



# Portable Learning and Assessment - Towards Ubiquitous Education

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## Advantages of Handheld CAA Applications

Traditionally Computer Aided Assessment (CAA) has been provided to students through desktop systems, either standalone, or connected to a central server. Even where the advantage of portable formative CAA tools have been recognised, this has usually been in the form of laptop machines. However, such systems are relatively expensive, and require appreciable set-up time before use. For truly portable CAA, systems are required which;

- Make best use of limited financial resources
- Have minimal size and maximal portability
- Are designed to be 'immediately to hand'

The handheld computer, or Personal Digital Assistant (PDA), is an ideal platform for such a task. A PDA is already designed to be used quickly and easily when a limited amount of time or set-up space is available. In addition, commercial pressures keep costs to a minimum while still retaining a feature set useful for CAA applications. Such devices are presently the best hope for truly portable and ubiquitous learning and assessment.

## Ubiquitous Assessment Tools

We have created PDA based 'quiz' applications - initially text based and multiple choice in nature - which may link to stored course texts to enhance practical student centred learning, and which journal the pattern of student usage. Quantitative analyses can thus be made of student learning styles both within the 'quiz', and in conjunction with other PDA tools.

### Features of the Quiz Application:

- Deliver Multichoice Questions, single or multi-answer
- Record time taken per question/test
- Feedback can be displayed after question answered
- Question order can be dependent on answers given
- Can also be utilised as interactive text
- Quizzes can be beamed to other users
- Question file format is simple tagged plain text



The Quiz Application automatically adjusts the display to fit the text



Feedback can be given after the question is answered

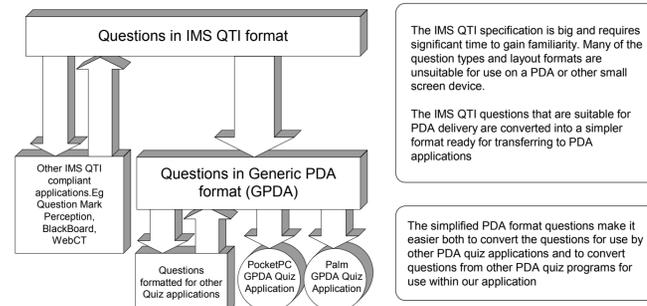


This project explores the use of portable computing to increase the flexibility of access and delivery of course material in higher education. It develops a system for learning and assessment delivery via Personal Digital Assistants (PDAs) and evaluates the benefits of such delivery for engineering and technology undergraduate students. The project targets an engineering environment, but has potential for use in many subject areas.

## Interoperability

Software has been developed to import questions from IMS QTI compliant applications into our application, permitting universal interoperability. This also allows the use of pre-existent question banks, such as that being constructed in the Faculty of Engineering at the University of Glasgow.

IMS QTI specification enables questions to be used in any IMS QTI Compliant application. The leading Virtual Learning Environments, such as BlackBoard, WebCT and Question Mark Perception, support CAA questions in this format.



## Opportunities for Quantitative Analysis

Journaling of PDA usage by students - both within the CAA applications themselves, and of the interaction between CAA and other handheld applications - is fundamental to the project. It allows quantitative analysis of student learning within the controlled environment of the CAA question set, and an insight into styles of student learning - how often students break from the CAA tool, how long breaks last, and what they do during those breaks.

AppLog is an application logging tool for use on PalmOS PDAs. It has been written to assist researchers studying the use of PDAs.

Applog records the time, date and application identifier whenever an application is started on the PDA.

When the PDA is synchronised with the desktop application the log file on the PDA is processed to produce a text file on the desktop system containing:

- Application identifier
- Date and Time the application was started
- How long the application was used

The file produced is in tab-separated format suitable for use with spreadsheet and database programs.

AppLog records details of applications used on the Palm

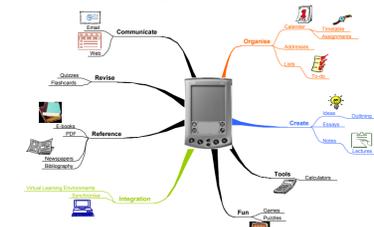


Time (Secs)	App	Date and time	Runtime
1021754671	lnch	Sat May 18 21:44:31 2002	7
1021754678	mail	Sat May 18 21:44:38 2002	97
1021754775	lnch	Sat May 18 21:46:15 2002	3
1021754778	JTPP	Sat May 18 21:46:18 2002	88
1021754866	lnch	Sat May 18 21:47:46 2002	7
1021754873	trgf	Sat May 18 21:47:53 2002	21
1021754894	lnch	Sat May 18 21:48:14 2002	3
1021754897	JTPP	Sat May 18 21:48:17 2002	194
1021755091	lnch	Sat May 18 21:51:31 2002	11
1021755102	mail	Sat May 18 21:51:42 2002	46
1021755148	lnch	Sat May 18 21:52:28 2002	9
1021755157	JTPP	Sat May 18 21:52:37 2002	396
1021755553	****	Sat May 18 21:59:13 2002	261

## A Culture of Ubiquitous Assessment

The effort required to participate in any learning or assessment exercise is often a practical hurdle for less confident students. An additional benefit of using PDA devices is that commercial pressures have already been brought to bear to make PDA application usage as intuitive as possible with consistent and simple user interfaces. CAA applications designed within these guidelines feel 'familiar' and it is quick and easy to learn how to use them.

Students also benefit from the practical applications - such as organisational tools, notepads, and e-books - allowing them to integrate their learning and assessment naturally into their workstyles, under their own control, thus further reducing hurdles to use.



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