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# Online Feedback and the Real-Time Evaluation: Integrating Wireless Technology into Instructional Strategies

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**Abstract.** The tremendous development of technology has significant contributions in the educational field. Education becomes ubiquitous, as the interconnectivity between teacher and students across geographical and time constraints is plausible. Another essential part of instructional strategy is evaluation. It is important for the teacher to get feedback from students to evaluate whether the materials explained are understood. A system called “PDA-Based Real-Time Evaluation Media”, is proposed in this paper to permit the teacher to solicit each student’s online-feedback during class and evaluate them in real-time. Because of their affordability, versatility, and mobility, it is predicted that PDAs will be very popular tools that most of students can have.

**Keywords:** PDA, wireless connection, online feedback, real-time evaluation.

## Introduction

Assessment and evaluation are important elements in the educational process. On one hand, it is important for teachers to have a vision of their roles and responsibilities to provide the best teaching strategies for their students, and on the other hand, students need to know the quality of their learning. Appropriate assessment and evaluation can provide valuable information to teachers and students about whether the learning objectives have been achieved to satisfactory level. For this, *all* students should be actively involved and have the same right to receive feedback. With feedback, a student can learn his or her strengths and weaknesses that can be corrected during a course.

The common way of assessing student’s understanding so far is by asking questions orally and selecting some students at random. Obviously, the answer may not be representative of the class as a whole and the teacher will not know how well all the students cope with the materials explained until there is a formal written test. It is true that a formal written test can give more representative information, but it is time consuming for the teacher to correct them all.

## 1. The Current Issues of Utilizing Online Feedback in the Classroom

Classroom network technology is maturing and becoming widely available from many vendors [1]. Now that software, support resources, and systems are abundant, the question has extended from the use of technology in teaching and learning process to the use of

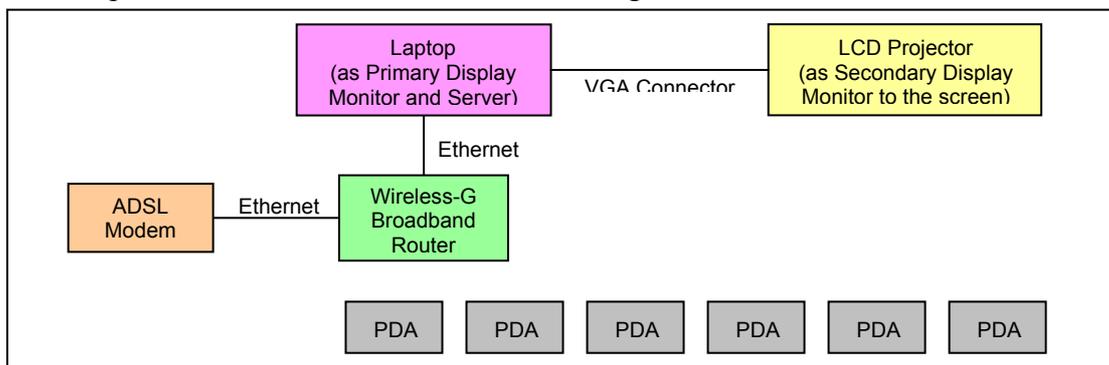
technology as a tool for collecting, storing, analyzing, and reporting evaluation data online [2]. Response keypads, special purpose devices for the students to enter their online feedback, are enjoying a boom. Various “online” response systems are well-developed to improve the interactions that take place within a classroom environment, such as Audience Response Systems [3], [4], [5]; Group Response System [6]; Personal Response Systems [7], [8], [9], [10]; Classroom Communication System [9], [11]; Classroom Performance System [10]; Fleetwood Reply Systems [10]; Texas Instrument’s TI-Navigator [12], [1]; etc. There are many applications of the existing response systems in the classroom, such as grading and scoring the students’ responses in real-time, evaluating whether the students understand the material taught and have a grasp of concepts, polling the students for their thoughts and opinions, and allowing problem areas to be identified. Since all students must participate, they are pushed to articulate their thoughts and to make a commitment to a particular line of reasoning. However, online keypad systems are not a cure-all.

Despite the promising potential of response keypads in education, there are some points that schools should consider before applying the systems. Among the major concerns are that most of the systems require “extra” registration charges each semester, besides the initial purchase of the transmitter; and the software used for the real-time assessment and evaluation are relatively expensive and sometimes they work only on certain Personal Computer (PC) or handheld computers [13]. The keypad is useful for giving online feedback, polling, or voting in the classroom only. Similar to a TV remote control, the keypad is not equipped with a keyboard; therefore the question types are restricted to multiple-choice. Since most of the systems use infrared to transmit the data, there is a distance limit and the infrared beaming posts must be unobstructed and pointing at each other. Another tool that is used for “online” feedback is the laptop computer. However, laptop computer is relatively expensive, so not every student can afford one.

## 2. The Proposed Scheme of “PDA-Based Real-Time Evaluation Media”

“PDA-Based Real-Time Evaluation Media” is a system of instructional media that permits each student to respond online to questions given by the teacher through his or her own registered wireless PDA and simultaneously to facilitate the teacher to give real-time feedback soon after the students submit their answers.

The process of data collection is shown in Figure 1 below:



**Figure 1.** The proposed “PDA-based real-time evaluation media” scheme for data collection

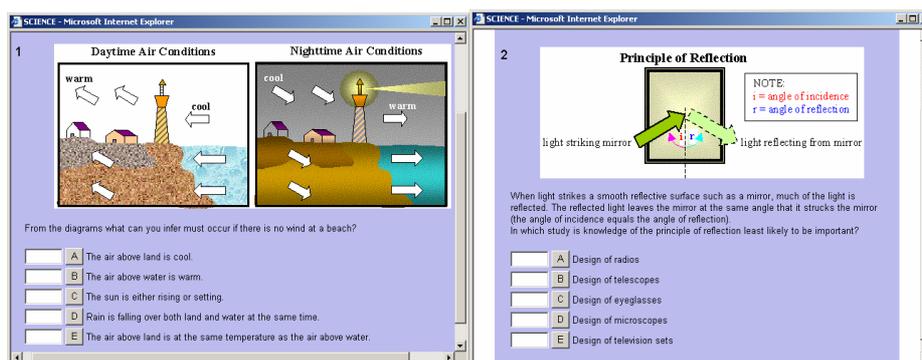
The components of the proposed system are as follows:

- Wireless PDAs with the minimal specifications as follows: WiFi, 64 MB memory, 3.7-inch VGA (640 x 480 resolution) display.
- Laptop as the primary display monitor and web server.

- LCD Projector (as secondary display monitor) + screen.
- Wireless-G broadband router.
- Wired LAN (Ethernet).
- Asynchronous Digital Subscriber Line (ADSL) modem (optional).

Using free software, *Hot Potatoes*, a teacher can create interactive multiple-choice, short-answer, and matching/ordering, to be loaded onto the internet. A multiple-choice test is preferred here since it is simpler to evaluate. However, the other test styles, such as short-answer, can be used since longer responses can be entered from the students' PDAs using an external keyboard, or a stylus. By publishing the questions on the website, by sharing a folder on the internet using slim HTTP (Hypertext Transfer Protocol) through a wireless-G broadband router, each student can see the questions on his or her own PDA which has been registered by the teacher earlier, answer the questions, and submit them individually. The PDAs transmit the data to the teacher's laptop as a server through the wireless-G broadband router. Soon after receiving the data, the teacher can analyze it statistically and automatically using Excel software, with a macro program, and/or SPSS, then the results can be displayed using an LCD projector and screen so that all students can see it. The display can be in a table, histograms, graphics, etc.

When students and teacher would like to connect to the internet, an ADSL modem is needed for connecting to an internet service provider. Some examples of the question display that will appear on students' PDAs are illustrated in Figure 2 below.



**Figure 2.** Examples of a question display

The questions in Figure 2 are created using *Hot Potatoes* 5.0 software. Obviously, students would find it easier to use laptops, Tablet PCs, or desktops to see the display. However, the price and the portability have been a deterrent.

### 3. The Advantages of the Proposed “PDA-Based Real-Time Evaluation Media” in Education

Some advantages of the proposed system of instructional media are as follows:

- The teacher can “send” the questions and each student can respond to them online.
- *All* students are involved.
- The teacher can monitor each student's answers and give *real-time* feedback.
- By seeing the statistical data presented by the teacher, each student can know his or her own strengths and weaknesses.
- Based on the track record of each student, the teacher can create responsive instruction by adjusting lessons as needed or identifying each student's learning problems.
- It creates an interactive teaching and learning process.
- It helps each student know what to study more.

- Since it tests material everyday, it helps students remember the material better.
- The system uses available, “free”, and common software.
- It increases human-to-human interaction in the ICT classroom.
- The recorded data of the feedback produced by the students and the evaluation given by teachers is a very valuable resource that the teachers and/or institution can retain and make available as a learning resource to future students.

#### 4. Conclusion

Evaluation is unquestionably vital in the educational system. Appropriate evaluation provides valuable information to teachers and students. PDAs with built-in wireless capabilities are gaining popularity. With their versatility, mobility, and affordability, it is predicted that PDAs will be indispensable and widely used educational tools. Combining them with a laptop, a WiFi router, and an LCD projector, PDAs can be used as powerful instructional media to refine assessment and evaluation procedures in education. Our proposed “Online Feedback” system using ‘PDA-Based Real-Time Evaluation Media’ combines formative evaluation and a wireless technology environment to offer an innovative instructional process in education system. It is hoped that the proposed system will make the teaching and learning process more fun, interactive, and attractive.

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