

# Applications of Mobile Technologies in Competency and Skills Education

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## Introduction

A focus on workplace performance has taken centre stage in the global competition for economic success. Educators are expected to contribute to solutions to improve graduates' entry level competencies and skills and their relevance to the workplace. If educators are to obtain direct evidence of competencies and skills, a concomitant increase in testing activity and time will be required. If, for example, it is necessary to collect 50 competencies across 150 students, how will students be assessed, data recorded and reports be prepared?

It will be shown that mobile technologies can provide a means to accomplish improved results in the management of these data. New benefits previously not possible using existing ICT, are made possible using mobile technologies. This paper describes a mobile-based systems model developed by researchers at Institute FRIS (First Robotics Industrial Science) to capture and manage skills and competencies data on a handheld mobile device.

FRIS's research objective was to determine the technical and pedagogical usability of mobile technologies to manage and assess competencies and skills in occupational training. The mobile

occupational skills learning management project was started in 2003 at FRIS, Penang. At that time mobile PDA technologies lacked wireless features, cameras, large memories, hand phone features and an ability to play back video and audio. WiFi and 3G were not in wide spread use in 2002.

## Mobile based systems model

FRIS researchers reviewed developments and future forecasts of mobile technologies. A systems model was developed for managing occupational and learning data (so called SKILLS). This model was designed to take advantage of new features forecast to appear on the market during the research and development period. This SKILLS model outlined features then not available in ICT systems. A diagram of this model is presented in Figure 1.

The SKILLS model has several key target design features, namely:

- Organises occupational tasks and learning management in a mobile device.
- Access to occupational task lists for target occupations on a mobile device.
- Access to trainee information, biodata, assigned learning outcomes and current performance assessments on a mobile.
- Links occupational tasks to learning modules, assessments and trainees.

- Access linked lecture plans and instructional resources on a mobile device.
- Assesses each performance based on a set of common performance criteria.
- Assesses performance on a five, three or two interval weighted scale.
- Automatically records rater's initials and dates of skills assessments.
- Access to a trainee's competency learning curve assessments with dates.
- Produces instant skills records and other reports.
- Stores multimedia video, images and audio records in a trainee's records.
- Stores up to 4 years of lecture notes on a 1 GB memory stick. (4 GB now available)
- Stores Power Point presentations with audio.
- Saves time and costs in the collection of performance data in class, laboratory, workshop, workplace and elsewhere.
- Displays convenience and ease of use to access performance records of a trainee.
- Operates in a LAN based environment and have on and off site Internet accessibility.
- Access to data from many servers with many databases.
- No requirement for keyboard entry.
- Connects PDA to an LCD projector or PC screen for full screen presentation

## The development of the model

During a two-year development period FRIS carried out on-site studies at SHRDC (Selangor Human Resource Development Center) which conducts industrial training, for a wide variety of clients including multinational companies, using a CBT (Competencies Based Training) model. Here, the SKILLS model for management of competencies and assessment of skills was introduced.

Interviews were conducted to obtain user feedback. Users cited the advantage of SKILLS as the ease of use and saving of time to capture and record assessments. Typically courses contain 100 or more competencies. Competencies assessments were obtained in a number of ways, including in-class instructor assessments, completed in-lab activities with required end results and question and answer sessions with individual trainees. Trainees equipped with mobiles and specialized software can beam their answers to the instructor where they are compiled to produce a summary result. Feedback obtained from SHRDC staff was used to modify the data management design.

Based on these and other inputs, several changes were introduced, after SKILLS had undergone six months of field trials. Based on

the field trials, SKILLS was modified, to include the following features:

- Assesses performance based on tasks - skills criteria sets.
  - Sorts learning modules into common sets.
  - Allows soft or generic to specific skills - learning module continuum.
  - Enters criteria for a competency checklist as: 'can', 'cannot' or 'not assessed'.
- Views and enters performance criteria on PDA

SKILLS version two is now in use at SHRDC. So far no new feedback has been obtained. A second six-month field trial is being conducted and will be reported on when resulting data has been reviewed.

## Future Research and Development

Future mobile technical developments are expected to include: WiMax accessibility, continued merger of hand phone and PDA features, terrestrial TV, wider area access to wireless broadband services, improved graphics user interfaces and decreased cost of mobile devices of all kinds. It is expected that these developments will result in a greatly increased population of users. Additional technical features now appearing include larger screens or mini projection systems,

larger memory sticks of 4GB or more, special components such as GPS for mapping and location applications, RFID applications, external sensors, use of mobile systems for payment and other applications too numerous to mention.

Pedagogically, rapid progress is being made in the development of learning objectives and their repositories. In Canada the repositories include: CAREO, Cancorc, POOL, BELLE and others. R&D is continuing to further develop SKILLS Learning Management System to enable selection and aggregation of selected learning objects into SKILLS Learning Modules. Additional Meta data descriptions for learning modules and their content will be added to ensure compliance for LO exchange with learning object repositories.

Technical and pedagogical features of PDA applications are forming the bases for mobile delivery of learning in the workplace and elsewhere. We expect lower costs of mobile devices to open up this global market. This will be followed by large increases in the availability of learning content to suit all kinds of learners. R&D at SHRDC and at FRIS will continue as new technical and pedagogical user features appear.

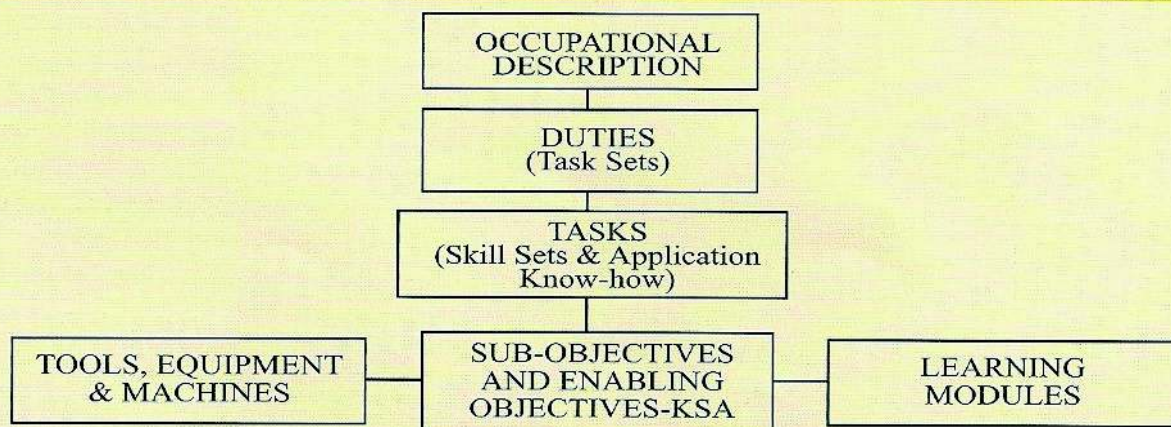


Figure 1: Job Oriented Descriptors Model