CAAS: A practical assessment tool

Introduction

The assessment of practical work has traditionally been a very subjective affair, often lacking accuracy and validity. This paper will address the issues of practical assessment and introduce an assessment tool that addresses these issues.

Practical assessments or the assessment of the practical component of competency, takes many forms:
- observation, for example, by a supervisor or trainer;
- demonstration, where the person being assessed performs a specified task and the outcome is measured and the process is observed;
- project based, where the performance of the task is largely unsupervised and the completed project is assessed;
- simulation, where training and assessment on the real equipment is not feasible.

These methods, tried and proven as they may be, by themselves clearly will not guarantee accuracy, validity or results that are comparable. We have to examine the issues raised by the needs of a statewide or national assessment system and examine the needs of those involved in assessment to evaluate assessment methods and assessment tools.

The issues of assessment in a state or national system

The Australian Vocational Education and Training System decrees that assessment should be based on the following principles:
1. *Competency-based training*
   Assessment approaches should measure the range of knowledge and skills and their application against the competency standards developed by industrial parties and endorsed by the National Training Board, as applicable.
2. *Flexibility in approaches*
   Assessment approaches should be flexible.
3. *Validity*
   Assessment approaches used should be appropriate i.e. the techniques used must actually assess what they claim to assess.
4 **Reliability**  
Assessment approaches should be able to be relied upon.

5 **Recognition of prior learning (RPL)**  
Assessment approaches should provide for the recognition of competencies held, no matter where they have been acquired.

These principles are sound and Computer Assisted Assessment System (CAAS) supports and formalises these five principles.

1 CAAS is **competency-based** by being criterion-referenced and measuring the outcomes accurately and objectively;

2 CAAS is **flexible** because it may be used at any stage of training for tasks of any degree of complexity;

3 CAAS is **valid** because it allows the trainer/assessor to tailor-make the assessment for the task;

4 CAAS is **reliable** because it largely removes subjectivity and it allows the learner to validate the result;

5 CAAS **supports the RPL concept** because it measures outcomes, not inputs.

Any state or national system of course needs these principles applied in a variety of workplaces and training institutions and it needs standards that apply equally no matter what the tasks, that are assessed in various places. Once these standards have been set, they can be applied very easily with CAAS.

**The needs of people involved in assessment**

Just as assessment is a crucial part of any national training system, it is crucial on a technical and personal level to the people it involves.

The three distinctive groups with an important stake in assessment are:

- the administrators of state and national systems that need to accredit, compare and enforce the standards of individual training providers;

- the trainers and assessors who have to make decisions and comparisons on individual learners;

- the learners whose careers are at stake and whose working futures are influenced by the assessment outcomes.

Any assessment system must cater for the needs of the people it serves and as shown previously, CAAS does meet the five demands put out by the Australian Vocational Education and Training System.
### THE NEEDS OF TRAINING PROVIDERS

<table>
<thead>
<tr>
<th>Needs of Training Providers</th>
<th>How CAAS Fills Those Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>An assessment system must be easy to use by all teachers and trainers</td>
<td>CAAS has graphic prompts and detailed instructions for quick and easy use</td>
</tr>
<tr>
<td>An assessment system must be accurate</td>
<td>CAAS is computerised for all logic decisions, arithmetic and recording tasks</td>
</tr>
<tr>
<td>An assessment system must be well accepted and fair</td>
<td>CAAS is objective and bias free and preferred by students</td>
</tr>
<tr>
<td>An assessment system must be tailor-made to cater for specific tasks</td>
<td>CAAS can be programmed to assess any task quickly and easily</td>
</tr>
<tr>
<td>An assessment system must give feedback to learners</td>
<td>CAAS prints out a detailed record of every check made and programmable comments</td>
</tr>
<tr>
<td>An assessment system must be able to show progress of individuals or groups</td>
<td>CAAS generates detailed reports on individuals and groups</td>
</tr>
<tr>
<td>An assessment system must be reliable</td>
<td>CAAS data is secure and well protected</td>
</tr>
<tr>
<td>An assessment system must be efficient</td>
<td>CAAS has rapid feedback for trainees and staff</td>
</tr>
</tbody>
</table>

### The needs of training providers

Assessment is arguably the most crucial part of any training program. It must be accurate, not only for the learner’s sake, but for the evaluation and validation of the whole training process itself. Certainly, under a competency-based system where the primary outcome is a yes or no decision on the learner’s competence to do a specific task, rather than a grading, there is added pressure that the outcome of the assessment process is directly and accurately linked to the criteria and standards. This demand for competency-based assessment makes it vitally important that the assessment is based on accurate measures and objective checks.
This demand for accurate measurement and objectivity has been the driving force in developing CAAS over the past ten years. Digital measuring tools, linked to a computer, provide the accuracy and the formal sequence of checks with detailed, often graphic instructions to the assessor assuring objectivity. This approach has proved to be extremely successful and has allowed the ACM Training Centre to achieve a number of very important objectives in our practical assessment strategy:

- All instructors can deliver the assessment for quick same result;
- Assessments can be done immediately for quick feedback;
- The assessment is open and trainees can be actively involved.

Like most training providers, the ACM Training Centre uses a range of models, projects and exercise for practical training and assessment. CAAS therefore, had to be flexible enough to accommodate all those tasks ranging from welding to precision machining to electrical work (over 100 practical tasks in all). It is one of the great features of CAAS to have that flexibility and still be easy to use, allowing us to generate an assessment program quickly and thereby removing one of the barriers to innovation and the implementation of change.

The needs of learners

To demonstrate the demands on CAAS as an assessment tool, let me cite the example of overseas applicants asking for papers as tradespeople. They were referred to ACM Training Centre by the authorities to undergo a 'trade test'. We designed practical exercises and set down the assessment criteria, conducted the assessment and found that the great majority of candidates did not meet the required standard. It was very disconcerting for us as trainers to see such a high rate of 'failures', but the assessment through CAAS was based on firm and realistic criteria and hence, the results were unassailable. No doubt, the negative results were even more disappointing to the candidates, but CAAS allowed us to give them objective advice on their skill gaps and initiate remedial training programs. This example again highlights the needs of learners for accuracy and objectivity in assessment above all else.
THE NEEDS OF LEARNERS | HOW CAAS FILLS THOSE NEEDS
---|---
The assessment must be correct, no matter who the assessor | CAAS prompts the assessor with detailed, graphic instructions and will give the same result with different assessors
The assessment must give clear feedback of details, not just a result | CAAS prints information on every check including notes, sizes and subtotals
The assessment should be open to scrutiny | CAAS print-outs allow each check to be scrutinised
The assessment must be timely | CAAS allows for quick feedback
The assessment must be valid | CAAS can be tailored to specific criteria

Product description
CAAS is a software package designed specifically for competency-based assessment of practical skills, processes and objects on low cost computer hardware.

It is an expert systems which instead of being pre-programmed at purchase, allows users to incorporate their expertise once, and then use it as many times as is required to undertake assessments.

Every assessment undertaken will automatically have exactly the same conditions, standards and incorporate the same procedures, therefore providing speed, accuracy, consistency, and equality in assessment.

Product design features
CAAS is an assessment tool that uses the expertise provided to it to develop assessment processes which include standards, limits, assessment processes which include standards, limits, assessment
Testing Times

Techniques, graphics, prompt information to the assessor, instant feedback to the trainee and an automated interface to a wide range of digital measuring tools and equipment.

This is then automatically translated into a real time - on screen assessment process where the trainees' skills are evaluated and automatically assessed. When the overall assessment is complete the system checks the actual trainees' results against the skills and competencies required and decides whether the overall competency has been achieved. The result is then placed in the system database which has powerful report generation and trainee progress reporting facilities.

The trainee is closely involved with the assessment process and can use CAAS as a self assessment tool if required. They receive a complete print-out listing all details of the assessments undertaken, including information on standards, marks available and allocated, programmable comments from the system or assessor and a detailed summary of the overall mastery decision.

A separate video screen is also supported by the software which provides item by item feedback for the trainee on current and previous assessment steps to ensure the trainee understands and accepts the assessment process.

General features

- Fully supports competency-based training and assessment
- User can develop their own assessments
- Run pre-designed or third party assessments
- Distribute assessments to other providers
- Runs on any 100 per cent compatible personal computer (80286 and up)
- No expensive specialised hardware required
- Expertise is provided once, then utilised many times over
- Wide trainee/trainer acceptance
- Self documenting assessment procedure
- Fast, instant competence assessment
- Efficient utilisation of staff time
- No 'bookkeeping' or menial work required
- Totally repeatable and verifiable
- Absolutely unbiased and gender neutral
- Powerful administrative functions
- Instant trainee reporting and progress monitoring
- Easy to use at all levels
Testing Times

- Information always provided to the assessor
- Very compact data and image storage
- Supports dual monitor configuration
- Extensive diagnostic tools for developers

Unlike many computer-based educational packages that need complex and costly information storage system (CDROM, Video Disk etc) CAAS image, record and presentation control storage is extraordinarily compact.

The ACM Training Centre’s system has three full year’s results (approximately 15 000 individual assessments), three year’s trainee rolls, 122 complete assessment procedures, 1256 screen images and 752 trainee semester reports completely stored in 11.7 megabytes.

This efficiency allows CAAS to operate on systems that most educational software packages could not even be installed on, let alone function fully and provide extensive storage capacity.

Assessment methods and results

CAAS is an expert system that allows an extremely wide range of assessment methods to be automated. As an expert system it does not restrict assessing methods and results and once expertise is provided, it automates the assessment and result storage process. This allows subject matter experts or curriculum development staff to develop once only, high quality assessment methodologies and results processes and to be sure every further assessment undertaken on the system meets their original criteria.

Evaluation processes and results

CAAS provides automated evaluation and result production. Because it is in full possession of the assessment criteria it can instantly evaluate trainees’ results and provide whatever level of feedback is desired, to all the parties involved in the training process.

Its record keeping facilities not only allow routine listing of outcomes for the trainee and supervising staff, but undertake statistical analysis on the results instantly to assess the trainee and organisation to ensure outcomes and trainee progress are to the required standard.
CAAS takes the reporting process beyond the listing of assessments. Industry is vitally interested in skills mastery, not cryptic module titles and CAAS can provide a ‘skills mastered’ summary for each assessment passed. This greatly enhances industry acceptance and involvement in competency-based assessment.

CAAS has been developed and tuned after extensive trialing and industry feedback to directly meet the needs of competency-based assessment.

Innovative features

CAAS is unlike any other software tool our research has been able to find applied to educational assessment either nationally or internationally.

Whilst there are a substantial number of packages available for computer-assisted learning and computer-managed learning, computer assessment using user customised expert systems seems to be a totally new field. Overseas investigation also points to this being a new innovation and is attracting substantial interest. Representatives of overseas trade missions have taken great interest in CAAS.

CAAS has been designed with wide issues in mind. All assessments created are easily distributed if required, allowing individual users to obtain assessment modules from other users or even from national bodies. CAAS can form the assessment core of a truly national system and encourages common assessment practices and communication between providers. Unlike some computer packages which retain all rights to applications created with their software, CAAS applications are copyright free.

Cost effectiveness

The CAAS package saves massive amounts of administration time. The time and resources needed for assessment have been reduced by over 50% with further savings in long term administration and record keeping costs.

In busy training providers, CAAS will pay for itself in just a few months and continue to show positive and verifiable cost savings into the future.
Testing Times

Typical time required

<table>
<thead>
<tr>
<th></th>
<th>Manual</th>
<th>CAAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time per assessment</td>
<td>8 min (ea)</td>
<td>5 min (ea)</td>
</tr>
<tr>
<td>Time for recording</td>
<td>3 min (ea)</td>
<td>0 min</td>
</tr>
<tr>
<td>End of term reports</td>
<td>3 min (ea)</td>
<td>1 min (ea)</td>
</tr>
</tbody>
</table>

Trainee reporting is also far more efficient as each trainee receives a print-out of their assessment which further assists the cost-effectiveness of the system.

Summary

CAAS is a completely new and innovative concept, unlike any product in use.

Not only is it time- and cost-effective, it genuinely improves the quality of training, which ensures competency-based training and assessment is effectively applied and accepted.

Endnote

1 'Competency' is the ability to do a specific task to a defined standard under industry conditions.