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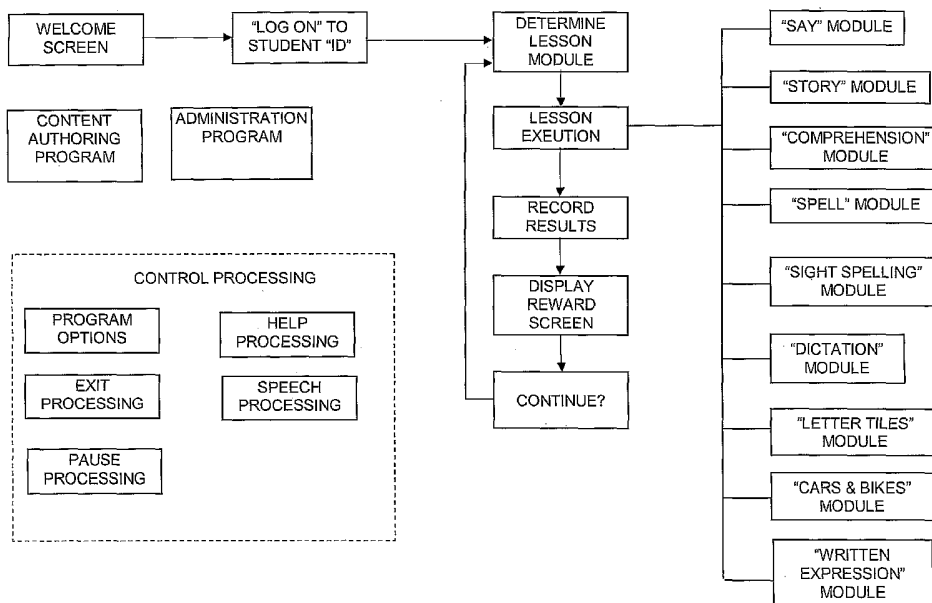
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(54) Title: LITERACY TRAINING SYSTEM AND METHOD

HIGH LEVEL PROGRAMMING STRUCTURE: MAJOR MODULE ACCESS



(57) Abstract: A literacy training system includes a series of interactive lessons displayed on a screen. The student's progress is monitored and progression to subsequent lessons determined by the student's progress. The lessons break words down to phonemes which are successively highlighted. Audio assistance in pronunciation may also be provided. Lesson modules build on these elements to improve reading, spelling, dictation and comprehension.

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Literacy training system and method

Technical field

[01] This invention relates to a method and system for literacy training. In particular, the invention relates to interactive literacy training systems and methods.

Background art

[02] US patent no. 6468084 discloses a system for improving reading skills by using a tape recorder to provide "self-voiced" feedback to the user.

Summary of the invention

[03] This invention provides a method and system of delivering a structured, supervised reading course which uses interactive visual literacy instruction.

[04] The system can provide contemporaneous stimulation for one or more of the faculties of spelling, reading, comprehension, and pronunciation.

[05] Preferably the system includes at least some lessons which provide contemporaneous stimulation for two or more of the four faculties.

[06] The system can provide an interactive screen display.

[07] Optionally the system provides associated audio instruction. This may be generated by a voice synthesiser, text to voice converter, analog speaker or other suitable source of acoustic signals. Such devices will be referred to herein as an audio generator.

[08] An animated indicator can be used to draw attention to specific characters or elements in a lesson.

[09] The system can indicate phonemes.

[010] There are about forty four phonemes in the English language, and each of these can be included in at least one lesson.

[011] The system can enable a pupil to drag and drop letters to form words on screen. This can be in response to audio instruction.

[012] The system can be provided from a central station to which the audio-visual terminal of the pupil is connected via a bi-directional communication link with a remote administrator, tutor or supervisor.

[013] Alternatively the system can be provided as a stand-alone package for use by a pupil with or without a local administrator, tutor or supervisor.

[014] In a further embodiment, the system can have a stand-alone component combined with a remotely connected component.

- [015] The system provides continual testing, monitoring, reinforcement, encouragement and reward for the pupil.
- [016] In particular, the embodiments of the invention can be incorporated in a method and a system having the features set out below. While the embodiments are set out in terms of a method, a system providing the analogous features is also within the inventive concept.
- [017] One embodiment of the invention provides a method of teaching a student literacy using a visual display, the method including:
- creating lesson content including breaking down one or more letters or words to phonemes;
 - displaying at least one phoneme, letter, or word using the visual display;
 - providing a visual animation to highlight at least one phoneme, letter or word.
- [018] The method can include generating phonemes from letters, sequences of letters, or words.
- [019] The method can include storing the lesson content in an information storage means.
- [020] The method can include providing one or more acoustic prompts to the student.
- [021] The method can include at least one acoustic prompt to demonstrate pronunciation of at least one phoneme, letter, or word.
- [022] The method can include incorporating into a lesson one or more of the elements of spelling, reading, pronunciation, and comprehension.
- [023] The method can include incorporating into a lesson all the elements of spelling, reading, pronunciation, and comprehension.
- [024] The visual display can be driven by a computer processor.
- [025] The visual display can be an interactive display, and the student can be provided with an interactive control means adapted to respond to the actions of the student to interact with the display.
- [026] The lessons can be incorporated in a computer program.
- [027] The interactive control means can generate feedback signals which act as inputs (parameters, variables, etc.) to the computer program.
- [028] The student can interact with the visual display by selecting a letter, phoneme, word or group of words.
- [029] The student can interact with the visual display by using the interactive control means to drag and drop a letter, phoneme, word or group of words as a response to a query from the lesson program.
- [030] The program can evaluate the student's response.

- [031] The program can provide feedback to the student based on the evaluation of the response.
- [032] The program can compile a report of student responses.
- [033] The report can be displayed using the visual display.
- [034] A user can be enabled to create and store lesson content.
- [035] A student's progress through a course can be tracked and recorded.
- [036] A progress record of the student's progress can be maintained and used to determine the stage at which the student enters the course at the commencement of each session.
- [037] The speed of the visual animation can be adjusted, for example, by the use of an adjustable control display on the visual display.
- [038] The speed of the animation can be adjusted in response to the student's reading ability.
- [039] A word, letter or phoneme can be displayed on a line in the visual display, and letters, words or phonemes can be highlighted from left to right across the visual display, for example, by the use of a slider under the line.
- [040] In one embodiment, the student is requested to pronounce the word, letter or phoneme, the program pauses for a period to permit the student to respond, and an audio generator then pronounces the word, letter or phoneme.
- [041] In the reading lesson, an animated marker can be displayed under the words of a story that is displayed, the marker moving under the words at a speed controllable to suit the ability of the student.
- [042] An audio reading of the story which keeps time with the marker can be generated.
- [043] Elements which contain student errors from one lesson can be recorded and the teaching and or testing of those elements can be carried forward to a subsequent stage.

Brief description of the drawings

- [044] Figure 1 illustrates a stand alone version of a computer system which may be used in conjunction with the invention.
- [045] Figure 2 illustrates a computer system using a communication network to deliver lessons according to an embodiment of the invention.
- [046] Figure 3 illustrates a screen display layout which may be employed in conjunction with an embodiment of the invention.
- [047] Figure 4 illustrates a screen display illustrating the highlighting of a phoneme according to an embodiment of the invention.

- [048] Figure 5 illustrates the overall structure of a system and method embodying the invention.
- [049] Figure 6 is a flow diagram of an embodiment of a control program suitable for applying the invention.
- [050] Figure 7 is a flow diagram of lesson plan processing.
- [051] Figure 8 exemplifies lesson plan and content.
- [052] Figure 9 is a flow diagram of the flow module.
- [053] Figure 10 is a flow diagram of the story module.
- [054] Figure 11 illustrates the screen display for a story module.
- [055] Figure 12 illustrates the elapsed time animation.
- [056] Figure 13 is a flow diagram of the spell-learn module.
- [057] Figure 14 illustrates the screen display for the spell-learn module.
- [058] Figure 15 is a flow diagram of the spell-test module.
- [059] Figure 16 illustrates the screen display for the spell screen.
- [060] Figure 17 illustrates the screen display for the student input area.
- [061] Figure 18 illustrates the screen display for detail of the game board.
- [062] Figure 19 is a flow diagram of the spell-story module.
- [063] Figure 20 illustrates the screen display for the story mode spell screen.
- [064] Figure 21 is a flow diagram of the dictation module.
- [065] Figure 22 is a flow diagram of the dictation sentence comparison routine.
- [066] Figure 23 illustrates the dictation screen.
- [067] Figure 24 illustrates an example of dictation input processing.
- [068] Figure 25 is a flow diagram of the letter tiles module.
- [069] Figure 26 illustrates the letter tiles screen.
- [070] Figure 27 is a flow diagram of the cars & bikes module.
- [071] Figure 28 illustrates the cars and bikes screen display.
- [072] Figure 29 is a flow diagram of the comprehension module.
- [073] Figure 30 illustrates a screen display for the comprehension module.
- [074] Figure 31 illustrates a multiple-choice question.
- [075] Figure 32 illustrates a Cloze question.

Description of the invention

- [076] The invention will be described with reference to the accompanying drawings.
- [077] Figure 1 schematically illustrates a user terminal suitable for stand alone implementation of a software based implementation of the invention. The user terminal

includes a PC 14, screen 10, keyboard 12 and mouse 18. A program implementing the inventive method is loaded into memory 16, which could be an internal memory of computer 14.

[078] Figure 2 illustrates an arrangement suitable for delivering the lessons embodying the invention remotely. The software is stored on a memory 28 of a server or PC 24 which is linked to a communication network 20 via a modem 26. An administrator, supervisor or tutor has access to a display 21 and keyboard 23, as well as mouse 25. The student's computer is linked to the network via modem 22. Thus the software and associated information can be downloaded from the memory 28 to the student's computer 14. The supervisor can be enabled to monitor the performance of the student and intervene if necessary.

[079] Figure 3 illustrates a layout of a screen display 30 which is utilized in some of the lessons of a literacy training system embodying the invention. The layout includes a display area 32, a first control area 34 including one or more control icons, a second control area 36 including further control icons, and a statistics area 38.

[080] By way of example, the display area can be used to display the program module content. In the "Story" module, this area can be used to display the lines of text in the story. For several of the modules, this area can be the programmatic equivalent of a SMIL (simultaneous multimedia integration language) "player" and may be custom-designed or based upon an existing player.

[081] The statistics area 32 can be used to display various statistics for each program module. For example, in the "Story" module, this area would display words per minute statistics, current page numbers, etc.

[082] The control areas 34, 36, can be used by the student to control the execution of the program. The functions are split between the bottom control area and a top right-hand control area. The function of each icon can vary for each module. However the general functions may be as follows:

[083] Bottom control area:

- Back: display the previous content segment;
- Play/pause: play/pause the program;
- Next: display the next content segment and/or commence module execution;
- Font size: change the size of font in the display area;
- Voice: switch between human voice and synthetic voice or no voice;
- Word animation: change or disable the graphic which appears beneath words in the display area;

- Speed: words per minute and/or animation speed control

[084] Top control area:-

- options: display options screen;
- help: display the help screen;
- exit: Exit the program module.

[085] Throughout the lesson modules, the student can be provided with graphical and/or audio reinforcement for answer they provide. For example, there may be a pool of 20 positive reinforcements (“Good job!”, “Well done!”, etc.) from which one is randomly selected when a question is answered correctly. To avoid monotony or overuse, not all of the correct answers receive a response.

[086] Encouraging reinforcement can also be used when a question is incorrectly answered. For example, there may be a pool of 10 “encouragement” audio reinforcement (“Try again!”, “Not quite right...”, etc.) from which one is randomly selected. For example, only 20% of incorrect answers will receive an “encouragement” reinforcement).

[087] If the student has the option set to receive visual reinforcement also, then a visual element will also appear along with the positive audio reinforcement. This can be a small positive animation, such as bursting fireworks, appearing somewhere on the display area.

[088] A plurality of “constants” in the program can be stored in a file/registry such that they can be modified. Program constants include:

- Lower threshold of Words Per Minute.
- Upper threshold of Words Per Minute
- Module Completion Achievement Tokens - the number of Achievement tokens a student gets for completing a module, set to 1.
- Lesson Completion Achievement Tokens – number of achievement tokens awarded to a student when they complete an entire lesson, set to 5.

[089] The multimedia content that is displayed with the Display Area 32 may adhere to the Synchronised Multimedia Integration Language (SMIL). This provides flexibility to specify the text, graphics, audio and video content that will appear in the Display Area, together with positioning and timing information. This also enables the streaming of content via broadband connections. The system may also be used for narrowband transmission. Additionally, the content utilised in the “Story” module may conform to other specifications, such as the DAISY5 DTB (Digital Talking Book) standard.

[090] When teaching the alphabet, use may be made of both audio and visual elements to reinforce the information with the student. The following is a typical sequence of content:

[091] The letter “A” appears in the upper left-hand corner of the Display Area 32, in a blue 60-point Arial font. After a five-second delay, an audio clip is played that gives the student the name of the letter and the sound that it makes. After another five second delay, a video clip appears in the upper right-hand corner of the Display Area 32, showing a sequence where an apple is selected from a bowl of fruit and bitten, whilst the soundtrack states that “A is for Apple”. Simultaneous with the word “apple” in the video, the word “Apple” appears at the bottom of the Display Area 32, in 40-point Arial font – with all letters in red, except the letter “A”, which is in blue.

[092] The program can be adapted to be used by a wide variety of students using different languages.

[093] The program has the capability of using different versions of English, such as Australian English, American English and United Kingdom English. The choice of English version is an option during the installation process and affects the choice of content database as well as program messages and other text.

[094] In addition to native English speakers, the program can be used by students who use English as a second language (ESL). As such, the program is designed to support multiple languages for program messages, menus, help screens, etc. The choice of language can be an installation option.

[095] The program can be designed to use a common software installation package such as the Wise Installer. The program can be installed from a “shrink-wrapped” CDROM or via an Internet-downloadable file.

[096] In addition to the previously described language options, the installation process can also allow the customer to select the installation directory and program group.

[097] The architecture of the program is shown in Figure 5, and includes a main control program which co-ordinates the invocation of the other modules (such as “Comprehension” and “Story”), manages content “lesson plans”, and manages student information.

[098] The main module is an executable program, invoked, for example, via a Windows desktop/Start Menu icon. The program opens with a welcome screen followed by a log on screen. The initial “Welcome” screen for the program has two text input boxes where the user can enter their username and password. The user must click on the “Login” button image to continue processing, or the “Exit” button to terminate the program.

[099] The data that the user enters is compared to the usernames and passwords stored in the User table in the database. If the data does not match a defined username/password, an error message is issued and control returns to the start of the module. When the student has

logged on, the program determines the appropriate lesson module, for example by examining a progress log (Student Lesson table) maintained by the program for that student. The program then progresses to the lesson execution in which one of a plurality of lessons is selected. These lessons may include:

- “Say” module
- “Story” module
- “Comprehension” module
- “Spell” module
- “Sight spelling” module
- “Dictation” module
- “Letter tiles” module
- “Cars & bikes” module
- “Written expression” module

[0100] The details of the modules are discussed below.

[0101] At the end of a stage during a session, the results are recorded, and an appropriate reward or acknowledgement may be generated and displayed. The student is given the option of continuing with the next stage, and the system progresses to the next stage or shuts down depending on this choice.

[0102] Figure 6 shows a flow diagram of the module invocation. When the program is started, the log on screen is displayed (after or as part of the welcome screen). The log on is verified, and, if correct, the program identifies the status of the user as student, tutor or administrator, and displays the appropriate screen.

[0103] Where the user is a student, the display is the content selection screen. Because the system can accommodate custom lessons entered by the tutor or administrator, the system has an option to select the custom lesson or the main lesson path. If the custom lesson option is selected, the program selects the lesson material and proceeds with the custom lesson. If the standard lesson option is selected, the program analyses the student’s progress log and selects the appropriate starting point.

[0104] To implement this choice, the program displays the Content Selection Screen where the student can:

- Click on the “Go” button image next to the lesson name (the program determines the current lesson name by examining the Student Lesson table. If a standard lesson is selected, the program will examine the Student Statistics table to determine the next

lesson module to be executed. Control passes to “Lesson Processing” with the current lesson and lesson module pointers as parameters;

- Select a custom lesson from a drop-down menu (if any have been defined) and press the “Go” button image next to the custom lesson drop-down. If a custom lesson is selected, control passes directly to “Lesson Processing” with the custom lesson pointer and a lesson module pointer of zero as parameters.

[0105] The program includes a database of content that has been designed to form cohesive sets of “lessons” that the student would normally progress through in a sequential order. Each lesson consists of a subset of content and a “lesson plan” used to invoke several (typically all) of the lesson modules.

[0106] Figure 7 illustrates the flow of the Process Lesson routine. A conceptual example of a lesson plan and its relationship to the content is illustrated in Figure 8.

[0107] The lesson is determined from the Student Lesson table and the lesson module is invoked. Depending on whether the module has been completed, the student’s performance is assessed and, in the case of successful completion, the next module is determined and indicated in the Student lesson table. If the student did not complete the module satisfactorily, the Student Lesson table is not indexed to the next module. A module may be repeated to reinforce the lesson, or to continue until the student has mastered the lesson.

[0108] In more detail, the Process Lesson routine performs as follows. Upon initial entry to the Lesson Processing, the invoking module passes the current Lesson ID and Lesson Module ID. Upon subsequent invocations (after the completion of a Lesson Module and the student electing to continue with the Lesson), the Lesson Module / Lesson table is examined to determine the next Lesson Module. The Lesson Module / Lesson table contains the relationships between the Lesson Module and Lesson tables, together with a sort number indicating the sequence of Lesson Module execution. If the Lesson Module / Lesson table indicates that there are no more Lesson Modules for the Lesson, execution returns to Content Selection.

[0109] The Invoke Lesson Modules perform as follows. Once the current Lesson and Lesson Module have been ascertained, the program examines the Enabled Modules list for this student. The Parent/Tutor and/or Administrator have the ability to “disable” specific modules for a student. If the current Lesson Module is disabled for this student, program execution returns to Determine Next Lesson.

[0110] If the Lesson Module is not disabled, the appropriate Lesson Module is invoked.

[0111] Upon return from the Lesson Module, execution continues at Reward Student. After the completion of a Lesson Module, the student is rewarded with Achievement Tokens and a Reward Screen is displayed. Once the student has completed an entire lesson plan, additional “bonus achievement tokens” can be provided (set as a program constant).

[0112] In the bottom right-hand corner of the Reward Screen, the student is given three options to click on:

- [Repeat] Clicking this option will result in program execution returning to Invoke Lesson Modules, thereby repeating the Lesson Module.
- [Go On] - Clicking this option will result in program execution continuing at Repeating Lesson Modules.
- [Exit Lesson] This option will result in the program execution returning to Content Selection.

Repeating Lesson Modules

[0113] Once a Lesson Module has completed, the student’s percentage of correct answers are compared with the “Pass Score %” variable (set via the Administrator options screen). If the student fails to achieve a set percentage of correct answers within a module, that module will be automatically repeated (program execution returns to Invoke Lesson Modules). After the third failed attempt at a module, the program will suggest that the student take a break and return to the lesson at a later date. The student will be given the option to keep trying or to exit. If the student chooses to exit, they will resume the same module when they log back into the program.

[0114] If the student’s score is greater or equal to the “Pass Score %” variable, program execution continues at Determine Current Lesson.

Achievement Token Reward System

[0115] In all of the lesson modules, the student is rewarded by accumulating a series of “achievement tokens”, based upon his/her performance in the module. These tokens are used to graphically illustrate progress toward a learning goal.

Reward Display

[0116] The student has a choice (via the “Options” menu) of the image used to display his/her rewards. For example, all images can have one hundred token “squares” to be filled in.

Award Processing

[0117] The number of tokens that are awarded to a student varies from module to module, but are based on a percentage of correct responses within the module. For example, if the student correctly answered 6 out of 8 words in the “Letter Tiles” module, they might be

rewarded with three tokens. If they achieved a perfect score, they may be rewarded with four tokens. All students receive at least one token for successfully completing the module.

[0118] At the end of the module, a pop-up window appears, containing the reward display image – filled with the tokens earned to date (this statistic is stored in the student database). The newly awarded tokens are filled in, one-by-one, accompanied by a sound effect. The new token total is updated in the student database.

[0119] For completing a module, the student receives the value of the Module Completion Achievement Tokens program constant (set to 1). If the module provides measurable results, and the student gets more than the “Extra Token Score %” program constant correct, they will get an additional achievement token. The amount of achievement tokens awarded, and the definitions of correct answers and percentages of correct answers, are described for each module in this document.

Award Certificates

[0120] Once the student has been awarded sufficient tokens to complete the squares in the reward image, he/she is given the opportunity to print a reward certificate. Once the certificate has been printed, a new reward “board” is started.

“Say” Lesson Module

[0121] Figure 9 illustrates the “Say” module flow diagram. The function of “Say” module is to display a set of words/letters from the content database, together with audio voice and other multimedia prompts. The student is expected to “say” the word displayed and prompt the program for the next word/letter. The student’s total and average response times are recorded and (optionally) displayed, together with (optional) animated characters indicating total elapsed time.

[0122] The areas of the display are utilised as follows:

Display Area This area is used to display the content.

[0123] Statistics Display Area

- This area is used to display the statistics during program execution. Statistics displayed include: Total number of words in list
- Number of word currently being displayed
- Average seconds of student response time per word
- A graphical clock-like elapsed time timer (Figure 12) Control Area This area is used by the student to control the execution of the program.

[0124] In this module, the button icons perform the standard functions, with the exception of:

- Back: repeat current word
- Next: Display the next word (or exit the module if on the last word). This icon is disabled (dimmed) upon entry to this module.
- Font size: Disabled for this module.

Start of Execution of “Say” module

[0125] Upon entry, “Average Time” and “Current Word” statistics counters are reset to zero and updated in the Statistics Area. The Word List table is examined to determine the total number of words and the “Total Words” value is updated in the Statistics Area of the screen.

[0126] The Lesson Module table is examined to determine if any pre-recorded Introductory Audio file exists. If the audio file does exist, it is played in its entirety before continuing to the next step. The “Next” icon is enabled and program execution waits for the student to click on the “Next” icon (or exit the program).

Word Display

[0127] When the student clicks on the “Next” icon from the previous step, execution continues and the “Current Word” counter is incremented. Using the “Word List / Word” table (which correlates Words with the Word List, together with a sequential number), the word corresponding to the “Current Word” counter is selected. If the Word List is exhausted, program execution continues at Record Statistics. Otherwise, the “Current Word” counter in the Statistics Area is updated and the “Next” icon is disabled.

[0128] The word text for the selected word is read from the Word table entry displayed in the Display Area.

[0129] Associated with each word are several SMIL formatting tags, including the X and Y positioning and font size. It should be noted that any text can be displayed as “word” text – including sentences.

Multimedia Content

[0130] The Word table entry is examined to determine if any multimedia content (Flash Movie and/or image) exists. If an image does exist for the word, the image display countdown timer is set to the value of the “Begin Time” in the Word table and is enabled. Once the countdown timer reaches zero, the image is displayed in the Display Area, using the SMIL formatting meta-tags – such as X and Y position, duration and fill.

[0131] If a Flash Movie does exist for the word, the movie display countdown timer is set to the value of the “Begin Time” in the Word table and is enabled. Once the countdown timer reaches zero, the movie is displayed in the Display Area, using the SMIL formatting meta-tags – such as X and Y position, duration and fill.

[0132] Once the timers have been set, program execution immediately proceeds to the next step (i.e., the video file can be playing (or waiting to start) whilst program execution continues).

Word Audio

[0133] The Word table entry is examined to determine if any Word Audio exists. If the audio file does exist, it is played in its entirety before proceeding to the next step.

Phoneme Highlighting

[0134] The Word table entry is examined to determine if any Phoneme Highlighting meta-tags have been defined. Phoneme Highlighting is controlled by a combination of a Phoneme Pattern meta-tag and a Phoneme Timing meta-tag. The Phoneme Highlighting meta-tag has the format of the word itself, with letters/letter combinations preceded by a “^” to indicate regular phonemes and “#” to indicate irregular phonemes (for example: “^th#ei^r”). The Phoneme Timing meta-tag has a matching combination of “^” and “#” tags, followed by a value to indicate the length of time that the corresponding letter/letter combination is highlighted (for example: “^20#10^20”). Each phoneme can be highlighted for a period of time calculated by the Default Phoneme Duration multiplied by the Phoneme Timing Value that it is assigned in the Content Database. (So a phoneme assigned a value of 20 will be highlighted for twice as long as a phoneme assigned a value of 10). Regular phonemes will all be highlighted first, and then the irregular phonemes will be highlighted.

[0135] If no Phoneme Highlighting meta-tags have been defined, execution continues with Irregular Phoneme Audio. Otherwise, the letters/letter combinations that have been tagged as regular phonemes are highlighted in yellow (see Figure 13 below for an example), one-by-one (or group-by-group, to be more accurate), followed by the irregular phonemes, which are highlighted in green.

[0136] If the Word Animation option is enabled, the selected Word Animation graphic will appear beneath each phoneme as it is highlighted.

Irregular Phoneme Audio

[0137] In this program segment, the Word table entry is examined to determine if any Irregular Phoneme audio exists. If it does exist, the audio is played in its entirety before proceeding to the next step. It should be noted that despite the naming, Irregular Phoneme Audio does not require the presence of Phoneme Highlighting.

[0138] If Irregular Phoneme audio does not exist, program execution proceeds immediately to the next step.

Student Input

[0139] At this point, the program enables the “Next” icon and waits for the student to click on it. When the icon is activated, the elapsed timer is activated and the timer animation in the Statistics Area commences.

Elapsed Time Animation

[0140] Program execution will continue when either the student has clicked the “Next” icon or the elapsed time timer reaches the Maximum Say Word Time as set by the Administrator or Parent/Tutor. When either event occurs, the Average Time statistic is updated in the Statistics Area and program execution continues with the next step.

After Word Audio

[0141] The Word table entry is examined to determine if After Word Audio is present. If no audio is present, execution continues at Record Statistics. If audio is present, it is played in its entirety before execution continues to the next step.

Record Statistics

[0142] Once all the Words have been displayed, the program inserts the statistics for the student in the Student Activity Database. The module will record the following statistics and information against the student’s records:

Common Info

- Lesson Number
 - Lesson Name
 - Lesson Module Number
 - Lesson Module Name
 - Date Lesson Module Completed
 - Time Lesson Module Completed
 - Abandonment (If the student clicked ‘Exit’ and abandoned the Lesson Module.)
 - Lesson Module Duration (Time taken on the lesson module – if the lesson is abandoned, this should still be recorded.)
 - Lesson Duration (Total time spent on modules in this lesson – this is accumulated across modules in the lesson)
 - Number of pauses
1. Specific to Say Module
 - Response time for each word
 - Words which timed out
 - Average response time for whole word list

[0137] Following the recording of the statistics, the Module Exit confirmation message is displayed.

Reward Student

[0138] After the statistics have been recorded, one “achievement tokens” is awarded and processing returns to the lesson plan module.

“Story” Lesson Module

[0139] The Story module flow diagram is illustrated in Figure 10. The “Story” module reads several pages of text from the Content Database and displays them page-by-page, accompanied by an (optional) animated object that “glides” from left to right underneath each line to assist the student in reading. Audio may also accompany the text as it is displayed, or an option may be set to have each page “read” by the text-to-voice engine.

[0140] The “Story” module uses the standard screen layout as shown in Figure 11. The Display Area is used to display the Story text and the Word Animation during program execution.

[0141] The Statistics Area is used to display the statistics during program execution. Statistics displayed include:

- Total number of pages in this story segment
- Page number currently being displayed
- Initial words per minute (optional)
- Average words per minute (optional) Initially, the “Average words per minute” and “Initial words per minute” statistics are set to the default option for this student, as specified in the Student Database.

[0142] The Control Area is used by the student to control the execution of the program. In this module, the button icons perform the standard functions, with the exception of:

- Back: return to the beginning of a page or to the previous page if clicked on while on the first word of the current page;
- Next: display the next page or exit the module if on last page;
- Font size: disabled.

Start of Execution

[0143] Upon initial execution of the Story Module, the Lesson Module Introduction Audio (if specified in the content database) is played, the requested story text is loaded from the Content Database. If the story contains page markers and audio cues, the total number of pages is calculated based upon the number of page markers. If there are no page markers in the story text, the program calculates the total number of pages based upon the number of words in the

story text, the font size and the display area size. The “Total number of pages” and “Current page number” are updated in the Statistics Area of the screen.

[0144] The Initial and Average WPM counters are updated to reflect the default WPM value from the Student Database and updated in the Statistics Area of the screen (unless the “Display Statistics” option is disabled in Options screen).

[0145] Upon completion of the Lesson Module Introduction Audio, the program pauses and the “Next” icon is enabled.

Display Instructional Story Pages

[0146] When the Student presses the “Next” icon, a page of the story text is displayed in the Display Area, along with pre-recorded audio (if it exists). During this phase of the module, the “Voice”, “Word Animation” and “Speed” icons are disabled.

[0147] Program execution depends upon whether or not the story text contains page markers and audio cues. If the story text contains page markers and audio cues, the text displayed is based upon the page markers and the audio is played based upon the start/stop timings in the audio cues. When the student clicks on the “Next” icon, the program determines the next section of text to display based upon the page markers, and plays the audio using the corresponding start/stop audio cues. The “Current Page” counter in the Statistics Area is updated accordingly. For example, the story text might be:

*0,15 The cat sat on the mat.

a. It was a fat cat!

[0148] In this case “The cat sat on the mat.” is displayed as the first page of text and the Story Audio is played from 0 seconds to 15 seconds. When the student clicks the “Next” icon, the “It was a fat cat!” text is displayed and the Story Audio is played from 16 seconds until the end.

[0149] When the last page text has been displayed, clicking the “Next” icon will result in program execution continuing with Display Student Story Pages.

[0150] If there are no page markers in the story text, the program calculates the page text based upon the number of words in the story text, the font size and the display area size. The story audio is started upon display of the first page and continues to completion – regardless of the page text being displayed (i.e. it is possible for the Student to not press the “Next” icon to advance to the second page, however the audio for that page (and all subsequent pages) will continue playing).

[0151] When the student presses the “Next” icon, the program recalculates the text to display in the page area. The “Current Page” counter in the Statistics Area is updated accordingly. This process continues until all of the words in the Story Text have been displayed. When the last

page of the story has been displayed, pressing the “Next” icon will result in the execution of the next section of the module.

Display Student Story Pages

[0152] In this phase of the program, the pages of the story are re-displayed one-by-one – with the voice disabled. (The educational process is that the student should be reading the story aloud him/herself). Each page of the story will be display upon the student pressing the “Next” icon.

[0153] The program determines what text to display in a manner identical to that in Display Instructional Story Pages. If the “Word Animation” option is enabled, a graphical image will “glide” under each sentence – at a speed determined by the “Words Per Minute” setting – until it reaches the end of the page, where it will stop under the right-hand side of the last word.

[0154] During the segment of the program, the “Voice”, “Word Animation” and “Speed” icons are enabled. If the student changed the “Voice” to the pre-recorded voice, the “Word Animation” and “Speed” icons may be disabled due to difficulties in synchronising the animation with the pre-recorded voice.

[0155] When the last page of the story page has been displayed, and the student click the “Next” icon, the program moves to Record Statistics.

[0156] Once the all the story pages have been displayed, the program inserts the statistics for the student in the Student Activity Database. The module will record the following statistics and information against the student’s records:

- Common Info
 - Lesson Number
 - Lesson Name
 - Lesson Module Number
 - Lesson Module Name
 - Date Lesson Module Completed
 - Time Lesson Module Completed
 - Abandonment (If the student clicked ‘Exit’ and abandoned the Lesson Module.)
 - Lesson Module Duration (Time taken on the lesson module – if the lesson is abandoned, this should still be recorded.)
 - Lesson Duration (Total time spent on modules in this lesson – this is accumulated across modules in the lesson)
 - Number of pauses

[0157] Specific to Story Module

- • Average WPM
- • Total Words Read
- • Slowest speed chosen
- • Fastest speed chosen
- • Number of pages read

[0158] Following the recording of the statistics, the Module Exit confirmation message is displayed, as illustrated in Figure 15 on page 30.

[0159] Reward Student

[0160] After the statistics have been recorded, one “achievement tokens” is rewarded and processing returns to the lesson plan module.

“Spell - Learn” Lesson Module

[0161] Figure 13 illustrates the flow diagram of the Spell-learn lesson module. In the “Spell – Test” module, words in the word list are displayed, pronounced, highlighted phonetically and then hidden from the student. The student then has three attempts to spell each word (via keyboard input), with “hints” provided if the word is not spelled correctly.

Screen Display & Controls

[0162] The “Spell-Learn” module uses the standard screen layout

[0163] The areas of the display are utilised as follows:

[0164] Display Area

[0165] This area is used to display the words and “hints” from the word list during program execution. This area is also used to display text input from the student.

Statistics Area

[0166] This area is used to display the statistics during program execution. Statistics displayed include:

- Time left (for student input).
- Total number of words in word list
- Words remaining
- Correct words

Control Area

[0167] This area is used by the student to control the execution of the program. In this module, the button icons perform the standard functions, with the exception of:

[0168] Back: repeat the current word;

[0169] Next: accept the student input or exit module if on last word;

[0170] Voice: disabled

Start of Execution

[0171] Upon entry, the “Correct Words” statistics counter is reset to zero and updated in the Statistics Area. The Word List table is examined to determine the total number of words and the “Total Words” value is updated in the Statistics Area of the screen. The Lesson Module table is examined to determine if any pre-recorded Introductory Audio file exists. If the audio file does exist, it is played in its entirety before continuing to the next step. The “Next” icon is enabled and the program execution halts until the student clicks the “Next” icon.

Word Display

[0172] When the student clicks on the “Next” icon from the previous step, execution continues and the “Current Word” counter is incremented. Using the “Word List / Word” table (which correlates Words with the Word List, together with a sequential number), the word corresponding to the “Current Word” counter is selected.

[0173] The “Next” icon is disabled.

[0174] If the Word List is exhausted, program execution continues at Record Statistics.

[0175] Otherwise, the “Remaining Words” counter is decremented, displayed in the Statistics Area, updated and the “Next” icon is disabled.

[0176] The word text for the selected word is read from the Word table entry and displayed in the Display Area. The Spell Learn Audio begins to play and the letters of the word are highlighted according to the Phoneme Highlighting and Phoneme Timing values in the Word table. Highlighting is done in a similar manner to the Say module.

[0177] Whilst the content creator has the flexibility to highlight any groups of letters he/she desires and record anything in the Spell Learn Audio, the content can follow a standard format as in the following example:

- Display Area Activities Audio
- The word “Dog” is displayed “Dog”
- The letter “D” is highlighted “D”
- The letter “o” is highlighted “O”
- The letter “g” is highlighted “G”
- All highlighting is cleared “Dog <Pause> Now you spell ‘Dog’.”

[0178] If the “Word Animation” option is enabled, the Word Animation graphic appears beneath each letter as it is highlighted.

[0179] After the Spell Learn Audio has completed, the Display Area is cleared and the phrase “Type the word:” appears in the centre of the Display Area. Beneath the phrase is a Student Input box.

[0180] The Spell Attempt Limit is set to either the value ‘4’ or one less than the length of the word – whichever is smaller, the Spell Attempt Counter is set to ‘1’ and the “Next” icon is enabled.

Student Input

[0181] The program now waits for the student to type the word into the Student Input Area and press the return key or click the “Next” icon. The word that the student entered is compared to the actual Word from the Word List. If the spelling is correct, execution continues at Audio/Visual Reinforcement, otherwise execution continues at Incorrect Answer.

Incorrect Answer

[0182] If the word was incorrectly spelled, the program first examines the Attempt Counter and compares it to the Attempt Limit. If the limit has been reached, the program displays the Word (in red) in the Student Input Area and program execution continues at Increment Word Pointer below.

[0183] If the limit has not been reached, the Word is displayed in the Student Input Area and the Word Audio is played (e.g. “Dog”). After a two second delay, the word is cleared from the Student Input Area and the first n letters of the word are entered into the Student Input Area as a ‘hint’ – where ‘n’ is equal to the Attempt Counter. The Attempt Counter is incremented and program execution returns to Student Input.

Audio/Visual Reinforcement

[0184] If the word is spelled correctly then there is a 40% chance that the system will play an audio positive reinforcement (with or without visual reinforcement, based upon the Student Option setting).

Increment Word Pointer

[0185] The program increments the Word Pointer and halts until the student clicks on the “Next” icon. Once pressed, the program examines the Word List/Word table to determine if there are more words – if so, processes resumes at Word Display”. Otherwise, program execution continues with the next step.

Record Statistics

[0186] Once the all the words have been displayed, the program inserts the statistics for the student in the Student Activity Database. The module will record the following statistics and information against the student’s records:

- Common Info
 - Lesson Number
 - Lesson Name
 - Lesson Module Number
 - Lesson Module Name
 - Date Lesson Module Completed
 - Time Lesson Module Completed
 - Abandonment (If the student clicked 'Exit' and abandoned the Lesson Module.)
 - Lesson Module Duration (Time taken on the lesson module – if the lesson is abandoned, this should still be recorded.)
 - Lesson Duration (Total time spent on modules in this lesson – this is accumulated across modules in the lesson)
 - Number of pauses

[0187] Specific to Spell-Learn Module

- Total Number of Words Presented
- Time elapsed for each word before an answer was entered
- For each incorrect word (could be multiple times) entered by the student will be stored: [Correct Word - Word as entered]
- Words which timed out
- Problem Words

[0188] Following the recording of the statistics, the Module Exit confirmation message is displayed.

Reward Student

[0189] After the statistics have been recorded, one "achievement tokens" is rewarded (see "Achievement Token Reward System" on page 23). Additionally, if the number of correctly spelled Words meets or exceeds the "Extra Token Score %" in the Student Options, then an additional token is rewarded.

[0190] Processing returns to the lesson plan module.

"Spell - Test" Lesson Module

[0191] The spell test lesson module flow diagram is illustrated in Figure 15 and the screen display is shown in Figure 16. In the "Spell – Test" module, the student rolls a die to determine the number of spaces to move on a "game board" that is displayed on the screen. The student's "game piece" is then moved to the corresponding space on the game board,

whereupon the student must either spell a sight words, or take the action that is indicated in that square (examples include “move ahead 3 spaces”, “go back two spaces”, etc.). Audio prompts are provided to the student, who then has three attempts to spell each word. (“Hints” are still provided if the word is not spelled correctly).

Screen Display & Controls

[0192] The “Spell-Learn” module uses the screen layout as illustrated in Figure 16. The areas of the display are utilised as follows:

- **Display Area**

[0193] This area is used to display the words and “hints” from the word list during program execution. This area is also used to display the Student Input Area.

- **Statistics Area**

[0194] There is no Statistics Area in the Spell-Test Module.

- **Control Area**

[0195] This area is used by the student to control the execution of the program. In this module, the button icons perform the standard functions, with the exception of:

- Back: disabled
- Next: “rolls” the game dice
- Font Size disabled
- Voice: disabled
- Word animation: disabled
- Speed: disabled

Start of Execution

[0196] Upon entry, the Lesson Module table is examined to determine if any pre-recorded Introductory Audio file exists. If the audio file does exist, it is played in its entirety before continuing to the next step. The “Next” icon is enabled and the program execution halts until the student clicks the “Next” icon.

“Rolling the Die”

[0197] When the student clicks on the “Next” icon from the previous step, execution continues and die graphic on the game board begins to “pulse”. Program execution halts until the student clicks on the die graphic or the “Next” icon. When either event occurs, the die graphic is animated to appear as though it has been rolled and “lands” with one of the six faces showing.

[0198] The Student Input Area appears in the corner of the game board and the “Next” icon is disabled.

[0199] Using the Word List and Word tables, a word is randomly selected and the Word Audio is played (e.g. “Dog”). The Spell Attempt Limit is set to either the value ‘4’ or one less than the length of the word – whichever is smaller – and the Spell Attempt Counter is set to ‘1’.

Student Input

[0200] The program now waits for the student to type the word into the Student Input Area and press the return key. The word that the student entered is compared to the actual Word from the Word List. If the spelling is correct, execution continues at Audio/Visual Reinforcement; otherwise execution continues at Incorrect Answer”. The student also has the option to press the “Give Up” button which results in the program displaying the Word (in red) in the Student Input Area and program execution continuing at Increment Word Pointer.

Incorrect Answer

[0201] If the word was incorrectly spelled, the program first examines the Attempt Counter and compares it to the Attempt Limit. If the limit has been reached, the program displays the Word (in red) in the Student Input Area and program execution continues at Increment Word Pointer.

[0202] If the limit has not been reached, the word is displayed in the Student Input Area and the Word Audio is played (e.g. “Dog”). After a two second delay, the word is cleared from the Student Input Area and the first n letters of the word are entered into the Student Input Area as a ‘hint’ – where ‘n’ is equal to the Attempt Counter. The Attempt Counter is incremented and program execution returns to Student Input.

Audio/Visual Reinforcement

[0203] If the word is spelled correctly then there is a 40% chance that the system will play an audio positive reinforcement (with or without visual reinforcement, based upon the Student Option setting).

Counter Movement

[0204] Next, the counter is moved on the game board – with the number of spaces moved corresponding to the number on the face of the die. If the counter lands on an “Action Square” as illustrated in Figure 18, it is automatically moved forward or backward a number of spaces - the exact number of spaces appears in a pop-arrow when the counter lands on the Action Square. Once the counter has been moved to a blank square, the program continues execution at Rolling the Die. If the counter has reached last square on the game board (exact roll is not required), program execution continues with the next step.

Record Statistics

[0205] Once the all the words have been displayed, the program inserts the statistics for the student in the Student Activity Database. The module will record the following statistics and information against the student's records:

- Common Info
- • Lesson Number
- • Lesson Name
- • Lesson Module Number
- • Lesson Module Name
- • Date Lesson Module Completed
- • Time Lesson Module Completed
- • Abandonment (If the student clicked 'Exit' and abandoned the Lesson Module.)
- • Lesson Module Duration (Time taken on the lesson module – if the lesson is abandoned, this should still be recorded.)
- • Lesson Duration (Total time spent on modules in this lesson – this is accumulated across modules in the lesson)
- • Number of pauses

[0206] Specific to Spell-Test Module

- • Total Number of Words Presented
- • Time elapsed for each word before an answer was entered
- • For each incorrect word (could be multiple times) entered by the student will be stored: o Correct Word o Word as entered
- • Words which timed out
- • Problem Words

[0207] Following the recording of the statistics, the Module Exit confirmation message is displayed, as illustrated in Figure 15 on page 30.

Reward Student

[0208] After the statistics have been recorded, one "achievement tokens" is rewarded. Additionally, if the number of correctly spelled Words meets or exceeds the "Extra Token Score %" in the Student Options, then an additional token is rewarded. Processing returns to the lesson plan module.

- **"Spell - Story" Lesson Module**

[0209] In the "Spell - Story" module, the words from the word list are incorporated into a story that is displayed for the student. When the story reaches one of the word list words, the

program provides an audio sample of the word and the student has three attempts to spell the word.

[0210] The spell-story lesson module flow diagram is illustrated in Figure 19. The “Spell-Learn” module uses the standard screen layout, as illustrated in Figure 20.

[0211] The areas of the display are utilised as follows:

- **Display Area**

[0212] This area is used to display the story text, spelling words and “hints” from the word list during program execution. This area is also used to display text input from the student.

Statistics Area

[0213] This area is used to display the statistics during program execution. Statistics displayed include:

- Total number of words in word list
- Number of words spelled correctly
- Number of words remaining
- Time elapsed (for student input)

Control Area

[0214] This area is used by the student to control the execution of the program.

[0215] In this module, the button icons perform the standard functions, with the exception of:

- Back: repeat current word
- Next: accept student input or exit module if on last word
- Voice: disabled
- Font size: disabled
- Word animation: disabled
- Speed: disabled
- **Start of Execution**

[0216] Upon entry, the Word List table is examined to determine the total number of words and the “Total Words” and “Words Remaining” values are updated in the Statistics Area of the screen. Next, the Lesson Module table is examined to determine if any pre-recorded Introductory Audio file exists. If the audio file does exist, it is played in its entirety before continuing to the next step. The “Next” icon is enabled and the program execution halts until the student clicks the “Next” icon.

Display Story

[0217] The entire Story text is loaded from the Story table and displayed in the Display Area. The word in the story that appear in the Word List are “flagged” in memory as Spelling Words. The “Next” icon is disabled. The Story Audio is played in its entirety, the “Next” icon is enabled and the program execution halts until the student clicks the “Next” icon. When the student clicks the “Next” icon, the Story Pointer is set to the start of the Story, the Display Area is cleared and processing continues with the next step.

Display Sentence Fragment and Spelling Word

[0218] The program displays the story text from the current Story Pointer up to and including the Spelling Word. The Spelling Word is highlighted in a blue font. Program execution halts until the student clicks the “Next” icon. When the student clicks the “Next” icon, the Word Audio is played for the Spelling Word. When the Word Audio has completed, the Spelling Word is cleared from the Display Area and replaced by a Student Input Area. The Spell Attempt Limit is set to either the value ‘4’ or one less than the length of the word – whichever is smaller, the Spell Attempt Counter is set to ‘1’ and the “Next” icon is enabled.

Student Input

[0219] The program now waits for the student to type the word into the Student Input Area and press the return key or click the “Next” icon. The word that the student entered is compared to the actual Word from the Word List. If the spelling is correct, execution continues at Audio / Visual Reinforcement, otherwise execution continues at Incorrect Answer.

Incorrect Answer

[0220] If the word was incorrectly spelled, the program first examines the Attempt Counter and compares it to the Attempt Limit. If the limit has been reached, the program displays the Word (in red) in the Student Input Area and program execution continues at Increment Story Pointer. If the limit has not been reached, the Word is displayed in the Student Input Area and the Word Audio is played (e.g. “Dog”). After a two second delay, the word is cleared from the Student Input Area and the first n letters of the word are entered into the Student Input Area as a ‘hint’ – where ‘n’ is equal to the Attempt Counter. The Attempt Counter is incremented and program execution returns to Student Input.

Audio/Visual Reinforcement

[0221] If the word is spelled correctly then there is a 40% chance that the system will play an audio positive reinforcement (with or without visual reinforcement, based upon the Student Option setting).

Increment Story Pointer

[0222] The program increments the Story Pointer to the next word in the story text. If there are no more words to display in the story text, program execution continues with the next step. Otherwise, program execution halts until the student clicks on the “Next” icon. Once pressed, the program resumes at Display Sentence Fragment and Spelling Word.

Record Statistics

[0223] Once all the words have been displayed, the program inserts the statistics for the student in the Student Activity Database. The module will record the following statistics and information against the student’s records:

- Common Info
- Lesson Number
- Lesson Name
- Lesson Module Number
- Lesson Module Name
- Date Lesson Module Completed
- Time Lesson Module Completed
- Abandonment (If the student clicked ‘Exit’ and abandoned the Lesson Module.)
- Lesson Module Duration (Time taken on the lesson module – if the lesson is abandoned, this should still be recorded.)
- Lesson Duration (Total time spent on modules in this lesson – this is accumulated across modules in the lesson)
- Number of pauses

[0224] Specific to Spell-Story Module

- Total Number of Words Presented
- Time elapsed for each word before an answer was entered,
- For each incorrect word (could be multiple times) entered by the student will be stored: o Correct Word o Word as entered
- Words which timed out
- Problem Words

[0225] Following the recording of the statistics, the Module Exit confirmation message is displayed.

Reward Student

[0226] After the statistics have been recorded, one “achievement tokens” is rewarded. Additionally, if the number of correctly spelled Words meets or exceeds the “Extra Token

Score %” in the Student Options, then an additional token is rewarded. Processing returns to the lesson plan module.

“Dictation” Lesson Module

[0227] The “Dictation” module helps a student learn how to spell by practising audio transcription. A short paragraph is read in full to the student. The paragraph is then re-read, line-by-line, as the student types in the transcription.

[0228] Figure 21 illustrates the flow diagram of the dictation lesson module. The “Dictation” module uses the screen layout illustrated in Figures 22, 23 & 24.

Display Area

[0229] This area is used for text input from the student and to display the corrected text.

Statistics Area

[0230] This area is used to display the statistics during program execution. Statistics displayed include:

- Total number of sentences in paragraph.
- Current sentence number.

Control Area

[0231] This area is used by the student to control the execution of the program. In this module, the button icons perform the standard functions , with the exception of:

[0232] Back: return to previous sentence

[0233] Next: display the next sentence or exit the module if on last page

[0234] Voice: disabled

[0235] Word animation: disabled

Start of Execution

[0236] Upon initial execution of the Dictation Module, the Lesson Module Introduction Audio (if specified in the content database) is played. Program execution halts until the Student clicks on the “Next” icon. The Dictation and Dictation Sentence tables are examined and the sentence audio is played in sequential order – as specified by the Sort Order field in the Dictation Sentence table. The Current Sentence Pointer is reset to the first sentence in the Dictation Sentence table and program execution halts until the Student clicks on the “Next” icon.

Sentence Audio

[0237] Once the Student clicks on the “Next” icon, a text input box is displayed in the Display Area (beneath any existing text, which is scrolled up, if required) and the sentence audio is played for the current sentence.

Student Input Processing

[0238] The student enters text (text can be entered whilst the sentence audio is playing) and presses the “Enter” key (or clicks on the “Next” icon). The text that was entered by the student is then checked for “correctness” (as illustrated in the flowchart in Figure 24. The system has two modes of Sentence Correction – Non-punctuation and Punctuation. The method to be used is set by the content creator and is stored in the Dictation table. Additionally, the content creator specifies the key words in a sentence that need be checked for correctness.

Non-Punctuation Version

[0239] To calculate the number of sentence errors the system will do the following:

[0240] Parse each sentence into a set of words.

[0241] Compare the first word in the Correct Sentence to the first two words in the Entered Sentence. If it finds a match, the system flags the word as Found in both sentences. If not, it flags the word as Unfound in the Correct Sentence. (The matching is not case sensitive).

[0242] Take the next word in the Correct Sentence. This is the now called Current Correct Word. Compare this to the Last Matched Word + 1 in the Entered Sentence. (If nothing has been matched yet, this will be the first one). If the system finds a match, it flags the word as found in both sentences, and repeats this step looking for the next word in the Entered Sentence. If not, the system moves to the next step.

[0243] Compare the Current Correct Word in the Correct Sentence with Last Matched Word + 2 in the Entered Sentence. If it finds a match, the system returns to Step 3. If not, it moves onto the next step.

[0244] Repeat Step 4, looking at Last Matched Word +3 in the Entered Sentence.

[0245] Repeat Step 4, looking at Last Matched Word + 4 in the Entered Sentence.

[0246] The system, having compared the Current Correct Word to the next four words in the Entered Sentence and not finding it, declares that the word is “Unfound”. Return to Step 3.

Punctuation Version

[0247] The administrator can also select the “Punctuation Version” of the Sentence Corrector. This works the same way as the non-punctuation version except with the following differences:

- • Punctuation is not stripped from the string when it is parsed into words.
- • Word matching is case-sensitive
- • Punctuation marks are treated as words in themselves. They are parsed as separate words and searched for like any other word
- • When the system is looking for a punctuation mark it only looks 2 words ahead of the Last Matched Word – that is, it only goes as far as LMW+2 before it classes the punctuation mark as “unfound”. (When looking for a word it looks four words ahead (LMS+4)).

[0248] Student errors are identified and the corrected sentence is displayed in place of the text input box, as shown in Figure 24.

Display Correct Sentence

[0249] Once the student input has been processed for correctness, the correct sentence is displayed beneath the Student Input Sentence (as illustrated in Figure 24). Key words that have been flagged as “found” are displayed in green, key words that were not found are displayed in red.

Audio / Visual Reinforcement

[0250] If the sentence has no errors then there is a 40% chance that the system will play an audio positive reinforcement (with or without visual reinforcement, based upon the Student Option setting). If the sentence has errors then there is a 20% chance that the system will play an audio encouragement message. The program increments the sentence pointer and halts until the student clicks on the “Next” icon. Once pressed, the program examines the Dictation Sentence table to determine if there are more sentences – if so, processes resumes at Sentence Audio. Otherwise, program execution continues with the next step.

Record Statistics

[0251] Once the all the story pages have been displayed, the program inserts the statistics for the student in the Student Activity Database. The module will record the following statistics and information against the student’s records:

Common Info

- Lesson Number
- Lesson Name
- Lesson Module Number
- Lesson Module Name
- Date Lesson Module Completed
- Time Lesson Module Completed
- Abandonment (If the student clicked ‘Exit’ and abandoned the Lesson Module.)
- Lesson Module Duration (Time taken on the lesson module – if the lesson is abandoned, this should still be recorded.)
- Lesson Duration (Total time spent on modules in this lesson – this is accumulated across modules in the lesson)
- Number of pauses

[0252] Specific to Dictation Module

- • Correct Sentence
- • Entered Sentence
- • Time Elapsed for each sentence
- • For each word in the Key Words list that was incorrectly spelled will be stored: o Correct Spelling o Spelling Entered (could be multiple).

[0253] Following the recording of the statistics, the Module Exit confirmation message is displayed.

Reward Student

[0254] After the statistics have been recorded, one “achievement tokens” is rewarded (see “Achievement Token Reward System” on page 23). Additionally, if the number of correct Key Words meets or exceeds the “Extra Token Score %” in the Student Options, then an additional token is rewarded. Processing returns to the lesson plan module.

“Letter Tiles” Lesson Module

[0255] The function of the “Letter Tiles” module is to display sets of words that are “constructed” using groups of letter tiles (similar to “Scrabble™” tiles). The student is prompted (via audio) to create words using the letter tiles that are displayed on the screen. The program flow is illustrated in Figure 25, and the screen display is illustrated in Figure 26.

[0256] The areas of the display are utilised as follows:

Display Area

[0257] This area is used to display the content (i.e. the letter tiles).

Statistics Area

[0258] This area is not used in the Letter Tiles module

Control Area

[0259] This area is used by the student to control the execution of the program. In this module, the button icons perform the standard functions, with the exception of:

- Back: Repeat the current word.
- Next: Accept the Student Input (or exit the module if on the last word).
- Font Size: Disabled for this module.
- Voice: This icon is disabled in this module.
- Word Animation: This icon is disabled in this module.
- Speed: This icon is disabled in this module.

Start of Execution

[0260] Upon entry, the Lesson Module table is examined to determine if any pre-recorded Introductory Audio file exists. If the audio file does exist, it is played in its entirety before

continuing to the next step. The “Next” icon is enabled and the program execution halts until the student clicks the “Next” icon.

[0261] Display Set-up

[0262] The program next examines the Word List and the Lesson Module tables to determine the Key Letters Tiles, the “Rack” Letter Tiles and the positioning of blank spaces. For example, if the Key Letter Tiles are “IT” and the words in the Word List are “FIT” and “SIT”, the program will determine that a single space is required preceding the Key Letters. The blank space(s) and the Key Letter tile(s) are displayed in the centre of the Display Area. The Rack Letters tiles are displayed in a random order at the top of the Display Area. The Word Pointer is set to the first word in the Word List.

Word Audio

[0263] The “Next” icon is disabled and the Word Audio for the word corresponding to the Word Pointer is played in its entirety. The program sets the Attempt Counter to one, enables the “Next” icon and waits for student input.

Student Input

[0264] The student has the opportunity to construct words by dragging the letter tiles from the “Rack” into the blank space(s) in the centre of the Display Area. The student can drag the letter tile(s) back to the rack. After the student has dragged the tiles to the centre of the Display Area to form the word and is satisfied with the word, they click on the “Next” icon. The program verifies that the student has spelled the word correctly. If the student has correctly spelled the word, program execution continues at Audio/Visual Reinforcement.

[0265] If the student has not spelled the word correctly, there is a 20% chance that the system will play an audio encouragement message. The incorrect tile(s) are returned to the Rack at the top of the Display Area, the correct tile(s) are automatically dragged into the correct positions and the Word Audio is played. After a delay of three seconds, the correct tile(s) are automatically returned to the Rack.

[0266] If the Attempt Counter has reached the value of three, program increments the Word Pointer and halts until the student clicks on the “Next” icon. Once pressed, the program examines the Word List table to determine if there are more words – if so, processes resumes at Word Audio. Otherwise, program execution continues with the next step.

Audio/Visual Reinforcement

[0267] If the word has been spelled correctly, there is a 40% chance that the system will play an audio positive reinforcement (with or without visual reinforcement, based upon the Student Option setting). The program increments the Word Pointer and halts until the student clicks on

the “Next” icon. Once pressed, the program examines the Word List table to determine if there are more words – if so, processes resumes at Word Audio. Otherwise, program execution continues with the next step.

Record Statistics

[0268] Once the all the story pages have been displayed, the program inserts the statistics for the student in the Student Activity Database. The module will record the following statistics and information against the student’s records:

- Common Info
- • Lesson Number
- • Lesson Name
- • Lesson Module Number
- • Lesson Module Name
- • Date Lesson Module Completed
- • Time Lesson Module Completed
- • Abandonment (If the student clicked ‘Exit’ and abandoned the Lesson Module.)
- • Lesson Module Duration (Time taken on the lesson module – if the lesson is abandoned, this should still be recorded.)
- • Lesson Duration (Total time spent on modules in this lesson – this is accumulated across modules in the lesson)
- • Number of pauses

[0269] Specific to Letter Tiles Module

- • Correct Word
- • Entered Word (could be multiple)

[0270] Following the recording of the statistics, the Module Exit confirmation message is displayed.

Reward Student

[0271] After the statistics have been recorded, one “achievement tokens” is rewarded.

Additionally, if the number of correct Key Words meets or exceeds the “Extra Token Score %” in the Student Options, then an additional token is rewarded.

[0272] Processing returns to the lesson plan module.

“Cars & Bikes” Lesson Module

[0273] The “Cars & Bikes” module presents a series of sight words to the student, which the student must then read aloud. A Parent/Tutor is present to verify that the student pronounces

the word correctly and (by pressing a key) indicates the (subjective) speed and accuracy in which the student responded (e.g. “Car” versus “Bike”).

[0274] Optionally, an animated object will appear – “gliding” from left to right beneath the site word to assist the student with decoding the word.

Detailed Functional Specification

[0275] The module program flow is illustrated in Figure 27, and the screen display is shown at Figure 28.

[0276] The areas of the display are utilised as follows:

[0277] Display Area - This area is used to display the site words and the “Car” and “Bike” icons during program execution.

[0278] Statistics Area - This area is used to display the statistics during program execution. Statistics displayed include:

- • Total number of words in word list
- • Word number currently being displayed

Control Area

[0279] This area is used by the student to control the execution of the program. In this module, the button icons perform the standard functions (as described in “15 - Control Area Button Processing” on page 64), with the exception of:

[0280] Back: Return to the previous word. If clicked whilst on the first word, the Introductory Audio (if exists) is replayed.

[0281] Next: Display the next word (only enabled when the student has clicked the back button to display a previous word).

[0282] Voice: Disabled for this module.

Verify Parent/Teacher

[0283] Presence Before the main module processing commences, the program must verify if a supervisor will be present to assist. A pop-up window will appear asking the student if a supervisor will be present, with “Yes” and “No” icons. If the “No” icon is clicked, program execution returns to the lesson plan module. If the “Yes” icon is clicked, program execution continues with the next step.

Start of Execution

[0284] Upon entry, the “Current Word” statistic counters is set to zero and updated in the Statistics Area. The Word List table is examined to determine the total number of words in the current Word List. These words are loaded into a table in memory. Additionally, if this is not the first execution of Cars & Bikes for this student, the program examines the Statistics Detail

table for the last execution of the module. From this table, it selects six words from the previous list that have the Problem Word (words that the supervisor clicked on the “bike” icon) flag set to “True”. If there are less than six problem words, additional words are selected from the Statistics Detail table that have the Problem Word flag set to “False”. These five words are added to the current Word List in memory. The “Total Words” value is updated in the Statistics Area of the screen. Next, the Lesson Module table is examined to determine if any pre-recorded Introductory Audio file exists. If the audio file does exist, it is played in its entirety before continuing to the next step. The “Next” icon is enabled and program execution waits for the student to click on the “Next” icon (or exit the program).

Word Display

[0285] When the student clicks on the “Next” icon from the previous step, execution continues and the “Current Word” counter is incremented. If the Word List is exhausted, program execution continues at Reward Student. Otherwise, the “Current Word” counter in the Statistics Area is updated and the “Next” icon is disabled. A word is randomly selected from the Word List in memory and displayed in the centre of the Display Area. The program then awaits input from the supervisor, whilst simultaneously displaying an animated object that glides beneath the site word, moving from left to right (if the “Word Animation” option has been enabled).

[0286] After the student reads the word aloud, the supervisor will click on either the “Car” icon or the “Bike” icon to indicate how quickly/accurately the student read the word. (Pressing the “C” or graphic image, together with a sound effect of a race car revving its engine or a bicycle bell ringing).

Audio/Visual Reinforcement

[0287] If the supervisor clicked on the “Cars” icon (or pressed the “C” key), a positive reinforcement audio / visual reward may be displayed in the Display Area, as described in Audio & Visual Reinforcement

Record Statistics

[0288] Once the all the Words have been displayed, the program inserts the statistics for the student in the Student Activity Database. The module will record the following statistics and information against the student’s records:

Common Info

- Lesson Number
- Lesson Name
- Lesson Module Number

- Lesson Module Name
- Date Lesson Module Completed
- Time Lesson Module Completed
- Abandonment (If the student clicked 'Exit' and abandoned the Lesson Module.)
- Lesson Module Duration (Time taken on the lesson module – if the lesson is abandoned, this should still be recorded.)
- Lesson Duration (Total time spent on modules in this lesson – this is accumulated across modules in the lesson)
- Number of pauses

[0289] Specific to Cars & Bikes Module

- • Words in Bike category
- • Words in Car category

[0290] • Problem Words

[0291] Following the recording of the statistics, the Module Exit confirmation message is displayed.

Reward Student

[0292] After the statistics have been recorded, one “achievement tokens” is rewarded (see “Achievement Token Reward System” on page 23). Additionally, if the number of Words categorised as “Cars” meets or exceeds the “Extra Token Score %” in the Student Options, then an additional token is rewarded.

Control Area Button Processing - Help Processing

[0293] When the “Help” icon is clicked during program execution, all timers, counters and animations are halted and control passes to this module. The module displays a pop-up window superimposed over the top of the interrupted program display. This window contains help information for the interrupted module – in “multimedia” format (e.g. screen captures, audio help, etc.). The bottom right-hand corner of the Help window contains a single button labelled “Continue”. This button is set as the default action. When the student clicks on the “Continue” button (or presses the “C” or “Enter” keys), the Help pop-up window disappears. The timers, counters and animations are returned to their previous states and control passes back to the interrupted module.

Exit Processing

[0294] When the “Exit” icon is clicked in the Control Area (or the “End” key is pressed) at any time during program execution, all timers, counters and animations are halted and control passes to this module. A pop-up window displays over the Display Area with a “Are you

certain you want to exit?" message and "Yes" and "No" buttons beneath the message. The "No" button is set as the default action. When the "No" button is pressed, the pop-up window disappears, all timers, counters and animations are returned to their previous states and program execution continues from the point of interruption. When the "Yes" button is pressed, control passes back to the calling program. No statistics are saved in the Student Activity Database.

Speed Processing

[0295] When the "Speed" control is adjusted by clicking the "increase/decrease" icons (or selected keys, such as F_n & F_{n+1} , are pressed), the speed of the text display (and animation) will be adjusted. The default "speed" will be read from the Student Database. The range and meaning of the speed control varies between modules: Module Min Max Units Say 1 20 Characters/second Story 20 100 Words/minute Each press of the " F_n " key or the "decrease" icon will decrease the animation speed by one twentieth of the speed range. For example, pressing the " F_n " key once in "Story will decrease the text display and animation by four words per minute. Attempting to decrease the speed once the lower limit has been reached will have no effect.

[0296] Similarly, each press of the " F_{n+1} " key or the "increase" icon will increase the animation speed by one-twentieth of the speed range. For example, pressing the " F_{n+1} " key once in "Say" will increase the text display and animation by one character per second. Attempting to increase the speed once the upper limit has been reached will have no effect. The new speed value will be reflected in the speed counter for each module (e.g. "Current WPM Counter" for the "Story" module). Once the speed has been adjusted, control returns to the interrupted program.

Pause Processing

[0297] When the "Pause" icon is clicked during program execution, all timers, counters and animations are halted and control passes to this module. The module displays a pop-up window superimposed over the top of the interrupted program display with a "Program is paused, press 'Go' to resume" message, a "Go" button/icon and an "Exit Program" button. When the "Go" button is clicked – or the "Enter" key is pressed – the pop-up window will disappear, and the timers, counters and animations will return their previous states. Control will then pass back to the interrupted program.

[0298] If the "Exit Program" button is pressed, processing continues as described in section "Exit Processing". All other inputs (both from the keyboard and the Control Area) are disabled whilst the Pause pop-up window is displayed.

Comprehension module

[0299] The “Comprehension” module reads several pages of text from the Content Database and displays them page-by-page. Audio may also accompany the text as it is displayed, or an option may be set to have each page “read” by the text-to-voice engine. Following the display of the Story text, the student is asked to respond to several questions relating to the story. Each question can be in one of the following formats:

- True / False
- Multiple Choice
- Cloze (missing word selected from drop-down menu)
- Sentence order

[0300] The comprehension module program flow is illustrated in Figure 29 and Figure 30 illustrates the screen display.

[0301] The Display Area is used to display the Story text and the student questions during program execution.

[0302] The Statistics Area is used to display the statistics during program execution. Statistics displayed include:

- Total number of pages in this story segment
- Page number currently being displayed
- Initial words per minute (optional)
- Average words per minute (optional)

[0303] Initially, the “Average words per minute” and “Initial words per minute” statistics are set to the default option for this student, as specified in the Student Database.

[0304] The Control Area is used by the student to control the execution of the program. In this module, the button icons perform the standard functions, with the exception of:

- Back: Displays previous page when in Story display. This icon is disabled during Question display.
- Next: Displays next page when in Story display. When the last page of the story is currently being displayed, this icon has no action. This icon is disabled during Question display.
- Font Size: This icon is disabled in this module.
- Voice: This icon is disabled in this module.
- Word Animation: This icon is disabled in this module.
- Speed: This icon is disabled in this module.

[0305] Upon entry, the Lesson Module table is examined to determine if any pre-recorded Introductory Audio file exists. If the audio file does exist, it is played in its entirety before continuing to the next step. After the student clicks on the “Next” icon, the requested story text is loaded from the Story table. If the story contains page markers and audio cues, the total number of pages is calculated based upon the number of page markers. If there are no page markers in the story text, the program calculates the total number of pages based upon the number of words in the story text, the font size and the display area size. The “Total number of pages” and “Current page number” are updated in the Statistics Area of the screen. The Initial and Average WPM counters are updated to reflect the default WPM value from the Student Database and updated in the Statistics Area of the screen (unless the “Display Statistics” option is disabled in Options screen).

[0306] Upon completion of the Lesson Module Introduction Audio, the program pauses and the “Next” icon is enabled.

[0307] When the Student presses the “Next” icon, a page of the story text is displayed in the Display Area, along with pre-recorded audio (if it exists). Program execution depends upon whether or not the story text contains page markers and audio cues.

[0308] If the story text contains page markers and audio cues, the text displayed is based upon the page markers and the audio is played based upon the start/stop timings in the audio cues. When the student clicks on the “Next” icon, the program determines the next section of text to display based upon the page markers, and plays the audio using the corresponding start/stop audio cues. The “Current Page” counter in the Statistics Area is updated accordingly. When the last page text has been displayed, clicking the “Next” icon will result in program execution continuing with Comprehension Questions.

[0309] If there are no page markers in the story text, the program calculates the page text based upon the number of words in the story text, the font size and the display area size. The story audio is started upon display of the first page and continues to completion – regardless of the page text being displayed (i.e. it is possible for the Student to not press the “Next” icon to advance to the second page, however the audio for that page (and all subsequent pages) will continue playing). When the student presses the “Next” icon, the program recalculates the text to display in the page area. The “Current Page” counter in the Statistics Area is updated accordingly. This process continues until all of the words in the Story Text have been displayed. When the last page of the story has been displayed, pressing the “Next” icon will result in the Question Pointer being set to “1” and execution of the next section of the module.

[0310] In the Comprehension Questions phase of the program, the “Next” and “Back” icons are disabled and the student is presented with a series of questions – based upon the Story text that he/she just read. Each question appears as a single “page” in the Display Area, as illustrated in Figure 30.

[0311] The program examines the Comprehension table to determine the correct question to display (based on the Question Pointer and the Sort Order field in the table). It then displays the question text and plays the Question Audio, if it exists. There are four types of questions (as indicated by the “Comprehension Question Type” field in the Comprehension table):

Multiple Choice

[0312] The multiple choice question illustrated in Figure 31 presents the student with the question text (from the Comprehension table), followed by up to four possible answers (from the Comprehension Answer table). The answers are display in accordance with the Sort Order field in the Comprehension Answer table. The correct answer has the boolean “Correct” field enabled in the Comprehension Answer table. The student must indicate their answer choice by clicking on the radio button next to an answer.

True/False

[0313] The True/False question is essentially the same logic as the Multiple Choice question – but with only two pre-defined answers in the Comprehension Answer table.

Cloze

[0314] For the Cloze Question illustrated Figure 32, the question text is divided into Part A and Part B in the Comprehension table. Part A text is displayed preceding the drop-down answer box, Part B text is displayed following the drop-down answer box. The values for the drop-down answer box are populated from the Comprehension Answer table, in accordance with the Sort Order field. The student selects his/her answer choice by using the mouse to select one of the drop-down values.

Sentence Priority

[0315] For the Sentence Priority question format, the student is presented with a series of numbered blank “slots” (corresponding to the number of answers), and a set of movable “sentence tiles” that they can drag-and-drop into the blank slots using their mouse. The student is expected to drag-and-drop the sentence tiles into the correct order.

Question Navigation

[0316] The student is able to “navigate” between the questions (if there are more than one) using the “Back” and “Next” buttons, as illustrated in Figure 33. Clicking on these button icons will decrement or increment (respectively) the Question Counter and resume execution at the

beginning of this step. For the first question, the “Back” navigation button is disabled (dimmed) and for the last question the “Next” navigation button is disabled.

[0317] The student is able to toggle between the Question pages and the Story pages using the “tab” icons in the lower right hand corner of the Display area, as illustrated in Figure 33 and Figure 34. When the “Return to Story” icon is clicked, the “Back” and “Next” icons in the Control Area are enabled, the current question is cleared, the “Return to Questions” tab is displayed and execution returns to “8.2.4 Display Story Pages”. During the phase of the Story Display, pressing the “Return to Questions” returns to “8.2.5 - Comprehension Questions” – with the Question Pointer set to the same question prior to the Story toggle.

[0318] When the student has answered all of the questions, they click on the “Submit” button. If there are questions that have not been answered, an alert is displayed indicating that there are blank questions. Control returns to the start of this step.

[0319] Once the “Submit” icon has been clicked (and all of the questions have been answered), the program inserts the statistics for the student in the Student Activity Database. The module will record the following statistics and information against the student’s records:

- Common Info
- Lesson Number
- Lesson Name
- Lesson Module Number
- Lesson Module Name
- Date Lesson Module Completed
- Time Lesson Module Completed
- Abandonment (If the student clicked ‘Exit’ and abandoned the Lesson Module.)
- Lesson Module Duration (Time taken on the lesson module – if the lesson is abandoned, this should still be recorded.)
- Lesson Duration (Total time spent on modules in this lesson – this is accumulated across modules in the lesson)
- Number of pauses

[0320] Specific to Comprehension Module

- Average WPM
- For all questions the following will be stored:
- Question Number
- Question Type

- Question Text
- Correct Answer
- Student's Answer
- Time taken to answer question

[0321] Following the recording of the statistics, the Module Exit confirmation message is displayed.

[0322] After the statistics have been recorded, one "achievement tokens" is rewarded and processing returns to the lesson plan module.

[0323] In a preferred embodiment of the stand alone version, a Macromedia Flash MX user interface interfaces with Macromedia Director MX which will communicate with a local database. The content will be stored in a directory structure (or compressed file archive) on the local machine for both online and broadband versions.

[0324] The on-line version application can use the same flash and director components as the local version. The Flash container can run from within a director container. All student information and statistics data can be saved locally, on the local database, and synchronised with the online database at the completion of each lesson modules. The student may download the entire lesson plan and run this locally. The time taken for the download will be affected by the size of the additional content (audio, video and image) included in the lessons. An administrator is able to control the access to this content based on a set of business rules.

[0325] Although SMIL present information on how to display the information, it does not natively describe information required to process the Phonica application content. To enable the Phonica application to obtain the necessary information to perform its tasks as required in the functional specification, the attributes of the SMIL 2.0 tags have to be extended.

[0326] SMIL 2.0 can describe:

- • The text to be displayed
- • The audio to be played
- • The image to be displayed
- • The location of the text and image
- • Sequence of display and audio playback

[0327] SMIL 2.0 does not provide support to describe the high interactivity features required by the Phonica application. SMIL 2.0 has been extended so the application can perform the following tasks:

- • Describe the phonemes
- • Describe the time to highlight the phoneme

- • Describe the type of user input sought
- • Describe data to validate the user input (e.g. comprehension, spelling)

[0328] Generic SMIL tags are also processed by the Phonica modules. These include Timing, Content Control, Layout, Media Objects, and Structure.

[0329] Timing

- • Begin
- • End
- • Seq(uence)
- • Dur(ation)
- • End sync
- • Par(allel)
- • Excl(usive)

[0330] Content Control

- • Switch
- • CustomAttributes / CustomTest

[0331] Layout

- • BasicLayout Module Elements
- o Layout
- o Root-Layout
- o Region

[0332] Media Objects

- • BasicMedia Module Elements
- o Animation
- o Audio
- o Image
- o Text

[0333] Structure

- • SMIL
- • Head
- • Body

[0334] Supported Content Formats include Content Audio, Content Images, Video Content.

[0335] Content Audio:

- • MP3 files

[0336] Content Images:

- • Standard JPEG (.jpg or .jpeg) files. in this embodiment, JPEG files are not Progressive.

[0337] Video Content Flash Movies (.swf).

[0338] Meta information informs client of lesson module type, and settings for that lesson module. The collection of information is lesson module specific. The following Meta Name Table lists the meta names used in the embodiment of the invention, and the Meta tags Table lists the meta tags.

META NAME TABLE	
Meta Name	Description
Author	Author of the lesson module
Title	Title of the lesson module
Content Class Name	The name of the Flash MX content class to be loaded by the client
Supervisor Required	If "yes" then display modal box to check supervisor presence
Story Title	Title of the story content
Word List Title	Title of the word list
Key	Key letters for letter tile lesson modules
Rack	Rack letters for letter tile lesson modules
Dictation Title	Title for the dictation lesson module
Punctuation (on or off)	Test for punctuation in dictation module
Capitalisation (on or off)	Test for capitalisation in dictation module
Written Expression	Written expression title

Meta tags table	
Lesson Module Type	Meta tags used
Say	Author Title Content Class Name Supervisor Required Word List Title

Meta tags table	
Lesson Module Type	Meta tags used
Story	Author Title Content Class Name Supervisor Required Story Title
Spell – Learn	Author Title Content Class Name Supervisor Required Word List Title
Spell – Story	Author Title Content Class Name Supervisor Required Word List Title Story Title
Spell – Test	Author Title Content Class Name Supervisor Required Word List Title
Jets and Turtles	Author Title Content Class Name Supervisor Required Word List Title

Meta tags table	
Lesson Module Type	Meta tags used
Letter Tiles	Author Title Content Class Name Supervisor Required Word List Title Key Rack
Dictation	Author Title Content Class Name Supervisor Required Dictation Title Punctuation (on or off) Capitalisation (on or off)
Comprehension	Author Title Content Class Name Supervisor Required Story Title
Written Expression	Author Title Content Class Name Supervisor Required Written Expression

[0339] Meta information informs client of lesson module type, and settings for that lesson module. The collection of information is lesson module specific.

[0340] In a preferred embodiment, the Attribute extensions include Word object based lesson modules. The Word Object based lesson modules are Say, Spell – Learn, Spell – Test, Spell – Story, Letter Tiles and Jets & Turtles. The Spell – Story lesson module has a story element, described in detail under the story lesson module.

<seq>

<seq rs:type="LessonModule" rs:LessonModuleID="0104">

[0341] This element describes lesson module specific information such as the introduction and exit audio.

<seq rs:type="word" rs:wordID="0136">

[0342] This element describes word phoneme and display information.

<par>

<par rs:id="wordAudio" rs:AudioType="introductionAudio"
begin="0s" dur="0s">

[0343] This element describes the playback information for the introduction audio.

<par rs:id="wordInformation">

[0344] This element describes the word.

<par rs:id="wordGraphic">

[0345] This element describes the word graphic information (image or video)

<par rs:id="wordAudio" rs:AudioType="irregularPhonemeAudio"
begin="0s">

[0346] This element describes the playback information for the irregular phoneme audio.

<par rs:id="wordAudio" rs:AudioType="sayAfterWordAudio"
begin="0s">

[0347] This element describes the playback information for the say after word audio.

<par rs:id="wordAudio" rs:AudioType="spellLearnWordAudio"
begin="0s">

[0348] This element describes the playback information for the spell learn audio.

<par rs:id="wordAudio" rs:AudioType="spellTestWordAudio"
begin="0s">

[0349] This element describes the playback information for the spell test audio.

<par rs:id="wordAudio" rs:AudioType="letterTilesAfterInputAudio"
begin="0s">

[0350] This element describes the playback information for the letter tiles after input audio.

<par rs:id="wordAudio" rs:AudioType="letterTilesWordAudio"
begin="0s">

[0351] This element describes the playback information for the letter tiles word audio.

<text>

<text text="data:,ant" rs:phonemes="^a#nt"

rs:phonemeTiming="^100#100" rs:fontSize="S" rs:xPos="0"

48

```
rs:yPos="0" rs:additionalSpellTime="0.003s" />
```

[0352] This element describes the text information.

[0353] The attribute rs:phonemes represent the delimited phonemes for this word, and rs:phonemeTiming is the associated timing. The attribute rs:fontsize, rs:xPos, and rs:yPos provide the font size information, and the location of the top left corner of the word on the display area of the client application. The attribute rs:additionalSpellTime is the additional time added to the default timeout for the spell lesson modules.

```
<img>
```

```

```

[0354] This element describes the source path and display position of the image file. The attribute, rs:xPos, and rs:yPos provide the location of the top left corner of the word on the display area of the client application.

```
<video>
```

```
<video id="0136video" begin="0s"
```

```
src="Content/Standard/Video/0136VidSRC.swf" rs:xPos="100"
```

```
rs:yPos="100" dur="0s" fill="Freeze" />
```

[0355] This element describes the source path and display position of the image file. The attribute, rs:xPos, and rs:yPos provide the location of the top left corner of the word on the display area of the client application.

```
<audio>
```

```
<audio id="0104FintroductionAudio" rs:audioVoice="female"
```

```
rs:introductionAudio="true"
```

```
src="Content/Standard/Audio/0104LMIA_F.mp3" />
```

[0356] This element describes the source path of the audio file. The attribute rs:audioVoice describe whether this audio file is used for the female or male voice. The attribute rs:introductionAudio is true if this is introduction audio for a lesson module.

Story

```
<seq>
```

```
<seq rs:type="LessonModule" rs:LessonModuleID="0068">
```

[0357] This element describes lesson module specific information such as the introduction and exit audio.

```
<seq rs:type="fullText" rs:fullTextID="0021">
```

[0358] This element describes the story display information.

```
<par>
  <par rs:id="wordAudio" rs:AudioType="introductionAudio"
    begin="0s" dur="0s">
```

[0359] This element describes the audio playback for the introduction audio.

```
<par rs:id="wordInformation">
```

[0360] This element describes the story.

```
<par rs:id="wordAudio" rs:AudioType="wordBaseAudio" begin="0s"
  dur="0s">
```

[0361] This element describes the audio playback for the story audio.

```
<audio>
  <audio id="0021FwordBaseAudio" rs:audioVoice="female"
    rs:wordBaseAudio="true" src="" />
```

[0362] This element describes the source location of the story audio file. The attribute rs:audioVoice describe whether this audio file is used for the female or male voice

Dictation

```
<seq>
  <seq rs:type="LessonModule" rs:LessonModuleID="0220">
```

[0363] This element describes lesson module specific information such as the introduction and exit audio.

```
<seq rs:type="Dictation" rs:dictationID="0100">
```

[0364] This element describes the dictation sentence and audio.

```
<par>
  <par rs:id="wordAudio" rs:AudioType="introductionAudio"
    begin="0s" dur="0s">
```

[0365] This element describes the audio playback for the introduction audio.

```
<par rs:id="dictationInformation">
```

[0366] This element describes the dictation sentence information.

```
<par rs:id="wordAudio" rs:AudioType="exitAudio" begin="0s"
  dur="0s">
```

[0367] This element describes the audio playback for the exit audio.

```
<audio>
  <audio id="0220FintroductionAudio" rs:audioVoice="female"
    rs:introductionAudio="true" src="" />
```

[0368] This element describes the source location of the introduction audio. The attribute rs:audioVoice describe whether this audio file is used for the female or male voice.

```
<audio id="0220FexitAudio" rs:audioVoice="female"
rs:exitAudio="true" src="" />
```

[0369] This element describes the source location of the exit audio.

[0370] The attribute rs:audioVoice describe whether this audio file is used for the female or male voice

```
<text>
<text text="data:,Nice try." />
```

[0371] This element describes the dictation sentence text.

Comprehension

```
<seq>
<seq rs:type="LessonModule" rs:LessonModuleID="0068">
```

[0372] This element describes lesson module specific information such as the introduction and exit audio.

```
<seq rs:type="fullText" rs:fullTextID="0021">
```

[0373] This element describes the story display information. This includes the audio playback information

```
<seq rs:type="question" rs:comprehensionID="0026"
rs:questionType="MultipleChoice">
```

[0374] This element describes the information required to display and validate a question, including the expected answers, and whether it is correct. The attribute rs:questionType indicates how to display the question (as true/false, cloze, multiple choice, or sentence priority)

```
<par>
<par rs:id="wordAudio" rs:AudioType="introductionAudio" begin="0s"
dur="0s">
```

[0375] This includes the audio playback information for the word.

```
<par rs:id="wordInformation">
<par rs:id="wordAudio" rs:AudioType="wordBaseAudio" begin="0s"
dur="0s">
```

[0376] This includes the audio playback information for the word.

```
<par rs:id="questionTextA">
```

[0377] The first part of the question

```
<par rs:id="questionTextB">
```

[0378] The second part of the question (for CLOZE question type)

```
<par rs:id="answer" rs:answerId="67" rs:order="1"
rs:isCorrect="1">
```

[0379] The answer to include in the display, its ID in the database, the sort order to display and if this answer is a correct one.

```
<audio>
```

```
<audio id="0021FwordBaseAudio" rs:audioVoice="female"
rs:wordBaseAudio="true" src="" />
```

[0380] This element describes the source location of the introduction audio. The attribute rs:audioVoice describe whether this audio file is used for the female or male voice.

[0381] While embodiments of the invention have been described in relation to on-line implementations, the invention can also be implemented in an off-line environment.

[0382] While embodiments of the invention have been described including specific combinations of integers, other combinations of the described integers which would be apparent to a person skilled in the field on reading the specification are also within the scope of the invention.

Claims

1. A method of teaching a student literacy by using a visual display, the method including: creating lesson content including breaking down one or more letters or words to phonemes; displaying at least one phoneme, letter, or word using the visual display; providing a visual animation to highlight at least one phoneme, letter or word.
2. A method as claimed in claim 1, including adjusting the speed of the visual animation.
3. A method as claimed in claim 2, wherein the speed of the animation is adjusted in response to the student's reading ability.
4. A method as claimed in claim 2 or claim 3, wherein a user can adjust the speed of the animation using an adjustable control display on the visual display.
5. A method as claimed in any one of claims 1 to 4, including displaying a word, letter or phoneme on a line in the visual display; highlighting letters, words or phonemes from left to right across the visual display.
6. A method as claimed in claim 5, including using a slider under the line to highlight words, letters or phonemes.
7. A method as claimed in claim 5, including requesting the student to pronounce the word, letter or phoneme; pausing for a period to permit the student to respond; using an audio generator to pronounce the word, letter or phoneme.
8. A method as claimed in claim 1, including generating phonemes from letters, sequences of letters, or words.
9. A method as claimed in any one of claims 1 to 8, including storing the lesson content in an information storage means.
10. A method as claimed in any one of claims 1 to 9, including providing one or more acoustic prompts to the student.
11. A method as claimed in claim 10, wherein at least one acoustic prompt demonstrates pronunciation of at least one phoneme, letter, or word.
12. A method as claimed in any one of claims 1 to 11, including incorporating into a lesson one or more of the elements of spelling, reading, pronunciation, and comprehension.
13. A method as claimed in claim 12, including incorporating into a lesson all the elements of spelling, reading, pronunciation, and comprehension.
14. A method as claimed in any one of the preceding claims, wherein the visual display is driven by a computer processor.

15. A method as claimed in claim 14, wherein the visual display is an interactive display, and wherein the student is provided with an interactive control means adapted to respond to the actions of the student to interact with the display.
16. A method as claimed in any one of the preceding claims, wherein lessons are incorporated in a computer program.
17. A method as claimed in claim 16, wherein the interactive control means generates feedback signals which act as inputs to the computer program.
18. A method as claimed in 16 or claim 17, wherein the student interacts with the visual display by selecting a letter, phoneme, word or group of words.
19. A method as claimed in any one of claims 16 to 18, wherein the student interacts with the visual display by using the interactive control means to drag and drop a letter, phoneme, word, or group of words as a response to a query from the lesson program.
20. A method as claimed in claim 19, wherein the program evaluates the response.
21. A method as claimed in claim 20, wherein the program provides feedback to the student based on the evaluation of the response.
22. A method as claimed in claim 20 or claim 21, including the step of compiling a report of student responses.
23. A method as claimed in claim 22, including the step of displaying the report using the visual display.
24. A method as claimed in any one of claims 1 to 23, including enabling a user to create and store lesson content.
25. A method as claimed in any one of the preceding claims including tracking and recording a students progress through a course.
26. A method as claimed in claim 20, including maintaining a progress record of the students progress and using the progress record to determine the stage at which the student enters the course at each session.
27. A method of teaching a student literacy, including:
 - storing the sequence of lessons in a storage means;
 - allowing the student access to one or more of the stored lessons in repeated interactive sessions;
 - monitoring the progress of the student;
 - maintaining a record of the student's progress in a student's progress log;
 - at each successive session, determining an appropriate entry point into the sequence of lessons based on the student's progress log.

28. A method of teaching spelling to a student, the method including:
storing a plurality of words in a spelling instructional module in a storage means;
allowing the student access to the spelling instructional module in an interactive session;
monitoring the performance of the student;
maintaining a record of the student's performance in a student's spelling performance log;
assessing the student's spelling performance.
29. A method of teaching spelling as claimed in claim 28, including:
dividing the spelling module into two or more stages; and
permitting the student to progress to a succeeding stage when the student has achieved proficiency in a current stage.
30. A method of teaching reading including:
storing a text version of a story in a storage means;
producing an audio version of the text;
playing the audio version while displaying the text version.
31. A method as claimed in claim 30, including:
highlighting letters, phonemes or words sequentially in time with the voice version.
32. A method as claimed in claim 30, including
displaying an animated marker under the words of a story that is displayed, the marker moving under the words at a speed controllable to suit the ability of the student.
33. A method as claimed in claim 32, including
generating an audio reading of the story which keeps time with the marker.
34. A method as claimed in claim 30 or 31, including:
redisplaying the text version after the audio version has been displayed.
35. A method of improving a student's comprehension, including:
displaying a text story with or without accompanying audio,
testing the student's comprehension of the story by assessing the student's responses in a question session to a series of questions concerning the content of the displayed story.
36. A method as claimed in claim 35, including:
enabling the student to redisplay the story text during the question session.
37. A method of improving a student's literacy using dictation, the method including:
storing an audio version of a dictation passage;
playing the audio dictation passage;
replaying the audio dictation passage in segments.
38. A method as claimed in claim 37, including:

monitoring the student's response to the replaying of each segment; and
replaying a succeeding segment when the student has successfully completed a current
segment.

39. A method of displaying phonemes in association with a literacy training program,
including:

storing alphabetical characters representing phonemes, letters, words, or groups of letters in a
store in the form of phonemes;

generating a screen display of the alphabetical characters representing phonemes, letters, words,
or groups of letters in response to commands from the program;

highlighting one or more of the phonemes in the display in a manner defined by the program.

40. A method as claimed in claim 39, including:

using one or more non-alphabetical characters to indicate a phoneme.

41. A method as claimed including:

determining the duration of the highlighting of phoneme depending on the non-alphabetical
character used to identify the phoneme.

42. A method as claimed in claim 41, including:

recording a letter, phoneme, word or group of letters as text;

recording the letter, phoneme, word or group of letters as a group of delineated phonemes;

recording the duration for which each delineated phoneme is to be displayed.

43. A method as claimed in any one of the preceding claims, including:

recording elements which contain student errors from one lesson and carrying the teaching and
or testing of those elements forward to a subsequent stage.

44. A system of teaching a student literacy using a visual display, the system including:

stored lesson content including one or more letters or words in which at least part of the content
is broken down to phonemes;

the visual display being adapted to display at least one phoneme, letter, or word;

highlighting means providing a visual animation to highlight at least one phonemes, letter or
word on the visual display.

45. A system as claimed in claim 44, including phoneme generator means to derive
phonemes from letters or sequences of letters.

46. A system as claimed in claim 44 or claim 45, including an information store containing
the lesson content.

47. A system as claimed in any one of claims 44 to 45, including an audio generator providing one or more acoustic prompts demonstrating pronunciation of at least one phoneme, letter, or word.
48. A system as claimed in any one of claims 44 to 45, wherein a lesson incorporates at least one of the elements of spelling, reading, pronunciation, and comprehension.
49. A system as claimed in claim 48, wherein a lesson incorporates all the elements of spelling, reading, pronunciation, and comprehension.
50. A system as claimed in any one of claims 44 to 49, wherein the visual display is driven by a computer processor.
51. A system as claimed in claim 50, wherein the visual display is an interactive display, and wherein the student is provided with an interactive control means adapted to respond to the actions of the student to interact with the display.
52. A system as claimed in any one of claims 44 to 51, wherein lessons are incorporated in a computer program.
53. A system as claimed in claim 52, wherein the interactive control means generates input signals to the computer program.
54. A system as claimed in 52 or claim 53, wherein the student interacts with the visual display by selecting a letter, phoneme, word or group of words.
55. A system as claimed in any one of claims 52 to 54, wherein the student interacts with the visual display by using the interactive control means to drag and drop a letter, phoneme or word on the visual display as a response to a query from the lesson program.
56. A system as claimed in claim 55, wherein the program is adapted to evaluate the response.
57. A system as claimed in claim 56, wherein the program provides feedback to the student based on the evaluation of the response during a session, or for a lesson, or on a progressive basis.
58. A system as claimed in claim 56 or claim 57, wherein the program is adapted to compile a report of student responses during a session, or for a lesson, or on a progressive basis.
59. A system as claimed in claim 58, including the step of displaying the report using the visual display.
60. A system as claimed in any one of claims 44 to 59, including content entry means enabling a user to create and store lesson content.
61. A system as claimed in any one of claims 44 to 60, including a progress information store recording a students progress through a course.

62. A system as claimed in claim 61, wherein the progress information store is used to determine the stage at which the student enters the course at each session.
63. A method of teaching literacy substantially as herein described with reference to the accompanying drawings.
64. A method of improving comprehension substantially as herein described with reference to the accompanying drawings.
65. A method of teaching spelling substantially as herein described with reference to the accompanying drawings.
66. A method of teaching reading substantially as herein described with reference to the accompanying drawings.
67. A method of improving literacy using dictation substantially as herein described with reference to the accompanying drawings.
68. A system for teaching literacy substantially as herein described with reference to the accompanying drawings.

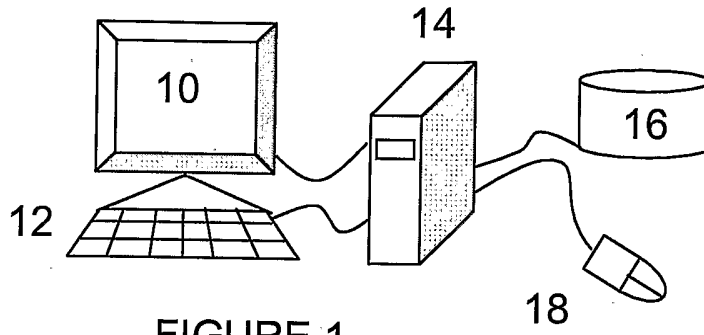


FIGURE 1

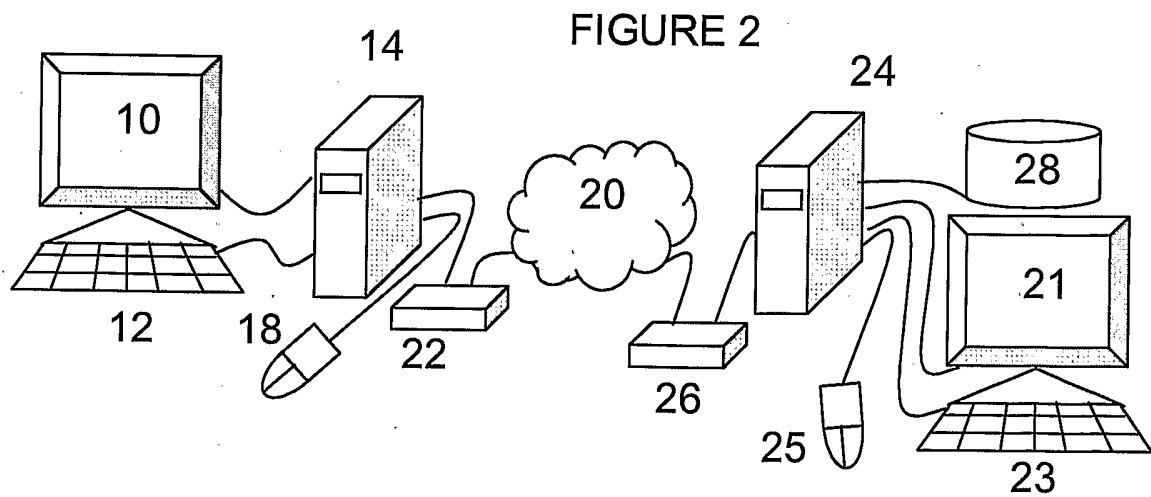


FIGURE 2

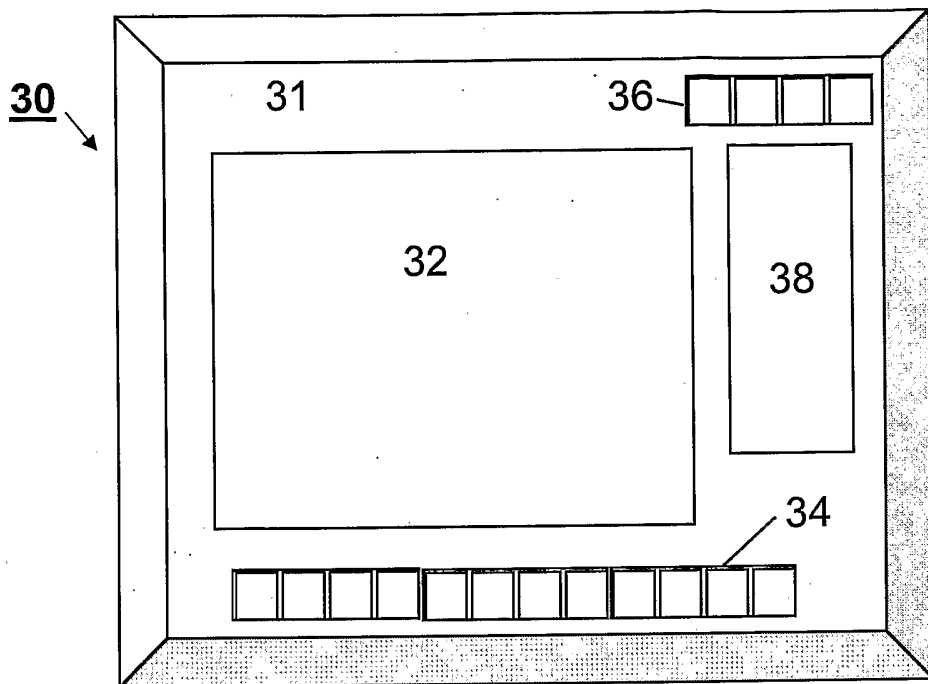


FIGURE 3

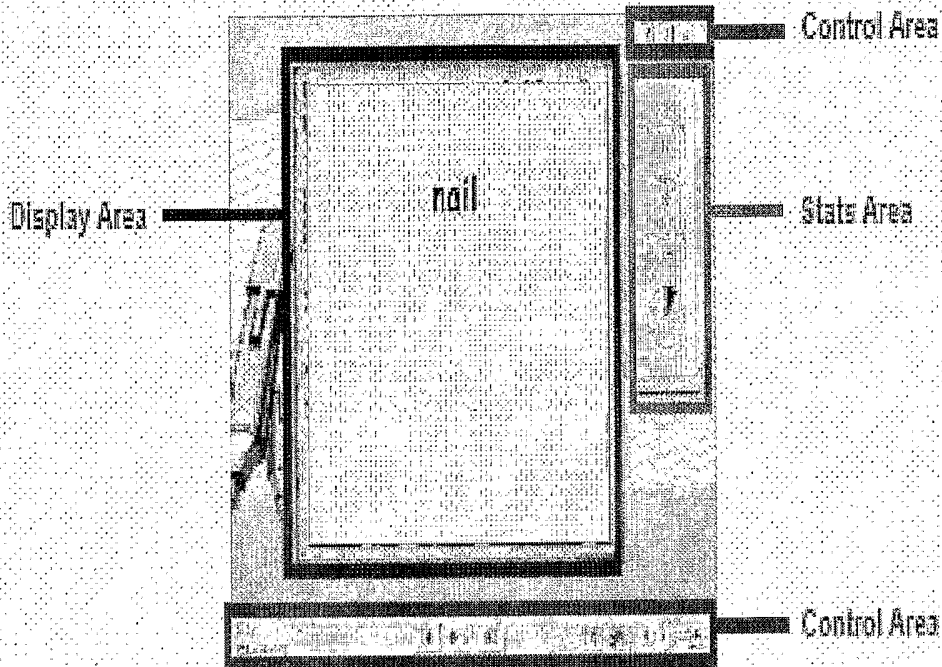


FIGURE 4A

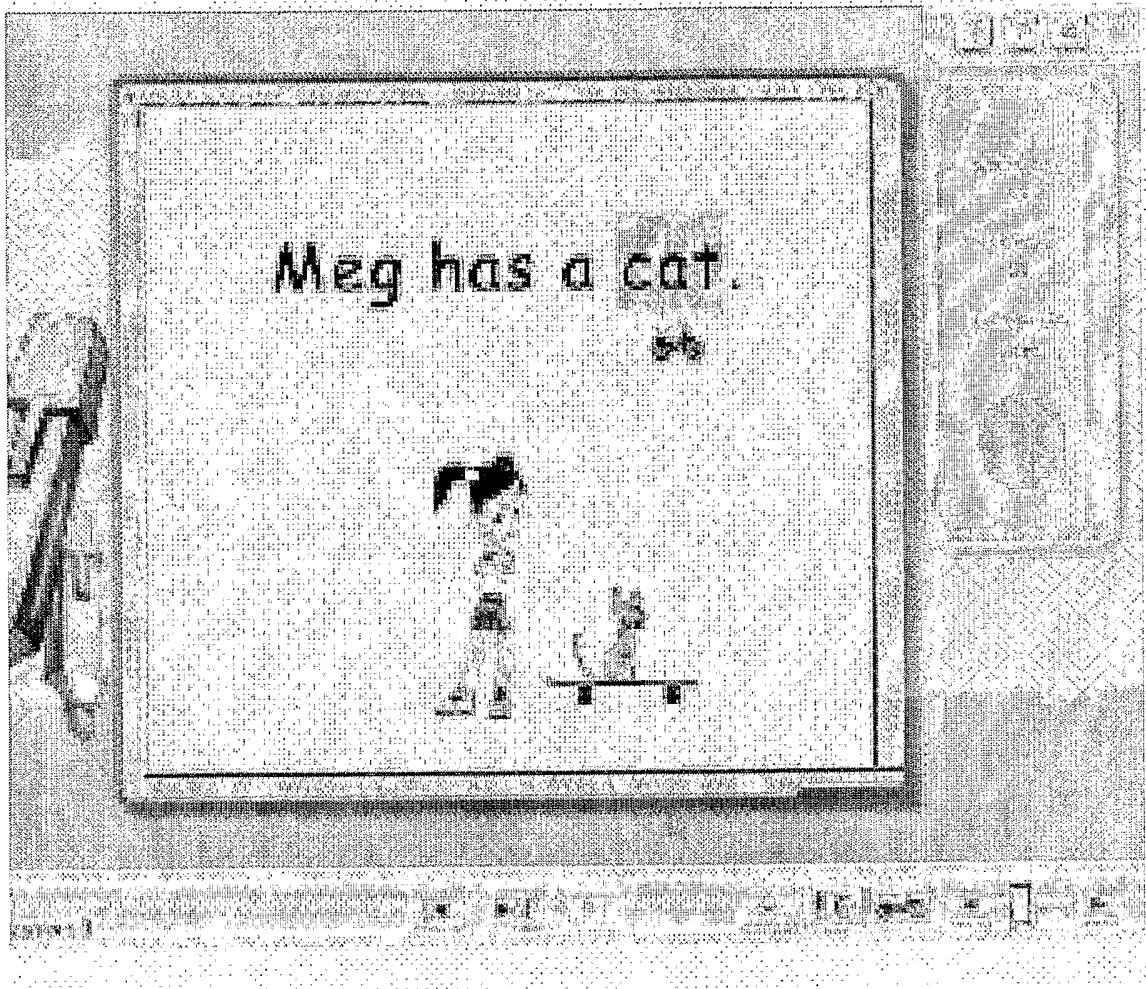


FIGURE 4B

HIGH LEVEL PROGRAMMING STRUCTURE: MAJOR MODULE ACCESS

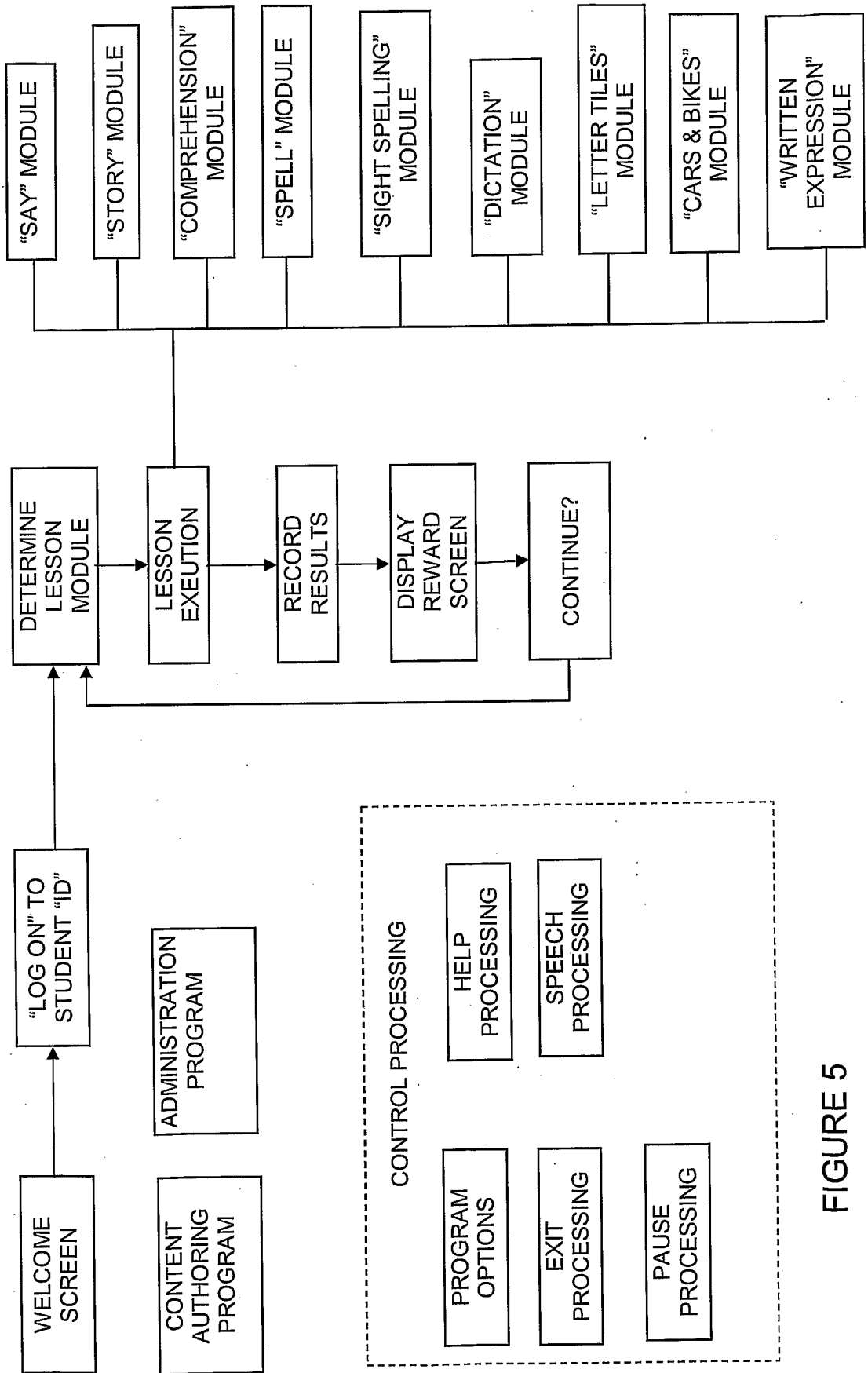


FIGURE 5

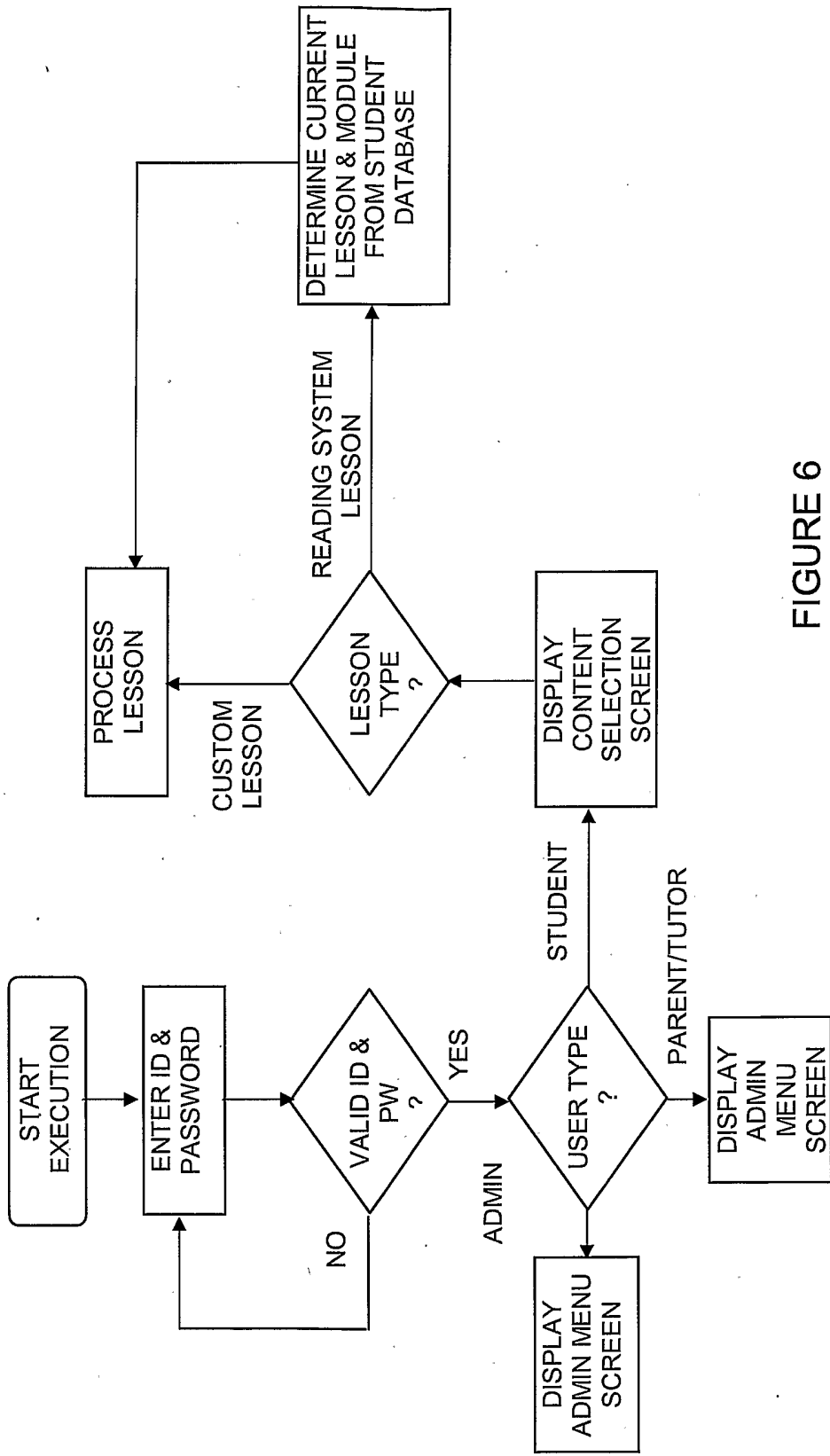


FIGURE 6

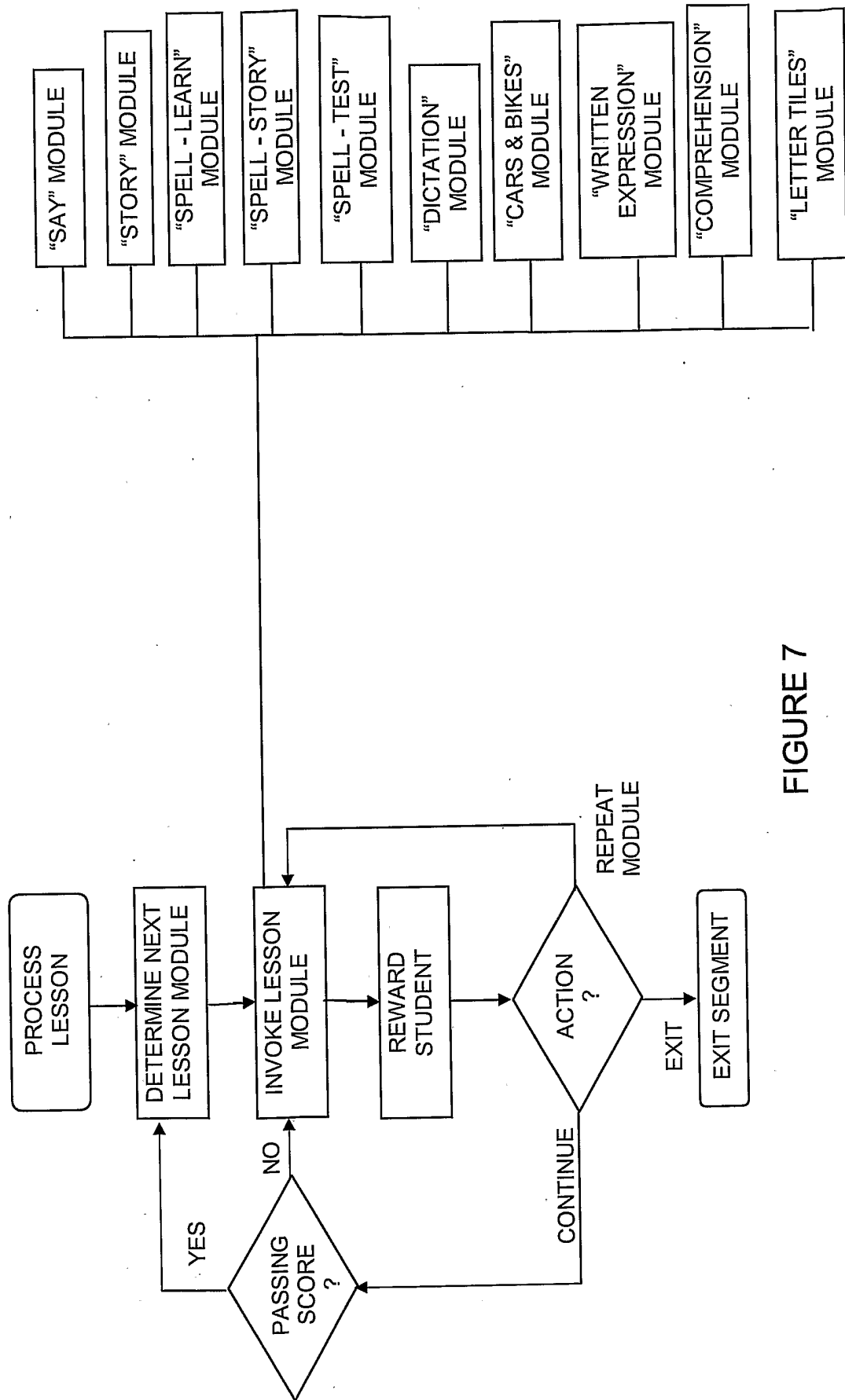


FIGURE 7

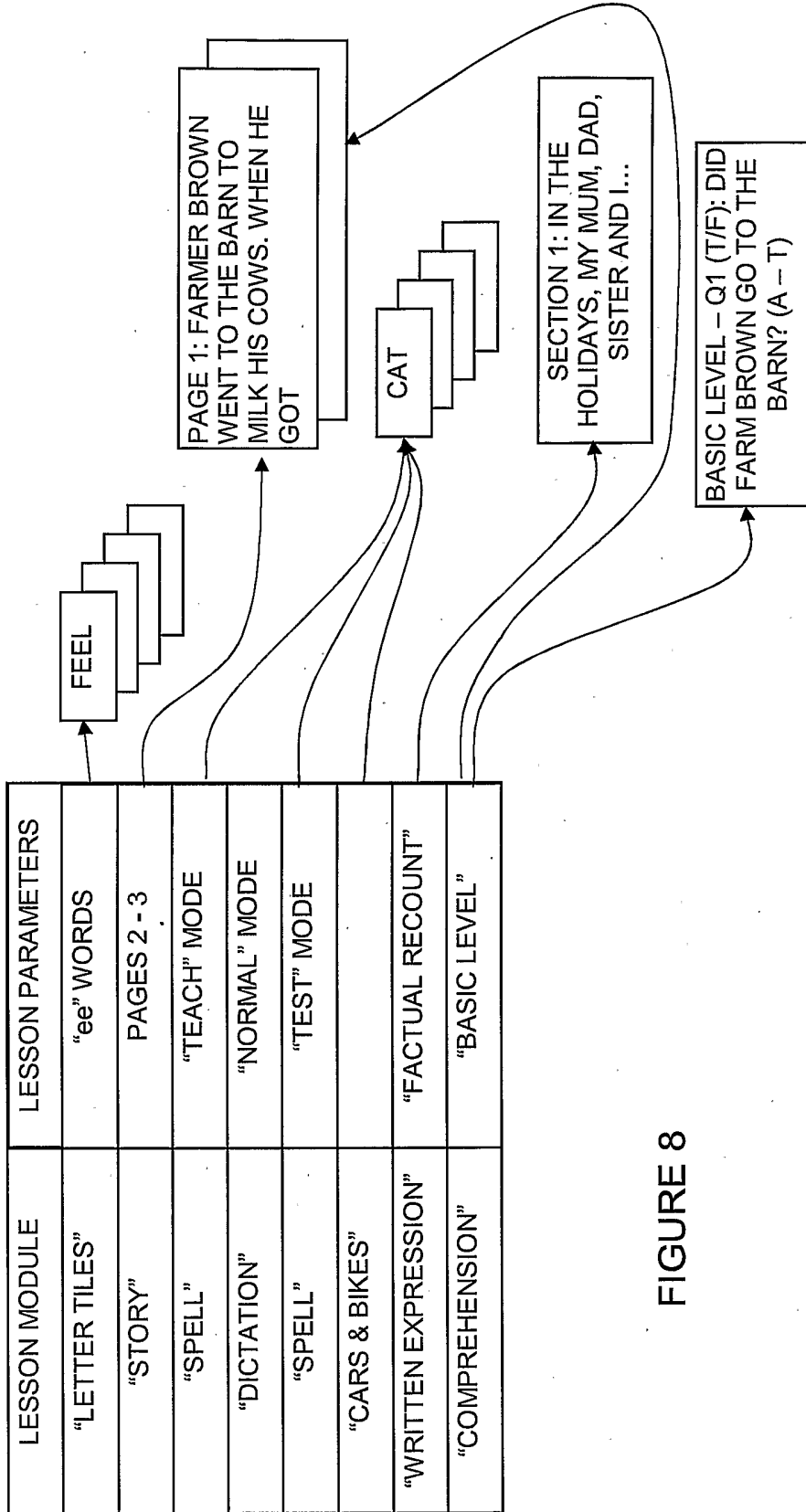


FIGURE 8

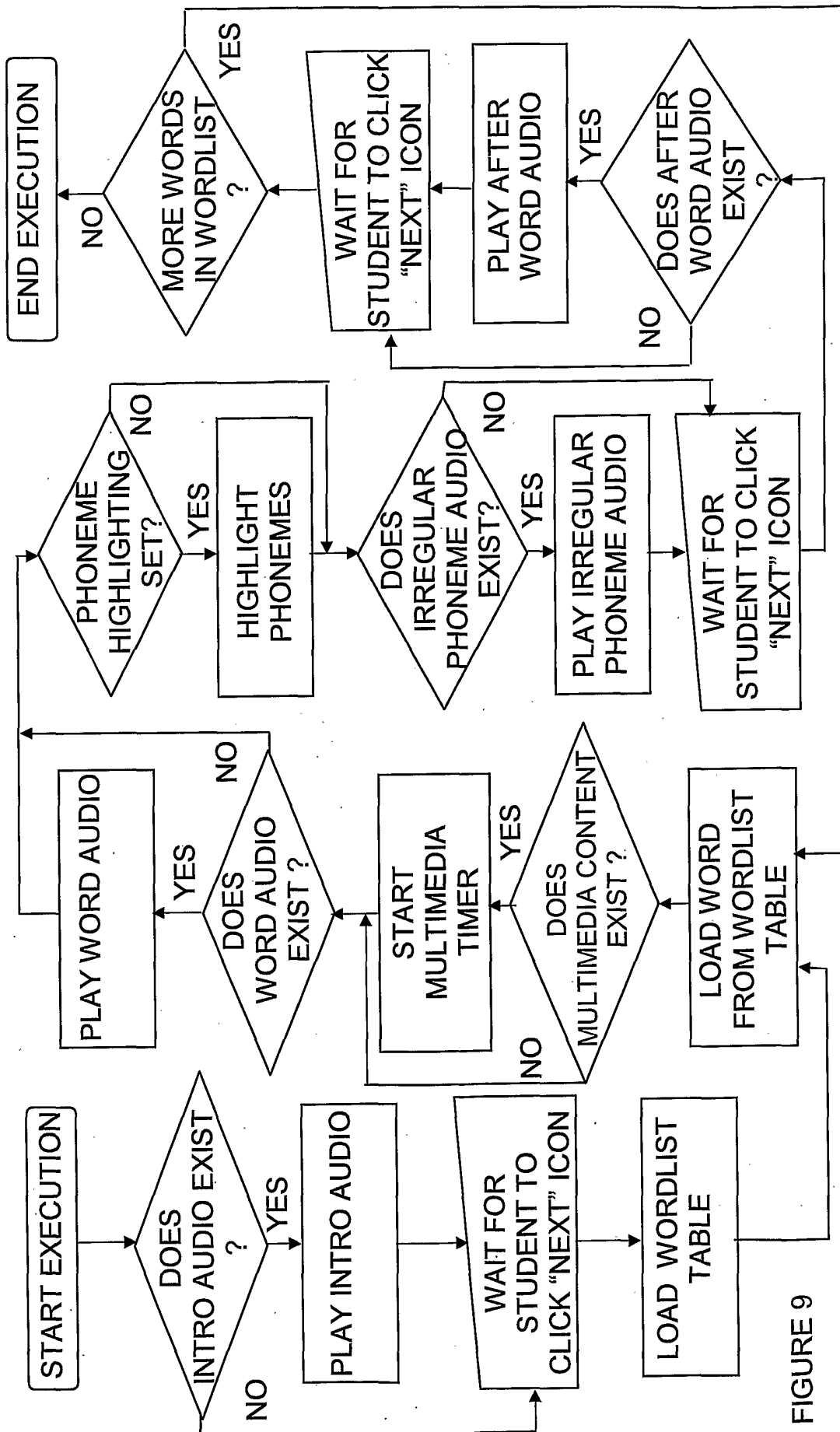


FIGURE 9

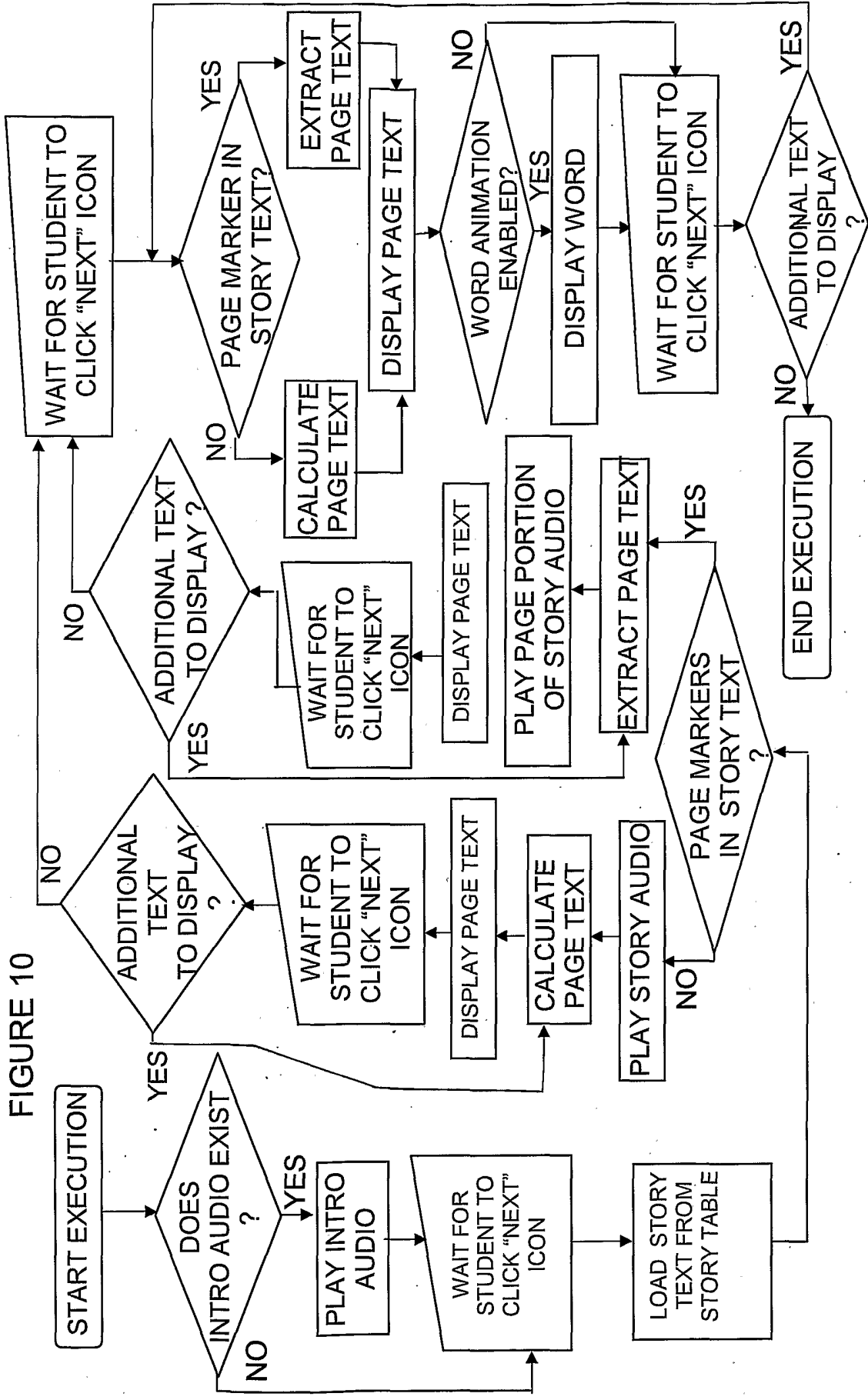


FIGURE 10

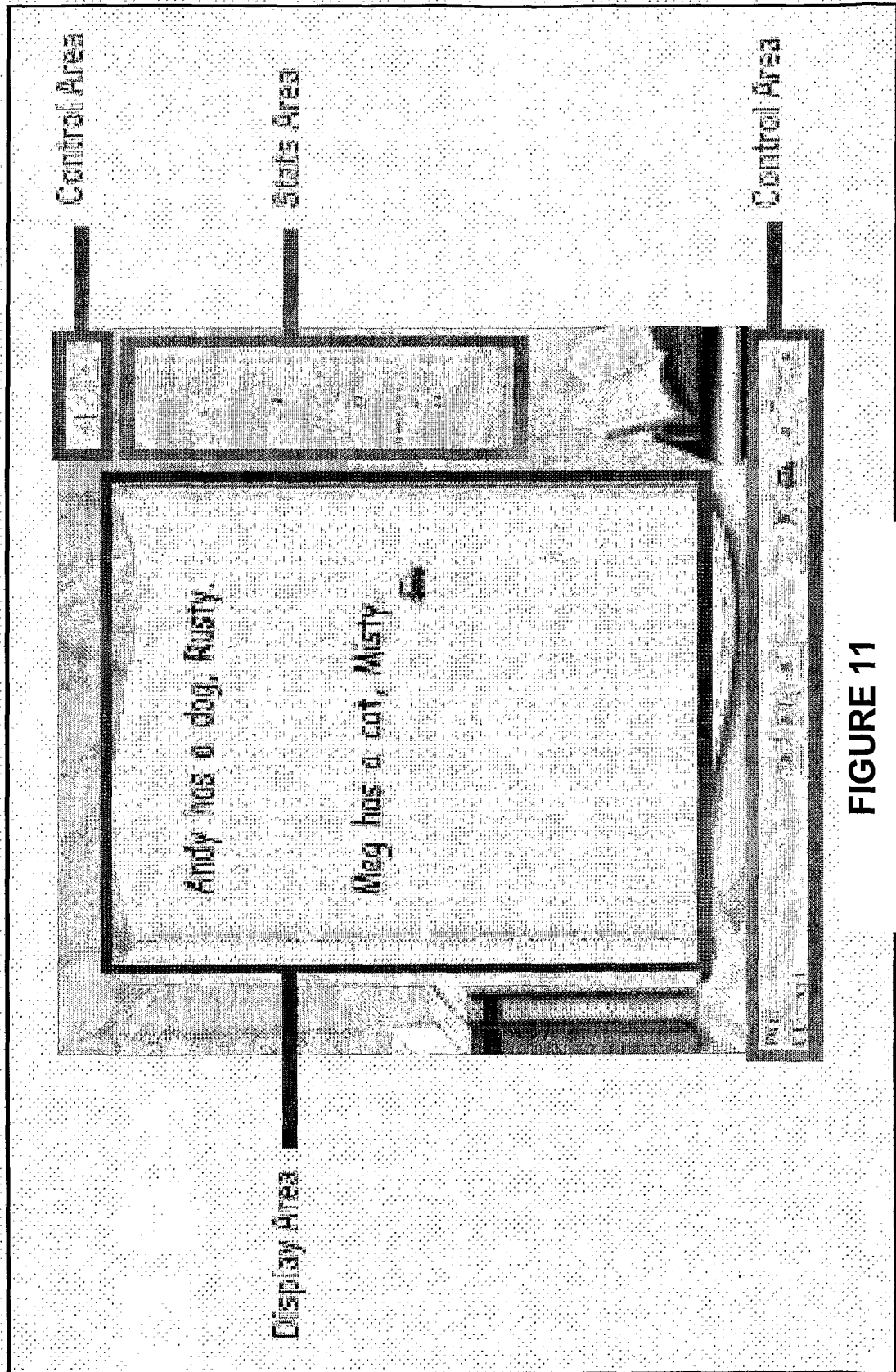


FIGURE 11

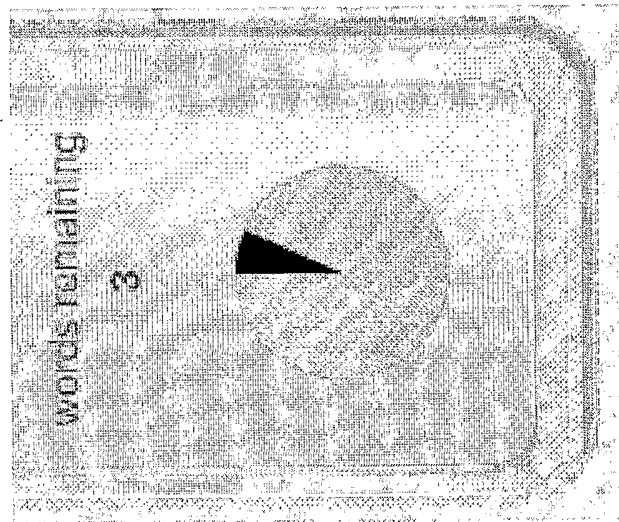


FIGURE 12

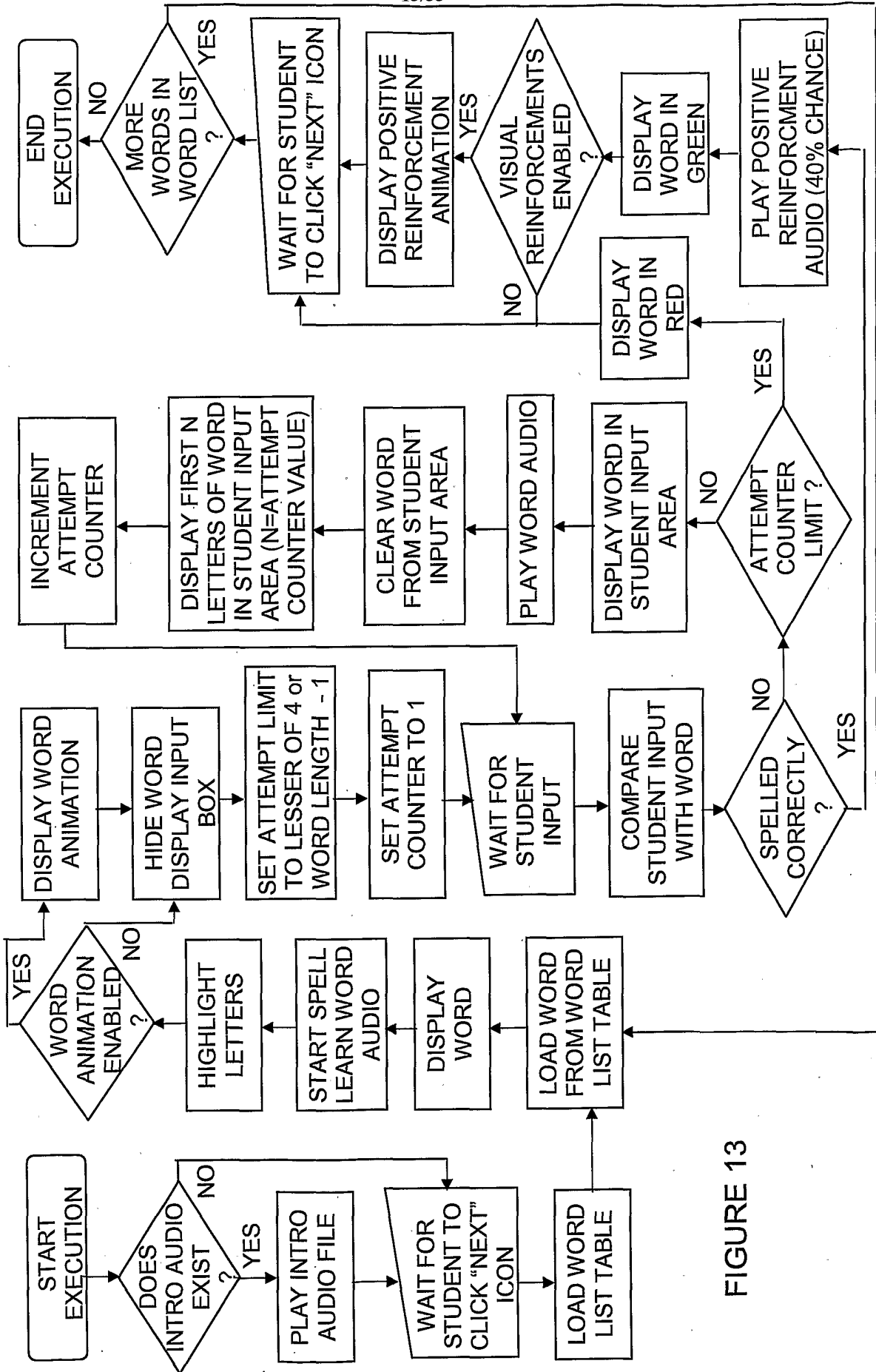


FIGURE 13

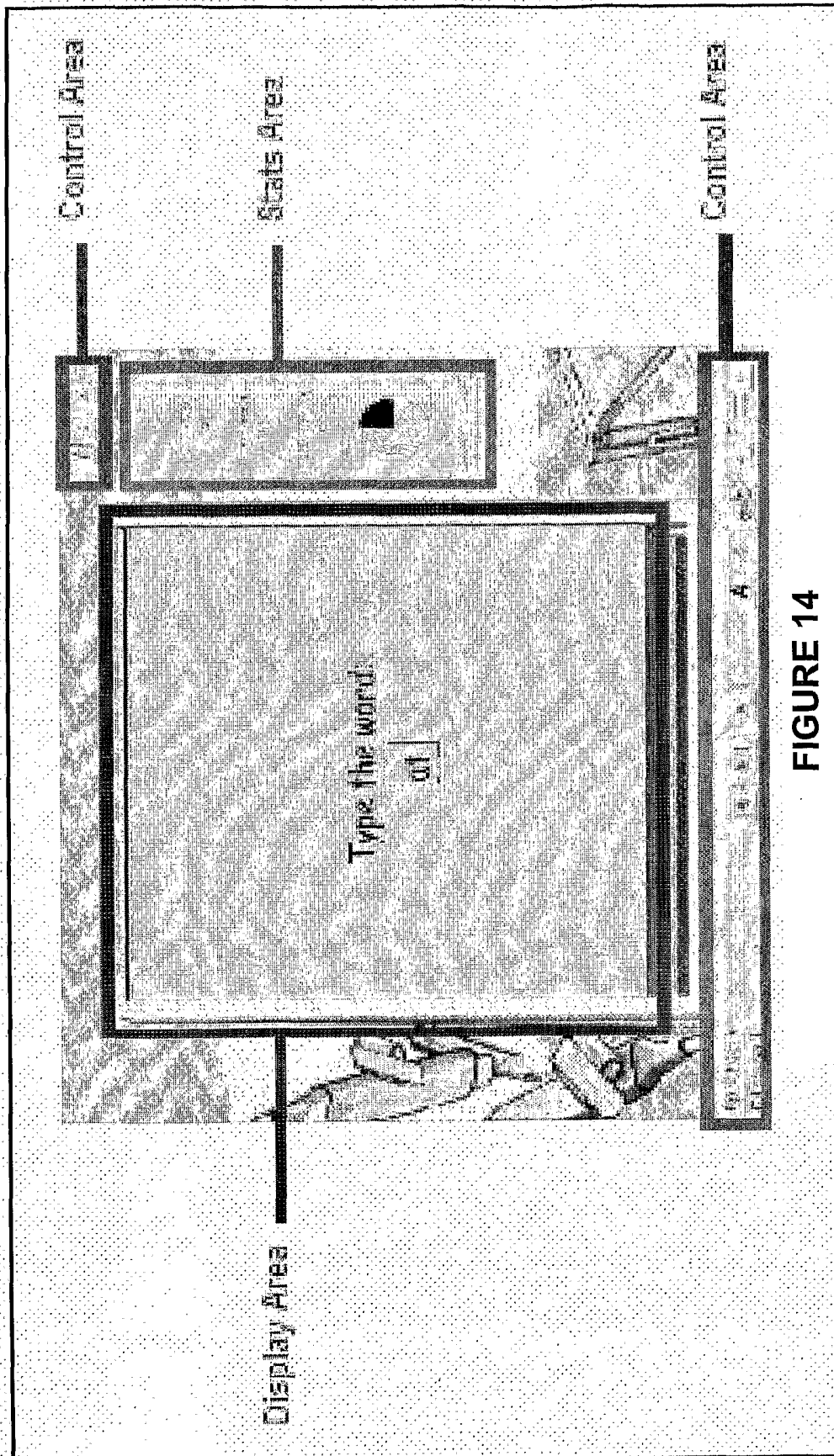


FIGURE 14

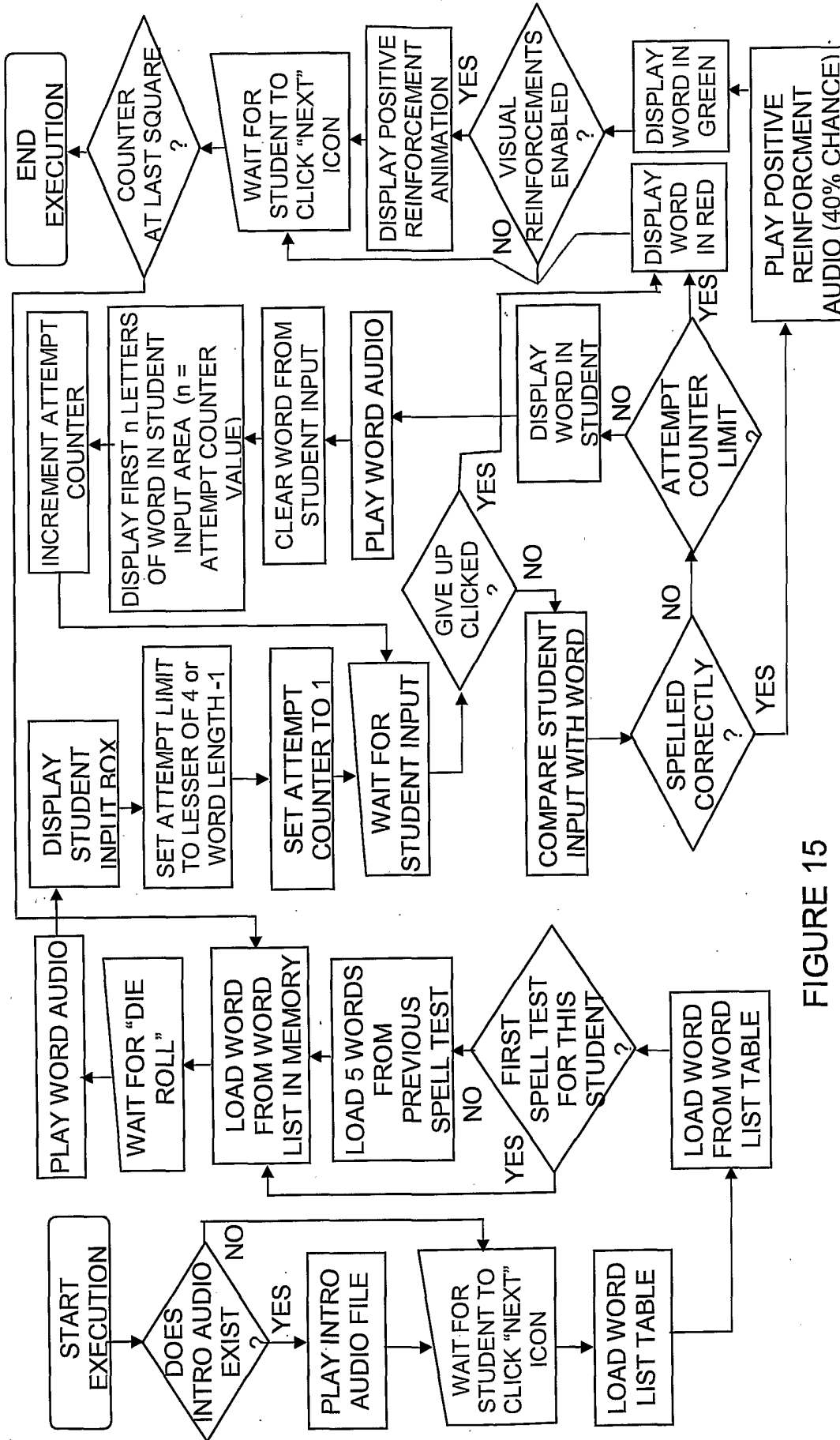


FIGURE 15

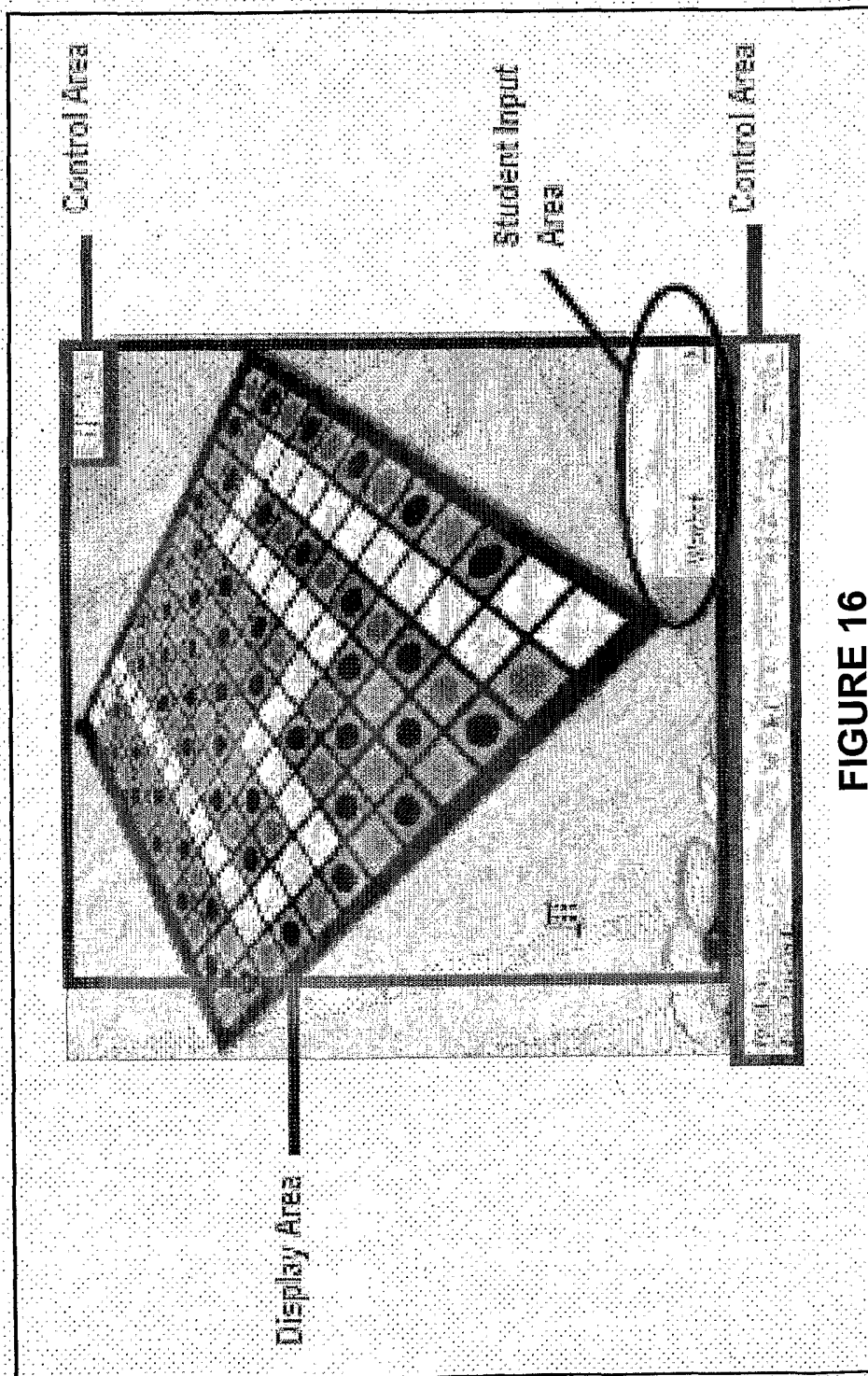


FIGURE 16

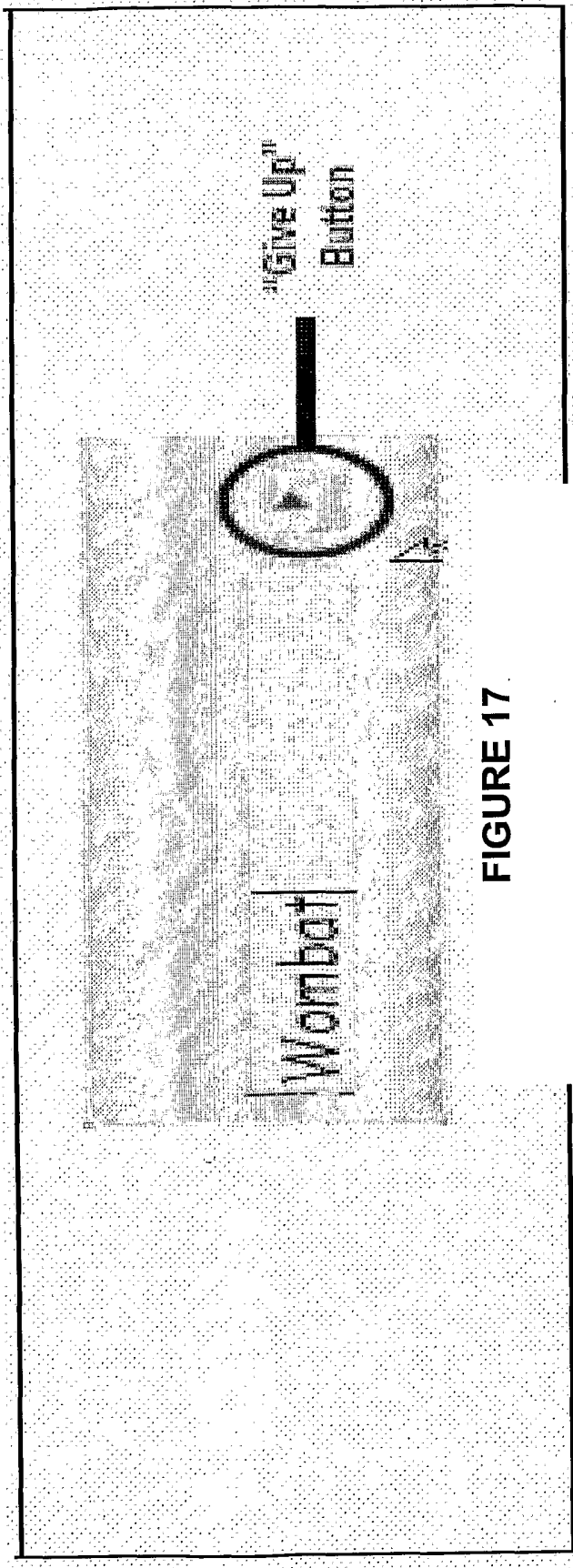


FIGURE 17

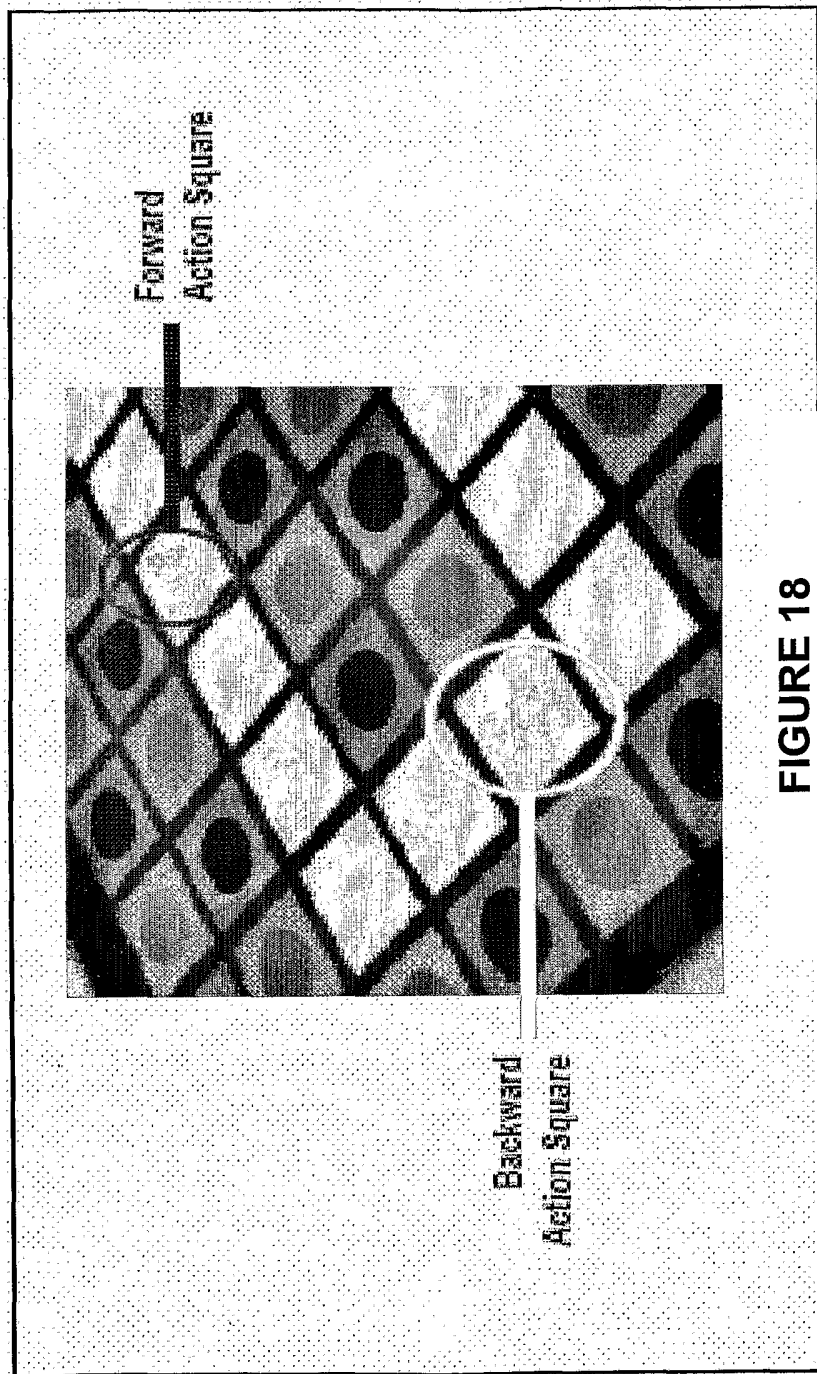


FIGURE 18

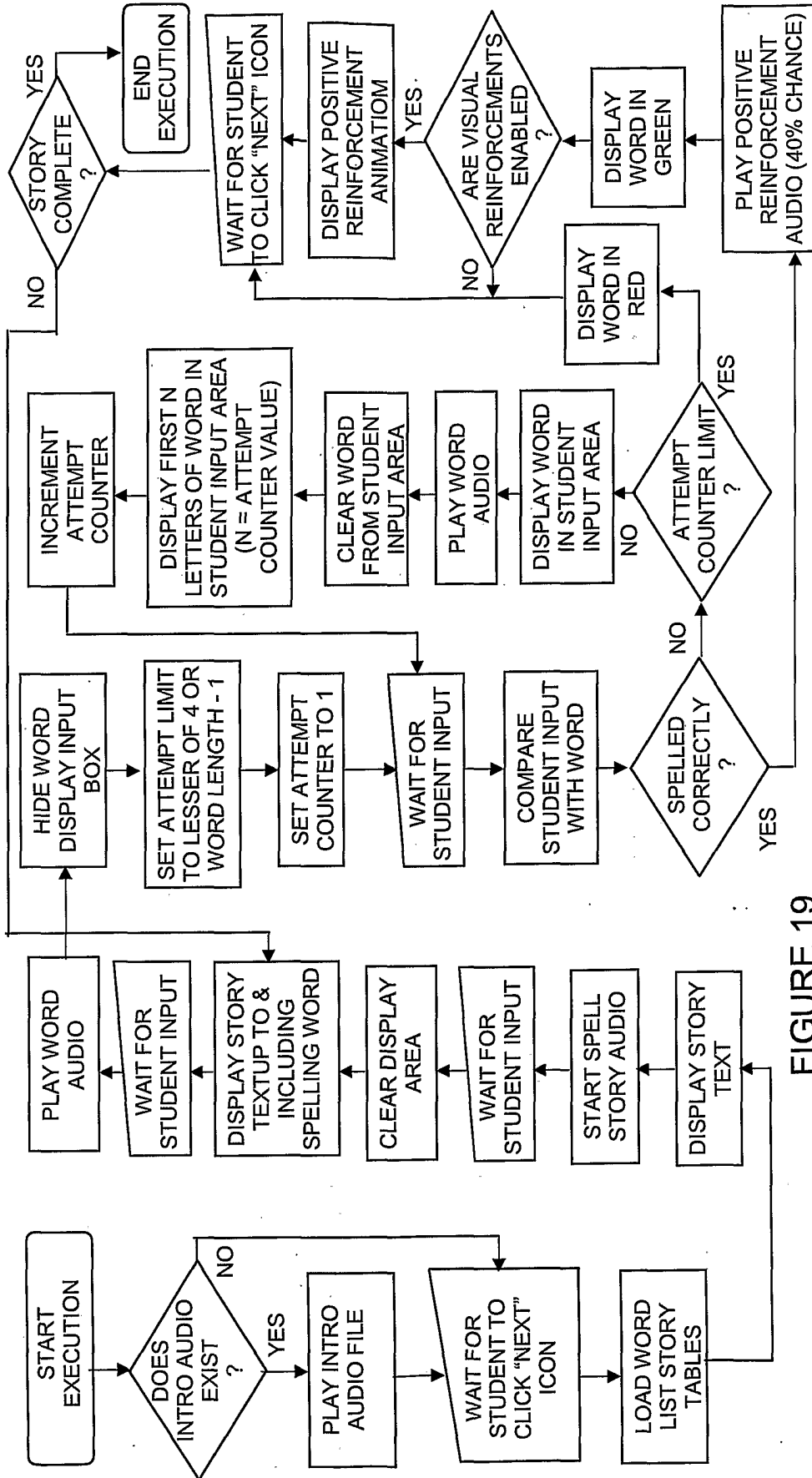


FIGURE 19

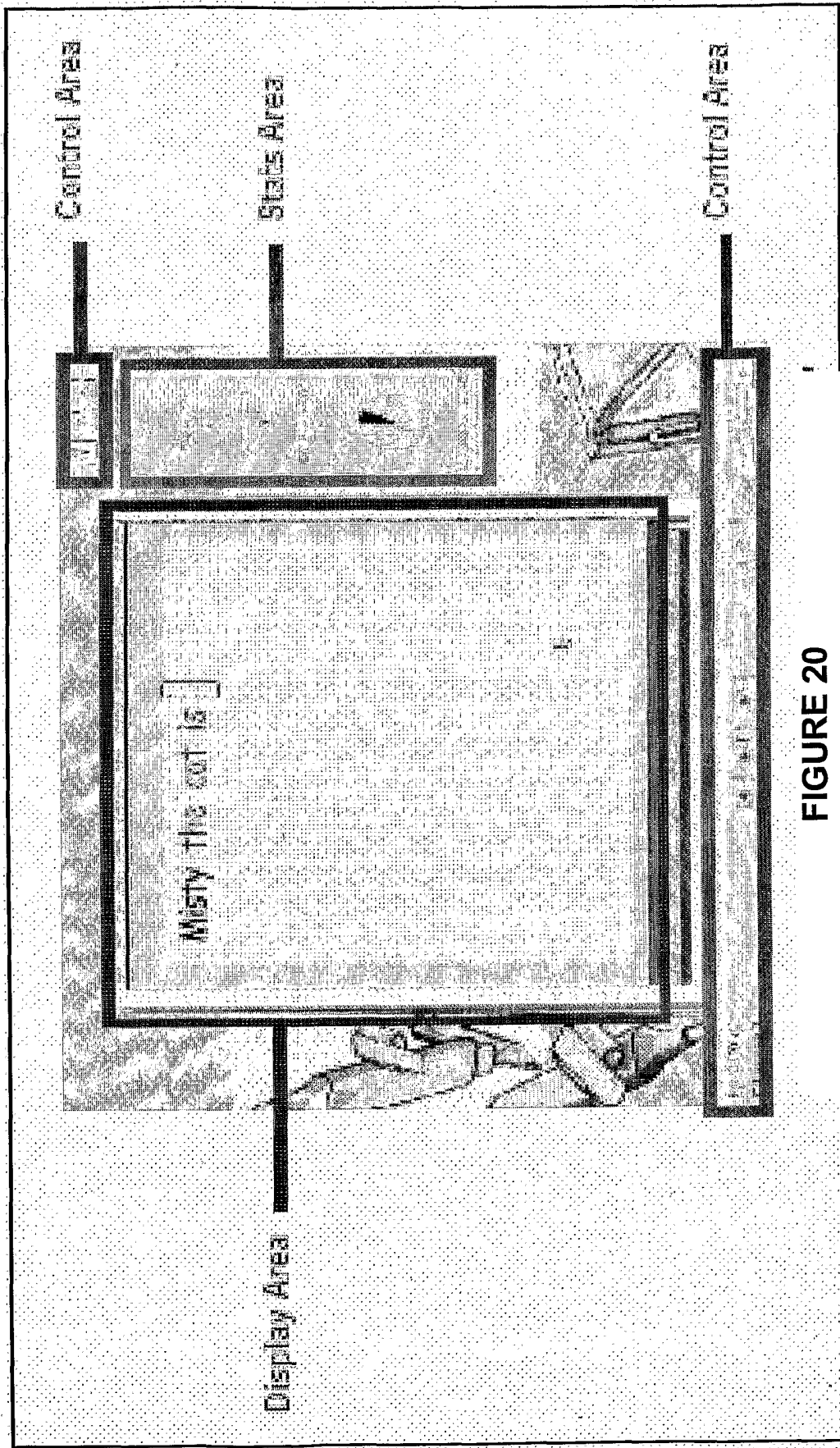


FIGURE 20

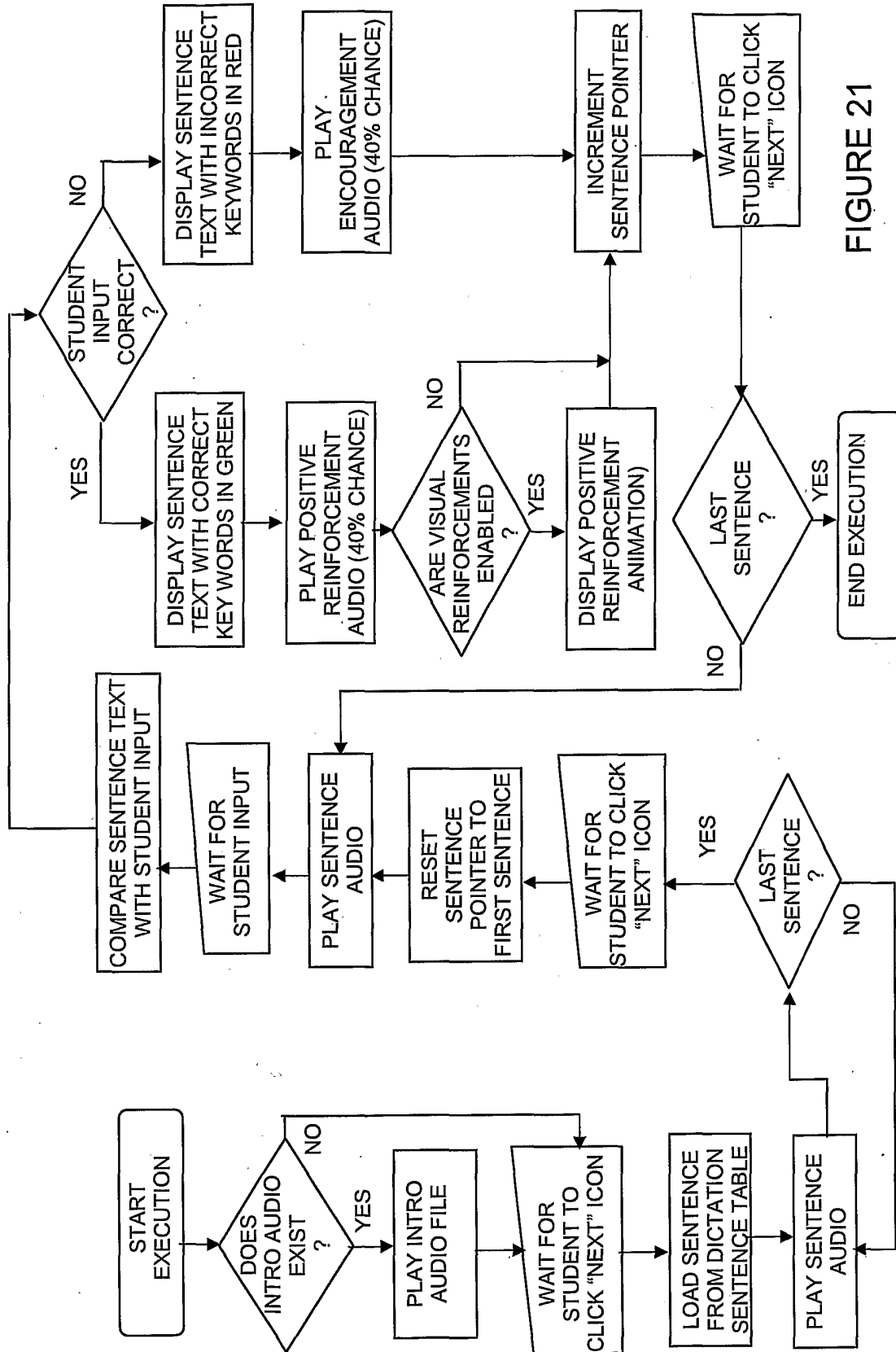


FIGURE 21

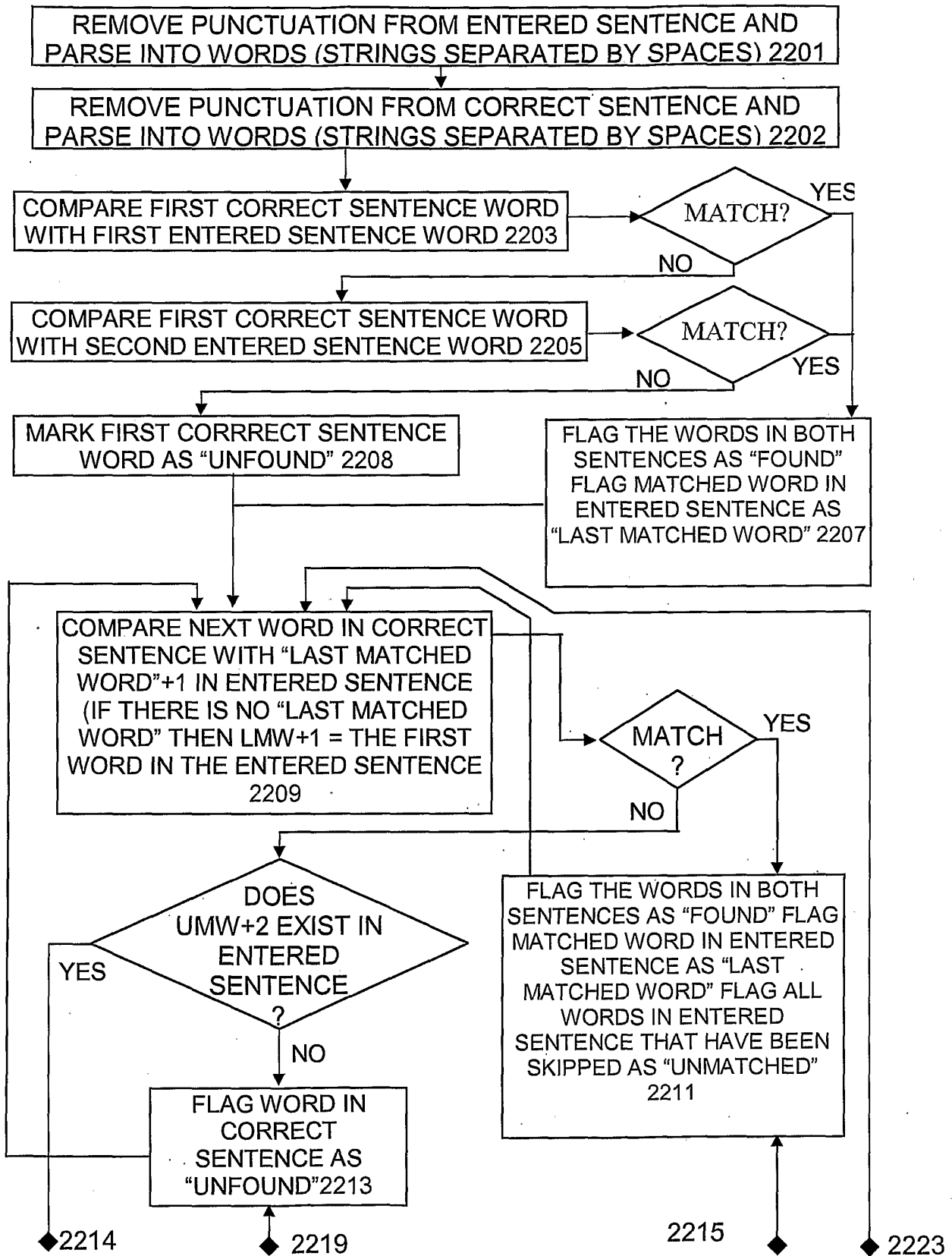


FIGURE 22 A

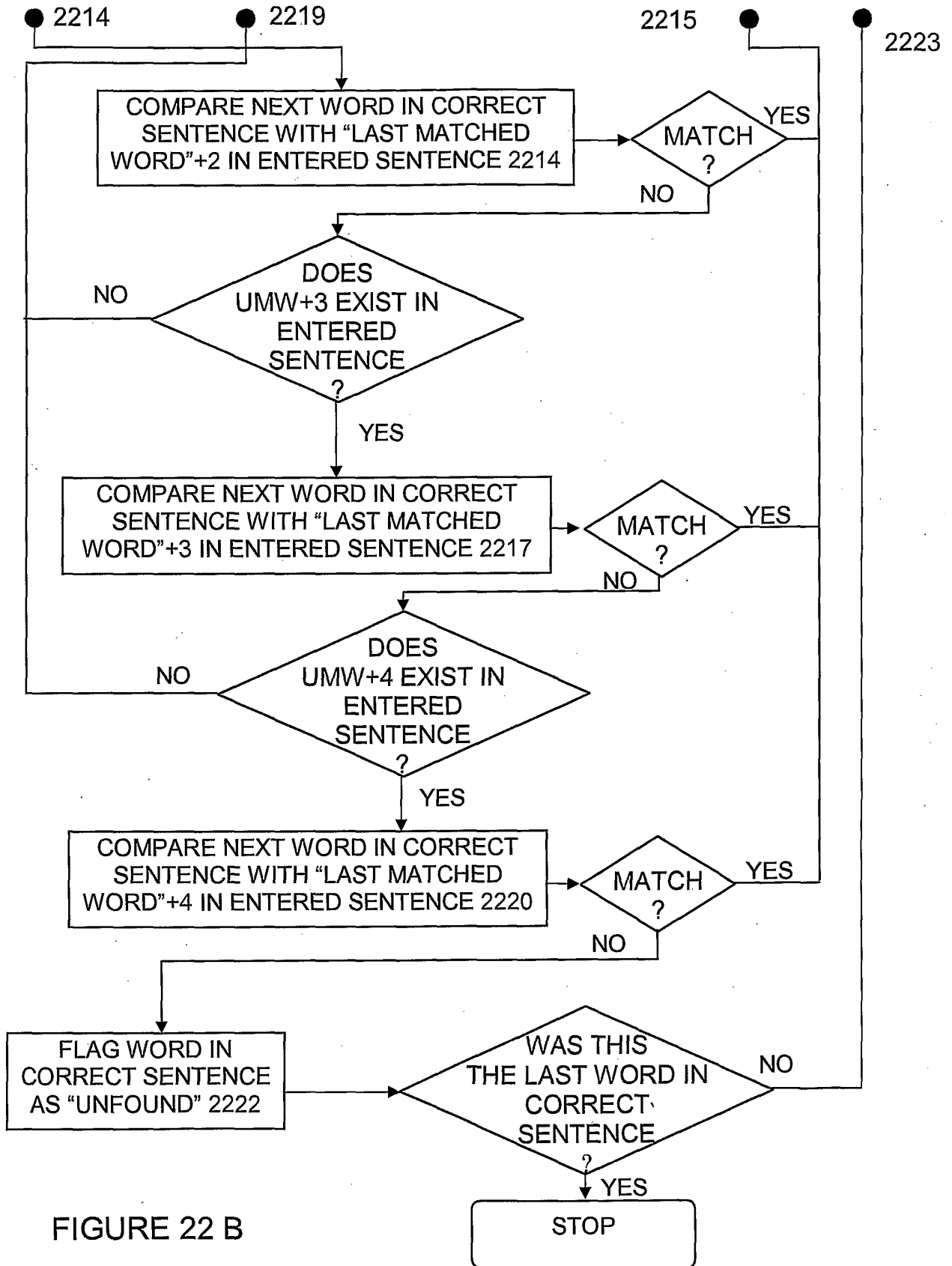


FIGURE 22 B

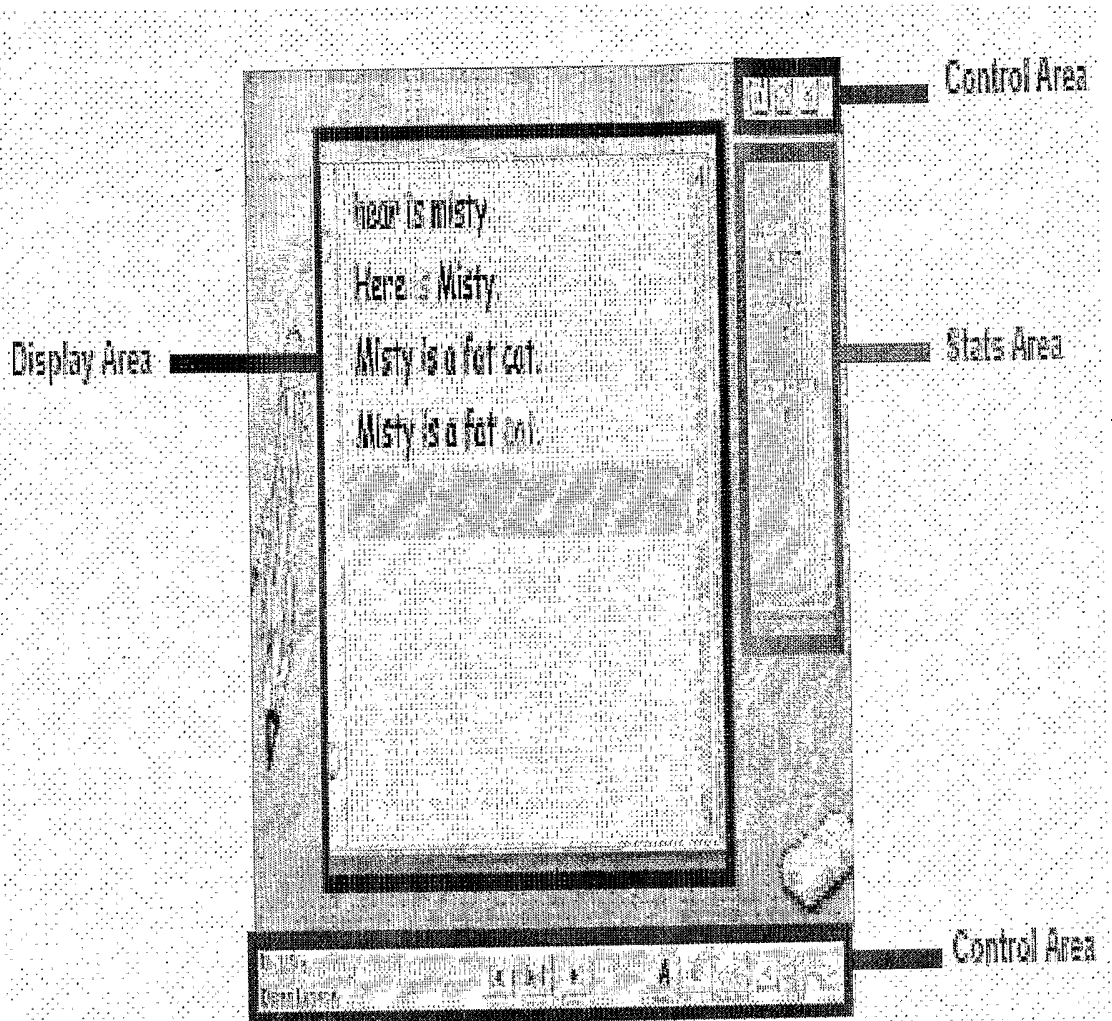


FIGURE 23

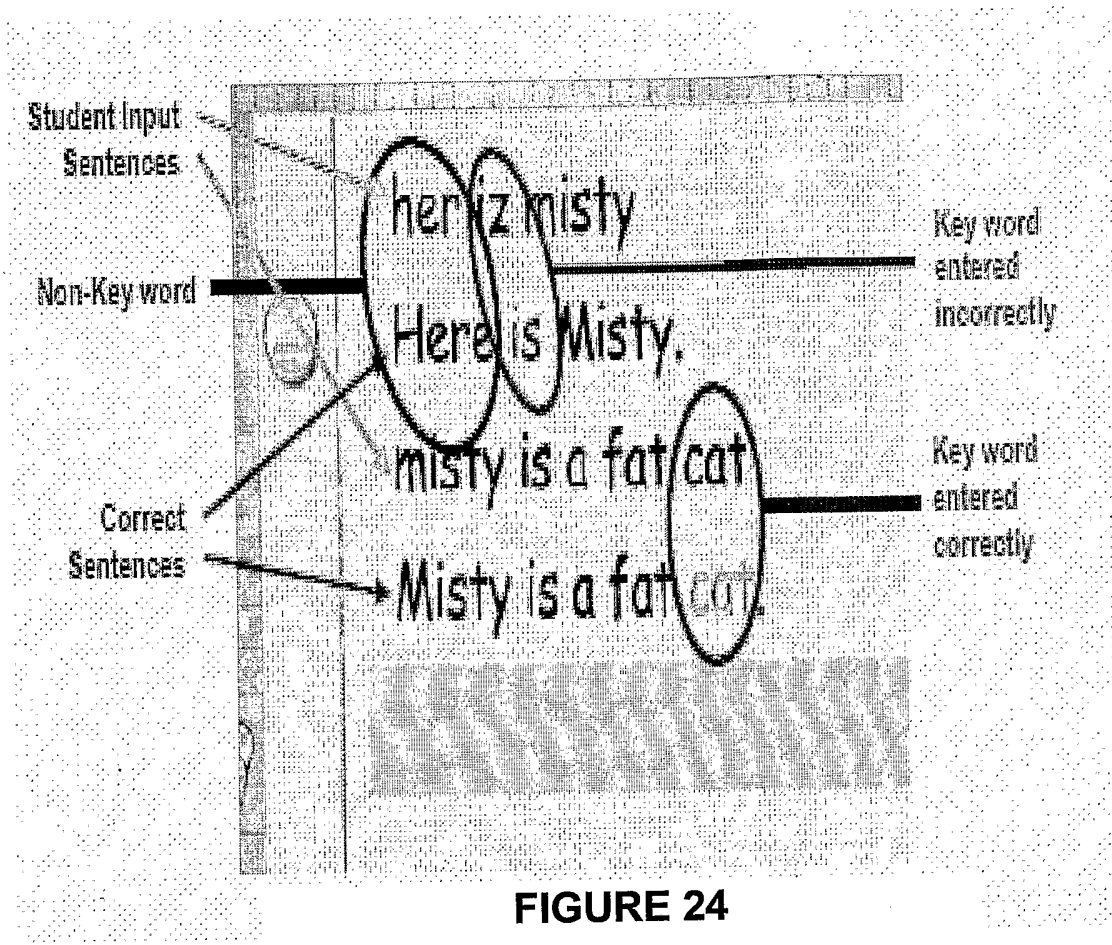


FIGURE 24

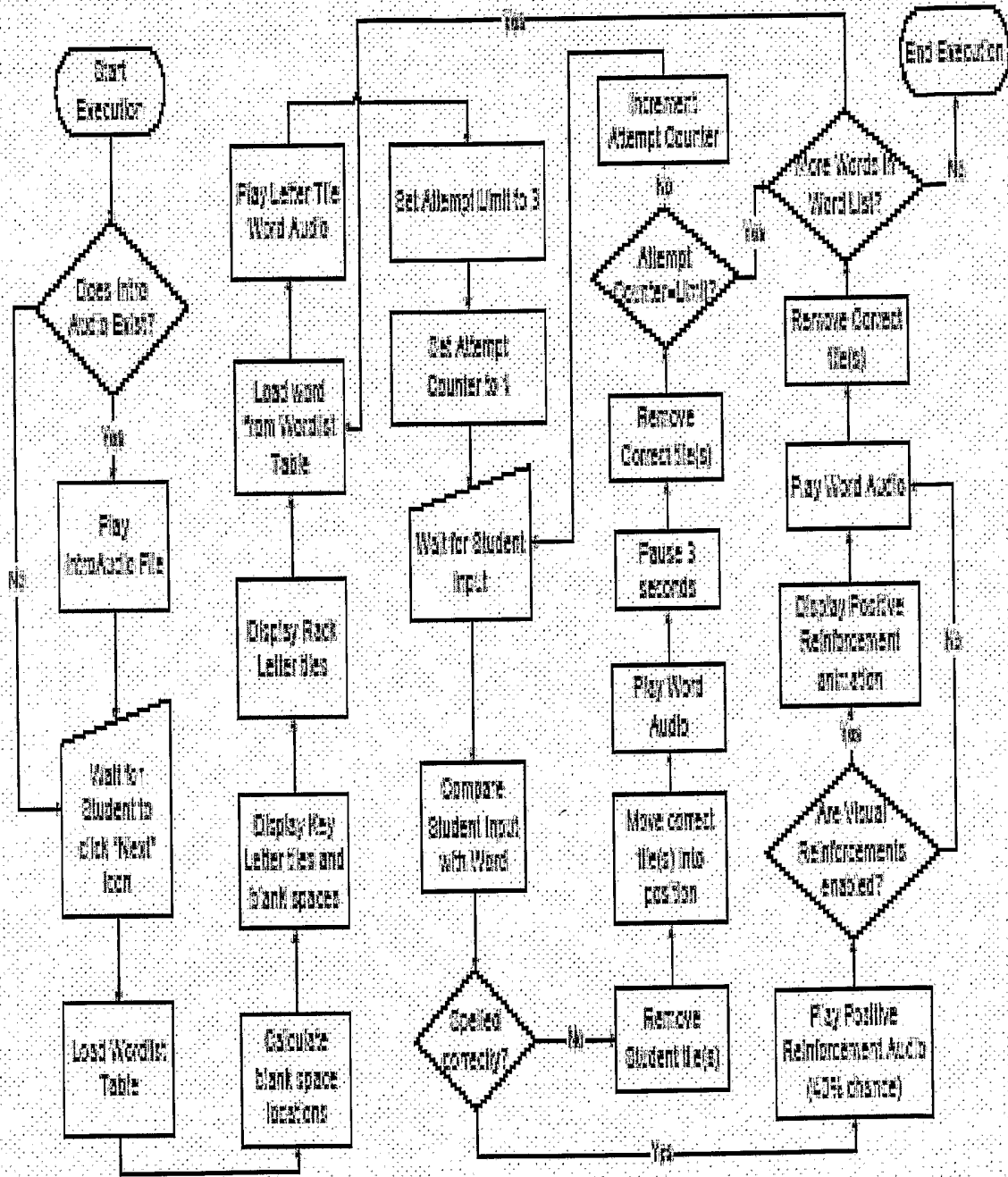


FIGURE 25

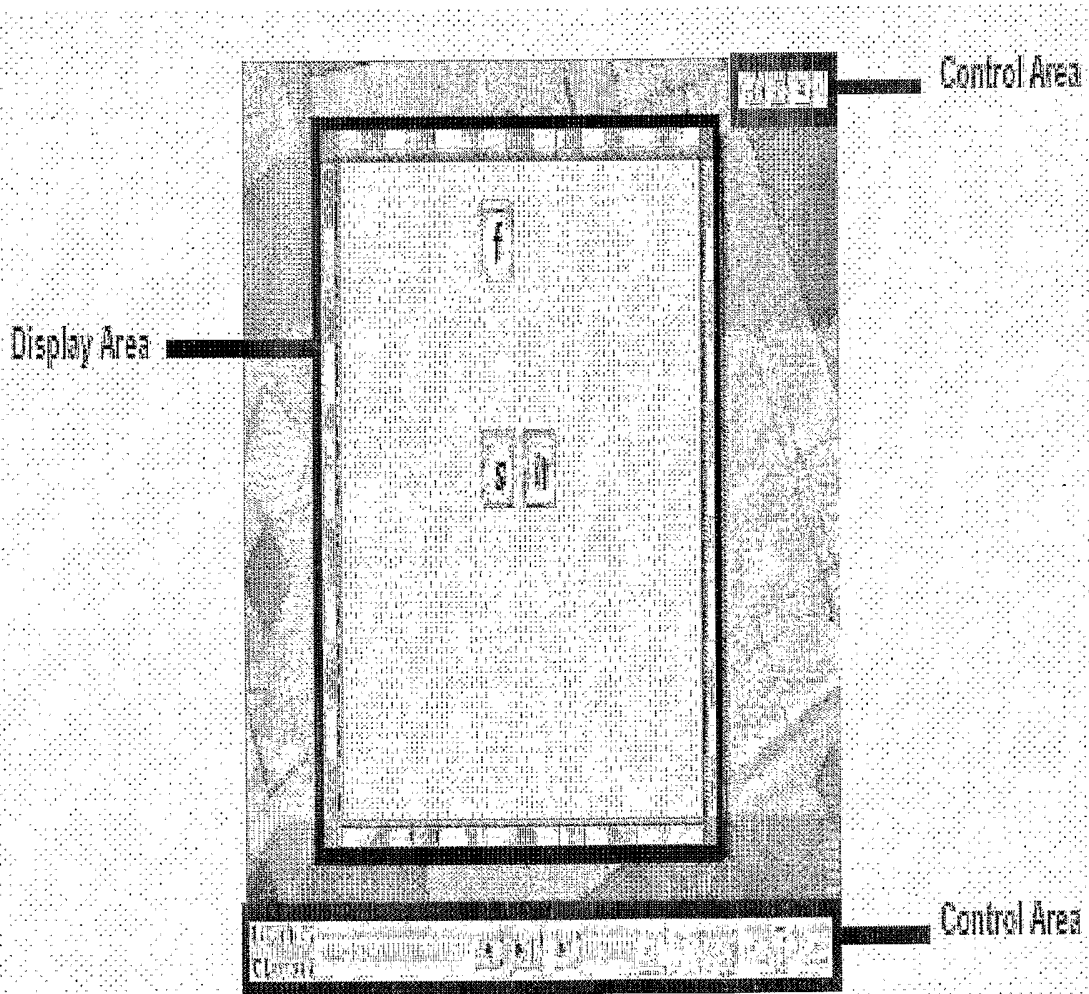


FIGURE 26

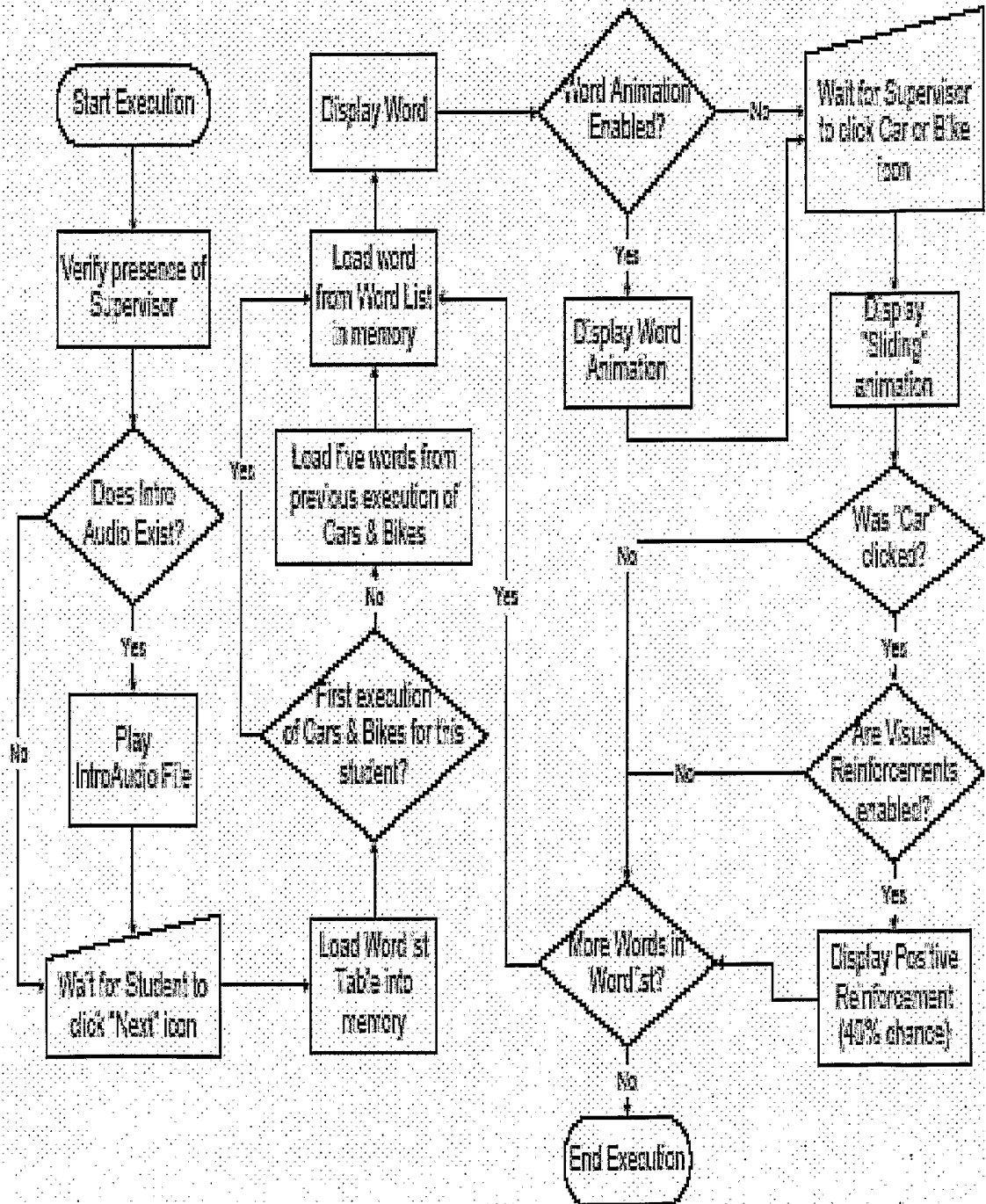


FIGURE 27

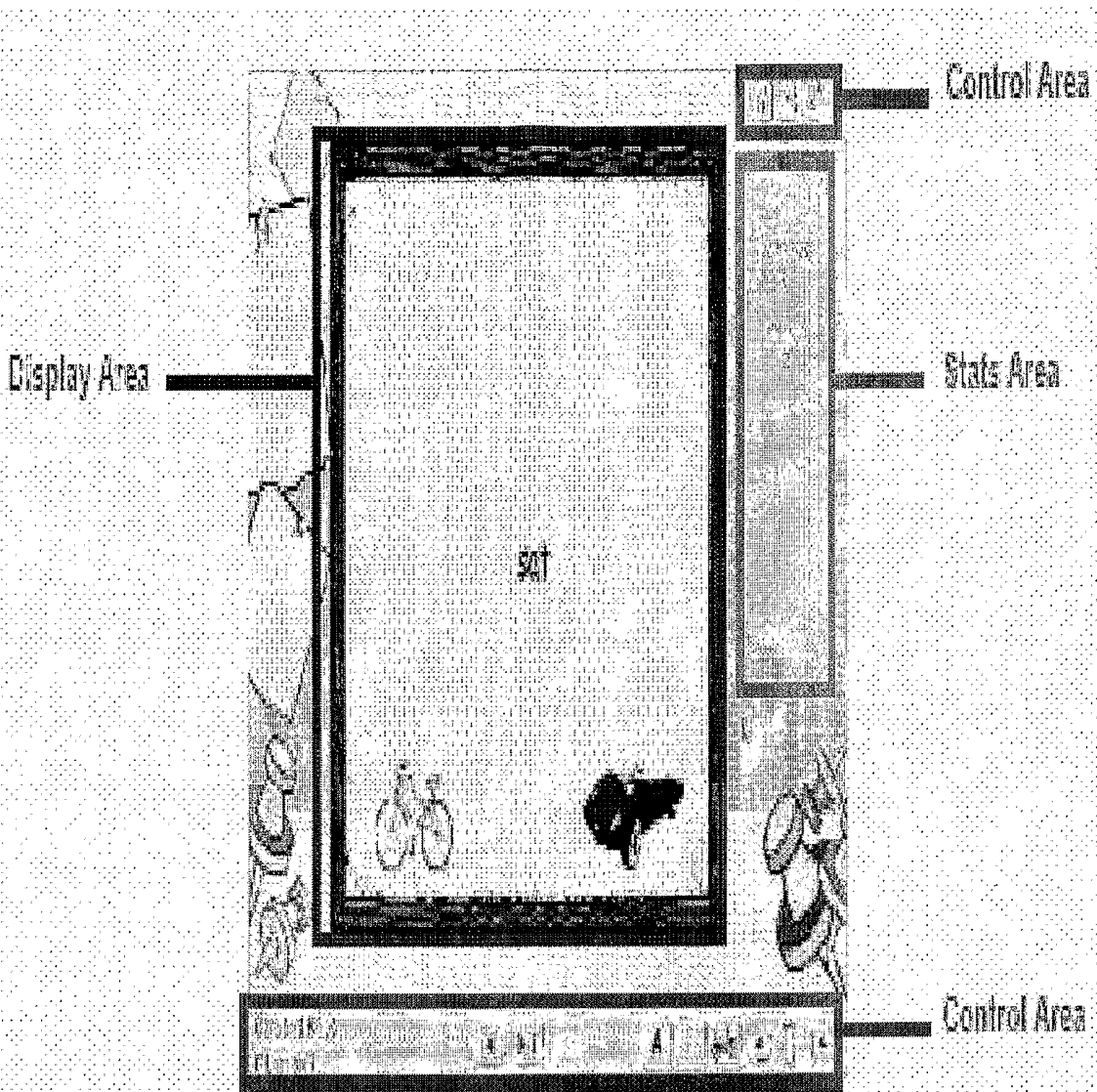
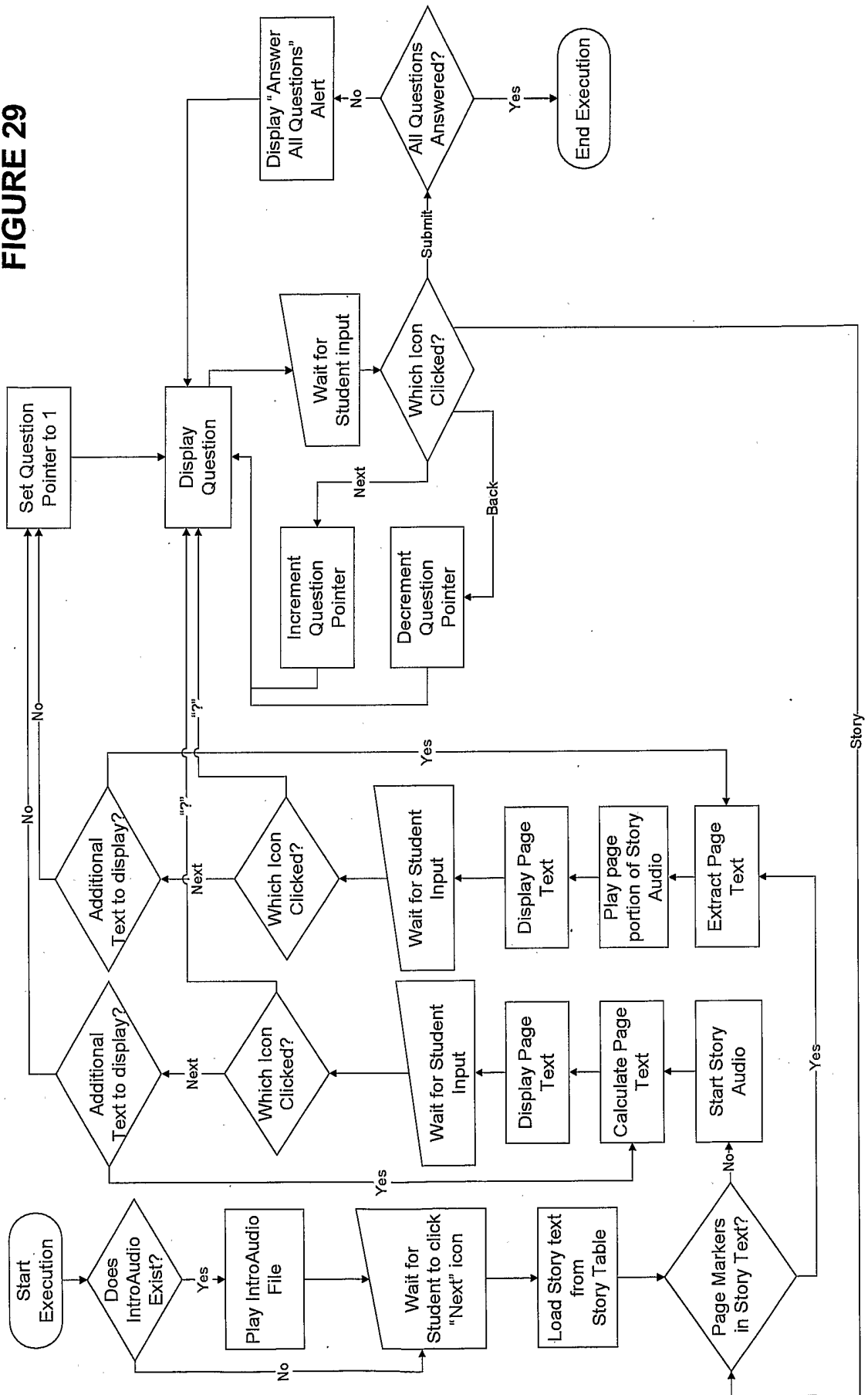
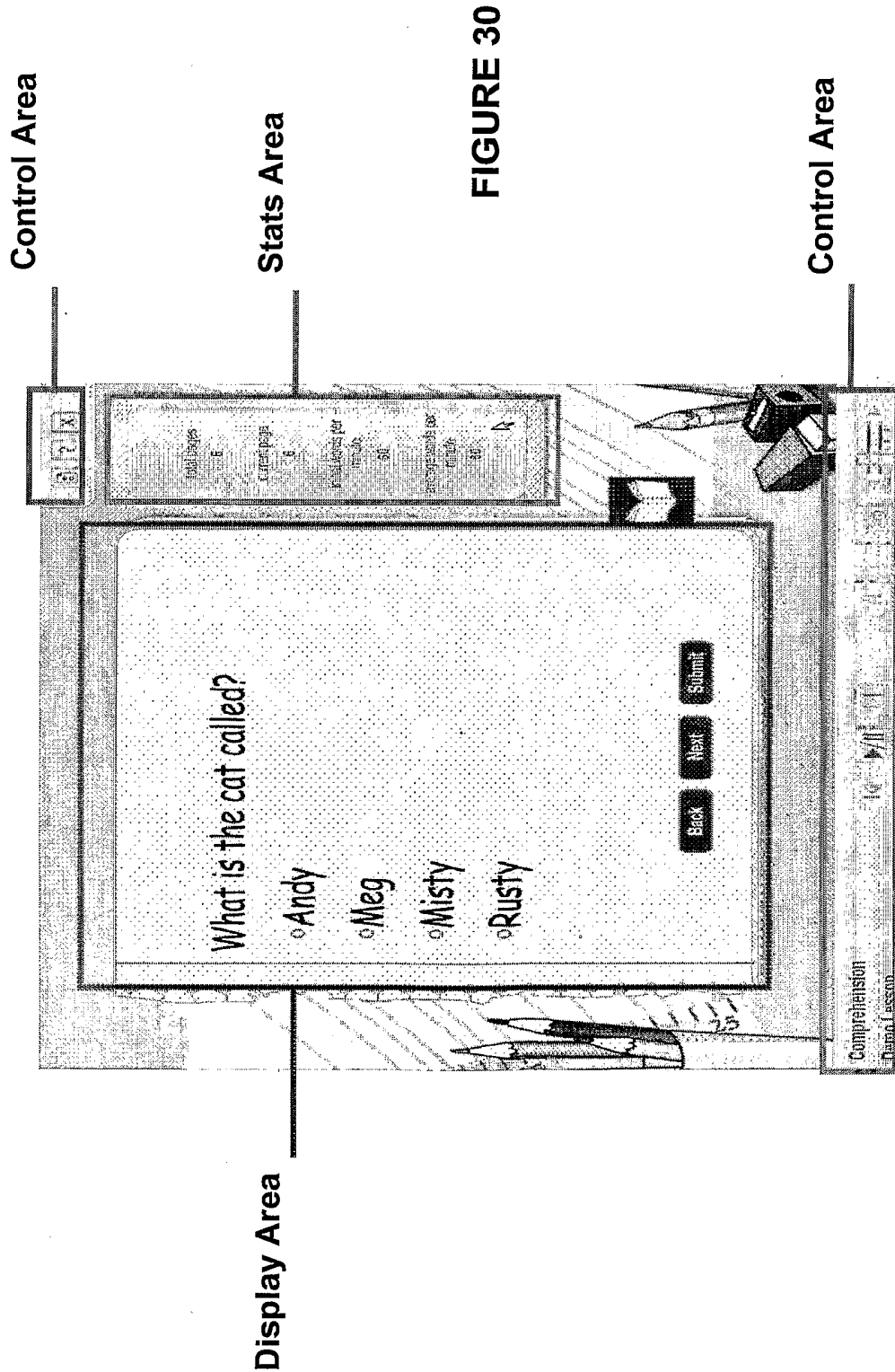


FIGURE 28

FIGURE 29





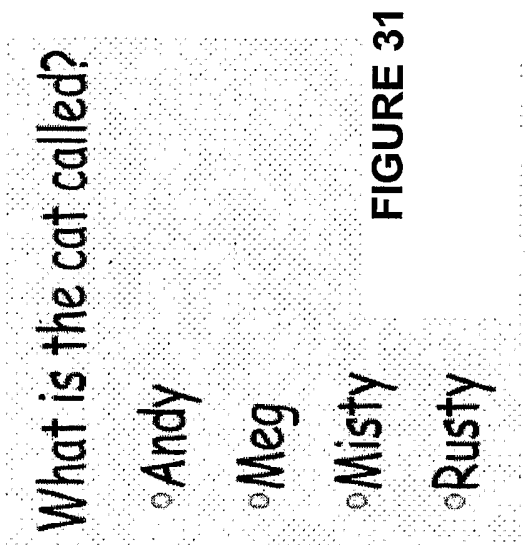


FIGURE 31

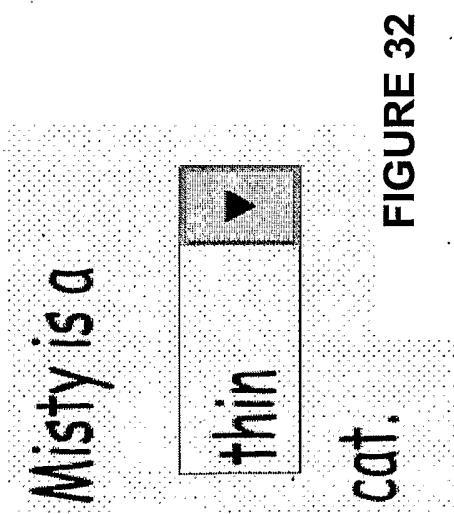


FIGURE 32

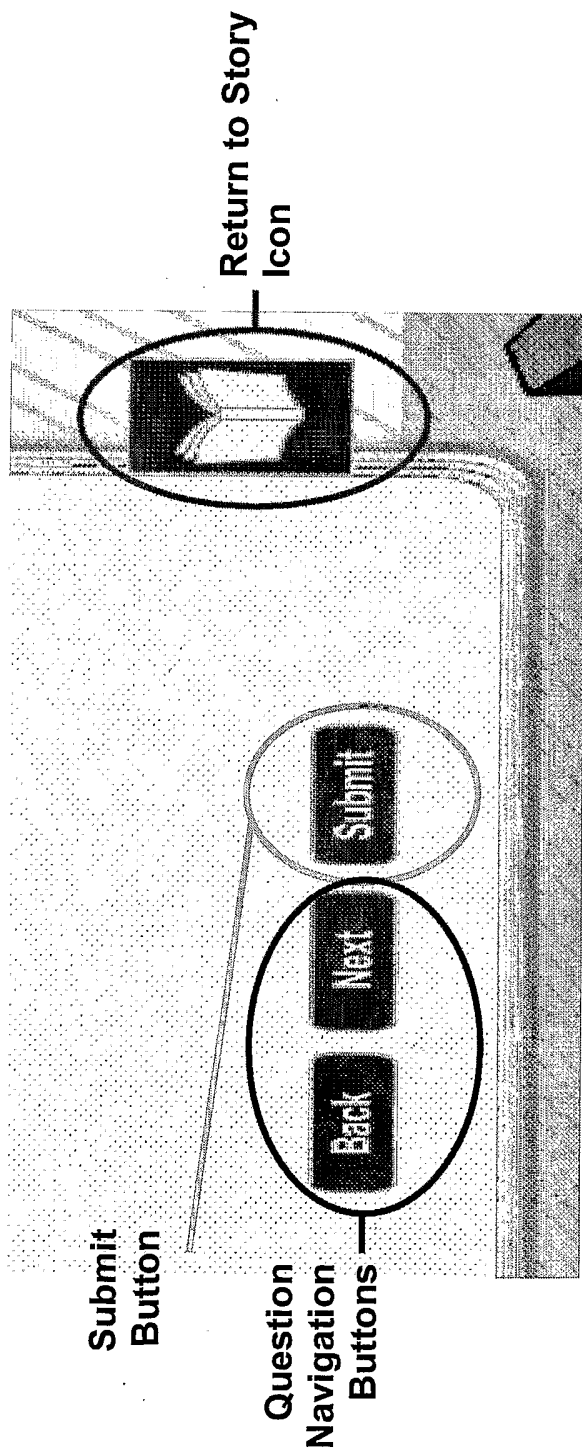


FIGURE 33

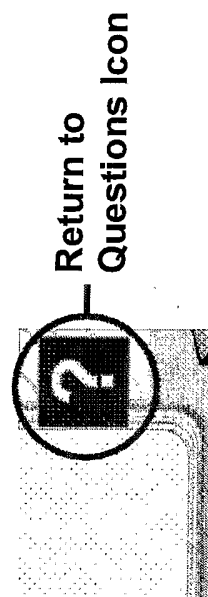


FIGURE 34

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2005/001398

A. CLASSIFICATION OF SUBJECT MATTER
 Int. Cl. ⁷: G09B 19/00, 5/00
 According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
 Minimum documentation searched (classification system followed by classification symbols)
 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 DWPI, USPTO, Esp@cenet: teach, train, learn, literacy, read, phoneme, visual, display and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, A	US 2005/0037322A1 (KAUL), 17 February 2005 whole document	
A	WO 2004/061796A1 (DIGISPEECH MARKETING LTD), 22 July 2004 whole document	
A	US 2004/0093212A1 (BELENGER et al), 13 May 2004 whole document	
A	US 2002/0142270A1 (FURRY), 3 October 2002 whole document	

Further documents are listed in the continuation of Box C See patent family annex

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 28 November 2005	Date of mailing of the international search report 6 DEC 2005
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Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer MANISH RAJ Telephone No : (02) 6283 2175
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2005/001398

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Refer to supplemental sheet...

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-26, 39-43 (claim 41 appended to claim 39) and 44-62

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2005/001398

Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No: III

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are THREE (3) different inventions as follows:

1. Claims 1-26, 39-43 (claim 41 appended to claim 39) and 44-62 are directed to *"a method of teaching a student literacy by using visual display"* including the following features:

- (i) creating lesson content including breaking down one or more letters or words to phonemes,
- (ii) displaying at least one phoneme, letter or word using the visual display, and
- (iii) providing a visual animation to highlight at least one phoneme, letter or word.

It is considered that *"teaching a student by displaying at least one phoneme, letter or word using visual display"* comprise a first "special technical feature".

2. Claims 27, 28-29 are directed to *"a method of teaching spelling to a student"* including the following integers:

- (i) storing a plurality of words in a spelling instructional module in a storage means,
- (ii) allowing the student access to the spelling instructional module in an interactive session,
- (iii) monitoring the performance of the student,
- (iv) maintaining a record of the student's performance in student's spelling performance log, and
- (v) assessing the student's spelling performance.

It is considered that *"assessing student's spelling performance using spelling instructional module"* comprises a second "special technical feature".

3. Claims 30-34, 35-36, 37-38 are directed to *"a method of teaching reading"* including the following integers:

- (i) storing a text version of a story in a storage means,
- (ii) producing an audio version of the text, and
- (iii) playing the audio version while displaying the text version.

It is considered that *"teaching reading by playing audio while displaying the text version"* comprises a third "special technical feature".

Since the abovementioned groups of claims do not share any of the technical features identified, a "technical relationship" between the inventions, as defined in PCT rule 13.2 does not exist. Accordingly the international application does not relate to one invention or to a single inventive concept, a priori.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2005/001398

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
US	2005037322	NONE	
WO	2004061796	AU 2003300143	US 2004176960
US	2004093212	NONE	
US	2002142270	JP 2002032003	US 6869286

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX