1. How and why the CAMI system works.

The CAMI system works because it is totally different in design.

To understand this statement, it is necessary to look philosophically at educational software design, development and evaluation.

The historic perspective documented below will also help to answer this question:

2. How your initial assumptions were devised and proved to be effective.

The best is perhaps to look at a historic overview of our reasons for existence, as well as the technologies employed:

Preamble

The personal computer debuted in 1979 in the market and by 1983 there were already a number of maths programs available for use on these machines. The style of programming used by these programs were either CBT - Computer Based Training, using the computer as a tutor, or Games, where the computer was used to entertain, educationally.

At that time Sarie Vorster became interested in the concept of setting up an after-school centre, in order to specialise in computer aided maths tuition, based on 20 personal computers linked in a network. During 1984 the school was started in Johannesburg and all the educational software available on the market was purchased.

Once used, the existing programs were found to be too slow and ineffective for the school environment, where results are demanded. Sarie's husband, Charl, then became involved with the creation of a new technology for computer usage, where the computer is mainly used as a knowledge retention and skills transfer device.

Charl, a professional engineer in background with degrees B. Sc., B. Eng (Mech) and MBL (a 4-year MBA), studied the lack of results from traditional educational software and started to apply the engineering and business concepts of Efficiency (doing things right), Effectiveness (doing the right things), Quality (fitness for purpose) and Productivity in order to open up new frontiers in educational technology.

A comprehensive literature search yielded no useful data, as most of the documented experiences related to observed behaviour and results, rather than new technologies to improve the effectiveness of computer aided teaching. To a large extent, the computers were used either as a paper-substitute or a teacher-substitute, with no concomitant increases in productivity.

It was clear that it was necessary for a breakthrough in thinking to yield the required results. Remember, parents were paying us for results, and results only, so we were forced to develop high performance, high productivity software in order to help our clients.

This pressure led to us incorporating a new, innovative work system based on empirical creation of new hypotheses, designing software to suit the performance criteria and then to test it in practice.

The new software so developed produced the required results and it laid the foundation for the actual birth of CAMI - an acronym for Computer Aided Maths Instruction.

The years 1984 - 1987

During the first 4 years, the foundation of CAMI was being laid through empirical experimentation and the measurement of results obtained in practice. Sarie operated and taught maths in the maths school during the afternoons and Charl developed new technologies during the evenings to solve problems that were uncovered during the day.

The critical variable measuring the productivity of the teaching system was defined to be the throughput – measured in sums completed per minute. The concept of" throughput" was then broken down further into its sub-components.

Once the critical variable has been defined, methods were devised to improve this. All time-wasters such as games, verbose instructions, use of animation, etc. were eliminated. Superfluous keystrokes were removed and the user interface was aligned more towards mimicking the actual problems seen on exam papers.

New Speed Tests were developed and a new measuring tool, the "Performance Index" was postulated.

This new style of programming, which we termed the "Practice for Skills" approach, was defined, concentrating on the retention of knowledge and the actual transfer of skills, instead of just being another tutoring tool.

All the time, the programs were getting faster and faster and the results of the pupils coming to the CAMI math school increased dramatically. It was becoming clear that we were indeed pioneers in this new style of programming.

The years 1987 -1992

By 1987 the programs were expanded higher up, to reach beyond year 12 level, as well as lower down, to start at pre-school level. The company was essentially still in the development phase and the software improved in leaps and bounds.

The Performance Index for Speed Tests rapidly improved over these years, from a typical mean of 10 to a "normal" PI of 20. The better students regularly achieved PI's of 30.

What is interesting is that up to 1992, no advertising was done. At start-up in 1984, the local newspaper carried a small news item on the opening of our maths school, and since then, the news spread rapidly by word of mouth, based on the good results that were being achieved by our pupils.

The years 1992 -1994

By the end of 1992, the owner of a private school with 800 students, Dr Tersia King, evaluated maths software with the aim of introducing it into her school. She heard about our good results and after some negotiations, the first copy of CAMI Maths was sold to her school.

During 1993, we supplied another 20 schools with CAMI software, all having heard through the grapevine that we were now selling our software to schools. During this year we also attended our first commercial exhibition, the Instructa '93 exhibition for educationalists.

By 1994, it was becoming clear that CAMI is the technology leader in maths software. This year also saw regular advertising in a number of publications, attendance at a number of exhibitions such as Instructa, Bexa Computer Fair, Calis expo in Bloemfontein and Computex show in Durban.

We were also requested to present papers on the abilities of our software at University of Pretoria, at NOTMO, the Northern Transvaal Mathematics Organisation and at the Calis (Computer Aided Learning In Schools) expo in Bloemfontein.

The schools rapidly embraced the new learning technologies offered by the CAMI system and soon a competitive spirit had schools competing in mental maths, using the CAMI speed tests as a basis. The PI's rapidly improved and once 40 was breached; the new champion was crowned at an unheard of high PI of 65!

The years 1994 - 1997

During these years, CAMI was established to be the de facto leader in maths software in this country. It was found that if schools purchased anything else, they returned to us within one year to replace the other software.

By mid-1996, we have started to sell the full range of CAMI software into the home market, thereby extending our penetration deeper into the market and today there are tens of thousands of pupils using the software in the home environment.

Furthermore, the well known schools such as King Edwards and St John's in Johannesburg, Grey College in Bloemfontein and SACS and Rondebosch Boys schools in Cape Town installed CAMI software in their computer centres. Countrywide, the results from schools had proved that the new style of programming whereupon CAMI is built, is extremely successful when results are required quickly.

From 1998 we contracted with international operators which soon opened up distributors in the UK, Australia and Finland. Universally, we have found that educators are highly thrilled with the programming style adopted by CAMI and in their words, they "have never seen anything like this before".

During this time, we did research into learning difficulties amongst younger children, when we discovered that their Perceptual Skills were underdeveloped. This led to us designing and developing CAMI Perceptual Skills Builder, the most comprehensive Foundation Phase product used in the world.

Similarly, when we found that some pupils could not excel in mathematics, just because of their reading difficulties, we again researched the reading problem, to then develop CAMI Reader, a comprehensive English reading and language system.

Later on, an entry level English system based on phonics and the correct use of letters and words was added – the CAMI Literacy system.

Beyond 2000

The year 2000 saw the erection of our own building, CAMI House, in Fir Drive,

Throughout this discussion of our history, you will note the strong focus on results. To this day, our prime responsibility is still towards children going to schools for maths, reading and perceptual lessons. We are daily still under pressure to perform and to produce results.

Record PI

At the most recent CAMI speed test competition, held on 24 October 2009, a Grade (year) 5 pupil smashed a PI of 100 for the first time.

In 400 seconds he completed 732 sums, 684 of them correctly, for a PI of 102.6!

There is no other software in the world that can even remotely come close to this level of performance.

And in a nutshell, that is the reason for our success – we put significantly more operations through the head of the child in a given period of time, making CAMI the most efficient, the most effective and the educational software with the highest productivity in the world.

CAMI is currently running in over 1200 schools in South Africa. With an average size of 900 pupils per school, there are more than a million pupils working regularly on CAMI at this moment in time.

3. The Functions of CAMI.

It is not easy to describe the functions of CAMI. It is sufficient to make the statement that your clients should experience the use of CAMI in their own environment.

The allure of CAMI software goes beyond the user interface. It incorporates the psychology of pupils becoming enthusiastic about maths. It includes maths teachers that realise that they have a powerful tool in their hands with which they can change the lives of children.

It prepares pupils for the higher level careers if they prove themselves capable of excelling in mathematics.

So the best way in which I can answer this question is by inviting any school to put our software to use and to closely monitor the results attained.

4. What Research was done that proves its effectiveness, including samples and case studies.

We never did external research, as all of the research during the first 10 years of product development was done in-house, on the pupils that came to our own maths school for extra lessons. They were our live test bed and we continuously refined the software over the 10 years of development until it was the best by a large margin.

Even to this day, CAMI is still 3 times faster than any other maths software available on the market. The dominance has continued to this day.

5. Worldwide, in the school system, how many students have used, or are still using, any CAMI progress, and what is the age coverage of these students.

CAMI software is applied from the pre-school level, at age 5 and it is used to the final year of the school curriculum, typically by 17-18 year old pupils.

Globally, more than a million school users access the CAMI system regularly.

In Australia, more than 10 000 home users access the CAMI system regularly.

6. Feedback from schools in a variety of countries, eg. UK, Sweden, Finland, Australia and South Africa.

We have never solicited feedback from users in other countries, because we have never tried to sell the software based on results from other countries. We believe that every country is unique in its approach towards teaching, and it is up to us to make sure that we best adapt our software to the learning environment used in each country.

For example, in South Africa CAMI software is more popular in schools, whereas in Australia, it is used more in the home environment. In Finland, our software is mainly used by occupational therapists in hospitals where brain-damaged patients are re-learnt the basics of education.

The Department of Education is keen to see the reports, so they can finalise the decision to introduce CAMI into the school system.

A separate report, which details the introduction and progress of Cami into the South African school system, would be of great help in showing the Department of Education how CAMI can be rolled out into a national school system.

We have witnessed two computerisation projects into 2 of the regions.

Western Cape Province went very professionally about it and has documented their implementation of computers into more than 1000 schools very carefully at the site www.khanya.co.za. We would suggest that the schools use their website,

and especially, their documentation section, where they have listed the complete project management of the implementation.

The Khanya project has been ultra successful for a number of reasons: They have "banned" the teaching Microsoft Office-type software and have instead concentrated on the exclusive of Educational software for Maths and Literacy. As a result, CAMI software has been widely used and has been ultra successful.

The project is on such a big scale and the implementation is so well done that we would like to suggest that officials visit the Khanya people in Cape Town, to witness the implementation and to question the officials on the successes as well as the pitfalls, problems and failures that they have had, and how they have overcome those challenges.

In contrast, the Gauteng Department of Education rolled out hardware to 2000 schools, concentrating on connectivity (every child an e-mail address) and the teaching of Microsoft products. The project has been a miserable failure in educational terms.

So, instead of our company trying to explain how to implement the CAMI system, it would be far more productive to put them into contact with the actual day-to-day users of our software and to ask their question directly to the Khanya staff.

I hope that these words will help any department get a better understanding of the way in which our software was developed – it was done to solve a practical need. In doing so, we have created the most effective system in the world, and we invite any school to use it in their own environment.