In-Sight, An Assessment Procedure for Visual Functioning in Partially Sighted Children, 6 to 12 Years of Age.
Research on the Psychometric Qualities of the Instrument.

Focus: Strategies for Change
Topic: Assessment Procedures- theory and practice

Els Vervaart
Special Educationalist
Visio, National Foundation for the Visually Impaired and Blind
Oud Bussumerweg 76
1272 RX Huizen
The Netherlands
0031 (0)35 5773300
The Netherlands
website: www.visioweb.nl
elsvervaart@visio.nu

Herman Heinecke
Remedial Teacher Visual and Tactual Functioning
hermanheinecke@visio.nu

Neeltje M. Janssen
Special Educationalist
Inzicht, a Society which fosters application-oriented scientific research that supports the needs of people with a visual impairment

Mathijs P. J. Vervloed
Assistant professor
Radboud University Nijmegen
m.vervloed@pwo.ru.nl

Abstract

At Royal Visio, a National Foundation for the Education of the Visually Impaired and Blind, an assessment procedure, called In-Sight, has been developed to screen visual functioning related to educational process. In-Sight is meant to be used for visually impaired children, six to twelve years of age, with normal learning capacities. The instrument has been structured around twelve categories of visual functioning. The development of the instrument and the design of the psychometric study are presented.

1. Development

At Royal Visio, National Foundation for the Education of the Visually Impaired and Blind, an assessment procedure, called In–Sight, has been developed to assess visual functioning in children with partial sight. In-Sight has been developed by the late Ida Ekkens, formerly Remedial Teacher Visual and Tactual Functioning, and is based on many years of practical experience assessing and training children with visual impairment.

In-Sight has been developed because most available instruments are suited for children with little residual vision while many other children with visual impairment do well on these tests. The question then arises which data could be obtained when demands on visual functioning increase. To try to answer this question, an analysis was made of the variability and complexity of visual tasks in educational settings, especially with regard to nearby tasks.

2. Target group

In–Sight is meant to be used for children with visual impairment, between six to twelve years of age, with normal learning capacities. Although the instrument has been developed for children with visual impairment, it proved also to be worthwhile for children who do not have an ocular disease but difficulties with visual perception due to cerebral visual impairment.

In–Sight has been developed with teachers in mind, but can also be employed by other professionals such as psychologists, special educationalists and occupational therapists.

3. The purpose

In–Sight is an instrument to assess visual functioning in children with visual impairment. The items of In-Sight are all related to educational tasks in which the demands on visual functioning are relatively high. The aims of In–Sight are threefold.

First of all the procedure aims to assess what a child can do with its residual vision. Secondly, with In–Sight it is possible to register what the child can not do, as yet. Or, regretfully, in case of a progressive disease with loss of visual functioning, can do no longer.

Thirdly, In–Sight aims to provide the possibility to systematically monitor the progress in visual functioning over a number of years.

4. The framework

In–Sight is divided into three colour-coded age groups. "Red" has been designed for six to eight year old children, "white" for eight to ten year olds and "blue" for 10 to 12 year olds.

In–Sight has been structured around twelve categories of visual functioning:
1. Viewing strategy

This concerns the 'technique' of viewing: the way in which a child approaches a task. For example: is it capable of scanning lines and columns without 'leaping'?

2. Colour and contrast

Can the child distinguish colours and name them correctly, not only on a black or white background, but also next to, on top of or among other colours? Is a large stimulus required? Can the child interpret low-contrast black-and-white photographs with blurred outlines?

3. Perception of detail

Rather than focussing solely on the perception of 'loose' details and the size of the stimulus, In-Sight takes into account the situation in which those details have to be perceived. This could be, for instance, in a visually complex picture or as a part of an outline.

4. Visual discrimination

The items in this category are used to measure the perception of similarities and differences in shapes. Perception of detail plays an important part in visual discrimination.

5. Third and second dimension

The transition from concrete objects to their depictions is not self-evident. The items in this category assess this skill.

6. Closure

This is the international term for 'making whole' or 'completing'.
The brain compensates for eventual deficiencies in perceived visual information, in order to derive meaning from it. Visual experience is very important in this category.

7. Part-whole relationships

This category is closely related to the previous one. For example, the child might be given a jig-saw puzzle or asked to indicate where certain shapes can be seen in a larger picture.

8. Visual-spatial perception

This category is very important in education, as it concerns, among other aspects, the location of objects in relation to each other. Not only shapes have to be viewed, but also the distance between them has to be included in perception.

9. Perception of symmetry

This is related to visual-spatial perception and includes topics as 'direction' and 'rotation'.

10. Visual-motor skills

There are many aspects to the co-operation of hands and eyes. Examples are: copying a drawing, 'dynamic precision' and scaling.

11. Figure-ground perception

Most objects and shapes have to be perceived on a busy background. Many children with visual impairment have problems in determining the relevancy of visual information.

12. Picture interpretation

For instance, it is often assumed that large pictures are easy for children with visual impairment. Nonetheless, there are children whose visual field is so restricted that they cannot view this kind of images in one glance. In order to interpret the picture, they have

to visually 'synthesize' it: composing it from the fragments they perceived. This skill is highly underestimated.

All items fall within one of the above mentioned twelve categories. Some items also load on one of six factors that were selected because of their frequent occurrence in many eye impairments:

- loss of visual field
- reduced contrast sensitivity
- disturbed perception of colour
- difficulty with fixation
- diminished perception of detail
- short viewing distance

Relevant items are marked by a symbol in the instrument, which refers to one or more of these factors. The idea is that if a child masters (some of) the items with a certain factor, it can be assumed that the child can compensate this factor. For example: in spite of reduced contrast sensitivity the child can cope with different nuances of a certain colour or shades of grey.

Photo: contents of In-Sight

4. Research on Reliability and Validity of In-Sight

In 2005 a two-year study started to gather information on the psychometric qualities of In-Sight. Two groups were formed: one group of 160 children with visual impairment and one control group of 80 sighted children. The participants are children in Dutch primary schools between 5 and 12 years of age, who do not have additional impairments (like attention deficit disorders, hearing problems etc.). The chidren with visual impairment are able to read print or recognise pictures without special needs and are supported by peripatetic teachers.

The research is done in cooperation with Utrecht University, Radboud University Nijmegen and all institutes for the visually impaired in the Netherlands.
The following psychometric qualities will be investigated: reliability, content-validity, construct-validity and criterion-validity. Each aspect contains one or more research-questions:

1) What is the item variance, the item difficulty and is the scoring of the items right?
The items of In-Sight have been classified in three age groups (red, white and blue). Item difficulty will be determined in order to estimate whether the item is placed in the right age group and whether each item differentiates sufficiently. Also a small group of elder and younger children will be examined (5 and 12 years old) to check for possible floor and ceiling effects. Lastly, scoring procedures will be checked.

2) What is the internal consistency of the items within the twelve a priori categories?
In-Sight has been structured around twelve categories, based on a task analysis of the skills necessarily for processing and interpreting visual information.
The consistency within and the associations between the categories will be examined.

3) Investigate the rightness of the six a priori factors.
Performance on items within one of the six a priori factors will be studied by comparing the results of children with and without problems with this factor. For instance, we will check whether children with a short viewing instance indeed have more trouble with the items marked 'short viewing distance'.

4) What is the stability of In-Sight?
It is important to know whether In-sight measures stable aspects of visual functioning or arbitrary or coincidental aspects of visual functioning. Is the profile of the second assessment the same as the first or are the results changing?

5) Based on normal visual development: do the items show the postulated hierarchical sequence between the age-groups?
This means assessing the premises of item difficulty: are the red items easier than the white, and are the white items easier than the blue ones?

6) Is the sequence of the items in children with visual impairment and sighted children the same?
By the assessment of children without visual impairments, it is possible to compare the performances of normal sighted and partially sighted children. This comparison will give insight into the difference and correspondence between both groups. Furthermore these data can be used to generate guidelines for scoring, for instance the required time for In-Sight.

7) What is the correlation between the shortened and the full version of In-Sight?
Are the items of the shortened version (the flash version) a good representation of the performances on the entire test?

8) What is the association with tests that measure comparable visual functions?
No instruments are available for the age group 6 until 12, with a compatible frame or the same intentions as In-Sight. Therefore the performance on parts of In-Sight is compared with the performance on parts of other tests (Test of Visual Perceptual Skills – Revised and the Developmental Test of Visual Perception second edition).

9) What is the association with tests that meaure other functions?
It is important to know whether results from In-Sight are different from other tests, such as intelligence tests. This will be investigated with the Wechsler Intelligence Scale for Children - III.

10) What is the association with educational skills?
In-sight was developed with educational tasks in mind. Therefore, some positive correlations with these task is to be expected. Data will be collected about reading, arithmatics, Pupil Monitoring System and the teacher's opinion about the pupil.

At this moment we are busy collecting data. At the moment of writing this article (April 2006) 110 children with visual impairment and 70 sighted children have been seen. Anecdotal information shows that children thus far like to work with In-Sight and are often able to perform items beyond their age range.
The final report and a scientific article will be available in 2007.
People who are interested in In-Sight or the results of the research are requested to mail to: in-zicht@visio.nu