A system of evaluating reading fluency by monitoring the underlining of text as it is being read on a tablet or other computing device. The text or passage is presented on the screen of the tablet computing device with a touchscreen, such as, but not limited to, an iPad. The reader uses a stylus, finger, or other device to underline each word as it is read, and may go back and re-underline any words to regress within the passage. Alternatively, a mouse can be used to indicate words as they are read. Computer software tracks the reader's underlining, providing detailed information about reading rate, pauses, regressions, and other word and word combination features.
Assessing silent reading fluency in classroom environments can be challenging. A new method of assessing silent reading, computationally monitoring a reader's silent reading fluency by the speed they underline words in a text, may address some of the problems other assessment techniques face.

FIGURE 1
(b) word boundaries

Assessing silent reading fluency in classroom environments can be challenging. A new method of assessing silent reading, computationally monitoring a reader's silent reading fluency by the speed they underline words in a text, may address some of the problems other assessment techniques face.

(c) mouse position

FIGURE 2
FIGURE 3

(d) reading patterns (including word reading times and regressions)
SYSTEM AND METHOD FOR EVALUATING READING FLUENCY USING UNDERLINING

This application claims benefit of and priority to U.S. Provisional Application No. 61/695,379, filed Aug. 31, 2012, by Max Louverse, and is entitled to that filing date for priority. The specification, figures and complete disclosure of U.S. Provisional Application No. 61/695,379 are incorporated herein by specific reference for all purposes.

FIELD OF INVENTION

This invention relates to a system and method for evaluating and assessing reading fluency using underlining.

BACKGROUND OF THE INVENTION

Monitoring where people look when reading a text and for how long can be done with various techniques that have been developed in the cognitive sciences (psychology, linguistics, and education). These techniques are self-paced reading methods and are based on the assumption that a participant will read at a rate matching the comprehension process. They are extremely useful in detecting when readers experience problems in a text, and how and how fast readers read the text. For instance, in moving windows paradigms readers press a button and a word appears on the screen. Even though this technique has been frequently used to measure reading processes, it does not allow for identifying reading difficulties beyond the word level and it requires a rather unnatural reading process. Other techniques, such as eye tracking, do allow for identifying reading difficulties at and beyond the word level, and are more natural. However, they require careful calibration, and do not allow for monitoring multiple readers over longer stretches of time, such as reading fluency and proficiency in classrooms.

Accordingly, what is needed is a more effective and efficient method of evaluating and assessing reading fluency that is natural, precise, and allows for monitoring multiple readers (e.g., a classroom or teaching environment).

SUMMARY OF THE INVENTION

In various embodiments, the present invention comprises a system of evaluating reading fluency by monitoring the underlining of text as it is being read on a tablet or other computing device. In one embodiment, as seen in FIG. 1, the text or passage is presented on the screen of the tablet computing device with a touchscreen, such as, but not limited to, an iPad, which may be folded down flat to resemble a piece of paper. The reader uses a stylus, finger, or other device to underline each word as they read it, and go back and re-underline any words to which the reader regresses within the passage. Computer software tracks the reader’s (or readers’) underlining, providing detailed information about reading rate, pauses, regressions, and other word and word combination features. An example of a chart showing word reading times and regressions is seen in FIG. 3.

The system has the significant advantage of being able to be used with multiple participants at one time without the need for an individual monitor for each reader, or special equipment (e.g., no helmet or special computer screen). It also provides a testing reading rate that is more similar to natural silent reading than moving windows methods, while providing more information than paper-and-pencil assessments. The system can monitor reading time at the word level, and records the reading time at any desired accuracy level (e.g., milliseconds). The reading behavior can thus be monitored precisely, with no intrusive measures or monitor involvement.

In an alternative embodiment, the user may use another form of computer input device, such as a mouse, to “underline” or indicate words in the text as they are being read. The computer program tracks the location of the mouse pointer on the screen, and considers a word as being indicated or “underlined” if the mouse pointer falls within a box or boundary established around each word in the text, as shown.

The present invention thereby allows the collection of reading behavior data over time, per user, per grade, per
school, per area, or combinations thereof. This enables
instructors to intervene at appropriate times for a student
experiencing reading difficulties. It not only provides
information for teachers and schools, it also provides data for
cognitive psychologists, school psychologists, publishing
houses, and the like.

In order to provide a context for the various aspects of the
invention, the following discussion provides a brief, general
description of a suitable computing environment in which
the various aspects of the present invention may be imple-
mented. A computing system environment is one example of
a suitable computing environment, but is not intended to
suggest any limitation as to the scope of use or functionality
of the invention. A computing environment may contain any
one or combination of components discussed below, and
may contain additional components, or some of the illus-
trated components may be absent. Various embodiments
of the invention are operational with numerous general purpose
or special purpose computing systems, environments or
configurations. Examples of computing systems, environ-
ments, or configurations that may be suitable for use with
various embodiments of the invention include, but are not
limited to, personal computers, laptop computers, computer
servers, computer notebooks, hand-held devices, micropro-
cessor-based systems, multiprocessor systems, TV set-top
boxes and devices, programmable consumer electronics, cell
phones, personal digital assistants (PDAs), network PCs,
minicomputers, mainframe computers, embedded systems,
distributed computing environments, and the like.

Embodiments of the invention may be implemented in the
form of computer-executable instructions, such as program
code or program modules, being executed by a computer or
computing device. Program code or modules may include
programs, objects, components, data elements and struc-
tures, routines, subroutines, functions and the like. These are
used to perform or implement particular tasks or functions.
Embodiments of the invention also may be implemented in
distributed computing environments. In such environments,
tasks are performed by remote processing devices linked via
communications network or other data transmission medium,
and data and program code or modules may be located in both local and remote computer storage media
including memory storage devices.

In one embodiment, a computer system comprises mul-
tiple client devices in communication with at least one
server device through or over a network. In various embodi-
ments, the network may comprise the Internet, an intranet,
Wide Area Network (WAN), or Local Area Network (LAN).
It should be noted that many of the methods of the present
invention are operable within a single computing device.

A client device may be any type of processor-based
platform that is connected to a network and that interacts
with one or more application programs. The client devices
each comprise a computer-readable medium in the form of
volatile and/or nonvolatile memory such as read only
memory (ROM) and random access memory (RAM) in
communication with a processor. The processor executes
computer-executable program instructions stored in
memory. Examples of such processors include, but are not
limited to, microprocessors, ASICs, and the like.

Client devices may further comprise computer-readable
medium in communication with the processor, said media
storing program code, modules and instructions that, when
executed by the processor, cause the processor to execute the
program and perform the steps described herein. Computer
readable media can be any available media that can be
accessed by computer or computing device and includes
both volatile and nonvolatile media, and removable and
non-removable media. Computer-readable media may fur-
ther comprise computer storage media and communication
media. Computer storage media comprises media for storage
of information, such as computer readable instructions, data,
data structures, or program code or modules. Examples of
computer-readable media include, but are not limited to, any
electronic, optical, magnetic, or other storage or transmis-
sion device, a floppy disk, hard disk drive, CD-ROM, DVD,
magnetic disk, memory chip, ROM, RAM, EEPROM, flash
memory or other memory technology, an ASIC, a configured
processor, CDROM, DVD or other optical disk storage,
magnetic cassettes, magnetic tape, magnetic disk storage or
other magnetic storage devices, or any other medium from
which a computer processor can read instructions or that can
store desired information. Communication media comprises
media that may transmit or carry instructions to a computer,
data/ing, but not limited to, a router, private or public
network, wired network, direct wired connection, wireless
network, other wireless media (such as acoustic, RF, infra-
red, or the like) or other transmission device or channel. This
may include computer readable instructions, data structures,
program modules or other data in a modulated data signal
such as a carrier wave or other transport mechanism. Said
transmission may be wired, wireless, or both. Combinations
of any of the above should also be included within the scope
of computer readable media. The instructions may comprise
code from any computer-programming language, including,
for example, C, C++, C#, Visual Basic, Java, Perl and the
like.

Components of a general purpose client or computing
device may further include a system bus that connects
various system components, including the memory and
processor. A system bus may be any of several types of bus
structures, including, but not limited to, a memory bus or
memory controller, a peripheral bus, and a local bus using
any of a variety of bus architectures. Such architectures
include, but are not limited to, Industry Standard Architec-
ture (ISA) bus, Micro Channel Architecture (MCA) bus,
Enhanced ISA (EISA) bus, Video Electronics Standards
Association (VESA) local bus, and Peripheral Component
Interconnect (PCI) bus.

Computing and client devices also may include a basic
input/output system (BIOS), which contains the basic rou-
tines that help to transfer information between elements
within a computer, such as during start-up. BIOS typically
is stored in ROM. In contrast, RAM typically contains data
or program code or modules that are accessible to or
presently being operated on by processor, such as, but not
limited to, the operating system, application program, and
data.

Client devices also may comprise a variety of other
internal or external components, such as a monitor or
display, a keyboard, a mouse, a trackball, a pointing device,
touch pad, microphone, joystick, satellite dish, scanner,
a disk drive, a CD-ROM or DVD drive, or other input or
output devices. These and other devices are typically
connected to the processor through a user input interface
coupled to the system bus, but may be connected by other
interface and bus structures, such as a parallel port, serial
port, game port or a universal serial bus (USB). A monitor
or other type of display device is typically connected to the
system bus via a video interface. In addition to the monitor,
client devices may also include other peripheral output
devices such as speakers and printer, which may be con-
nected through an output peripheral interface.
Client devices may operate on any operating system capable of supporting an application of the type disclosed herein. Client devices also may support a browser or browser-enabled application. Examples of client devices include, but are not limited to, personal computers, laptop computers, personal digital assistants, computer notebooks, hand-held devices, cellular phones, mobile phones, smart phones, pagers, digital tablets, Internet appliances, and other processor-based devices as described above. Users may communicate with each other, and with other systems, networks, and devices, over the network through the respective client devices.

Thus, it should be understood that the embodiments and examples described herein have been chosen and described in order to best illustrate the principles of the invention and its practical applications to thereby enable one of ordinary skill in the art to best utilize the invention in various embodiments and with various modifications as are suited for particular uses contemplated. Even though specific embodiments of this invention have been described, they are not to be taken as exhaustive. There are several variations that will be apparent to those skilled in the art.

What is claimed is:

1. A machine for evaluating reading fluency, comprising:
a stylus; and
a processor or microprocessor coupled to a display screen,
wherein the processor or microprocessor is programmed to evaluate reading fluency by:
presenting a text with a plurality of words on the display screen to a user to read;
receiving physical input from a stylus used by the user indicating when the user is looking at a particular word while silently reading a sequence of words from the text;
and
recording the sequence of words looked at, the period of time each word in the sequence is looked at, and the number of times each word in the sequence is looked at.

2. The machine of claim 1, wherein the display screen is a touchscreen, and machine receives input from the user by the user underlining or touching each word on the touchscreen with the stylus as the user looks at that word.

3. The machine of claim 1, wherein the processor or microprocessor is further programmed to perform the step of analyzing the reading rate, pauses, and regressions for the user reading the text.

4. The machine of claim 1, wherein the processor or microprocessor is further programmed to perform the following steps:
presenting a text with a plurality of words on a display screen to a user to read;
receiving physical input from a stylus used by the user indicating when the user is looking at a particular word while silently reading a sequence of words from the text; and
recording the sequence of words looked at, the period of time each word in the sequence is looked at, and the number of times each word in the sequence is looked at.

5. A non-transitory computer-readable storage medium with an executable program stored thereon, wherein the program instructs a processor or microprocessor to perform the following steps:
presenting a text with a plurality of words on a display screen to a user to read;
recording physical input from a stylus used by the user indicating when the user is looking at a particular word while silently reading a sequence of words from the text; and
recording the sequence of words looked at, the period of time each word in the sequence is looked at, and the number of times each word in the sequence is looked at.

6. The medium of claim 5, wherein the display screen is a touchscreen, and the program receives input from the user by the user underlining or touching each word on the touchscreen with the stylus as the user looks at that word.

7. The medium of claim 5, wherein the program receives input from the user by the user moving a pointer on the screen to point to each word as the user looks at that word.

8. The medium of claim 5, wherein the processor or microprocessor further performs the steps of analyzing the reading rate, pauses, and regressions for the user reading the text.

9. A method for evaluating reading fluency, comprising:
presenting, using a processor or microprocessor coupled to a memory, a text with a plurality of words on a display screen to a user to read;
receiving physical input from a stylus used by the user indicating when the user is looking at a particular word while silently reading a sequence of words from the text; and
recording, using the processor or microprocessor, the sequence of words looked at, the period of time each word in the sequence is looked at, and the number of times each word in the sequence is looked at.

10. The method of claim 9, wherein the display screen is a touchscreen, and the processor or microprocessor receives input from the user by the user underlining or touching each word on the touchscreen with the stylus as the user looks at that word.

11. The method of claim 9, where the processor or microprocessor receives input from the user by the user moving a pointer on the screen to point to each word as the user looks at that word.

12. The method of claim 9, further comprising the steps of analyzing the reading rate, pauses, and regressions for the user reading the text.

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