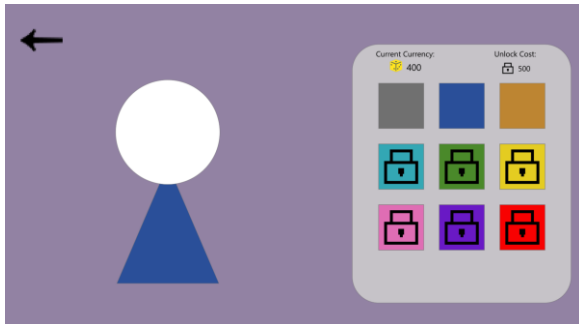


Figure 3 - Customisation page 2

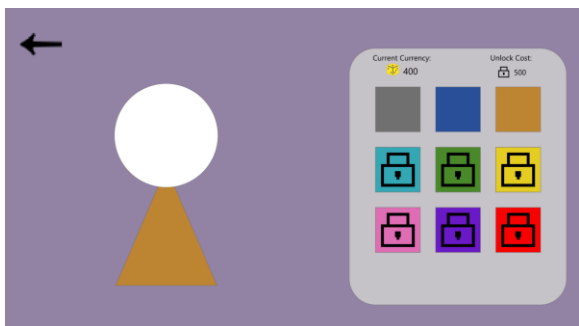


Figure 4 - Customisation page 3

When the user has selected a topic from the topics page, they are able to pick what difficulty to complete the topic at, earning more points the higher the difficulty, and is then presented with a set of questions (just the one for the sake of the prototype) and if the required number of correct answers is met, then the currency is awarded to the learner. The learner is then offered a chance to repeat the current topic, once again selecting the difficulty or to go back to the topics page. All of the page colours correspond with the colour of the topic on the topic select screen as a visual aid to the learner of what topic they are covering.

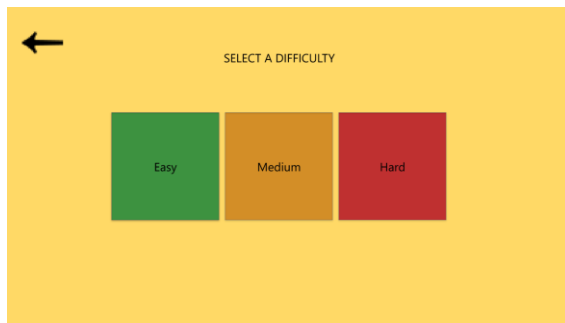


Figure 5 - Difficulty Page

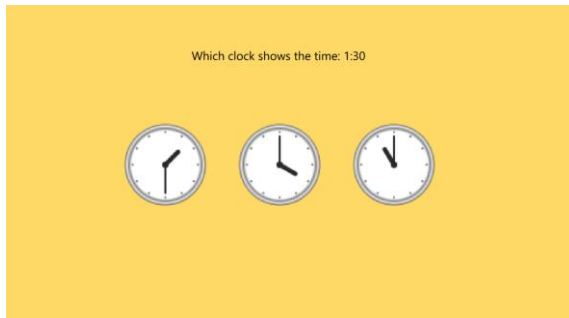


Figure 6 - Example question

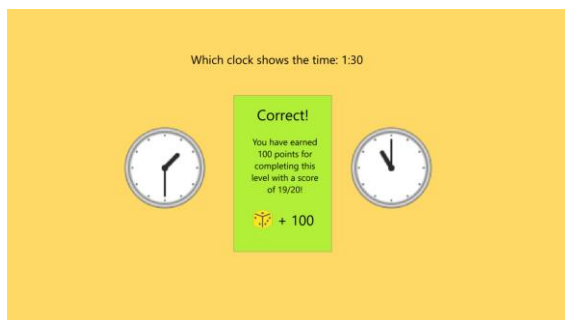


Figure 7 - game complete

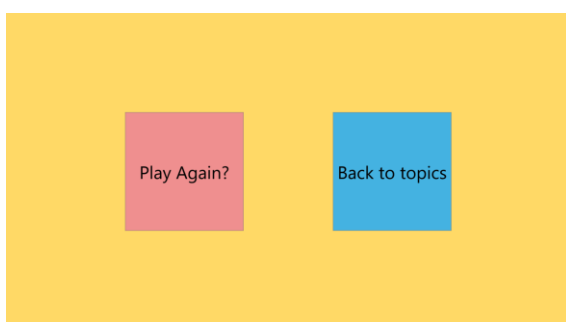


Figure 8 - End of Game screen

All images are sourced from Icons8: <https://icons8.com/> (Icons8, 2023)

The prototype can be viewed here: <https://xd.adobe.com/view/f3d21aff-ab2d-41ec-968b-8651022497d5-a681/>

## From Theory to Design

In this learning environment, I have opted to use the behaviouristic approach, using operant conditioning to reward the learner for achieving a high score in the game they have played, choosing to reward their good behaviour with a digital currency that they can spend on customising their avatar. Giving the currency to the learner after receiving a passing score in a game, rewards them for persevering and for choosing to cover a topic that they may have found difficult previously. With different difficulties offering different amounts of currency, there is an incentive for the learner to try an easier difficulty and work their way up the difficulty scale, until receiving the highest reward possible for that topic. This positively reinforcing their behaviour. On the other side, by not getting a passing score, the learner does not earn any currency and instead has the natural desire to try again in order to get a passing score.

This environment focuses mostly on an intrinsic motivation method where the student leads their own educative need and turns the workload into a competitive minigame for them to partake in. Intrinsic motivation is also explored through the use of an instant feedback system that the user can see to check if their answers were right or wrong. There are opportunities all over the environment for self-direction. There are also extrinsic motivators for this such as being able to compare the amount of currency a learner has against other learners in their class, or to compare their avatars and the desire to want to be better than other students. In a hybrid environment, the software would also feature extrinsic motivation by the teacher monitoring student behaviour as the complete minigames.

## Innovative Interactions

Typical classroom interactions normally include only a lesson taught in a teacher-led environment with little to no reward to the learner for getting an answer correct. This enhanced environment constantly rewards the learner as well as offering instant feedback on the correctness of answers. It also offers a student-led experience where the student can pick and chose what topics to learn more about and so can feel more rewarding for themselves if they self-impose an amount of challenge and overcome it on their own. The learner is able to pick and chose the time of their learning. This is a huge benefit to all students, especially those with a smaller attention span or any specific learning difficulties as there can be as many breaks as the learner needs and there is no detriment to the learner.

This learning environment is in no way meant to replace the usual teacher-led environment of mathematics but is instead meant to transform it into a hybrid learning experience, letting users pick and chose what topics to reinforce their knowledge on. Students can even use the environment while inside of the school premises as long as there is a computer and can serve as an addition aid for the teacher to improve productivity and engagement in a lesson.

## References

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- Dodson, K. R. (2021, October 04). *Can Gamification Drive Increased Student Engagement?* Retrieved March 26, 2023, from Educause: <https://er.educause.edu/articles/sponsored/2021/10/can-gamification-drive-increased-student-engagement>
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Promethean. (2020). *Promethean explains: student-led vs teacher-led learning*. Retrieved March 26, 2023, from ResourceEd: <https://resourced.prometheanworld.com/student-led-teach-led-learning/#:~:text=In%20a%20teacher-led%20class%2C%20the%20educator%20decides%20the,methods%20as%20below.%20A%20teacher-led%20classroom%20focuses%20on%3A>

The British Dyslexia Association. (2010). *About dyslexia*. Retrieved March 26, 2023, from The British Dyslexia Association: <https://www.bdadyslexia.org.uk/dyslexia/about-dyslexia/what-is-dyslexia>

## Appendices

### Appendix A | Week 2 | Brainstorming

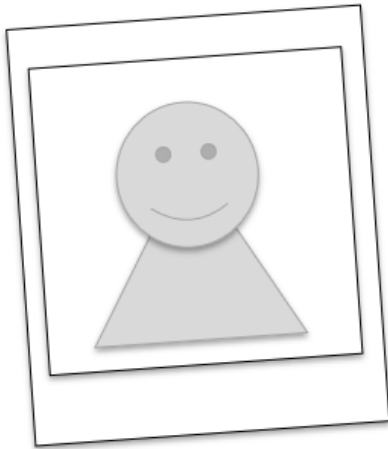
<b>Week 2 Practical activity: brainstorming</b>	
<b>What? (topic / target audience / context)</b>	<b>Why? (what is interesting about this idea)</b>
Maths	Traditional classroom teaching is not as stimulating to all students. Playing a game could benefit students who don't learn well from conventional methods such as classroom teaching.
Learning Languages	Learning a language tends to be a lot of memory recall, improving the environment to include more visual or audible aids could prove better for different learners.
Coding	Games are fun, creating your own is a sense of achievement. Coding opens an industry that is not saturated with workers but still is hard to enter without proper experience.
Older people using technology	The use of technology is often difficult for older people to pick up and as such are more prone to scams / incorrect usage.
Learning an instrument	Reading sheet music may not be the best way of learning for everyone. A software that listens to the learner's sound and can display on screen how good or bad they are playing.
At home workouts	Working out from home is not as mentally stimulating as other methods such as jogging outside. A virtual environment would change the atmosphere of learning and can provide a visual aid to the workout.
Spelling	An online spelling tool to help encourage correct spelling usage for non-native English speakers and for younger children learning how to spell.

At home DIY	A tool to visually aid a learner to create something from nothing. This is similar to learning DT in schools where the student creates things like totem poles. Can include pictures of each step with instructions.
Learning to drive	Learning to drive is expensive and so having software that lets you practice as much as you would like without having to physically drive the car everywhere could help to improve the skills associated with driving so that learners are more comfortable on the road.
Sign Language	Sign language is something that can be used to communicate not just with deaf people but just anyone who cannot hear you. Learning sign language is often just lots of pictures and words. Having an audible aid as well as a video and some subtitles would provide more stimuli for the learner
Learning about historical events	Can simulate historical events such as the sinking of the titanic or the battles that took place during the 100-year war. Historical text is normally very long and often just large pieces of text that require someone to focus on for a long time which is not suitable for every learner.

## Appendix B | Week 3 | Understanding and specifying the context of use

<b>Week 3 Practical activity: Understanding the context of use</b>	
<b>Question</b>	<b>Response</b>
What is the topic?	Maths
In what settings are the topic taught?	Websites, a classroom, online games.
How is the topic currently taught?	Through problem sets and memory recall tests
What are the problems with the way the topic is currently taught?	It is mostly text with not as much visual aid and almost no audible aid. It is also not engaging.
Who are the audience for the topic?	Younger people who are learning maths at GCSE level
What are their general characteristics?	Desire to learn new skills. Play video games.
What is their prior knowledge of the topic?	Key stage 1 maths
What are their motivations for learning the topic?	Enjoy doing maths, want to know more, want to be better than the rest (competitive)

## Persona Template



Design Brief: Gamification of mathematics

Name: Tilly

Age: 8

Location: Scotland

Level of  
technical comfort: Average

### Back story and goals

Tilly has really enjoyed playing games her whole life. She enjoys learning new skills and does not like being away from the computer for too long. She wants to improve her understanding of mathematics to try to get to the top of the class and have an advantage over the rest.

### Existing practices

There are worksheets online that Tilly can use at any point to learn as well as many forms of basic online games to play. Tuition can offer a guided experience while learning mathematics. Classroom environments have guided lessons through various topics on the national curriculum.

### Motivations and frustrations

She wants to be at the top of the class and to put her best self forward to her peers. She finds that classroom environments where a PowerPoint is shown, and a worksheet given does feel not engaging. She often finds the work either too easy, or much too difficult but the standard of work given to her had to cover a broad range of skills (untailored for her). She does not like to wait before finding out if she was correct and would prefer a more instant response.

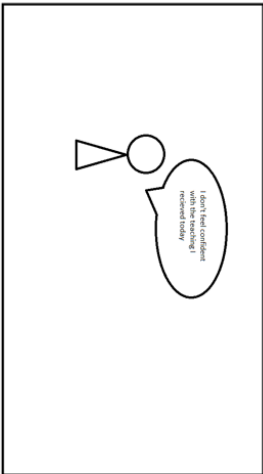
## Appendix C | Week 4 | Specify the user requirements

Question	Response
What technology have you selected to use?	Desktop
If there is no change in technology between current teaching methods and your proposal (e.g. desktop in both) then what is the innovation?	Traditional classroom methods of teaching is mundane, allowing students to (once a topic has briefly gone over) learn the topic at their own chosen difficulty level, and allow learning whenever they would like it.
Why do you think this technology / innovation will improve on the way things are currently taught?	Tailored content to suit the needs of the learner, engaging, interactive, instant feedback.

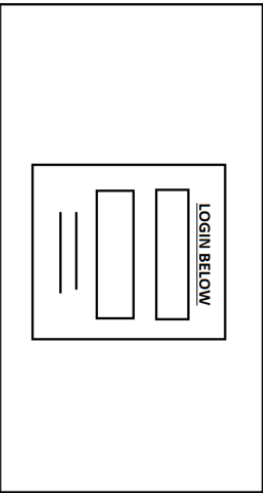
## Context scenario:

Tilly would like to learn more about her current topics she is covering in school. Her teacher has given her a list of topics on the national curriculum for her age group that she can take home to both cover topics already learnt in the classroom and those currently being covered. She wants to be at the top of her class and would like to try to get the highest mark in her class. She takes the topic list home and logs onto her computer ready to learn. She asks her parents to help her get onto the website (that has been already sent to parents to ensure online safety) and selects her age so that she is covering the topic at the level expected of her. Once selected she navigates to one of the topics on her list and the game begins to load. Once the game has loaded there is a list of instructions for Tilly to read so that she is aware of how the game will play out. She picks an easier difficulty at first because she remembers struggling in class in this topic. After about 10 minutes, Tilly feels much more confident in her ability and decides to try at a higher difficulty. The higher difficulty makes the answering time smaller and so thinking has to be faster, the questions are more difficult, and she gets more points. She spends some of the points on changing the look of her digital avatar which appears as the main character on each of the games played. Once Tilly has finished, she just picks another topic and repeat her previous actions. When happy with the topics covered, Tilly closes the browser and is left feeling more comfortable with all the topics covered, enjoyed learning each topic through the games, and is happy with the progress she has made today.

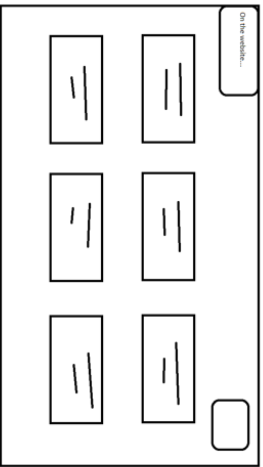
Appendix D | Week 5 | Produce design solutions to meet user requirements



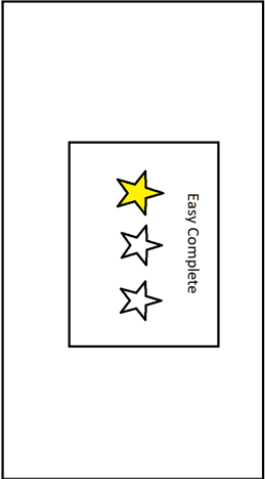
Tilly makes the decision that today's learning was not of sufficient quality



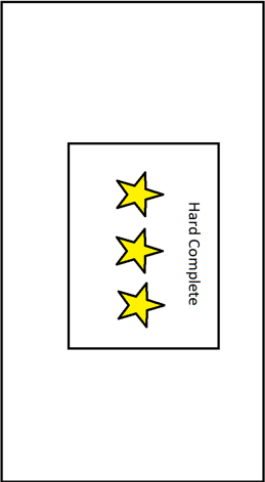
She logs into the learning portal using her log in details



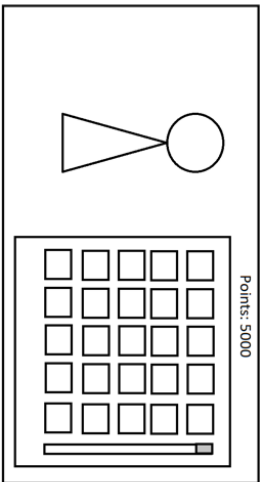
Tilly picks out the topic she felt she was not as confident in



First playing the game from that topic in easy to reinforce the learning and gain a small number of points



Trying the game on a harder difficulty to challenge her topic understanding and gain more points



After playing, rewards herself with new cosmetic items using her points that she earned

Appendix E | Week 6-10 | Produce design solutions to meet user requirements & evaluate the designs against the requirements

<b>Feedback Requested</b> (designs/ideas you wish to get feedback on)	<b>Feedback Received</b> (include as much detail as possible)	<b>Action to Take</b> (how you could respond)
Colour Schemes to aid in visual appeal	Try to include bright colours, ensure lots of variety, avoid dark colours as it is not as fun	In prototype, make each page a different colour / colour scheme (e.g. multiplication could be a green button and then swap to a green background)
Point system for children aged 6-10	Would be better to have a currency rather than points, make the currency more thematical with maths	Swap the points system for a form of digital currency that is spent in the customisation panel, include some image that links to maths such as link cubes.
Topics list – break it down, keep it as national curriculum sets	Breaking down the topics such as measurements into measurements and currency helps to keep each topic specific to what it is testing	Breaking down all of the topics in the national curriculum to individual topic pages as this will help to ensure that each topic the learner wants to cover is more specific. (makes TELE better because learner has more control).
Game completion screen, currently using stars and then giving currency based on stars earned	Skip the stars and just show the increase in currency, much more rewarding to show the immediate effects of success than the inferred.	Replace the winning screen after each game to a screen displaying the increase in currency awarded to the learner.