1 THE BREAK-THROUGH

1.1 The DBD

For the first time affordable and commonly available technology is adapted to increase productivity in education. The increase in productivity means that the quality in education is increased while the input is decreased, primarily the decrease of teacher’s time and therefore the decrease of education cost.

This is achieved by means of the development of the DBD (digital disk book), the real e-book on DVD-basis. The DBD functions on DVD-basis, therefore providing an e-source big enough to integrate the different sources of communication, namely the spoken word, the written word and the hypermedia image. The structure of the DBD can be illustrated as follows:

Structure of the DBD

![DBD Structure Diagram]

1.2 Increase in quality

Enriched communication and information transfer

By using the DVD-basis and the above structure the managed use of the different communication types can be realised in order to increase the richness of the teaching support. In this way the modern types of communication that is being used by learners can be incorporated in one source. The development of communication and the characteristics of modern communication can be illustrated as follows:
The development of communication

While modern communication realises in the everyday world of people according to the third era characteristics, in education use is primarily being made of communication types typical of the second era.

**Increase of average teaching quality**

The DBD supports the increase of quality of contact education. The typical elements of the contact teaching and learning lesson can be illustrated as follows:

When the elements: explanation, interpretation, demonstration and provisioning of information is being put on the DBD the advantages are as follows:

- the teaching support is provided by the best teachers;
- new curricula and syllabi can be introduce with much better results;
- inexperienced teachers can in this way be coached and receive in-service training and education;
- education managers knew precisely what is being done in class;
- learners can work through the work on their own time – therefore real individualisation and differentiation realise; and
• the learners can review the work which they cannot do with the (living) teacher.

It is particular the fact of ‘reviewing’ that increase the academic achievements of learners. The value of reviewing of teaching is explained by the research of Rizzolatti, Fogassi & Gallese that were reported in the article *Mirrors in the Mind* in the journal *Scientific American*, Nov 2006 which report the following:

• Actions performed by one person can activate motor pathways in another person’s brain responsible for performing the same action. This occurs without the second person doing anything.

• The pattern of activity was a true representation of the act itself.

• These “mirror neurons” provide a direct internal experience and therefore supports the understanding of another person’s act, intention or emotion.

• Confirms the importance of the use of hypermedia. Several repetitions of (re)viewing of the same teaching activities, strengthen the acquired ‘pathways of mirror neurons’. This increases the portability and transfer of learned competences (knowledge, skills and attitudes) to new situations.

1.3 Decrease of input/cost

The decrease in input, namely the decrease in teacher time can be explained by the following figure:

Example: Teaching Maths Literacy, to 5 groups of Grade 8-learners

<table>
<thead>
<tr>
<th></th>
<th>Per 1</th>
<th>Per 2</th>
<th>Per 3</th>
<th>Per 4</th>
<th>Per 5</th>
<th>Per 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gr 8a</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
</tr>
<tr>
<td>Gr 8b</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
</tr>
<tr>
<td>Gr 8c</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
</tr>
<tr>
<td>Gr 8d</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
</tr>
<tr>
<td>Gr 8e</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
<td>DBD</td>
<td>T(p&amp;r)</td>
</tr>
</tbody>
</table>

DBD – teaching provided through DBD, T(p&r) – teacher provided problem solving and re-inforcement in the class

From the above figure it is clear that when the DBD is fully applied, up to 50% of teacher time can be saved. Other combinations are also possible, for example, teacher assistants can be used to supervise the learners while working on the DBD’s. At least a 25% saving of teacher time and about 20% of the accompanying budget can be realised.
2 PROVEN BY RESEARCH
The applicability and effectiveness of the DBD was tested in three research projects with the following results:

- DBD supports increased academic achievement in foundation phase: Klopper (2006).
  A group of 40 Grade 2 learners, that used the DBD, achieved statistically significant higher in the standardised Vasi-Maths test and Essi-reading and spelling test than the control group.
- The DBD supports increased academic achievement in Geography in teacher education: Van der The Westhuizen (2006).
- The DBD supports increased academic achievement in map work in Grade 10 Geography: Golightly (2006)

3 ADVANTAGES OF THE DBD-IN-EDUCATION
The following is some of the advantages of the DBD-in-education:

- The quality of teaching in classes is transparent to everyone, to education managers as well as the general public.
- The DBD-in-education supports an increase in academic achievement, as was proven by research.
- By means of the DBD the issue of efficiency in the language of teaching and learning (regarding learners and educators) can be catered for much easier.
- The DBD can serve as a powerful instrument in teacher development (educators learn through coaching).
- The ever-changing demography of learners can be handled much easier. It is easier to provide an extra DBD than an extra teacher when an unexpected number of new learners enrol at a particular school.
- The provision of teachers can be handled with much more ease. The differentiated shortage of teachers regarding, for example, subjects or needs in rural areas as well as problems such as retirement, absence because of illness and attending workshops is not the biggest problem anymore.
- Better use can be made of teacher assistants to provide quality education.
- Finally, the DBD supports an increase in education productivity, meaning an increase in quality and eventually a decrease in education expenditure (budget).
- The DBD-in-education can be supportive in the realisation of the targets set out in the White Paper 5 for expanded access to Grade R by 2010.

4 POSSIBLE RISKS
In order to escape the possible risks, careful attention should be given to the following:

- The introduction of the DBD should be handled carefully and widely propagated. Teachers should never get the idea that the DBD is introduced to eliminate their important role or to decrease the number of teachers. It should be clear that the DBD is being introduced to assist teachers to better execute their responsibilities.
• The technological infrastructure used in the implementation of the DBD is directed at the entertainment environment. The infrastructure should be customised for use in education.

• Steps should be taken that the reluctance in the education fraternity to make the paradigm shift does not sink this positive development (‘it should not be allowed that the Swiss invented quartz watch to be developed years later by the Japanese’).

4 THE PROPOSED WAY FORWARD

The time is right to introduce the DBD-in-education (a first in the world) and particularly in a developing country such as South Africa. This can also be a major step to close the ICT gap between the developed and developing countries.

All involved should contribute to implement this new opportunities in education. South Africa should take the responsibility to develop attainable, sustainable and affordable solutions in quality education particularly applicable in developing countries.

HJ Steyn
Chairman: Board of Directors
Education Expert
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