

# GraphoGame Teacher Handbook

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## 1. Introduction

GraphoGame is a computer-based learning environment for training phonics reading skills. GraphoGame is a result of research conducted by GraphoLearn, a research initiative that develops and studies the GraphoGame family of European and other language games. The software and game format was developed by researchers in Finland, firstly as a support tool to help children struggling with reading (University of Jyväskylä & Niilo Mäki Institute). The Finnish game was very successful and was subsequently adapted to support the acquisition of phonics skills by all Finnish-speaking children. The Finnish government has made the game available to all children during their first years of schooling. Subsequently the University of Jyväskylä and Niilo Mäki Institute approached researchers in other languages to develop similar high-quality games. The development of the GraphoGame family of games is an evidence-based process, led by researchers and based on research findings.

The English language version of GraphoGame is based on research on reading by “rhyme analogy”, carried out in the 1980s and 1990s by Professor Usha Goswami (Goswami, 1986, 1988, 1995; Goswami & Mead, 1992). The rhyme analogy research studies highlighted the importance of oral awareness of linguistic “onset-rime” units in reading development. To segment a word into onset-rime units, divide at the vowel (“s-ing”, “st-ing”, “spr-ing”). Developed at the Centre for Neuroscience in Education, University of Cambridge, the English GraphoGame focuses on rime patterns, teaching individual letter-sound correspondences within rhyming families of words. The game has shown good efficacy in two small-scale, researcher-controlled studies (Kyle, Kujala, Richardson, Lyytinen & Goswami, 2013; Bhide, Power & Goswami, 2013; note that the children in these studies were also learning synthetic phonics as part of their school reading curriculum). A large scale randomised controlled trial of GraphoGame funded by the Education Endowment Foundation (EEF) did not find any evidence that children playing GraphoGame improved more in reading than control children receiving teacher-led reading intervention (both groups gained on average 9 months in reading age during the EEF trial). GraphoGame may help support the development of phonics skills when utilised within a full literacy curriculum. GraphoGame is likely to be most effective when children are also experiencing a rich oral language curriculum, within which phonics training is only one element of reading instruction.

The game involves multiple choice trials in which a player has to match an audio segment (phoneme, rime, word) with a visual representation (letter or text segment). There are also tasks in which a player builds up written words from smaller elements to match spoken target words. If an inaccurate response to an item is given, the game immediately guides the player to a correct answer, and in this way adapts to the player’s learning level. The game incorporates a dynamic element which adapts to the child’s own level of ability and sets practice sessions and movement to further levels in accordance with individual ability.

## **2. Format of the Game**

Each child is set up with a personal in-game character and plays at an individual pace. The game is arranged in **streams** of increasing difficulty, within which are **levels** of different tasks. Across the game there are 25 streams each containing 5 to 9 levels, or tasks, for the children to attempt. Streams 1 to 5 each begin with a level introducing a subset of single letter sounds. These single sounds are then combined together to make 2-letter rime units. The remaining levels on these streams show single letters added to the front of these rime units to make words. This is followed by a demonstration of how all the individual sounds/letters come together to make the same word. Streams 6 and 7 begin with a level which introduces both single and two letter sounds (digraphs). The next levels combine these letters or digraphs together to make 2- and 3- letter rime units. These rime units are then used to make real words. Again this is followed by a demonstration of how all the individual sounds/letters come together to make the same word.

The streams and tasks appear as various game scenes (underwater submarine, farmyard, game show, digging for diamonds). After a short spoken introduction, the children have to click on the letter, rime unit or word to match what they hear. If the child does not achieve a pre-set threshold of success on a level, they cannot proceed in the game until that threshold has been reached (or the level has been tried 3 times). The final levels of each stream check the children's familiarity with the sounds so far encountered, with either a spelling task or a rhyming task. In addition to the changing task levels, there is also an assessment level, which checks phoneme, rime and word knowledge, repeated throughout the game.

### **3. Getting started**

#### **Installing the game**

iOS and Android versions of GraphoGame are distributed through Apple App Store and Google Play Store, respectively. GraphoGame will be available for Windows and MacOS computers before the end of 2018 and will be distributed via Windows Store and Apple App Store.

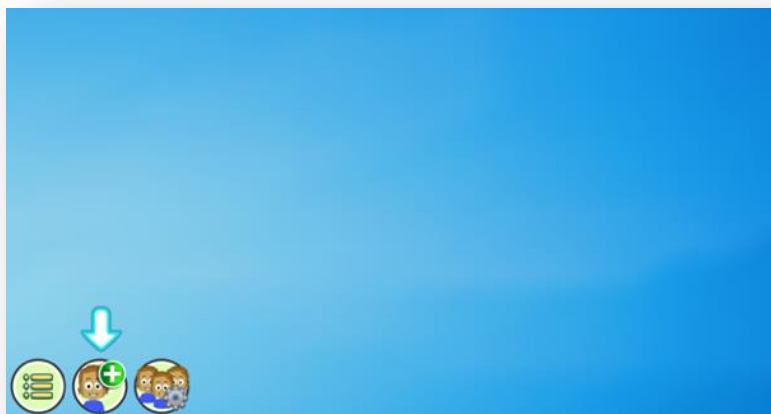
#### **Getting started**

GraphoGame is currently an offline application, which means all analytics, data and usage stats are stored locally in the device's memory. The user's progress is saved only in the current device. As the game is offline currently, a user must return to the same device on subsequent sessions to be able to progress with the tasks.

Online features are currently under development.

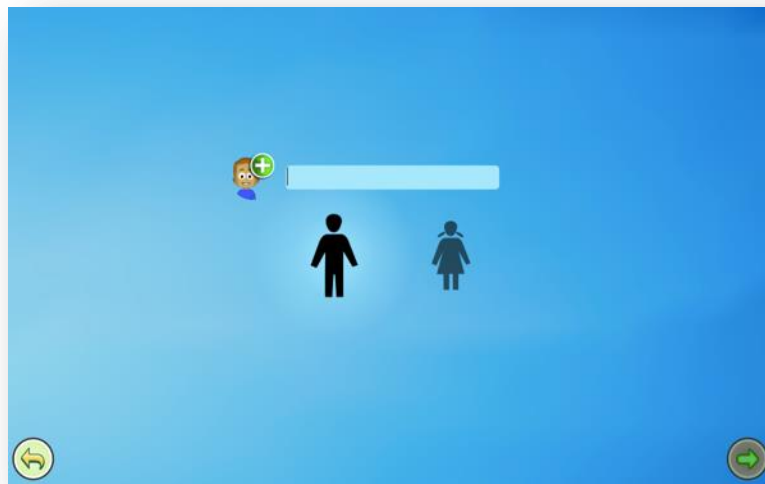
#### **Player creation and selection**

Once the game launches the **Player Selector** screen appears. This is the general entry point to the game, where an active player is selected and gameplay sessions begin. On first visit to the game the user will need to create their avatar characters. On the bottom left-hand side of the screen is the **New Player** button (child's head with green plus sign). This will be highlighted with an arrow and this is used to create new player avatars.



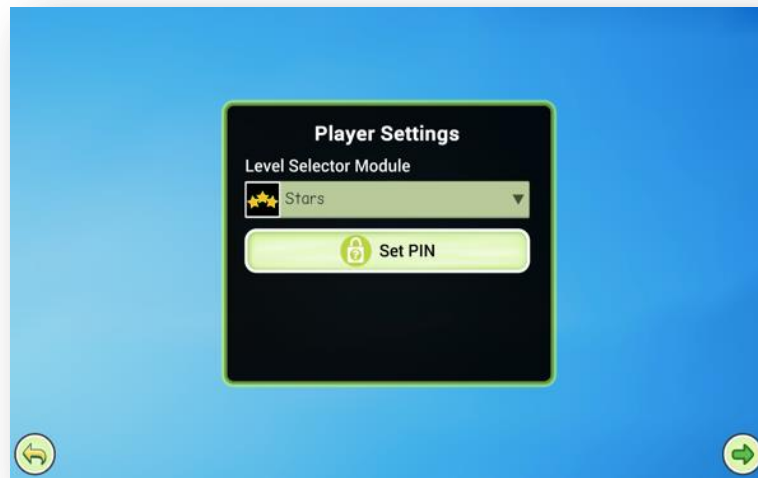
## 4. Creating new players

Click on the new player button to access a set up page for a new character avatar. For a new player three things must be provided: avatar name, avatar gender and the desired level selection mode. The player name should contain just a first name or nickname that a child will recognise and gender is selected. Click on the green arrow button on the bottom-right to advance to the next page.



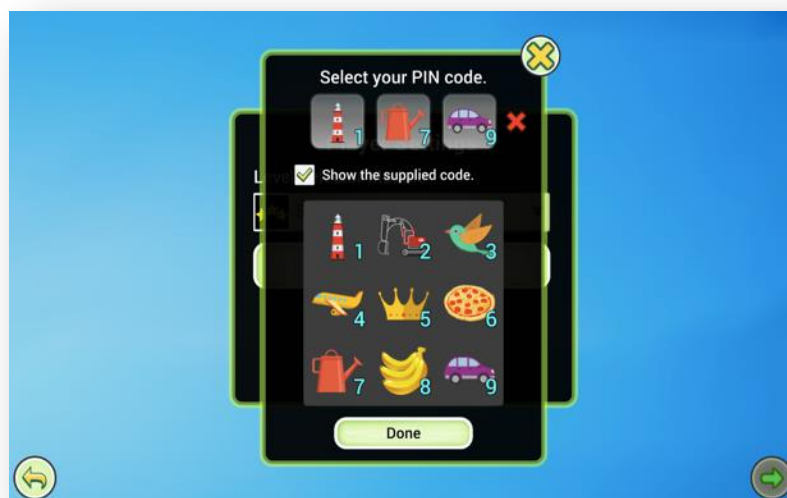
### **Level selector module**

Each user (for example a parent or class teacher) chooses the **Level Selector Module**, which chooses the interface type for the avatar. The **Stars** -level selector only shows a rudimentary level interface that is more suitable for classrooms and allows for better control of what levels are being played. The **Paper Map** -level selector is a child-friendly adventure map that is suitable for unsupervised playtime. The choice of level selector is not permanent and can be changed in the settings at any time after the avatar has been created. If at any point a user wishes to return to a previous page click on the yellow arrow on the bottom left-hand side of the page.



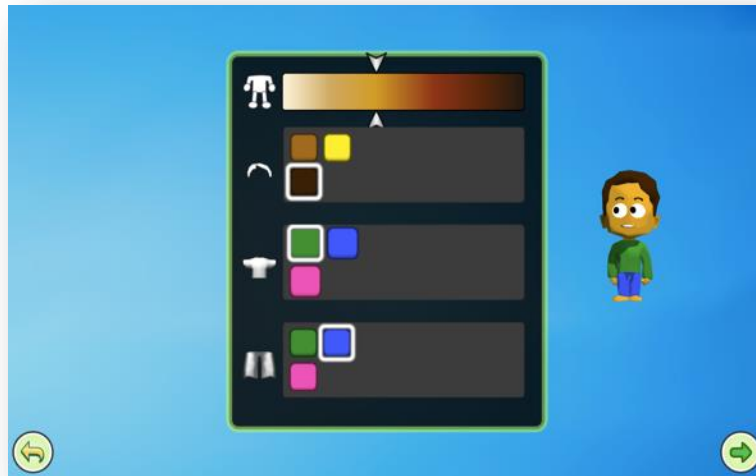
### Set PIN code

For extra security each player can be assigned a PIN code at this point, which will thereafter need to be provided before activating the player. If an avatar's PIN code is forgotten, it will not be possible to access it.



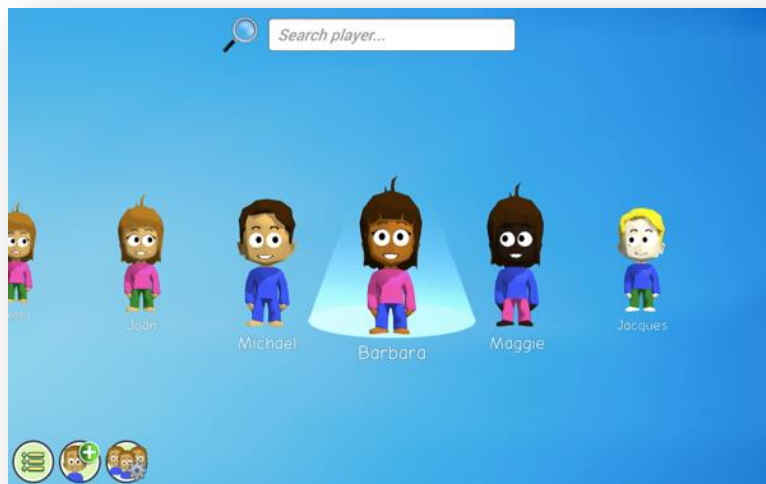
### Character customisation

The next page allows skin, hair and clothes colours to be set for the new character. These features can be changed again at certain points in the game as reward tokens are gathered on task completion. The personalised character is now ready to play. The game can be moved forward to begin playing by clicking on the green arrow.






### Player selector

Once created the individual avatars appear together on the **Player Selector** page. A single click on any avatar will open the game for this character.



On the main **Player Selector** page the dropdown list in the top right hand corner allows you to filter players by assigned group. Click on the green arrow to expand.

In the bottom left hand corner are the icons for the menu , new player creation  and player manager 

## 5. Menu options

When the menu icon  is clicked on in the **Player Selector** page several features can be accessed:



### **Settings**

Allows music and effects sound levels and screen display to be altered. Please be aware that the voice sound levels for the task are altered using sound level on main device so it is advisable that this is checked and set at a medium level before beginning the game.

In the display settings the game's monitor resolution and performance level can be changed. If the game is running slowly, it is recommended to move the slider to 'Faster'.

In UI Language (user interface language) the user can change the language used in the game's menus. This does not affect the language of the learning content.


The credits show the details of the game development personnel.

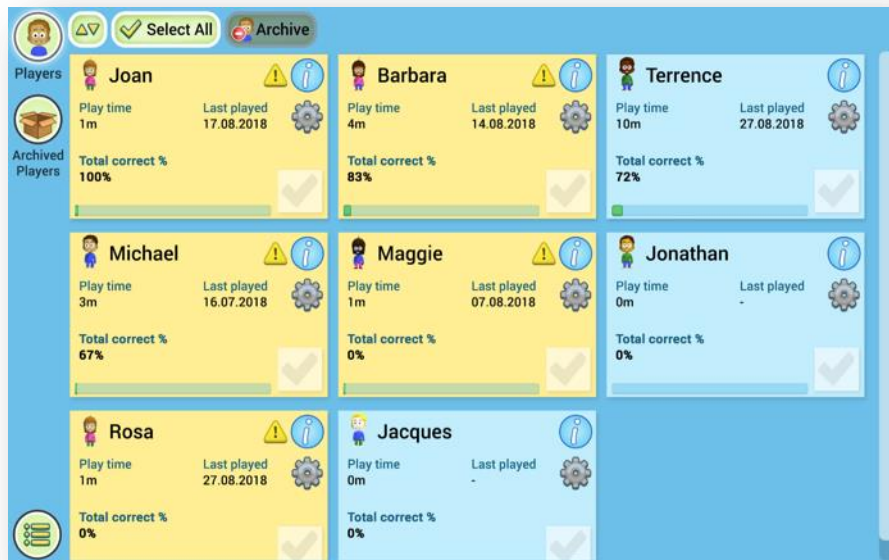




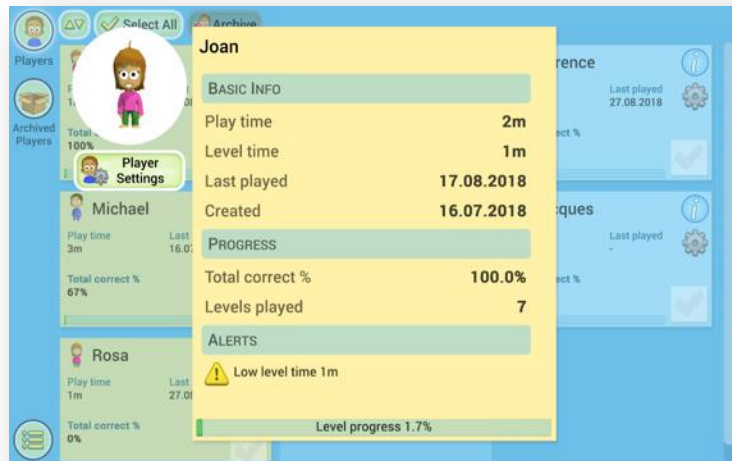
### Player manager

Allows viewing of data linked to individual player progress on the individual player cards. Here the date of player avatar creation, total playing time, last date played and progress through the game is summarised.

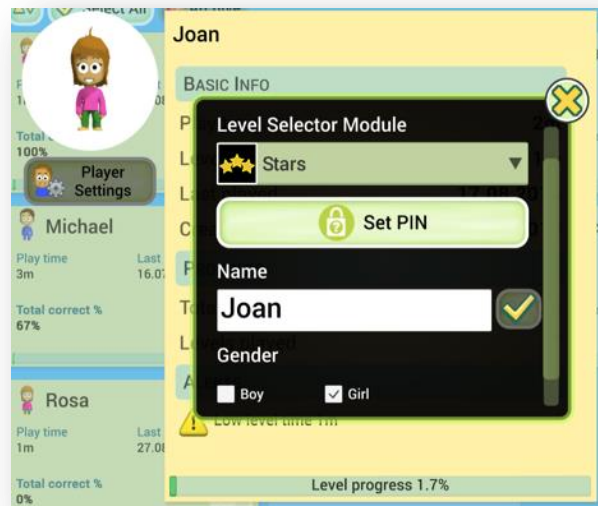
If a player card is yellow and there appears a warning symbol  the game has detected a possible issue in the player's learning, such as a low correct percentage or insufficient playtime.



Click on an individual card and more detailed information about the player’s game usage is revealed, for example the **Alerts** function warns if frequency of play or high incorrect percentage is an issue.



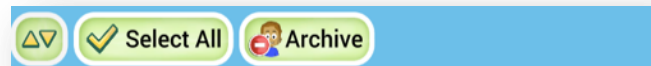
The **Player Settings** allows for changes in the level selector module, PIN code, character name and character gender.




The **Player Manager** screen also reveals the options: to archive and delete players (non-permanent and permanent removal) or to restore archived players to player selector screen. To archive a player, click on the tick on the player card, and then click on “Archive” on the top of the page.



Across the top of the page are a series of action buttons:

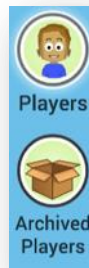


- The first button  brings up the player sorting options. These options allow for sorting players by different categories:



- The **Select All** -button allows all the players on the page to be selected for action
- The **Archive** button archives any selected players and removes them from the player manager and player selector. This button will only be active when at least one player has been selected by ticking in the bottom right-hand corner of a player card.

Down the left hand side of the Player Manager page are a series of tab buttons:



- The **Players** button returns the main player manager view
- The **Archived Players** button opens the archived player manager where all archived characters are stored.

### Archived player manager


All archived characters are stored in the archived player manager. In this view it is possible to **Restore** a character to continue playing with it as normal, as well as **Destroy** the player character permanently. After destroying the character, all data relating to it will also be permanently deleted.

This button will only be active when at least one player has been selected by ticking in the bottom right-hand corner of a player card.



### Quit

Exits the game to the device's main screen or desktop.

To close the menu button window click on the yellow cross on the top right hand corner 


## **6. Level Selector**

The levels selector page is where a player chooses tasks, plays the game, earns coins and unlocks various rewards. When a player exits the Level Selector the active play session ends and the user returns to the Player Selector page

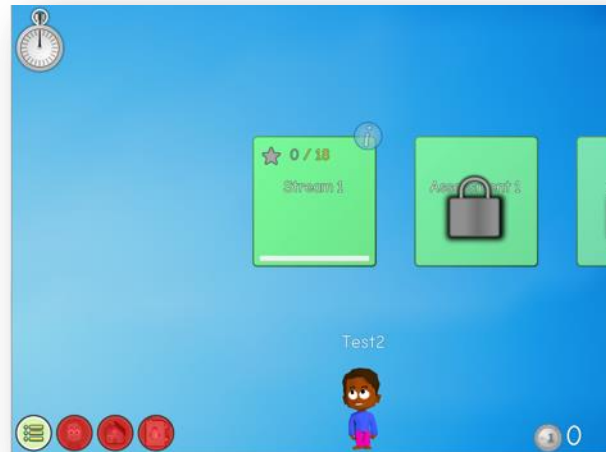
GraphoGame is divided into **Streams**, **Assessments** and **Levels** . A stream is a set of multiple levels and once all are completed, the user receives an in-game reward and unlocks the next stream or assessment. The player cannot jump to a stream they have not completed the prerequisite stream for. An assessment stream is a set of levels designed to assess the user's ability.

There are two options for navigating and progressing through the game: **Stars** level selector and **Paper Map** level selector. The Stars -level selector shows a more rudimentary level interface that is more suitable for classrooms and allows for better control of what levels are being played. The Paper Map -level selector is a child-friendly adventure map that is suitable for unsupervised playtime, but choosing levels is not possible. The choice of level selector is not permanent and can be changed in the player settings at any time (See 5. in this handbook).

### **Stars - Streams view**

A page appears showing the available streams for the different tasks. The streams are displayed as blocks. A sliding scale at the bottom of each block indicates how much of the stream has been completed. An information button  allows the user to open a summary of the task data.


On each block there is also a score. This represents the number of gold stars awarded for tasks within the stream as a fraction of the total number of gold stars that could possibly be won.

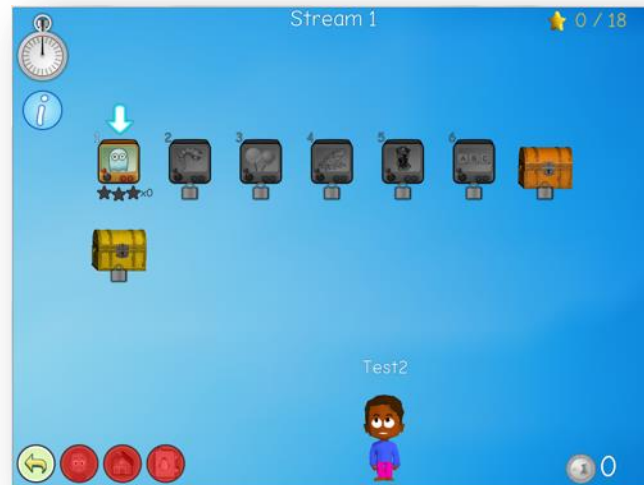


- At the start of the game all streams are locked except for the very first stream
- All non-current streams are shown padlocked and cannot be accessed
- Any stream that has been completed shows a tick at the bottom of a box
- To return to player selector page click on the yellow arrow icon button (bottom left of screen)

### Stars - Levels view

Select a stream and the level view page appears. Available levels will appear in colour and without gold stars or a padlock. Where a level has been played, and is completed, a number of gold stars will be shown under the icon for that level. If all items for the task are correctly answered the player will receive three gold stars. Unavailable levels are grey and padlocked.

The information button  opens the stream-specific statistics screen. To return to the Streams view page click on the yellow arrow in the bottom left hand corner.



### Paper Map

The “Paper Map” level selector (chosen during character creation and can be changed in the settings) is an alternative graphical interface for playing GraphoGame. Designed for unsupervised playing, the Paper Map is a child-friendly adventure map where levels appear on the map and are accessed by pressing the level icon on the map.




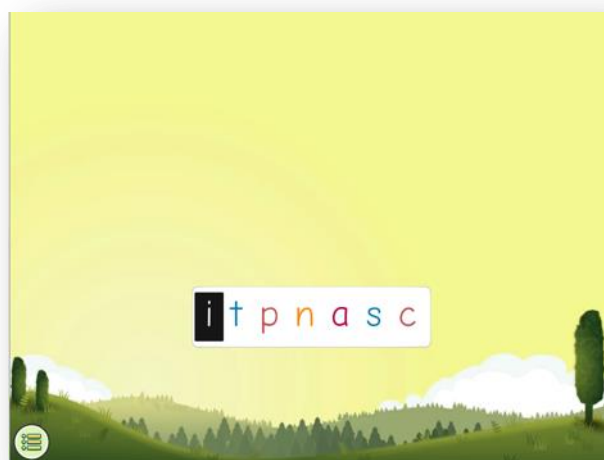
When the level is played through successfully, the Paper Map comes on-screen again with a selection of new levels to play. The game linearly follows the same progression as in the Stars Level Selector, but finished levels cannot be replayed in the Paper Map level selector. To replay a level, the level selector must be changed to Stars. Furthermore, stream-specific statistics and analytics are unavailable in the Paper Map level selector.



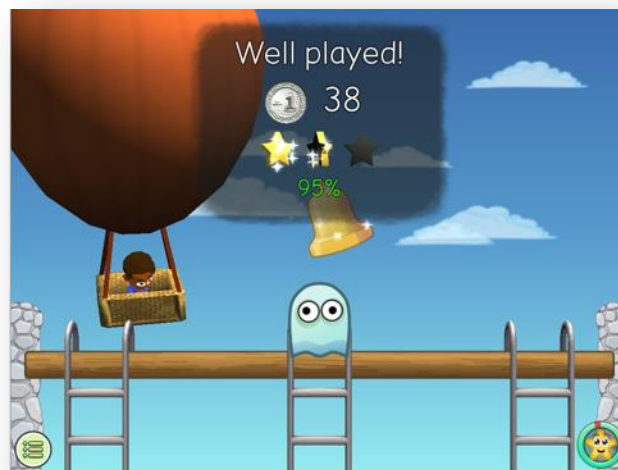






## 7. Task Format

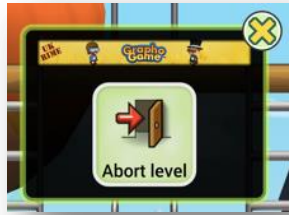
The tasks begin with spoken instructions and associated animations. For each level one of a range of animated tasks will appear (for example a throwing range, a frog eating insects, an underwater submarine). These tasks will feature an individual player's avatar. The task sounds heard are represented visually, as are some additional distractors. When a correct response is clicked on there is an associated positive response from the avatar, the display changes and the next item is presented. An incorrect response is accompanied by a musical theme and a shake of the avatar's head. The correct response remains on screen. At the bottom right hand corner a star icon  indicates the progress through the task and the proportion of correct (green) and incorrect (red) responses.







- To repeat an instruction click on the yellow arrow icon  where it appears
- To move on with the task click on the green arrow icon  where it appears
- To hear an item again click on the speaker icon 
- To withdraw from a level before it is completed click on the menu icon in the bottom left hand corner  and an option window appears. Click on the 'abort level' and the game returns to the page showing the different levels.



### Reward system


The rewards icons do not become accessible until the end of a Stream or after ten minutes have been spent playing in the levels. The current time spent in the levels, as a proportion of ten minutes, is indicated on the time clock in the top left hand corner. Press the clock image and your current session play time is indicated, plus the total time played.




The clock is full when 10 minutes of tasks have been played. At this point the rewards options become available for 2 minutes. As the player continues with the game the pattern of 10 minutes playing, 2 minutes rewards, 10 minutes playing, 2 minutes rewards continues.

Along the bottom left hand side of the stream and level pages are icons representing the rewards (coins, accessories and stickers) accumulated by working through the levels. When a stream is completed, depending on the accuracy of responses on the different tasks, one or two of the locked treasure chests to the right of the level buttons will sparkle. The bronze chest opens when every level of the stream is passed with at least one star. The gold chest opens when every level is passed with three gold stars. Click on the chests and reward cards appear.




Click on each of the cards to reveal rewards in the form of stickers, coins and gifts. To store rewards for future use move on with the game by clicking the green arrow . On the bottom right hand side of the stream and level pages there is a tally of the coins that remain unspent in the accessories shops.




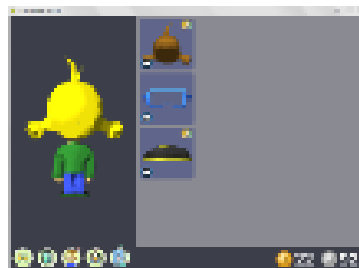
After a session of ten minutes the indicator clock at the top left will be totally green  and the icons for the various rewards will become coloured and sparkle.





The first icon of a money box  allows coins to be collected. Click on the green arrow to bank the money bags. This balance can be used to buy accessories in the shops.



The second icon of a child  allows the avatar to be customised with new garments, accessories and hair styles purchased in the shops.



The third icon of a shop  allows access to three different shops  to buy items with the money banked. There is a shop for accessories, a barber and a clothes shop. Click on a shop and choose from the items that are highlighted as available.



The cost of the items will be deducted from the money in the 'bank'. The items will then be deposited on the customising page above and are applied by clicking on the item. The figure to the left shows how the avatar will be changed.

Time spent in the shop does not increase the session clock, only time spent in the levels does. If a player is not active in the game it automatically pauses. After a 15 minute pause (anywhere) the session clock resets. After a pause longer than 30 minutes, any possible levels are aborted and the game returns to the player selector.

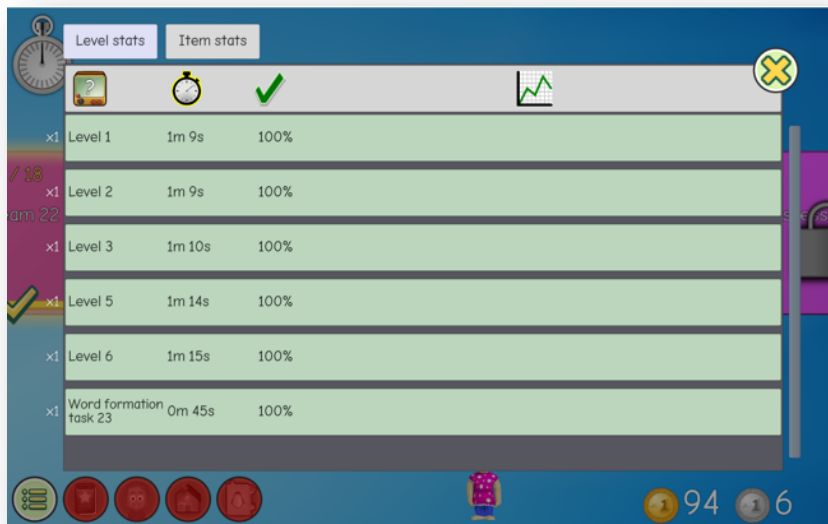
**Summary Task Data**

On the Stream pages there is an information icon in the top right hand corner of each Stream box.



Click on this information icon to access two sets of summary statistics:

Level stats: number of times the level was completed, time spent on the level, percentage of items correct on level.



**Item Stats:** the number of times an item was encountered and the percentage of correct responses on this item. For incorrect responses a red box will be seen. Click on this to reveal the details of the incorrect response.



This information is also available by clicking the information button on the left hand side of the levels view page.

## **8. Other Useful Information**

### **Errors**


If an error is made through incorrect or inaccurate clicking it cannot be undone and is recorded as an incorrect response.

### **Game terminology**


See Appendix B for useful GraphoGame game terms and their definitions.

## Appendix A

### Installing on Android smart phones & tablets:

- Purchase “GraphoGame: Kids Learn to Read” on **Google Play Store**
  - [Link to Google Play - “GraphoGame: Kids Learn to Read”](#)
- Follow the download and installation instructions provided by Google Play
- Click on the icon  in your device’s front page or applications list

### Installing on iOS devices (Apple iPads & iPhones)

- Purchase “GraphoGame: Kids Learn to Read” on **iTunes Store / Apple App Store**
  - [Link to iTunes Store - “GraphoGame: Kids Learn to Read”](#)
- Follow the download and installation instructions provided by iTunes Store
- Click on the icon  in your device’s front page or applications list

### Installing on Windows

- GraphoGame: Kids Learn to Read is not yet available on Windows devices.

### Installing on MacOS

- GraphoGame: Kids Learn to Read is not yet available on Mac devices.



**Appendix B**

<b>Player</b>	Actual player that plays the game, e.g. a child. Active player means the player that is currently selected, and is playing the levels.
<b>User</b>	The individual user of the device that runs GraphoGame. The user can have one or more players. For example a teacher that has several students (players).
<b>Player Selector</b>	Screen where player selection happens and new player creation can be initiated. This is the main screen when there is no active player selected.
<b>Stars Level Selector</b>	Screen where the gameplay streams and levels are displayed for the chosen (active) player. This is the main screen when playing the game (outside the actual levels).
<b>Player Manager</b>	Management screen that is mainly intended for teachers that have several players under their user account.

### **Appendix C**

Goswami, U. (1986) Children's use of analogy in learning to read: A developmental study. *Journal of Experimental Child Psychology*, 42, 73-83.

Goswami, U. (1988) Orthographic analogies and reading development. *Quarterly Journal of Experimental Psychology*, 40A, 239-268.

Goswami, U. and Mead, F. (1992). Onset and Rime Awareness and Analogies in Reading. *Reading Research Quarterly*, 27 (2), 152-162.

Goswami, U. (1995). Phonological Development and Reading by Analogy: What is Analogy, and What is it Not? *Journal of Research in Reading*, 18, 139-145.

Kyle, F., Kujala, J., Richardson, U., Lyytinen, H., & Goswami, U. (2013). Assessing the effectiveness of two theoretically-motivated computer-assisted reading interventions, GG Rime and GG Phoneme. *Reading Research Quarterly*, 48 (1), 61-76.

Bhide, A., Power, A.J., & Goswami, U. (2013). A rhythmic musical intervention for poor readers: A comparison of efficacy with a letter-based intervention. *Mind, Brain and Education*, 7 (2), 113-123.

### **Book:**

Goswami, U. & Bryant, P.E. (2016). *Phonological Skills and Learning to Read*. Reissue of 1990 research monograph in the "Classics in Psychology" series, Hove: Psychology Press.