Abstract

GautengOnline has provided computer laboratories, assistive hardware and enabling software to almost all of the Gauteng public schools that provide educational services for learners with special educational needs. (The rest will be completed soon). This document provides a brief description of the numbers and kinds of learners, and categories of ELSEN schools, which are to be serviced with GautengOnline ICT. The hardware devices, and the enabling software selected for each school, are also presented. This document should be accompanied by the GautengOnline ELSEN training manual. An asset list per school is provided as Annexure 1, and the costs of the equipment, software and training as Annexures 2 & 3.

Introduction

The design and rollout of GautengOnline assistive technologies to schools which provide educational services to learners with special educational needs, was confirmed by three separate government initiatives:

1. The rollout of GautengOnline is driven by an e-Learning Framework, approved by the Provincial Cabinet, which committed the Provincial Government to provide a standardised, fit-for-purpose ICT laboratory for all learners in Gauteng public schools;
2. The White Paper on e-Education which committed central Government to ensure that: “Every South African learner in the GET and FET bands will be ICT capable (that is, use ICTs confidently and creatively to help develop the skills and knowledge they need to achieve personal goals and to be full participants in the global community) by 2013.”
3. White Paper 6 on Inclusions, which committed Provincial Education Departments to strengthen existing special-needs schools so they can serve as resource centres for “neighbourhood” schools as they pursue inclusion policies.

They initiatives together ensured that: all learners, no matter how profoundly handicapped, shall have access to ICT for learning. The GautengOnline ELSEN rollout has turned rhetoric into results and constructed this solution presented here. The emphasis is on the integration of assistive technology with the special needs of the learners, and then with the curriculum. This informs the design of the laboratories, the choice of the software, and hence the training. Together they ensure that learners attain the GautengOnline e-Learning Outcomes. These are the same for all learners in the province – they will be able to:
ICT Education for Learners with Special Educational Needs

- Use and maintain ICT in an appropriate, effective, efficient, ethical & responsible manner;
- Collaborate with others when using ICT;
- Locate & evaluate information using ICT;
- Process data using ICT;
- Solve problems using ICT; &
- Communicate & present information using ICT.

**GautengOnline ELSEN Learners and Schools**

There are in excess of 25,000 learners attending the 100 Gauteng ELSEN schools. They exhibit a very wide range of abilities. As an illustration, the last ELSEN school to be opened was Albertina Sisulu’s school for severely mentally handicapped learners, and the next one will be Oprah Winfrey’s academy of leadership for (high performing) girls. The ELSEN policy is broad and, therefore, embraces learners who are considered “outside the norm” or who “are on the edges of the mainstream”

<table>
<thead>
<tr>
<th>Province</th>
<th># ELSEN Schools</th>
<th># ELSEN Learners</th>
<th>Per learner exp. (Rands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Cape</td>
<td>41</td>
<td>6,483</td>
<td>13,746</td>
</tr>
<tr>
<td>Free State</td>
<td>19</td>
<td>3,127</td>
<td>22,627</td>
</tr>
<tr>
<td>Gauteng</td>
<td>96</td>
<td>25,451</td>
<td>11,049</td>
</tr>
<tr>
<td>KwaZulu-Natal</td>
<td>58</td>
<td>7,631</td>
<td>21,254</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>15</td>
<td>2,692</td>
<td>17,839</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>8</td>
<td>1,392</td>
<td>15,749</td>
</tr>
<tr>
<td>Limpopo</td>
<td>19</td>
<td>4,250</td>
<td>16,609</td>
</tr>
<tr>
<td>North West</td>
<td>42</td>
<td>4,364</td>
<td>13,015</td>
</tr>
<tr>
<td>Western Cape</td>
<td>82</td>
<td>9,213</td>
<td>28,636</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>380</strong></td>
<td><strong>64,603</strong></td>
<td><strong>Average = R17,838</strong></td>
</tr>
</tbody>
</table>

Table 1. Numbers of ELSEN learners and schools (Source: White Paper 6)

White Paper 6 on inclusions indicates that Gauteng has the largest number of ELSEN learners and schools (only the Western Cape comes close), and that Gauteng spends the least per learner than other provinces.

<table>
<thead>
<tr>
<th>Disability</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifically Learning Disabled</td>
<td>3.0</td>
</tr>
<tr>
<td>Severely Mentally Handicapped</td>
<td>3.0</td>
</tr>
<tr>
<td>Epileptic</td>
<td>3.0</td>
</tr>
<tr>
<td>Cerebral Palsied</td>
<td>4.0</td>
</tr>
<tr>
<td>Physically Disabled</td>
<td>4.0</td>
</tr>
<tr>
<td>Severe Behavioural Problems</td>
<td>5.0</td>
</tr>
<tr>
<td>Hard of Hearing</td>
<td>5.0</td>
</tr>
<tr>
<td>Deaf</td>
<td>5.0</td>
</tr>
<tr>
<td>Partially Sighted</td>
<td>5.0</td>
</tr>
</tbody>
</table>
ICT Education for Learners with Special Educational Needs

### Table 2. Funding for ELSEN learners

<table>
<thead>
<tr>
<th>Type</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind</td>
<td>5.0</td>
</tr>
<tr>
<td>Autistic</td>
<td>6.0</td>
</tr>
</tbody>
</table>

Funding for these schools is calculated from the number of learners, and their type of disability. Learners are assessed by district teams and categorised according to disability. Greater funding equates to more adults, and smaller class sizes. The GautengOnline rollout took this into account, and the number of computers provided per school was adjusted to suit the average sized class. Indeed, the savings were essential in providing for essential additional equipment and software.

<table>
<thead>
<tr>
<th>District</th>
<th># Schools</th>
<th>Adult:Learner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ekurhuleni East</td>
<td>9</td>
<td>1:6</td>
</tr>
<tr>
<td>Ekurhuleni West</td>
<td>10</td>
<td>1:6</td>
</tr>
<tr>
<td>Gauteng North</td>
<td>2</td>
<td>1:7</td>
</tr>
<tr>
<td>Gauteng West</td>
<td>8</td>
<td>1.7</td>
</tr>
<tr>
<td>Johannesburg East</td>
<td>8</td>
<td>1:7</td>
</tr>
<tr>
<td>Johannesburg North</td>
<td>9</td>
<td>1:9</td>
</tr>
<tr>
<td>Johannesburg South</td>
<td>9</td>
<td>1:7</td>
</tr>
<tr>
<td>Johannesburg West</td>
<td>11</td>
<td>1:7</td>
</tr>
<tr>
<td>Sedibeng East</td>
<td>5</td>
<td>1:8</td>
</tr>
<tr>
<td>Sedibeng West</td>
<td>2</td>
<td>1:7</td>
</tr>
<tr>
<td>Tshwane North</td>
<td>12</td>
<td>1:7</td>
</tr>
<tr>
<td>Tshwane South</td>
<td>11</td>
<td>1:6</td>
</tr>
<tr>
<td>(N.B. Excluding SFL)</td>
<td>96</td>
<td>Average = 1:7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. ELSEN schools per Gauteng Department of Education District

The number and type of ELSEN schools is distributed unevenly in the 12 districts.

Any attempt at categorising or classifying the learners themselves, is bound to be flawed. Many learners exhibit spectrum disorders, like Autism, or they have combinations of differing abilities. Nevertheless, the National Directorate on Inclusive Education used the following categories in its recent survey.

<table>
<thead>
<tr>
<th>Visual impairment</th>
<th>Partially blind – Totally blind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hearing impairment</td>
<td>Partially deaf – Totally deaf</td>
</tr>
<tr>
<td>Behavioural problems/disorder</td>
<td>HADD; ADD; Emotional</td>
</tr>
<tr>
<td>Speech &amp; Language</td>
<td>Autistic spectrum disorders – Autism</td>
</tr>
<tr>
<td>Neurological &amp; SLD</td>
<td>Asperger’s disorder; Down syndrome; Parkinson’s disease; Spina bifida; Muscular dystrophy</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>Mild intellectual – Severe intellectual; Cerebral</td>
</tr>
</tbody>
</table>
ICT Education for Learners with Special Educational Needs

<table>
<thead>
<tr>
<th>Physical disability</th>
<th>Intellectual &amp; Physical disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quadruplegia; Brittle bone disease; Tourette syndrome; Hemiplegia; Cystic fibrosis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intellectual &amp; Sensory impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical disability &amp; Sensory impairment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Autistic spectrum disorders &amp; Sensory impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurological &amp; SLD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other</th>
</tr>
</thead>
</table>

Table 4. National Directorate on Inclusive Education ELSEN taxonomy

It is clear from Table 4 how difficult attempts at such taxonomy can be. For example, Spina bifida and Muscular dystrophy are quoted as neurological in nature, but they both have profound physical implications for the learners.

For it own administrative purposes, this is the manner in which the GDE classifies the range of ELSEN schools in the province. It serves as a guide to district teams when they deploy learners to them.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>+ GoL Labs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind (VIP)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Cerebral Palsy</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Deaf (HoH)</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Hospital</td>
<td>6</td>
<td>4 + 1</td>
</tr>
<tr>
<td>Industry (welfare)</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Learning Disorder</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Mildly Mentally Handicapped</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Neural Disorder</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Physically Disabled</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Schools of Focused Learning</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Severely Mentally Handicapped</td>
<td>39</td>
<td>25 + 5</td>
</tr>
<tr>
<td>Totals</td>
<td>102</td>
<td>81 + 6</td>
</tr>
</tbody>
</table>

Table 5. Gauteng Department of Education’s classification of ELSEN schools, and the number with GautengOnline ICT laboratories. The ones after a + sign are Phase 5 schools and will be completed in April, 2006 (the others will be completed as soon as possible).

This classification is realistic in that it starts to define the broad categories of special needs learners. Using it as a reference, together with school visits, workshops, and other research, a basic toolkit of assistive technology was designed and procured for each school. Table 6 contains a brief description of the learners’ special needs per school. This then defines the hard and software for each school’s laboratory. The methodology was to take the standard GautengOnline ICT laboratory design, and then to augment it with assistive technology and enabling software. The standardised design includes 25 computers, TV (+ DVD, VHS), printer and gateway server.
Table 6. GDE ELSEN school classification, matched to the learners’ special needs.

<table>
<thead>
<tr>
<th>School type</th>
<th>#</th>
<th>Learners’ Special Needs</th>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools of focused learning</td>
<td>5</td>
<td>Gifted, high achieving learners in: sport; performing arts; maths &amp; science etc.</td>
<td>* Standard GautengOnline LAN.</td>
<td>** Standard GautengOnline image.</td>
</tr>
<tr>
<td>Blind; severely visually impaired</td>
<td>4</td>
<td>Visually Impairment (VIP) (this is more widely accepted than blind); Blind is used for persons with no vision; includes some Blind &amp; Deaf learners; can be associated with other disabilities.</td>
<td>Standard GautengOnline computers reduced in numbers to suit class sizes; 19” screens; scanners; Braille Printer.</td>
<td>Standard GautengOnline image; talking software/reading support (Accessibility Suite); web page reader (Webbie); Braille translation (Kwikbrl); Foundation Phase for all 11 languages (Inter-ED).</td>
</tr>
<tr>
<td>Deaf, hard of hearing</td>
<td>6</td>
<td>Hearing impairment (learners with hearing deficits); Deaf (learners with hearing loss).</td>
<td>Standard GautengOnline laboratory (25 PCs etc).</td>
<td>Standard GautengOnline image. Foundation Phase for all 11 languages (Inter-ED).</td>
</tr>
<tr>
<td>Cerebral palsy</td>
<td>6</td>
<td>Clumsy, uncontrolled and limited movements; however, these schools now cater for a wide range and combination of sensory impairments, intellectual and physical disabilities; these learners experience Mild, Moderate (MLD) or Severe or Profound/Multiple Learning Disabilities (PMLD).</td>
<td>Standard GautengOnline computers, reduced in numbers to suit class sizes; 19” monitors; switches; rollerballs, joysticks; touch screens.</td>
<td>Standard GautengOnline image; talking software/reading support (Accessibility Suite); early PC &amp; cognitive literacy (Sensory Software); early literacy support + Alternative &amp; Augmentative Communication (Clicker; Boardmaker); thinking support (Kidspiration); Foundation Phase for all 11 languages (Inter-ED).</td>
</tr>
<tr>
<td>Hospital</td>
<td>6</td>
<td>Learners recovering from illness or injury, or other medial condition (e.g., unplanned teenage pregnancies)</td>
<td>Standard GautengOnline computers reduced in numbers to suit class sizes.</td>
<td>Standard GautengOnline image; talking software/reading support (Accessibility Suite) Foundation Phase for all 11 languages (Inter-ED).</td>
</tr>
<tr>
<td>Industry (welfare)</td>
<td>8</td>
<td>Places of refuge for children in conflict with the authorities (or parents), and street children; learners exhibit gaps in education; particularly poor literacy</td>
<td>Standard GautengOnline computers reduced in numbers to suit class sizes.</td>
<td>Standard GautengOnline image; talking software/reading support (Accessibility Suite Foundation Phase for all 11 languages (Inter-ED).</td>
</tr>
<tr>
<td>Learning disorder</td>
<td>9</td>
<td>Barriers to learning. These learners experience Mild, Moderate (MLD) or</td>
<td>Standard GautengOnline laboratory (25 PCs etc) and</td>
<td>Standard GautengOnline image; talking software/reading support (Accessibility Suite); early PC &amp; cognitive literacy (Sensory</td>
</tr>
</tbody>
</table>
## ICT Education for Learners with Special Educational Needs

<table>
<thead>
<tr>
<th>Category</th>
<th>Severe or Profound/Multiple Learning Disabilities (PMLD)</th>
<th>touch screens.</th>
<th>Software; early literacy support + Alternative &amp; Augmentative Communication (Clicker; Boardmaker); thinking support (Kidspiration); Foundation Phase for all 11 languages (Inter-ED).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mildly Mentally Handicapped</td>
<td>16 Barriers to learning; learners experience Mild, Moderate (MLD) or Severe or Profound/Multiple Learning Disabilities (PMLD).</td>
<td>Standard GautengOnline laboratory (25 PCs etc) and touch screens.</td>
<td>Standard GautengOnline image; talking software/reading support (Accessibility Suite); early PC &amp; cognitive literacy (Sensory Software); early literacy support + Alternative &amp; Augmentative Communication (Clicker; Boardmaker); thinking support (Kidspiration); Foundation Phase for all 11 languages (Inter-ED).</td>
</tr>
<tr>
<td>Neural disorder</td>
<td>1 Barriers to learning; learners experience Mild, Moderate (MLD) or Severe or Profound/Multiple Learning Disabilities (PMLD).</td>
<td>Standard GautengOnline computers reduced in numbers to suit class sizes; &amp; touch screens.</td>
<td>Standard GautengOnline image; talking software/reading support (Accessibility Suite); Foundation Phase for all 11 languages (Inter-ED).</td>
</tr>
<tr>
<td>Physically disabled</td>
<td>2 Physically disabled; learners experience Mild, Moderate (MLD) or Severe or Profound/Multiple Learning Disabilities (PMLD).</td>
<td>Standard GautengOnline computers reduced in numbers to suit class sizes; 19” monitors; switches; rollerballs; joysticks; touch screens; head mouse.</td>
<td>Standard GautengOnline image; talking software/reading support (Accessibility Suite); early PC &amp; cognitive literacy (Sensory Software); early literacy support + Alternative &amp; Augmentative Communication (Clicker; Boardmaker); thinking support (Kidspiration); Foundation Phase for all 11 languages (Inter-ED).</td>
</tr>
<tr>
<td>Severely Mentally Handicapped</td>
<td>39 Wide range of learners: Autistic, Cerebral palsy, Hydrocephaly, Down Syndrome, Spina bifida, Muscular dystrophy. As a result of a range of sensory impairments, Intellectual or Physical disabilities, these learners may experience Mild, Moderate (MLD) or Severe or Profound/Multiple Learning Disabilities (PMLD).</td>
<td>Standard GautengOnline computers reduced in numbers to suit class sizes; 19” monitors; switches; rollerballs; joysticks; touch screens; head mouse.</td>
<td>Standard GautengOnline image; talking software/reading support (Accessibility Suite); early PC &amp; cognitive literacy (Sensory Software); early literacy support + Alternative &amp; Augmentative Communication (Clicker; Boardmaker); thinking support (Kidspiration); Foundation Phase for all 11 languages (Inter-ED).</td>
</tr>
</tbody>
</table>

- * Standard GautengOnline computers: 24 learner and 1 teacher’s workstation, laser printer, TV (DVD + VHS), server, Internet connectivity, e-Mail.
- ** Standard GautengOnline image: Microsoft donation (Windows XP Professional, XP Office Professional, Publisher, Front Page, Project, Visual Studio, Encarta, Visio,); Symantec anti-virus software; Mindset; Multichoice.
The accessibility hardware and software is primarily matched with the special needs of the learners, to enable them to use the computers to access the curriculum and attain its outcomes. The GautengOnline ELSEN learner therefore lies at the convergence of these three elements: Curriculum, Accessibility and Therapy. The technology is only part of the answer. It must be harnessed to support the therapy the children are already receiving and the Curriculum.

**Access-Abilities**

The main aim of this ELSEN rollout is to enable all learners to use the GautengOnline computers for learning, so they may attain the Learning Outcomes. There are a number of abilities that a learner requires to be able to access a computer for learning – these are called access-abilities. Identifying what they are and what level the learners have attained is important in assessing
their progress. Table 7 summarises these and shows six different levels as the learners progress being unable to use a computer at all, to full usage to access the curriculum.

These abilities are:

- **Motor coordination:** learners have to be able to use input devices to control the computer and to manipulate the applications. Some profoundly handicapped learners will not be able to use any of the devices until trained. They will then move from simple switch activities, through rollerballs, joysticks and touch screen, to the optical mouse and 104 Keyboard;

- **Cognitive abilities:** learners need to understand and make meaning of the activities they complete. At one end of the scale, some learners do not attend to the sensory world. Attention-grabbing software attracts these learners and provides them with opportunities to understand cause and effect, to manipulate images and sounds, to discriminate, track and sequence;

- **Eyesight:** learners who can, need to see the screen, and large screens and magnifying software can assist them (see Dual Screen Reader). Blind learners have to learn how to use scanners to import documents, and talking software, to access materials and produce outputs;

- **Hearing:** Deaf and hard of hearing learners can access support materials locally, or from the Internet;

- **Speech:** learners who have problems speaking are encouraged to vocalise with input devices and software which turns the sounds they make into an input device. Much of the talking software and reading support is very useful for these learners.
### Table 7. The abilities required to access a computer for learning, and the range of GautengOnline options

<table>
<thead>
<tr>
<th>Accessibilities</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor co-ordination</td>
<td>Cannot use any input device</td>
<td>Uses single Switch to build image &amp; patterns</td>
<td>Uses double switch to coordinate activities</td>
<td>Uses touch screen as pointing device + simple keyboard</td>
<td>Joystick + Roller ball as input device + complex keyboard</td>
<td>Optical or Head mouse as full input device &amp; keyboard skills</td>
</tr>
<tr>
<td>Cognitive abilities</td>
<td>Does not attend to the PC</td>
<td>Attracted by moving coloured patterns, can manipulate patterns with device</td>
<td>Further manipulation of images with input device</td>
<td>Pattern recognition, matching, discriminating, tracking &amp; sequencing</td>
<td>Read &amp; build words</td>
<td>Read &amp; carry out instructions using multi-media</td>
</tr>
<tr>
<td>Eyesight</td>
<td>Cannot see screen information to use computer</td>
<td>Use of magnifying software to read</td>
<td>Use voice software to read</td>
<td>Launch Braille translation software</td>
<td>Use Braille printer</td>
<td>Use of magnifying &amp; voice software to access Internet &amp; e-Mail</td>
</tr>
<tr>
<td>Hearing</td>
<td>Cannot carry out verbal or written instructions</td>
<td>Use of headphones to assist hearing</td>
<td>Able to understand and carry out simple written instructions</td>
<td>Able to understand complex written instructions</td>
<td>Use of voice recognition software as input</td>
<td>Ability to use multimedia software</td>
</tr>
<tr>
<td>Speech</td>
<td>No vocalisation</td>
<td>Use voice as simple input device</td>
<td>Use voice as complex input device</td>
<td>Use microphone to record message</td>
<td>Use of voice recognition software as input device</td>
<td>Ability to send a voice file by e-Mail</td>
</tr>
</tbody>
</table>
ICT Education for Learners with Special Educational Needs

Hardware

The methodology used in the GautengOnline ELSEN rollout was to take the standard GautengOnline computer equipment, and build accessibility into it that suits the special needs of the learners. Many ELSEN schools have class sizes of less than 25 learners. The number of learner workstations in each school lab was therefore adjusted to cater for the average class size. Indeed, the funding model was based on using the savings of 20% on computers, cabling, furniture etc to pay for the additional equipment and software.

A combination of the following devices was installed in each of the GautengOnline ELSEN labs. The devices are both interoperable and suitable for the GautengOnline ELSEN software. Learners can use a combination of them together to utilise the GautengOnline solution.

As part of the GautengOnline ELSEN rollout, the South African Bureau of Standards was commissioned to test all of the equipment for the special purposes it had been intended. This included robustness of design, construction and materials. The touch screen will not shatter if a child strikes it, children can be rough with the rollerball and joystick without inflicting damage, and if a child dribbles on any of it, it won’t be dangerous and it can be cleaned easily. The SABS reports on each device are available from the GDE.

1. Switches

These are large, brightly coloured button switches which work on pressure exerted by any part of the learners. They are most effective with learners who have limited control over movement, and/or difficulties with communication. They can be used in combination with other GautengOnline input devices (e.g., headmouse, rollerball), enabling learners to use a wide range of the GautengOnline ELSEN software (including Clicker). Learners can thereby complete cause-and-effect activities, practice coordination, play
games and engage in e-Alternative and Augmentative Communication. They allow the most profoundly handicapped learners to participate in GautengOnline, attain the Learning Outcomes and engage with the curriculum.

There are many types of switches available (e.g., blow-suck and blink switches). The preferred GautengOnline switch is Traxsys Variable (Joggle) Switch Medium.

Additional important features:
- Robust and brightly coloured;
- Ability to adjust the sensitivity of the switch to suit a range of operating pressures;
- Easy to attach it to the bench;
- Easy to clean;

2. Roller ball mouse
The one selected for GautengOnline is the Traxsys Trackerball Plus. It is simply an inverted ball mouse for users who have limited movement abilities, or who tremble, and hence cannot use the GautengOnline optical mouse. As they move a large, heavy, coloured ball (rather like a pool or snooker ball), they control the cursor. It has various buttons for clicks, double clicks, click and drag, but it can also be used with a switch. The speed of the cursor can be adjusted.

Other important features:
- Large robust and brightly coloured ball and switches;
- One double-click + one drag switch;
- Variable speed control;
- Removable guard for cleaning;
- Easily secured to bench.
The rollerball (and Joystick below) has a strong cover. It has been tested for strength, and the cover can be removed easily for cleaning.

The need for robust equipment is clear. This severely Autistic child is also physically handicapped. She had never used a computer before this moment. She was presented with a rollerball and a pattern generating activity (one of the Sensory Software range). She immediately became elated as her, albeit poorly coordinated, movements generated and manipulated colourful patterns. She is a strong child and gave the rollerball a good work out.
3. Joystick

The Traxsys Joystick Plus is similar to the roller ball mouse, but the cursor is controlled by a stick which has various extensions or handles. It is a hand-gripped pointing device, for learners with limited movement abilities, but can be manipulated by any able part of a child’s body. The two buttons on either side of the stick are for clicks, but it can also be used with a switch. There are buttons for double clicks and click and drag. The device also has variable sensitivity.

This child is using the Joystick with a soft rubberised handle, and manipulating it with her chin.

This child is also using the Joystick with a soft rubber handle in combination with a red switch.
Other important features:
- One double-click + one drag switch;
- speed control;
- easily secured to bench.

4. Touch screen
These are familiar in restaurants. They enable the learners to operate functions by merely touching the screen, and can be considered a precursor to the optical mouse. The model chosen for GautengOnline is the Keytech removable touchscreen (Magic Touch from Mayer-Johnson Inc). It is a suitable size for the monitors and it is moveable. The learner can use a finger or a pointer, or a mouth-held prod to control the pointer and to click. It does everything a mouse does.

This learner has Attention Deficit Disorder (with Hyperactivity), probably due to mild Autism. He has an extremely short attention span and difficulties in learning. He has just been introduced to this application. It is a noisy colouring-in activity. He chooses his colour and paints the shapes with his finger and, at the same time, generates a sound. He immediately began to focus and concentrate.

This combination of hard and software allows this learner to interact with the computer screen directly, rather than being distracted from the learning activity by having to look away and fumble and fiddle with the mouse.

Other important features:
- External mounting (attached with Velcro) enables the device to be moved easily from one monitor to another;
• Appropriate size for GautengOnline screens;
• Input device compatible with all GautengOnline software.

5. Head Mouse
The Smart Nav Head Mouse is a hands-free, input device for learners with profound physical and/or mental difficulties. A highly reflective (“Bindi”) dot is worn on the head or any suitably-abled part of the learner. An infra-red scanner fits on top of the monitor and tracks the reflective dot, translating it to movements of the cursor. It can be adjusted such that moving the learner’s head by 1 cm can move the cursor from one side of the screen to the other. A dwell-switch works when the learner rests the pointer on a hot part of the screen for more than a selected period. It can therefore be used with the on-screen keyboards, grids and picture galleries included in the GautengOnline ELSEN software.

This is an educator undergoing the GautengOnline ELSEN training. She is demonstrating the functionality of the head mouse. She is wearing the highly reflective (“Bindi”) dot on her forehead. When she looks directly at the screen, the small infrared scanner on top of the monitor picks up the reflection and her head movements control the pointer.

Here she is using the dwell switch (pause the pointer on a hot part of the screen for longer than a selected time and it will click) to launch Windows Media Player.
6. Scanner
The purpose of the scanner is for severely visually impaired or blind learners to draw text into the talking software provided in the Accessibility Suite. An Epson desktop scanner was selected. It is robust and the controls are positioned to be easily manipulated by the learners.

7. Braille Printer
GDE has a strong commitment to Braille as a means of enabling literacy in the blind. The four schools which specialise in blind and severely visually impaired learners, have the same printer, the Braille Express 150. By their very nature, they require frequent servicing and, while one is off-line, the other three can assist in providing the necessary printing services. Learners in these schools will be able to print out their own work and reference work in Braille for assessment and study purposes. The printer will be used with KwikBrl translation software.

Other important features:
- 150 characters per minute;
- double sided printing;
- at least 200 page memory;
- regular and high resolution functions;
- automatic speech feedback;
- adjustable line spacing, including standard Braille line spacing up to one and one-half line spacing;
- impact adjustment for heavier or lighter paper;
- multi-copying facility (at least 25).
Table 8. Progressive ICT skills development, matched to software used in the GautengOnline laboratory

<table>
<thead>
<tr>
<th>Level/Skill</th>
<th>Mode</th>
<th>Processes</th>
<th>Patterns</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Attention</td>
<td>Passive</td>
<td>Attending to the screen</td>
<td>Engages with AT + computer by attending to visual ± auditory stimuli;</td>
<td>Ameba, Plazma, Magma series Build It, Build Some More Listen Hear, Listen Hear V2, Look ‘n Listen, Look Here, Look Here Again Knockout, Reveal Speak Up V2, Speak Up Too V2 Splatter Touch Here Too V2 Touch Here V2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Focusing</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Tracking</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responds to</td>
<td>Selecting</td>
<td>Modifies patterns &amp; sounds with input device (e.g. switch)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>the</td>
<td></td>
<td>Adopts facial expression of interest &amp; pleasure; body language = clap hands, stamp feet, laugh</td>
<td></td>
</tr>
<tr>
<td></td>
<td>computer</td>
<td>Moving input device</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vocalising (input)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Operation</td>
<td>Active</td>
<td>Using Technology with intent</td>
<td>Uses input devices to create and modify digital materials: colour in drawings + change sounds; responds by expression: smiles, laughs Indicates: gesture, head-nodding &amp; pointing Uses augmented communication e.g., sign language, drawings Makes utterances Names… then discriminates = chooses between two items</td>
<td>Kaleidoscope 2 Match ‘em Maze on My Noisy Colouring Book Knockout, Reveal Clicker Boardmaker</td>
</tr>
<tr>
<td></td>
<td>Uses the</td>
<td>Using input devices fully</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>technology</td>
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<td></td>
<td>as instructed</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Vocalising (input)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Understanding Cause &amp; Effect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Function</td>
<td>Interactive</td>
<td>Independent Operation</td>
<td>Makes requests to use AT + computer: facial expressions, gestures, sign, visual + language cues Engages with technology (speech, sounds, music) Recognises images on screen through gesture, facial expression, body language, sign, sounds Follows visual or voiced directions Follows cursor visually; moves mouse; clicks2 at appropriate times; drags objects across screen Closes programme and chooses and opens another</td>
<td>Clicker Boardmaker Inter-ED Talking Word Processor Talking Dictionary Talking Calculator</td>
</tr>
<tr>
<td>Skills</td>
<td>Choosing to</td>
<td>Choosing to use technology for their own</td>
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<td>use</td>
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Software

There is a bewildering choice of educational software available for young learners, and much of it can be considered suitable for ELSEN learners. However, the bouquet of applications installed in the GautengOnline ELSEN schools was chosen to embrace all of the special needs of all the learners in them, in the context of the South African curriculum (RNCS). The software (when used with the hardware) is not only engaging and entertaining, it enables the learners to acquire knowledge and skills and demonstrate the attainment of the Learning Outcomes in a manner that can be assessed by their educators.

An attempt at mapping out skills and competencies levels, with the means to assessing them, to the type of software is given in Table 8. Mainstream learners also need to move through these skill levels, and from passive to active and interactive modes, but they do so very rapidly. Many learners at ELSEN schools will move through these levels slowly.

Sensory Suite

The Sensory Suite contains more than 20 computer applications. It is wide range of multi-sensory software which enables learners, no matter how handicapped they are, to access the curriculum using the GautengOnline laboratory. The software has been designed specifically for profoundly handicapped children, but some of it is also useful for Grades R & 1 and even for adults developing literacy.

The applications can be used in an ontogenetic sequence from beginners to advanced. They begin with “attention-grabbing” images, sounds and activities, that only require the mouse to be moved or clicked (or by using the range of GautengOnline input options), and then progress to more complex activities.

Through gaming (i.e., exploration, discovery, trial-and-error and having fun) learners acquire and perfect mouse and keyboard skills. They use input devices to create and modify digital materials: colour-in drawings and change sounds. They also learn to focus, track and sequence in preparation for early literacy.

The Sensory Suite can be used with various GautengOnline input devices (including the learner’s own voice, to encourage developing speakers), to enable the learners to concentrate on the content and process of learning, without being hampered by disabilities.

Below is a brief description of these applications and their use.
1. Ameba; Plazma; Magma series

This software trilogy constructs a multi-sensory environment for profoundly disabled people, and developing learners, to explore and manipulate. Educators can use these as “beginners” programmes. Indeed, research has shown that all three programmes can be very useful with children who do not attend to the sensory world.

The three applications are “attention-grabbing” software, in which a series of changing shapes and patterns can be watched and manipulated in various ways by the learner. When any significant buttons on the keyboard, mouse or other input device are pressed, or even when the mouse is moved, it causes the shapes to change and produces different sounds.

In addition, using the GautengOnline head set, the learner’s own voice can be harnessed as an input device to manipulate the images. The applications respond to volume, fricative sounds (such as “sh” and “ss”) and pitch, to encourage developing speakers to explore vocalising.

Learners move from being passive to responsive, as they engage with the software, developing mouse and keyboard skills and recognition of cause and effect. The software then enables learners to take charge of the computer and immediately raises self-esteem. It then encourages them to focus, and to begin tracking and sequencing.

Each of the three can be controlled by the several different devices in the GautengOnline laboratory simultaneously:
- Up to 8 switches;
- Mouse (including Head Mouse), Trackerball, Joystick or Touch Screen.
- The GautengOnline headset has a microphone (n.b., select the microphone option when launching the applications.)
The software can be used in an ontogenetic sequence, starting with *Plazma*, which is the easiest to understand and manipulate. *Magma* is the “quietest” and most calming. Visually it has much lower contrast and so may not be as suitable as the other two for users who have very poor eyesight – but, nevertheless, they should be exposed to it to try – there may be surprising results. *Ameba* is the most advanced and introduces learners to many different buttons on the keyboard.

2. **Build It; Build some more**

*Build it* is an extensive series of activities for learners, whereby they build up pictures of different plants and animals (with accompanying sound effects) as they repeatedly press one or more switches or mouse buttons. It is especially useful with developmentally young learners. Each click produces (or paints) another part of the picture until it is completed (a series is included below). The learner is then rewarded with suitable sound effects (the noise the animal makes, clapping, cheering etc) as they develop mouse and cognitive skills.

*Build Some More* is most suitable for early switch users. It has a wide range of activities for switch users from simple, single press cause-and-effect activities, to requiring the user to press a switch several times to incrementally build up (or paint) a picture.

*Build Some More* can be controlled by one or two switches (including using a microphone as a sound switch), Joystick, Trackerball, touch screen or the mouse buttons.

Several input style are allowed such as two switch alternating, activate on release and even a cooperative mode where two switches have to be pressed together (a learner using two switches together; or collaborating with an educator or another learner).
3. **Kaleidoscope 2**

This is a programme for early learning that provides a wide range of resources associated with creative painting activities. It can be considered as a painting programme, as a paint-by-numbers programme, or as symmetry painting programme. However, perhaps most important (for some early learners) are the options that produce Kaleidoscopic multi-coloured paintings. This means that, however profoundly handicapped the learner may be, and whatever their limitations are, they can always produce an attractive painting. These can be captured using the Shift/Print Screen keys and pasted into Word and printed for display and assessment. *Kaleidoscope 2* works particularly well with the *GautengOnline* touch screen, Joystick or Trackerball.

4. **Listen Hear; Listen Hear V2; Look ‘n Listen; Look Here and Look Here Again; Look Some More**

These applications provide sensory stimulation to developing learners, and they have been particularly successful with children with profound and multiple disabilities.

*Listen Hear, Listen Hear V2 and Look ‘n Listen* have been specifically designed to provide auditory stimulation to learners. They can play PC compatible sound files through the *GautengOnline* stereo speakers, with a range of effects that can cause the sound to move closer, pan from left to right, randomly jump about, etc. when the cursor is moved around the screen by an input device. The software will also enable the learner to play a large number of 3D sounds which accompany suitable images.
The applications develop an awareness of cause and effect, directional sounds, and a sense of humour. A large number of sample sound files are provided with these packages, together with associated configurations that play them using the effects available. Although a large number of activities are provided, educators and/or learners can easily personalise them by putting in their own sound files or, if they are more adventurous, making completely new activities.

It is recommended that the educator will sit with the learner using the computer to provide stimulation, and that the educator (not the learner) will use the keyboard, screen and mouse.

Control of *Listen Hear, Listen Hear V2* and *Look ‘n Listen* can be:
- Automatic, e.g. sound moving from left to right in a loop.
- Switch controlled, e.g. when user presses a switch the sound will play and move from left to right.
- Fully user controlled, i.e. the position of the sound is controlled by a mouse, joystick or touch screen. This can be done either by the educator or by the learner.

*Look ‘n Listen* can be used for basic switch/touch screen activities, and for testing discrimination skills where one of two alternatives are presented (there are support materials on Bigger/Smaller, Taller/Shorter etc.). Most of the activities, in *Look ‘n Listen*, can be controlled by the mouse, touch screen or by two switches. The Joystick/Touch Screen play activity in *Look ‘n Listen!* enables learners to use a joystick to move sounds around (but they can still use the mouse/Touch Screen if they want to).
Look 'n Listen! works particularly well with the GautengOnline input devices: a touch screen, or Trackerball or Joystick that control the mouse pointer.

There are three kinds of activities in Look 'n Listen:
- **Two Switch Carousel**: where pressing one of two switches (including mouse buttons or keyboard alternatives) or the left & right sides of the screen if using a touch screen, results in a sound/picture/text/movie.
- **Two Switch Test**: here the learner is prompted with a sound/picture/text/movie and is expected to press one of two switches (or alternatives) or the left & right sides of the screen if using a touch screen. If correct then a sound/picture/text/movie combination is played. If wrong then a sound/picture/text/movie combination is played (n.b., it is possible to leave an error as blank if you do not want any error message).
- **Joystick/Touch Screen Play**: here a picture is displayed and a sound is played. As the user moves around the screen (with mouse, joystick, or touch screen) the sound follows the movement. The picture can be changed by pressing one of the four buttons on a joystick or they can be set up to change automatically.

*Look Here and Look Here Again* have been designed to provide visual stimulation. There are options to produce a flashing chessboard, moving lines, and various other striking combinations of colour and movement. Many of the effects can have options such as, the speed of movement, colours, sizes of objects, etc., customised to suit individual learners.

It works best when the educator sits with the learner using the computer to provide stimulation, and that the educator (not the child) will introduce the use the keyboard, screen and mouse.

*Look Some More* provides sensory stimulation. It can be used to just look at (and listen to), to control with one or two switches (either learner and educator, or two learners), or it can even run in sound activated mode.

*Look Some More* has been designed to build on and extend the package *Look Here/Look Here Again* which was specifically designed to provide visual stimulation. For example, it enables sounds to be played and/or switch presses to control the programme. Some of the effects available include, setting options such as the speed of movement, colours used, the size of objects, etc. which can be set to suit an individual learner. These personal configurations can then be saved to disc to be loaded again when required.

This also works best when the educator sits with the learner providing stimulation and direction.
5. Match ‘em

This has been developed to provide visual training, and to support visual assessment. It has a wide range of matching and discriminating activities. The learners merely have to indicate the odd one out, or the matching image, with one of several input devices. It is also possible for learners and educators to create their own activities.

*Match ‘em* can be controlled by one or two switches or the mouse pointer. It works particularly well with a touch screen or other GautengOnline input devices that control the mouse pointer.

6. Maze on

This is a programme that lets you create and play mazes. These are activities where the task is to manoeuvre a “puck” (i.e., a picture object), by clicking and dragging, through an environment to a target area. The activities are imaginative and entertaining, and the mazes are simple to more complex as the learners develop manual dexterity using the input devices.

In *Maze On* the type of the environment can be very flexible, it can:
- play sounds as you move around the maze and/or when you reach the target area;
- allow mazes to be joined together - when you finish one you can start another;
- provide access via the mouse/Touch Screen, keyboard or switches (one or two).
Maze On works well with a touch screen or other GautengOnline input devices that control the mouse.

7. My Noisy Colouring Book

This is a fun programme that provides users with a colouring-in book that they colour-in, or paint areas of a picture with a click of an input device. The Noisy part plays sounds as they click and colour-in – each colour has a different sound. It can also blend colours. The colour schemes can be configured for particular users and/or activities. My Noisy Colouring Book can be controlled by the mouse, Trackerball, Joystick, touch screen or switches.

Four colouring books are provided which contain a large number of pages. These pages can be captured by using the Shift/Print Screen keys and then pasted into Word and printed, so the learners can take the page and colour it in their other classroom.
8. **Knockout and Reveal**

These are two programmes that involve playing with pictures in ways that are intended to encourage and stimulate various aspects of visual development and prediction.

The programmes provide learners with a number of activities. These include: revealing all or part of a picture, painting pictures by area, groups, or using a grid. Options include, colours on/off, stepping through colours, by choosing colours from a palette. Activities can be set up in one of the many styles available, including loading your own pictures to use. Any configuration can then be saved to disc (and loaded again later).

**Knockout** and **Reveal** work well with a touch screen or any other [GautengOnline](#) input devices that control the mouse.

9. **Speak Up V2** and **Speak Up Too V2**

These are two of a range of programmes from Sensory Software that have been produced for developmentally young individuals. They have been produced with a focus on children with profound and multiple disabilities. However, they are also useful with adults with learning difficulties, or even for nursery school children.

**Speak Up V2** and **Speak Up Too V2** are specifically designed to encourage vocalisation. Learners make noises into the [GautengOnline](#) headset and, depending upon the volume of sound, patterns and pictures on the screen get large, move up, move down, etc..

More specifically:
- **Speak Up V2** provides abstract colours and lines that move about the screen as the learner vocalises.
- **Speak Up Too V2** enables the learner to control pictures - and as they make noises the pictures can move up the screen, get larger, get taller, etc.. This is useful in dealing with concepts of size and position.

It is recommended that the educator will sit with the child using the computer to provide support, and that the educator (not the child) will use the keyboard, screen and mouse. The child will use the microphone.
10. Splatter 2

This is a fun programme that enables users to “splatter” pictures on the screen with the click of an input device. Each “splat” is accompanied by sound effects – some of them quite rude (farts, belches etc). It encourages the learners to use the input devices and, no matter how profoundly handicapped the learner, s/he will always be able to produce an attractive painting.

Splatter 2 can be controlled by the range of GautengOnline input devices (i.e., mouse; touch screen; Trackerball; Joystick or switches). However, if the switch is used, there is no control over the placement of images. Splatter 2 can also be used with a sound switch, i.e. when the user makes a noise a picture will be randomly “Splattered” onto the screen.

11. Tap Here

This is another programme that has been developed for switch users. It provides a range of single switch activities from just pressing the switch to get a sound and animation reward, to activities that involve timing and/or scanning skills. The switch(es) can be connected to the serial port or can be activated by a mouse click (maybe Touch Screen emulating a mouse?) or by keyboard presses.
These two programmes have been developed to provide sensory, particularly visual stimulation. The learners are required to move a mouse pointer around the screen in exchange for visual rewards. It has been produced with a focus on children with profound and multiple disabilities.

Touch Here V2 provides the learner with an image that is modified by merely moving the mouse. Touch Here Too V2 has been specifically designed to provide visual stimulation and to enable learners to practice targeting. Touch Here V2 works well with the range of GautengOnline input devices (i.e., touch screen, Joystick, Trackerball).
Kidspiration

This is a “mind mapping” tool. It provides visual support for developing learners to think, write and comprehend. (Visual learning is regarded as one of the most effective ways for teaching thinking skills). Learners create graphic organisers by combining pictures, text and spoken words, and use familiar paint tools to generate their own symbols. Their own drawings become an important element of their graphic organisers, allowing developing learners to refine and personalise meaning. They can visualise, organise and categorise information graphically. Working visually, young learners build important early literacy skills, while more advanced students are able to better understand information and communicate ideas.

The application has a large number of pre-designed activities involving discrimination, classification and sequencing. It has a large number of clip art graphics images and the learner can even draw their own or import their own graphic files. Although written in the US, Kidspiration is a productivity tool and can readily be used to support the South African curriculum through all languages. In particular, areas like reading and writing, social studies, science (including Biology) and Maths are supported fully.

The application is also enjoyable to use, inspiring developing learners to improve comprehension, to clarify thinking, to increase retention and strengthen organisation, thus creating a foundation for academic success.
Boardmaker

This is a graphics database containing over 3 500 Picture Communication Symbols that can be used to create a variety of communication materials. It is primarily an educator’s tool. They can use it to construct communication devices in the GautengOnline laboratory for use in the other classroom. The drawing window allows educators to quickly create communication boards, device overlays, worksheets, schedules, calendars etc.

The symbols can be made any size, used in colour or black and white, and displayed with text in a variety of languages. There are over 250 blank template boards which are provided to help educators quickly build the boards they need. Pictures can be altered or added to, thereby making new, unique pictures.

All learners can benefit from this teacher's tool, especially children with little or no functional speech and children who are emerging literacy users. It enables learners to assign a variety of actions to the buttons on any board so educators and learners can use the computer for Assistive and Augmentative Communication and inclusion. This enables learners to communicate a need or response to a question and reduce the frustration and powerlessness often felt by speech and language impaired persons.
Clicker

Clicker provides literacy support for developing readers and writers. It enables them to build sentences electronically and, thereby, it changes the way they write. It contains a fully integrated talking word processor and a large vocabulary, with which learners can write with pictures and words (1000 picture library).

Clicker is used to construct grids, the cells of which can hold words, phrases, pictures or sounds. They can be used for writing or for multimedia applications. Learners build their sentences with the click of a mouse or other input device.

Clicker writer is a talking word processor. Learners can type their sentence and, when they type a full stop, the sentence is spoken to them.

Words can be colour coded (i.e., nouns in one colour, verbs in another etc), and the pictures can be used to help with word recognition. It can be used to help learners with subject specific words. They type in the rest of the structure of their sentences and use the grids for subject vocabulary. It can also provide lists of connectives (because, however, and etc) to be entered into sentences.
Inter-ED

The Inter-ED system (Mecer Interactive Educational System) is a multimedia, interactive educational system primarily for Foundation Phase learners, although it is also very useful for developmentally young learners and developing readers. It involves guided instruction, discovery and a drill component that has proved to be highly successful with young learners who are beginning to learn how to use computers. It is fully multi-media and interactive, and promotes the development of literacy, numeracy and life orientation skills.

Inter-ED has been developed to support Outcomes-Based education. The activities are tagged to the Learning Outcomes and Assessment Standards of the Revised National Curriculum Statement for Foundation Phase. It is divided into lessons, which are structured around the three Foundation Phase Learning Programmes, and it supports all 11 official languages. All learning areas are included in these three programmes and it is relatively straightforward, therefore, for either Foundation Phase, or ELSEN educators, to use learners’ time on the GautengOnline computers to support their classroom teaching while, at the same time, acquiring computer skills. Training learners to be able to listen and carry out instructions is a feature of Inter-ED, particularly in the lesson below.

This issue of presenting learning support materials in the learners’ home language is central to accessibility and full participation in the curriculum. If a Foundation Phase learner can understand a mathematical concept, like “greater than” or “smaller than”, in their own language, they will be able to transfer this understanding to another language.

The Learner Management System (LMS) built into Inter-ED will enable ELSEN educators to assess and track the progress of learners, regardless of what official language they choose to use. The assessment of computer skills is also relatively straightforward with Inter-ED.
Accessibility Suite

This is a compilation of speaking applications that are suitable for blind, severely visually impaired learners, and developing readers. Therefore, it has been installed in all GautengOnline ELSEN laboratories at the once-off cost of R1 000 per school (or R4 per learner).

1. The Complete Reading System©

The Complete Reading System© is an easy-to-use, self-contained reading programme with full talking menus. It has a simple design, which only requires basic computer skills and which enables easy installation and use. It reads out loud to the user in one of a range of voices, the speed of which can be adjusted by the learner.

Having full talking menus negates the need for a screen reader to navigate through the application. The system doesn’t require an external keypad and therefore works equally well on desktops or laptops.

Most major functions are single-key operated. For example, reading materials are placed on the desk scanner, and pressing F5 initiates scanning and recognition of the text. When the scanner has finished, pressing F6 initiates reading. Auto page orientation allows you to place the document on the scanner at almost any angle and it will still be recognised by the system.

The Complete Reading System© can also open and read existing documents. The default file format is Microsoft Word, the choice of GautengOnline, but the programme supports many other word processors that schools or individuals may be using.

Other important features

- 24 Different Voices;
- Zoom up to 400%;
- Talking Menus;
- Automated Document Feed Support;
- Works with any USB Scanner;
- Large Print Menus;
- Change Font and Background Colours;
- Single Key Operation;
- Word Tracking While Reading;
- Open and Read Existing Documents;
- Auto Page Orientation;
- MP3 Player compatibility.
2. Ultimate Talking Dictionary

The Ultimate Talking Dictionary (UTD), is primarily a comprehensive dictionary. But, in addition, the UTD can read the definition of a word out loud to you, in a choice of eight adjustable voices, and it can use the word in a sentence to facilitate understanding. The total dictionary that comes with the UTD contains over 250 000 words, including slang, jargon, and historic figures such as George Washington. The UTD also has a fully-integrated thesaurus for referencing synonyms and antonyms of all words.

The UTD has adjustable fonts, so the user can present text as large print (for visually impaired learners). It also contains lists of synonyms and antonyms, and will indicate when the nominated word is misspelled and will provide you with the correct spelling.

It is easy to use. The word to be looked up is merely highlighted, and pressing a single “hot” key looks it up and UTD reads the definitions out loud and presents a list of synonyms….all without exiting your current application. The Zoom feature allows you to turn the UTD into a large print dictionary. Voices can be turned off, for use with other screen readers.

Other important Features
- 250 000 words, definitions and historical figures and places;
- Choice of 8 adjustable voices;
- Hot key word lookup;
- Spelling checks any word;
- Reads definitions;
- Power search using partial word strings;
- Thesaurus with both synonym/antonym support;
3. Text Cloner

Text Cloner© is an easy-to-use scanning package. With the push of a single key, a user can clone text to an electronic format from virtually any printed material.

Text Cloner© can determine the position that a document has been placed on the scanner and automatically correct the orientation. It even corrects documents that are placed on the scanner up to 15° off centre. All formatting is automatic.

Text Cloner© will automatically determine the number of columns, work around pictures, and process two pages of a book. It will clone the text and concatenate it into an easy-to-read column.

Text Cloner© also comes with its own spell check feature that includes a dictionary of over 100,000 words. Users can even add their own customized words to the dictionary.

Key Features
- Single button functions
- Works with any TWAIN compatible scanners
- Automatic image alignment
- Automatic document formatting
- Full-featured word processor
- Built-in 100 000+ word spell checker
- Compatible with all major screen readers

4. PDF Magic

“Portable Document Format” (PDF) is a file format created by Adobe Systems Inc™. Such files are commonly used to distribute documents to multiple platforms. Adobe distributes a free reader (Acrobat) which allows users to open the particular PDF document, without requiring the software that created the document. The concept and the product work really well for individuals who do not have trouble reading printed material. However, the rest of the population is pretty much excluded. PDF Magic© makes these documents fully accessible.

In addition, many PDF files only contain pictures of scanned documents. It is impossible to search through such scanned documents for text.

With PDF Magic©, PDF images are converted to text “on the fly” so that you can search a PDF File with only images. A significant issue is that it is unnecessary to know whether there is scanned imbedded text in a document ahead of time.
PDF Magic® does it for you. The PDF file extracts the images and runs them through an OCR engine producing a finished document that is fully accessible. PDF Magic® can also access encrypted files and put them into an accessible format.

PDF Magic® can also convert a PDF file into a text or Microsoft Word compatible document, or PDF Magic® can read it out loud to you with high-quality digital voices. PDF Magic® can also turn a PDF file into an audio file so that you can listen to those long boring technical manuals away from your computer.

**Key Features**
- Highlights the word as it reads
- Allow you to edit and make notes in a document
- Comes Standard with 5 Voices
- 250,000-word Dictionaries
- Zoom up to 400%
- Access to Encrypted PDF Files
- Convert a PDF File to MS Word, Text or HTML
- Turn a PDF File into an Audio File
- 100% Accurate document conversion

**5. The Talking Word Processor**

Talking Word Processor® is an easy-to-use word processing programme designed to help people with visual impairment or those who have difficulties with reading and writing. It is a word processor with speech capabilities.

All standard word processor files are compatible with Talking Word Processor®, including the latest versions of Microsoft Word, standard text, and rich text formats. A single key stroke enables learners to hear text as they type. The “word repeat” feature repeats the word after it has been typed. This alerts the learner immediately if the word is misspelled.

The “Word Pause” feature allows the learner to slow down the reading of words, without distorting the way the words are spoken. The learner can increase or decrease the time between each word. This lets them hear the words at their own pace.

“Word magnify” also tracks the word being spoken. When this option is turned on, each word is highlighted and magnified as it is spoken. This is a major support for developing readers and allows them to focus on one word at a time. Additionally, each of these features can also be turned on or off with the click of a mouse.

**Key Features**
- Fully functioning talking word processor
17 different voices
- Word pause
- Word magnify
- Word repeat
- Key echo
- 250,000+ word English dictionary
- Medical and legal dictionaries
- Can create and edit Microsoft Word 95, 97, or 2000 documents
- Adjustable voice rates and pitch
- Easy to use

6. Talking Calculator

This is a fully functional calculator that reads out loud the numbers entered, the function selected, and the results of the calculations.

Dual Screen Reader

Dual Screen Reader is a combination of two applications: LookOUT and Magnus. LookOUT is speech output software that makes a computer talk. Magnus is magnification software which can produce an inverted image. Dual therefore combines speech and magnification. They have been developed for users who cannot read what is on a computer screen. Dual Screen Reader enables the computer to talk, and/or the screen to be magnified, and/or the mouse pointer to speak text as it hovers over it.

LookOUT is easy and intuitive to use without need to see the screen. It offers a wide range of accessibility options, a screen marker system, mouse pointer control from the keyboard, a novice mode for beginners, and visual basic scripting. LookOUT Extra also includes a Realspeak™ English female voice.
Magnus has up to 16 times magnification (this illustration is the MS Word File pull-down menu on a 14” screen with 10x magnification). It is a very clear image. It works in all screen resolutions and offers refinements such as split screen, a lens and a strip magnifier to cope easily with enlarged text reading, as well as font smoothing and colour inversion.

**WebblIE**

WebblIE is a text browser that enables blind learners to cruise the Internet. They can easily enter URLs, access the requested pages and then navigate and "read" them. They can follow links and activate other hot functions. With a keyboard, a blind learner can enjoy the full range of Internet services.

It has been designed at the Department of Computation, UMIST, Manchester, UK, with funding from The Guide dogs Association for the Blind, UK. WebblIE is free to all visually impaired users and has been installed (with training) on the computers in the four Gauteng schools for the blind.

WebblIE is a powerful Internet access tool. It re-formats any web page and converts it to line-by-line text. It also has options to change the colour and font size of text, for severely visually impaired learners.

WebblIE has an address bar near the top of the screen, which shows the address of the current website being interrogated. Most of the screen contains a text
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display of the contents. To change websites the user types the address (e.g., www.sancb.org.za or www.rnib.org.uk) into the address bar and presses ENTER. In a few moments WebbIE loads the website, and the cursor moves to the text display of the contents. The learner can read the page by moving around the text with the arrow keys. Learners can switch between the text display of the contents and the address bar by pressing the tab key.

Links in web pages always start at the beginning of a new line and begin with the word "LINK". The destination of the link is given next. To follow a link to a new page, the learner presses ENTER on the chosen link line.

The learner can navigate pages by pressing the backspace key – it'll go back one page each time it is pressed.

The first page that WebbIE shows when it loads is called the Home Page. The learner can return to this at any time by pressing the ALT+Home key. If s/he wants a different page as the home page, s/he presses CONTROL+S and enters the address of the desired home page.

KwikBrl

KwikBrl is software which converts text from MS Word (and other word processors) to produce Grade 2 (standard Braille) easily and quickly on the GautengOnline Braille Printer.

Conclusion

What is presented here is a basic toolkit of assistive technology for each of the 100 ELSEN schools in Gauteng Province. It is sufficient for most of the special needs of the learners, but it is only a beginning for learners and educators. In addition, there is a small number of Blind and Deaf learners in the province who still have to be accommodated in the GautengOnline laboratory. Technology does not necessarily have all the answers but, with the support of well-trained and enthusiastic educators, it can help almost all of the learners in these schools access the curriculum. The combination of Curriculum, Accessibility and Therapy will ensure that the performance of the learners will rise. The magic is certainly in the mix.

Concerning the policies that govern the ELSEN schools, there are a number of consequences of the GautengOnline rollout that require attention. For example, the inevitable result of an inclusion policy, such as the one described in White Paper 6, is that all learners who can will be in mainstream schools. This means that the ELSEN schools will become filled with profoundly handicapped learners. The need to strengthen these schools with technology is therefore apparent.

The next stage in the rollout is, through a communications strategy, to initiate a
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recruitment drive. Comparing South Africa with other similar countries, it seems there are many ELSEN learners, of school-going age, who are being kept at home. If so, there will be inevitable pressures on the GDE to find additional spaces at the existing ELSEN schools (waiting lists are not unknown in these schools). The enrolment policies of the GDE will also come under scrutiny. There seems to be only limited transformation in many of the ELSEN schools. In addition, GDE will come under pressure to provide adequate transport for the learners. It is all very well to have a CP or an Autistic child in Soweto, but you can hardly send such a child with R10 to catch a taxi. These learners require safe and supervised transport – and this is expensive. Nevertheless the GDE commitment is there. Indeed, the Head of Department, MaLilele PeTjé, in his address to the principals and trainee educators from the ELSEN schools, quoted the then Minister of Education, Kader Asmal’s introduction to the White Paper on Inclusions:

“I hold out great hope that through the measures that we put forward in this White Paper we will also be able to convince the thousands of mothers and fathers of some 280,000 disabled children – who are younger than 18 years and are not in schools or colleges – that the place of these children is not one of isolation in dark backrooms and sheds. It is with their peers, in schools, on the playgrounds, on the streets and in places of worship where they can become part of the local community and cultural life, and part of the reconstruction and development of our country. For, it is only when these ones among us are a natural and ordinary part of us that we can truly lay claim to the status of cherishing all our children equally.”