Lucid EXACT

COMPUTERISED LITERACY ASSESSMENT FOR 11 TO 24 YEARS

Specialist Consultants

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Administrator's Manual

6th Edition, Revised, July 2015
Lucid Exact Version 1.7

Lucid

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1 Introduction

1.1 What is Lucid Exact?

Lucid Exact is a suite of computerised tests designed for the assessment of literacy skills in the age range 11 to 24 years. The Lucid Exact suite comprises standardised tests of the following areas of attainment:

- Word recognition
- Reading comprehension and reading speed
- Spelling
- Writing to dictation: Typing speed and handwriting speed

Test administration is carried out entirely by the computer. Each test begins with spoken instructions and practice items. The total suite takes between 30–40 minutes. Full details of the tests in Lucid Exact, including guidelines on test administration, are given in Chapter 3. Results, based on nationally standardised norms, are available immediately. Results are given in standard score and centile score formats within thee age range 11:0 – 24:11, and age equivalents for the age range 6 to 18 years are also provided. Guidance on understanding results and interpreting reports are given in Chapters 4 and 5.

Lucid Exact has been specifically designed to meet the need for a group of tests that assess whether examination candidates should have access arrangements, such as extra time or use of a reader or scribe in written examinations. They are particularly aimed at the United Kingdom GCSE and 'A'-level examinations and the requirements of the Joint Council for Qualifications (JCQ). Assessors should note, however, that Lucid Exact does not provide ALL the evidence required by JCQ when applying for exam access arrangements. Indeed, there is no single test currently on the market that can provide all the information necessary for the full completion of JCQ Form 8, which depends on a range of specialist assessment skills as well as thorough familiarity with current JCQ regulations and calls for information from various sources. Lucid Exact provides a substantial amount of the assessment information required for Form 8. Chapter 6 gives guidance on this.

Lucid Exact has a wider range of uses other than assessment for exam access arrangements. The program is also appropriate for assessing students with specific learning difficulties in secondary, further or higher education, or for teachers wishing to obtain a standardised objective assessment of literacy of groups of students within the test's age range, or of individual students within the test's age range who have specific problems (such as slow handwriting, spelling or reading comprehension).

Although individual tests from Lucid Exact may be helpful in suggesting dyslexia, or may form part of a dyslexia assessment, this group of tests are not sufficient in themselves to make a diagnosis of dyslexia and are not designed for that purpose. Administrators who require a test that will identify dyslexia should consider using LASS 11-15 (for the age range 11:0 – 15:11) or LADS/LADS Plus (for ages 16 and upwards). For further information see Section 4.3.

Lucid Exact has two forms of equivalent difficulty – Form A and Form B. This allows for repeated assessment if desired, although this should be carefully planned and with due consideration to the impact of possible practice effects. The two forms can be alternated over time in order to record progress, e.g. in response to intervention given to students with literacy difficulties. For further information on retesting see Section 3.8.

1.1.1 Rationale for the tests in Lucid Exact

There are three distinct, but interrelated, skills that are required by fluent readers. The first is often known simply as 'phonics' and comprises the sub-skills of grapheme-phoneme decoding (used when reading) and phoneme-grapheme encoding (used when writing). For most students phonic skills have been mastered by the age of 11. However, the other two principal abilities – rapid word recognition and comprehension – continue to develop. We have therefore concluded that rapid word recognition and comprehension are the key skills to be assessed in secondary school students and in individuals above this level. In Lucid Exact we have designed tests for these key reading skills, and we have also included measures of spelling, handwriting and typing, which are central to the requirement for students to be able to record their work and display their knowledge and abilities in examinations.

1.1.2 Why are the tests in Lucid Exact speeded?

All the tests in Lucid Exact are *speeded* – i.e. they are performed against time limits. There are good reasons for this. From age 11 onwards the underlying skills in reading and writing should be largely automatic so that the mental focus can mainly be on understanding what is read and on conveying clear meaning in writing. Unless individual words in text are read quickly and effortlessly, it is extremely difficult to retain morphological elements (words, phrases, sentences) in working memory so that the overall text can be understood. Similarly, unless the mechanical production of written words (letter formation, spelling, organisation, layout) can be carried out quickly and effortlessly when writing, it is extremely difficult for the writer to retain in mind a clear idea of what they intended to get down on paper. Hence untimed tests are likely to give a misleading impression of the capabilities of students in secondary school and beyond. In particular, when students with specific learning difficulties are placed in the situation of a timed examination, their literacy skills are likely to be much worse than would be predicted from untimed measures of those skills.

Arguably, writing to dictation (as in the Exact Dictation Test) provides a purer and more reliable measure of writing speed than free writing because it is uncontaminated by the student's ability to create ideas. Research has shown that free writing speed is influenced by the topic chosen, teacher and administrative factors, and the extent to which students want to (or have been encouraged to) produce a really good piece of writing.[1]

1.2 Lucid Exact and Access Arrangements

1.2.1 JCQ Regulations on Access Arrangements

Lucid Exact has been designed to meet the requirements for examination access arrangements, most notably those regulated by the Joint Council for Qualifications (JCQ) for United Kingdom GCSE and 'A'-level examinations. Schools and colleges may apply for access arrangements in examinations for students with disabilities or special educational needs, which may take the form of extra time to complete written examinations, rest breaks, use of a word processor, provision of a reader or a scribe (amanuensis), or a transcript of a written paper. Lucid Exact is already widely used by many schools and examination centres for access applications and is accepted by JCQ, although it does not provide ALL the evidence required by JCQ when applying for exam access arrangements (there is no single test currently on the market that can provide all the information necessary for this purpose). Chapter 6 specifically provides advice to those assessing the need for examination access arrangements.

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[1] Ferrier, J., Horne, J. & Singleton, C. (2012) *Factors affecting the speed of free writing.* Paper submitted for publication.

The regulations for access arrangements during the current academic year are published each autumn by JCQ. JCQ regulations are subject to revision each year and assessors should therefore check these regulations on an annual basis. These may be downloaded from www.jcq.org.uk

The information in this fourth edition of the Lucid Exact manual relates to the JCQ regulations in force at the time of writing, i.e. the regulations for the period 1 September 2014 to 31 August 2015.

Patoss (the Professional Association of Teachers of Students with Specific Learning Difficulties) publishes a guide to assessing the need for access arrangements[2] (for further information see www.patoss-dyslexia.org). As with all computer delivered group tests, Patoss recommends that when assessing for exam access purposes, Lucid Exact should be administrated carefully so that individual student responses can be observed and monitored.

Communicate-ed (www.communicate-ed.org.uk) offer training (online and face-to-face) and resources for professionals involved with access arrangements.

1.2.2   Why Lucid Exact is suitable for access arrangements assessments

In exams students are under the pressure of strict time limits which may pose particular problems for those with difficulties in handwriting, reading or spelling. Indeed, it is for this very reason that students with these difficulties are often allowed extra time by the awarding bodies. It has already been pointed out that literacy tests that are not speeded are unlikely to reflect properly the levels of literacy competence of individuals of secondary school age or older, particularly in situations such as examinations.

Consequently, all the tests in Lucid Exact include an element of time pressure in order to recreate that feature of exam conditions. Thus in the spelling test there is ample time for students to type each word and correct a simple mistake but not enough time for them to try out a variety of different spellings. In the comprehension test, because dyslexic pupils may have to read and re-read questions a number of times in order to fully understand them, we have not only set a time limit on the whole test, but we have also included a measure of reading comprehension speed, relating to the time taken for the questions to be understood.

The Lucid Exact word recognition test can give an indication of slow reading of single words, but because it is timed it cannot currently be used as evidence for a reader because the JCQ regulations for access arrangements assessments currently specify an *untimed* test of single word reading accuracy for a reader application (see below). A student who can read single words in the absence of time pressure but who struggles to do so when under time pressure might benefit more from extra time than from a reader.

The Lucid Exact spelling test is suitable for a scribe application. JCQ regulations state that there must be "a spelling accuracy score in the below average range" (JCQ Regulations 2104-15, Section 7.5.10). JCQ do not specify that the spelling test should be either timed or untimed therefore either will be suitable under current regulations.

Some candidates may be quite proficient readers or writers but they need extra time to demonstrate their proficiency. Since all the tests in Lucid Exact are speeded, comparing the scores with other tests might be useful. For example, where a candidate scores within the average range on the WRAT4 single word reading test, but achieves a much lower score on the Exact word recognition test the assessor might consider whether this could be evidence that the candidate is disadvantaged when under time pressure. The same would apply when comparing results of the WRAT4 spelling test with those of the Exact spelling test.

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[2] Jones, A (Ed.) (2011) *Dyslexia: Assessing the need for Access Arrangements during Examinations: A Practical Guide* (4th Edition). Evesham, Worcs.: Patoss.

1.2.3 Limitations regarding access arrangements assessments

Administrators wishing to use Exact when assessing eligibility for access arrangements should note that under current JCQ regulations the Exact word recognition test is not acceptable as a measure of reading accuracy when applying for a <u>reader</u> because it is a <u>timed</u> test of single word reading (similar to TOWRE). Section 7.5.9 of the JCQ Regulations 2014-15 specifies an <u>untimed</u> test of reading accuracy. It will therefore be necessary to supplement Lucid Exact results with the results of a suitable standardised <u>untimed</u> reading accuracy test, e.g. WRAT4. Nevertheless validation studies (see Section 1.5) have confirmed that the Exact word recognition test is an excellent test of single word reading, with scores very consistently located between those of WRAT4 and TOWRE. This test is therefore useful to help 'paint a picture' of a student's disabilities as advocated by JCQ when applying for <u>extra time up to 25%</u> (JCQ Regulations 2104-15, Sections 5.2.2 and 7.6.1). JCQ regulations go on to state that assessment evidence to support applications for extra time "… must confirm that the candidate is unable to complete an assessment in the time allowed."

The writing tests in Lucid Exact take the form of timed writing (both handwriting and typing) to dictation. A poor score in the handwriting test is clear evidence of slow writing speed, while a satisfactory score in the typing test provides evidence of adequate typing skills such that the student would be capable of using a word processor in examinations. However, the current JCQ regulations request that the assessor should also "comment on the candidate's <u>free writing</u> under timed conditions" (JCQ Regulations 2014-15, Section 7.5.10) and, obviously, free writing is different from writing to dictation. Hence when assessing students for eligibility for access arrangements it is recommended that a free writing task should also be employed (for further information on assessing free writing consult the Patoss website: www.patoss-dyslexia.org or the Patoss guide *Dyslexia: Assessing the need for Access Arrangements during Examinations: A Practical Guide*). However, the Exact dictation tests are useful in showing those students for whom a keyboard may be more appropriate than a scribe. This is particularly relevant to students wishing to go to university, where fluency on a keyboard is important and scribes are not readily available.

1.2.4 Assessment of processing speed

Section 5.2.2 of the JCQ Regulations 2014-15 specify provisions regarding speed of working the relation to eligibility for exam access arrangements, such that significantly below average performance (i.e. standard scores below 85) on *'cognitive processing measures which have a substantial and long term adverse effect on speed of working'* are valid evidence for provision of exam access arrangements. Section 7.5.11 goes on to state that *'Cognitive processing assessments would include, for example, investigations of working memory, phonological or visual processing, sequencing problems, organisational problems, visual/motor co-ordination difficulties or other measures as determined appropriate for the individual by a specialist assessor.'*

Lucid Exact is a suite of literacy tests and does not contain any cognitive tests. However, another product, **Lucid Recall**, assesses working memory and processing speed in the age range 7:0 to 16:11. Results from these tests are acceptable measures of cognitive processing when applying for exam access arrangements, provided the student is not older than the test ceiling which is 16 years 11 months. For further information on Lucid Recall, visit the Lucid website www.lucid-research.com

1.2.5 Who can administer Lucid Exact?

It depends on the purpose of the assessment. When used for the purposes of general assessment almost any competent adult can administer Exact with minimal training and by following guidance in the manual. So it does not have to be a teacher who administers the tests – it could be a teaching assistant, for example. However, interpreting results from

Exact requires professional educational skills, and so should be left to a qualified teacher. For this reason, Lucid Exact is only available for purchase by schools, qualified teachers, other educational institutions and some other professionals connected with education (e.g. speech therapists or careers guidance advisors).

When used for the purposes of assessing eligibility for exam access arrangements, JCQ Regulations specify that the assessment must be carried out by a suitably qualified person, who could be a psychologist or a specialist teacher, and the Head of Centre must satisfy themselves that this person is competent to carry out such assessments (JCQ Regulations 2014-15, Section 7.3). This person then takes responsibility for selecting appropriate tests, interpreting the results, and making the recommendations for access arrangements. Many schools use LSAs to assist in test administration, especially when larger groups of pupils are involved. However, it is important that the specialist teacher is present during the assessment process in order to be able to sign the declaration on page 9 of JCQ Form 8. JCQ regulations specify what qualifications and experience are required of named specialist teachers (JCQ Regulations 2014-15, Section 7.3).

These requirements apply whatever tests are used, whether Lucid Exact, or any others.

1.3   Changes to version 1.7 of Lucid Exact

Version 1.0 of Lucid Exact was first released in October 2009 and has been widely adopted in schools and colleges in the UK and elsewhere in the world. Consistent with Lucid's general policy of regular updating and improvement of all its products, and also in response to feedback from users and reviewers, number of revisions to v1.0 have been carried out in order to create the current version (v1.7). The Patoss guide *Dyslexia: Assessing the need for Access Arrangements during Examinations: A Practical Guide* (4th Edition, 2011) contained several comments on Exact, summarised from a review published in the Patoss Bulletin, Summer 2011.[3] This review included a number of critical comments about Exact, all of which were addressed in a reply that was published in the Patoss Bulletin, Winter 2011.[4] The reviewers noted that there had been no published evidence on the validity of the tests in Exact. This is because some of the validity studies were still in progress at the time. However, these have since been completed and the results show good validity for all the tests in Exact (see Section 1.5).

Among the most pertinent criticisms by the Patoss reviewers were the following points that specifically relate to changes made to v1.5 - v1.7 of the program:

- **Word recognition test.** The reviewers thought that pupils with visual tracking, fine motor skills and/or eye-hand coordination difficulties may find the word recognition test stressful because the words in this test appeared on the screen in random locations, which could introduce some unreliability into the results. The standardization and validation studies were re-examined to test this assertion and there was no evidence of any students actually finding this test stressful, or of any students who had such poor visual tracking or manual dexterity that they could not do the test (including some who are known to have dyspraxia). Furthermore, the validation data show no evidence that this test disadvantages certain students (see Section 1.5). Nevertheless, in order to allay concerns that some administrators might have in this regard, the presentation of items has been revised in the latest versions of Lucid Exact. In v1.5 onwards the words now appear in random positions within a

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[3] Backhouse, G., Green, L. & McCarty, C. (2011) Lucid Exact: An Evaluation. *Patoss Bulletin*, 24 (1), 79-86.

[4] Ferrier, J., Horne, J. & Singleton, C. (2011) Lucid Exact: a reply to Backhouse, Green and McCarty. *Patoss Bulletin*, 24 (2), 21-24.

circular arrangement of prescribed locations, thus minimizing the effects of any difficulties with visual tracking, fine motor skills and/or eye-hand coordination.

- **Spelling test.** The reviewers felt that the Exact spelling test is overly dependent on keyboard skills. However, although this test requires responses via the keyboard, there is actually sufficient time for anyone who knows how to spell the word to enter their answer, even if their typing is poor. What the time limit prevents is a student spending ages trying out many different spellings, which is what happens when they don't really know how to spell the word. In fact, this is a very good measure of spelling ability and this conclusion is supported by the validity data (see Section 1.5). In particular, Exact spelling has a very high correlation with WRAT4 spelling, indicating that both tests are measuring almost exactly the same skills. Since WRAT4 is a conventional (pen and paper) test, it seems unlikely that keyboard skills are a significant factor in the Exact Spelling Test, as the reviewers imply. Nevertheless, in v1.5 the method of keyboard entry for this test has been improved so that students can start typing straight away, and do not have to wait for the computer to finish saying the test item (see Section 1.3.1).

- **Reading comprehension test.** The reviewers suggested that students who can't read or have poor comprehension would be more inclined to choose the 'Can't tell' answer option, which could bias results. Although in its present form this test actually has good validity (see Section 1.5), it is accepted that this might occur and consequently the practice item has been changed to make it clearer to students when the 'Can't tell' answer option should be used. Administrators are encouraged to make students aware that they will sometimes have to deduce or work out the answer from the information given in the passage, and that the 'Can't tell' option should only be selected when the student is convinced that there is insufficient information given in the passage to enable the answer to be deduced.

In September 2014, Patoss published an update to *Dyslexia: Assessing the need for Access Arrangements during Examinations: A Practical Guide* (4th Edition, 2011) which summarised revisions to JCQ regulations that came into force in 2014-15. This did not include any comments about particular tests but in a letter to Lucid the Chief Executive of Patoss has said that Patoss is *"...satisfied that many of the reviewers' original concerns have been addressed through the updating of the test and in the production of guidelines which clarify its use when assessing for access arrangements."* These guidelines can be found in Section 6.2 of this manual and are also available on the Lucid website www.lucid-research.com

1.3.1 Technical improvements

A number of technical improvements have also been made to version 1.5, including:

- More explicit warnings to administrators in cases where students have 'dubious' reading speeds in the reading comprehension test: see Section 3.2.

- Inclusion of a sound volume test to make it easier for administrators to check that students can hear the words and spoken instructions in the tests: see Section 2.6.6.

- Improved export functions: see Section 2.3.7.

- Changes to the accessibility of retesting options to make this facility easier to use: see Section 3.8.6.

- Modifications to the spelling test to allow students to hear the target word immediately and begin typing their answer before the contextual sentence has been voiced. This permits speedier responding while not altering the difficulty of test items: see Section 3.3.

Lucid Research Ltd would like to thank all those customers and reviewers who have provided constructive criticism and made suggestions for improvements to Lucid Exact.

1.4   Standardisation and norms

Technically, 'standardisation' is the process used in psychometric test development to create *norms* so that the performance of students of different ages can be represented by means of scores that are independent of age. However, the term 'standardised' is sometimes used in a non-technical sense to refer to the *consistent administration* of a test – i.e. that test instructions and methods of administration are the same for all who take the test. Because this non-technical usage can be misleading (e.g. users may assume that a test has standardised norms when in fact it hasn't) Lucid only uses the terms 'standardisation' or 'standardised' in strict accordance with technical psychometric usage.

The most common normative scores are standard scores and centile scores. Standard scores have a mean (average) of 100 and a standard deviation[5] of 15. Centile scores (sometimes known as percentile scores) place individuals on a 'ladder' of attainment from 1 to 100 compared with the population of that age; e.g. a centile score of 70 means that 70% of people would have lower raw scores and 30% would have higher raw scores. (For further information about standard scores and centile scores see Section 4.2).

The standardisation sample for Lucid Exact comprised 1,171 students aged from 11:0 to 18:11. The students were drawn from 17 schools across the UK, selected to give a representative spread of types of school and socio-economic profiles. The basic results are shown in Table 1.

It can be seen in Table 1 that Form A and B were very similar in all tests except reading comprehension, where Form A has a slightly higher mean score and thus would appear to be slightly easier than Form B. However, this difference is taken into account in the norms, so the two forms are still psychometrically equivalent.

All raw data except those for the word recognition test approximated to normal distributions (symmetrical bell shaped curves), with skewness (the degree of asymmetricality of the distribution) and kurtosis (the degree of flatness and peakedness of the distribution) below the critical threshold of 1.0. The distributions of raw scores for the word recognition test were negatively skewed – i.e. scores were found to bunch towards the upper end of the scale. For this particular test, therefore, the raw score was transformed to give the normal distribution that is necessary for satisfactory generation of standard scores. This statistical transformation, which took into account the speed of response, had minimal effect on scores of students with raw score below the mean, but, as intended, had somewhat greater effect on scores above the mean. For students who have below average word recognition, over 70% of the variance in transformed score is predicted by raw score – i.e. for these students the standard score produced by this test is largely a function of their reading accuracy rather than speed. For students whose word recognition is highly skilled, however, differences are largely a function of speed rather than accuracy.

Table 1. Lucid Exact test results for the standardisation sample.

Test	Form A		Form B	
	Mean	*SD*	*Mean*	*SD*
Word recognition (total number correct)	52.17	8.81	52.09	8.19

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[5] The standard deviation is the most common statistic for expressing variability in a set of scores and is calculated as the average amount by which the scores in the set deviate from the mean.

Test	Form A		Form B	
	Mean	*SD*	*Mean*	*SD*
Word recognition (transformed score)	24.57	6.12	25.28	6.46
Reading comprehension (total number correct)	24.40	5.79	22.10	5.85
Reading comprehension speed (wpm)	79.61	28.87	72.32	31.90
Spelling (total number correct)	34.40	9.30	36.03	8.37
Typing speed (wpm)	21.25	7.51	22.37	6.85
Handwriting speed (wpm)	20.88	5.18	21.29	4.02

SD= standard deviation.

Normative results in standard score and centile score form are incorporated into the Lucid Exact program. The norms are provided in 3-month age bands from 11:0 to 18:11 and in 12-month age bands from 19:0 to 24:11. Standard scores and centile scores for the age range 19:0 to 24:11 were calculated by extrapolation. Age equivalents have been calculated for the age range 6:0 to 18:11 (over this age, age equivalents become meaningless). Age equivalents in the 6:0 to 10:11 range were calculated by extrapolation.

1.5 Validity of Lucid Exact

Validation of a psychological or educational test is not the same thing as the psychometric standardisation of a test, nor should it be confused with the *reliability* of a test. 'Reliability' generally refers to the extent to which a test can be expected to give the same results when administered on different occasions or by a different administrator, or the extent to which the components of a test give consistent results (see Section 1.6). 'Validity' is a measure of the extent to which the test measures what it is supposed to measure (e.g. reading or spelling ability). Validity is usually established by comparing the test with some independent criterion or with a recognised test of the same ability. Inevitably, this raises the thorny issue of what is the 'gold standard' – i.e. which is the 'best' measure of any given ability against which all other should be compared? Professional opinions differ as to the merits of various tests and consequently there are no generally agreed 'gold standards' for assessing reading, spelling and writing. Hence the conventional method of establishing test validity is to show that a new test produces results that agree reasonably closely with well-established test(s) of the same ability.

1.5.1 Concurrent validity tests and results

In validating Exact, the following established tests were selected for comparison: *TOWRE (Test of Word Recognition Efficiency)* – a speeded test of recognition of real words and nonwords; *WRAT4 (Wide Range Ability Tests) Reading and Spelling* – untimed measures of single word reading and spelling accuracy; the *Edinburgh Reading Test* – a measure of reading comprehension ability; and the Hedderly Sentence Completion Test – a test of handwriting speed. Note that WRAT4 and TOWRE have US norms, but nevertheless are widely used in assessments for exam access in the UK.

Lucid Exact has undergone separate studies with different samples for the validation studies and the standardisation study. An independent validation study of Lucid Exact was carried out in 2010-11 by Dr Joanna Horne of the Psychology Department, University of Hull, in four different schools in different parts of Britain and involved a total of 103 students. The results showed that all the tests in Lucid Exact correlate significantly (p<0.01) with equivalent conventional (pen and paper or individually administered) tests that are in regular use for exam access assessments, clearly evidencing the validity of the tests in Exact. The results are shown in the Table 2.

Table 2. Concurrent validity results for the tests in Lucid Exact*

Exact Test	Comparison test(s) and correlation values			
Word recognition	TOWRE Single Word Reading Efficiency **r=0.80**	TOWRE Phonemic Decoding Efficiency **r=0.84**	WRAT4 Reading **r=0.70**	Edinburgh Reading Test **r=0.74**
Reading Comprehension	Edinburgh Reading Test **r=0.73**	WRAT4 Reading **r=0.56**	TOWRE Single Word Reading Efficiency **r=0.51**	TOWRE Phonemic Decoding Efficiency **r=0.52**
Reading speed	Edinburgh Reading Test **r=0.70**	Exact Reading Comprehension **r=0.54**	TOWRE Single Word Reading Efficiency **r=0.57**	TOWRE Phonemic Decoding Efficiency **r=0.51**
Spelling	WRAT4 Spelling **r=0.91**	WRAT4 Reading **r=0.70**	TOWRE Single Word Reading Efficiency **r=0.76**	TOWRE Phonemic Decoding Efficiency **r=0.87**
Handwriting speed	Hedderly Sentence Completion Test **r=0.54**	Exact Typing speed **r=0.48**		

All correlations are significant at the p<0.01 level

It should be noted that the differential correlations shown in the table follow a logical pattern. The Exact Word Recognition test correlated more highly with the TOWRE tests than with WRAT4 Reading. This is because the TOWRE tests are speeded tests (like Exact Word Recognition) while WRAT4 Reading is an untimed test. Exact Reading Comprehension (a timed test) correlates more highly with the Edinburgh Reading Test (a test of comprehension) that it does with the measures of phonic skills and individual word recognition. Correspondingly, the Exact Reading Speed measure also correlates more highly with the Edinburgh Reading Test (a timed test) than with the Exact Reading Comprehension score, showing that reading speed and reading comprehension have been separated out more in Exact, whereas the Edinburgh Reading Test conflates the two measures. Exact Spelling shows a very high correlation with WRAT4 Spelling – higher than with the various reading measures. (Note that, as might be expected, reading and spelling skills tend to be significantly related: the correlation between WRAT4 Reading and WRAT4 Spelling, for example, was found to be 0.70, the same value as between Exact Spelling and WRAT4 Reading).

To give some idea of expected levels of correlation, the correlation values between WRAT4 Reading and the other comparison tests were as follows: TOWRE SWE 0.64; TOWRE PDE 0.77; Edinburgh RT 0.67. These values are, in fact, lower than the corresponding values for Exact Word Recognition, suggesting that Exact Word Recognition has somewhat better concurrent validity than WRAT4 Reading.

1.5.2   Validation of the Lucid Exact Typing to Dictation Test

Exact Handwriting Speed is significantly correlated with the Hedderly Sentence Completion Test (a commonly used measure of writing speed). Since there are no comparable tests of typing speed, no validation figures are given for this component of Exact. However, an independent study of the writing and typing to dictation tests in Lucid Exact has been published and this provides support for the validity of this test [6]. This paper reports on two studies using computer-based dictation tasks for measuring speed of typing and handwriting.

In the first study 952 students aged 11-17 years attending 19 different secondary schools hand wrote and typed passages dictated by a computer. For both handwriting and typing, a very high correlation was found between speed calculated by the computer and that calculated by a human assessor, establishing that computerised calculation is a reliable as well as convenient and time-saving method of establishing writing speed. There were greater age-related gains in speed of typing compared with handwriting and greater variation in typing skill than handwriting skill. However, almost half of students with slow handwriting (below standard score 85) were found to have average or better typing speeds.

In the second study, 55 students aged 13-14 were administered these tasks together with the Hedderley Sentence Completion Test of handwriting speed. Despite the clear differences between the two test formats, a reasonable level of agreement was found between them. Almost one-third of students with slow handwriting in the computer-based task had not previously been identified as having support needs but would potentially be disadvantaged in written examinations. By eliminating the 'thinking' time involved in free writing, computerised dictation tasks give 'purer' measures which can reveal physical handwriting and/or typing problems. They also simulate examination requirement more closely than mechanical repetitive tests of writing speed, and should be particularly helpful in establishing whether students need access arrangements in examinations.

1.6   Reliability of Lucid Exact

'Reliability' generally refers to the extent to which a test can be expected to give the same results when administered on a different occasion or by a different administrator (*test-retest*), or to which the components of a test give consistent results (*internal consistency*). Note that this is not the same as the validity of the test (see Section 1.5).

Table 3 shows the coefficients of reliability for each of the Lucid Exact tests, calculated using Chronbach's alpha statistic, which is a measure of the internal test consistency. Note that the reliability coefficients shown in the table are all high (around 0.9) except for the Reading Comprehension test, where the reliabilities are nearer 0.8. This is because Reading Comprehension scores are based on a relatively small number of test items. These results show that all the tests in Lucid Exact have satisfactory reliability.

Although test-retest reliability is frequently quoted in test manuals, this measure is problematic because students are likely to remember items and answers from the previous assessment, which results in confounding memory factors. However, since Lucid Exact comprises two parallel forms these can be compared in a test-retest situation, which is arguably a more satisfactory method of checking the test reliability since the test content is different in the two forms. To achieve this, Exact reading comprehension and spelling test data were collected a total of 373 students aged 11-16 attending a large secondary academy in South London. The test-retest correlation coefficients over a period of 6 months were: spelling 0.757, reading comprehension accuracy 0.614, reading comprehension speed 0.511,

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[6] Horne, J., Ferrier, J, Singleton, C. & Read, C. (2011) Computerised assessment of handwriting and typing speed. *Educational and Child Psychology,* 28(2), 2011, 52-66.

these results all being statistically significant at better than $p<0.001$. (Word recognition and writing to dictation were not tested in this project.) Given the nature of the reading comprehension test, with five increasingly lengthy and complex texts of different genres and on different topics, together with progressively challenging questions, this result clearly demonstrates satisfactory psychometric and educational integrity of the assessment methods.

Table 3. Reliability coefficients (Cronbach's alpha) for the tests in Lucid Exact.

Test	Reliability
Word Recognition Overall Score	0.93
Word Recognition Regular Words Score	0.97
Word Recognition Irregular Words Score	0.96
Reading Comprehension Accuracy Form A	0.81
Reading Comprehension Accuracy Form B	0.80
Reading Comprehension Speed Form A	0.84
Reading Comprehension Speed Form B	0.83
Spelling Overall Score	0.91
Spelling Regular Words Score	0.94
Spelling Irregular Words Score	0.88
Typing Speed	0.93
Handwriting Speed	0.93

1.7   Advantages of computerised tests

One of the great advantages of a well-designed computer-based test is that it does not require any special expertise on the part of the administrator. This applies to all the tests in Lucid Exact, which can be administered by any competent adult (see Sections 1.2.5 and 3.5.4). Provided headphones are used, they can also be administered and undertaken in a room where other activities are taking place, and no special directions to the students are required other than to tell the student(s) which of the tests should be attempted, along with an explanation of the importance of moving through the tests quickly and of thinking carefully about responses (see Section 3.5.3).

Computers also provide more precise measurement, especially when complex cognitive skills are being assessed. Tests are administered in an entirely consistent manner for all persons taking the test, which enhances reliability of measurement. Timings and presentation speeds can be controlled precisely. The subjective judgment of the administrator does not affect the test outcome as it can in conventional tests. Lucid Exact is largely self-administered and results are available immediately; both of these factors help to reduce administrative load and avoid time delays.

There is good evidence that most students prefer computer-based tests to conventional tests (whether paper-based group tests or administered 1:1 by a teacher). This is particularly the case for students with below average literacy skills, who are more likely to feel intimidated by assessments and be embarrassed by their performance. Computer-based tests have generally been found to be less threatening and less stressful, which helps to ensure more

reliable results.[7] There is also evidence that there is less gender bias in computer-based tests than in conventional tests, so there are good reasons to regard computer-based tests as fairer, as well as being more consistent and objective, than conventional tests.[8]

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[7] Singleton, C.H. (2001) Computer-based assessment in education. *Educational and Child Psychology*, 18, 58-74.

[8] Horne, J.K. (2007) Gender differences in computerised and conventional educational tests. *Journal of Computer Assisted Learning*, 23, 47–55.

2 Installing and running Lucid Exact

Carrying out most of the procedures in this Chapter will be a straightforward task for any person who is reasonably familiar with using computers. However, where subsections refer to procedures that are not essential for the novice user, these have been marked (Optional) so that they can be skipped if desired.

2.1   Installing Lucid Exact on a stand-alone computer

Please note that the version of Lucid Exact for networks comes on a different CD, which has a separate installation guide. If you have a network version please use the guides provided on the CD and disregard Section 2.1 of this manual. The rest of this guide applies to both the stand-alone and the networked versions.

2.1.1   Minimum computer specification

Lucid Exact needs to be installed on a personal computer system with the following **minimum** specifications to run successfully.

- Intel Celeron Processor running at 700 MHz with 512 Mb RAM
- CD Rom and Sound Card
- Graphics resolution of 1024 x 768
- Microsoft Windows ® Vista / Windows 7 / Windows 8
- Windows Media Player ® Version 9 or above
- Printer (optional but recommended)

2.1.2   Installation procedure

Lucid Exact v1.7 is designed for installation on a stand-alone PC. If you are not confident about this procedure you may want your IT technician to undertake this for you.

To install the Lucid Exact program

Step 1.

Either:

Use *Windows Explorer* to browse the Lucid Exact CD, then double click *setup.exe*

Or:

Click 'Run' on the *Windows Start menu* and the type *d:\setup* in the dialogue box and click 'Open' (assuming d: is the letter of your CD drive; if it is another letter then obviously substitute that for 'd').

This launches the Front End Menu which looks like the one shown in the figure on the next page.

Step 2.

Click the **Install now** button to proceed to the software installation.

(The installer is called setup.exe in the folder 'software' on the CD.)

Note: Clicking on the **View the Manual** option will display a copy of this manual. The manual will be opened as a pdf version in Adobe Acrobat Reader ® or, if you do not have Adobe Acrobat Reader installed on your computer, it will open as an hmtl version within your default web browser. If you wish to install the latest version of Adobe Acrobat Reader (free of charge) go to www.adobe.com/downloads/ Both versions have active links both within the document and to websites featured in the document.

Lucid Exact Front End Menu

2.2   Getting started

2.2.1   Starting Lucid Exact

Click on the **Start** button and choose **Programs ⇨ Lucid Exact ⇨ Lucid Exact**

Alternatively, Double click the Lucid Exact icon on your Desktop, as shown opposite.

Lucid Exact desktop icon

2.2.2   Missing CD

When you run Lucid Exact v1.7 the original CD Rom must be in the CD drive. If it is not then you will receive an error message (see figure opposite). Insert the correct CD and try again.

Note that the networked version does not need the CD in the drive in order to run the program.
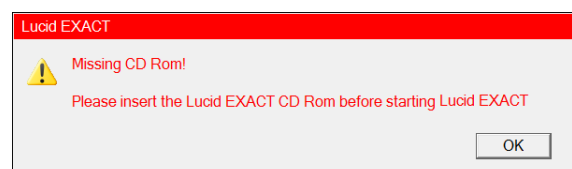
2.2.3 Administrator password

When you run Lucid Exact for the first time you will be presented with the Administrator Login box (see figure opposite).

Note: The default Administrator Password is '**lucid**'.

Enter the password into the Password box and click the **Login** button.
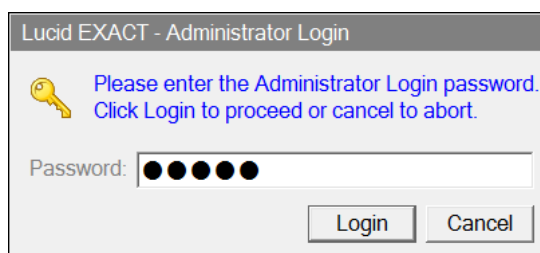
Administrator log-in box

Once you have logged in for the first time it is recommended that you change the Administrator Password (see Change administration password: Section 2.6.5). Please ensure you make a note of the new password and keep it in a safe place.

2.2.4 Registering Lucid Exact

Lucid Exact needs to be registered in order to start using it. Enter the name of the Administrator (i.e. the person who will be primarily responsible for administering Lucid Exact, e.g. the SENCo, headteacher or yourself), the name of your institution or school and, finally, your software serial number as shown in the Lucid Exact DVD case when supplied.

When all these details have been entered in the text boxes, click on **Register** (see figure opposite).
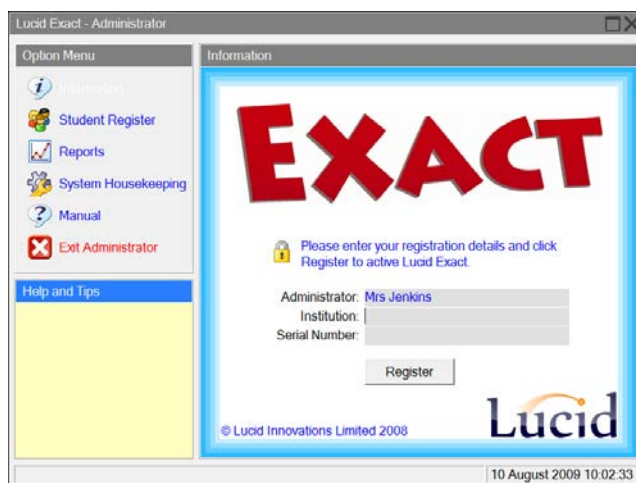
Administrator registration box

2.2.5 Information screen

After registering your software, the Administrator information screen will display your registration details and the dates of registration and expiry (see figure opposite).

Note that your software licence period may not coincide with these dates if the software was not installed immediately after receipt or delivery.

You can also click on the Lucid logo shown in the bottom right-hand corner of the screen to launch the Lucid Research website in your web browser.
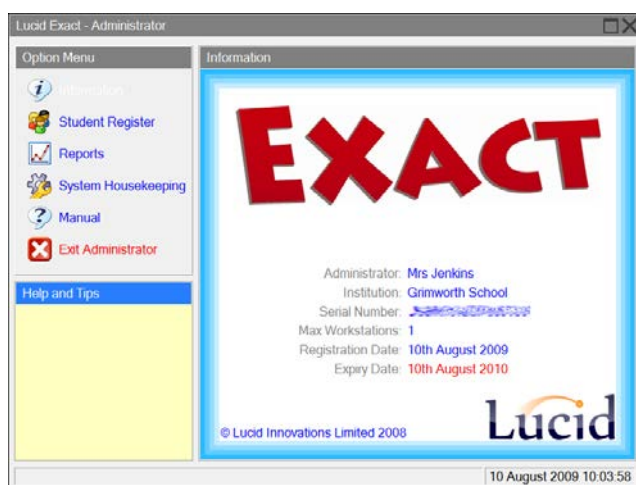
Administrator information screen

2.2.6   Options menu

The Administrator screen has an Options menu on the left hand side. Clicking on each option will display the appropriate detail page to the right.

The yellow **Help and Tips** window shows context-sensitive help for each item the mouse pointer passes over.

To expand the software to cover the entire screen you can click on the Maximise button at the top corner of the screen.

2.3   Managing the student register

2.3.1   Student register

Click on the **Student Register** option within the Administrator menu to display the Student Register Detail screen (see figure opposite).

A new installation of Lucid Exact will not have any students listed.
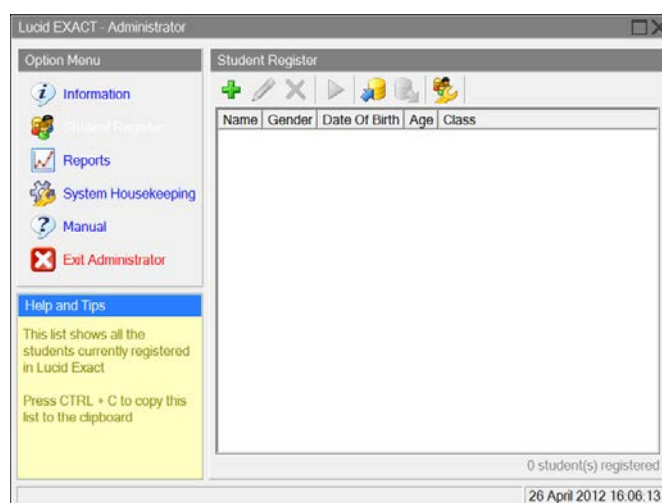
Student Register

2.3.2   Adding students

Click on the ✚ icon on the Student Register screen to add a new student [see *Add student panel* (1), opposite].

Complete all the relevant fields. When you enter the date of birth using the calendar feature provided, the program will automatically display the student's age [see *Add student panel* (2), below, right].

The Class field allows you to allocate the student to an appropriate group (see Manage student classes, Section 2.3.8).

Add student panel (1)
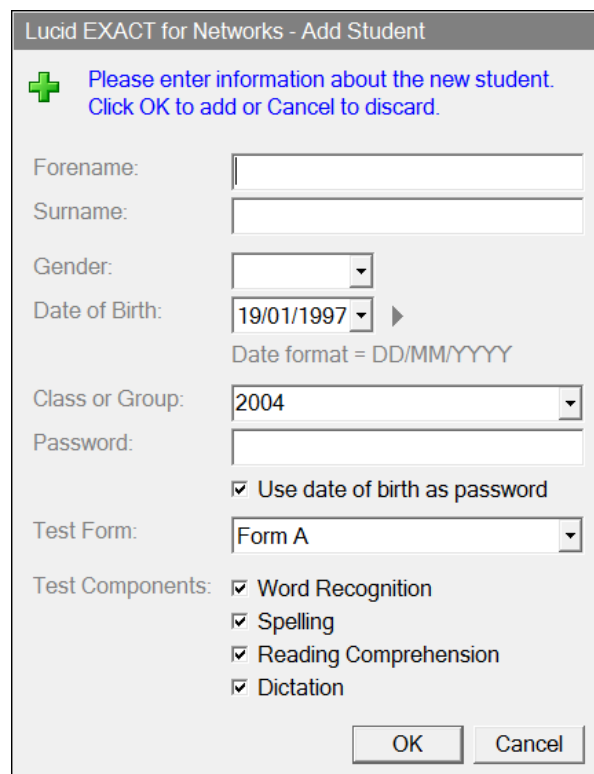
The password box will automatically be set to the student's Date of Birth. If you wish to set a specific password, uncheck the 'Use date of birth as password' check box and type your chosen password into the password field.

You will see that *Test Form* will default to the setting 'Form A'. If you wish to use Form B then select that instead in the drop down menu [see *Add student panel* (2), opposite].

For information about using the parallel test forms A and B in Lucid Exact, please see Section 3.8.

The test components are ticked. If you do not want a particular student to do any particular test, untick the appropriate box.

Click on **OK** to complete the Add Student panel and return to the Student Register screen.

Add student panel (2)

2.3.3   Selecting students

When students have been added to Lucid Exact they will be displayed in the Student Register screen (see example opposite). Clicking on one of the students will select that student and make active the Edit and Delete toolbar buttons.

You can also select more than one student from the list by holding the SHIFT or CTRL keys down. This is useful when you want to delete a group of students or create a student export file (see Section 2.3.7).
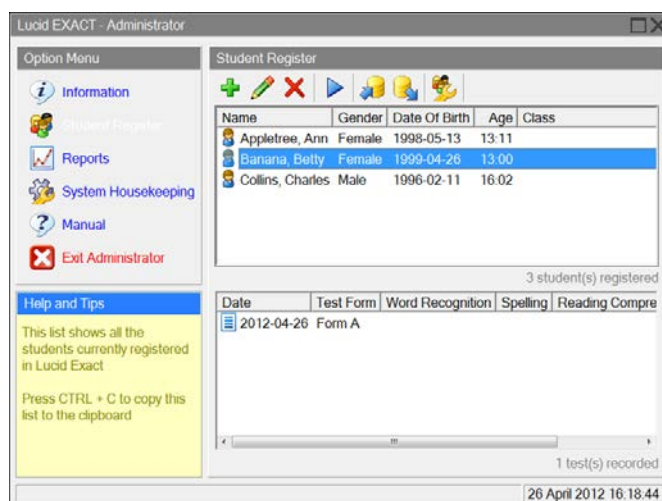
Selecting students

Useful tip:

Pressing the Ctrl and C keys when any list is displayed in Lucid Exact will copy the information to the clipboard where it can be pasted into other applications, such as Microsoft ® Excel.

The list of columns can be sorted according to each of the column headings. Click on the appropriate heading to sort the list in ascending order. Click the same column heading again to sort in descending order.

2.3.4   Editing students

Clicking on the ✎ icon will allow you to edit the currently selected student (see example opposite).

Most of the fields can be changed, though there are restrictions to making changes to the Test Form and Test Components where this would cause loss of the student's data.

Editing students

2.3.5   Deleting students (optional)

Clicking on the ✖ will delete the currently selected student or students. Click on the **Yes** button to confirm the deletion.
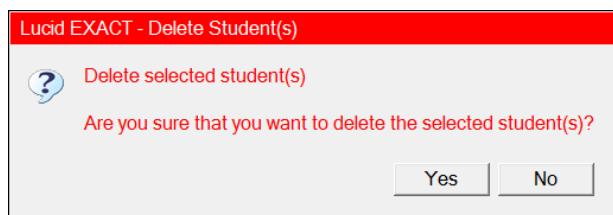
2.3.6   Importing students (optional)

You can create multiple new students using the student import function.

Create a text file containing all student records that you wish to import.
Each student has one line separated by commas.

The text file must follow the format shown in the figure below. You may omit the *Class* field from the students but if you do, you must retain its leading comma at the end of each line. The example shown has a line space after the header for clarity, but this is not strictly required.
Note: The first string (the header) in your import file must be typed in **exactly** like this:
`surname,forename,dob,gender,class`
If you get it wrong you will get an error when you attempt to import the file.
NEW! In version 1.7 the gender fields **m**, **M, f** and **F** are now accepted in your import file - in earlier versions it was only **Male** or **Female**.
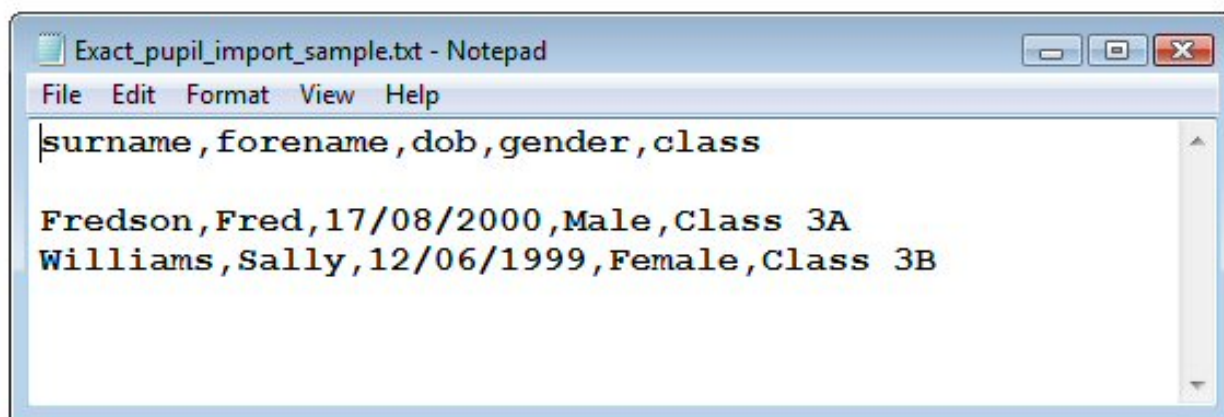
Click on the 📁 icon to locate your student load file. This will display the Import from Student Export File Dialog (see figure opposite), which allows you to browse to the folder where you have created your Student Load file.

Select the file and click the **Open** button.
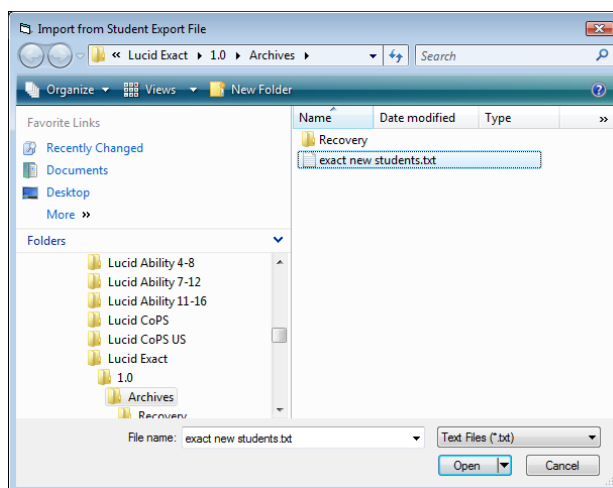
Import from Student Export File Dialog

Lucid Exact will display a message box saying how many records have been imported (see figure opposite).

Lucid Exact will also display a message if any errors were encountered and give you the name and location of the error file (see figure opposite).
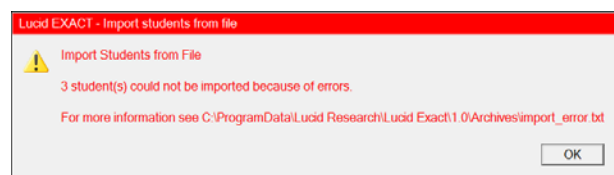
The error file will give an indication of why the record was rejected (see figure below).
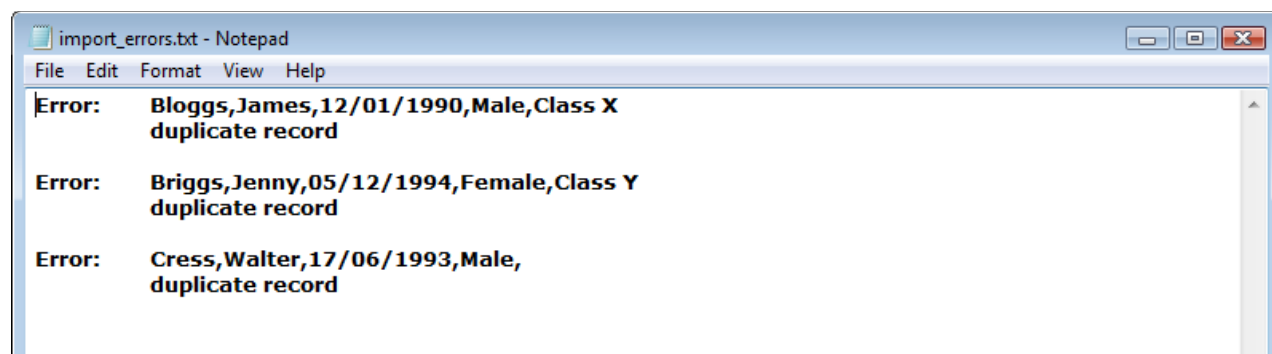
Any students imported will be displayed in the student register (see figure opposite).

Other fields within the student record will be assigned default values, which can be edited later if required.
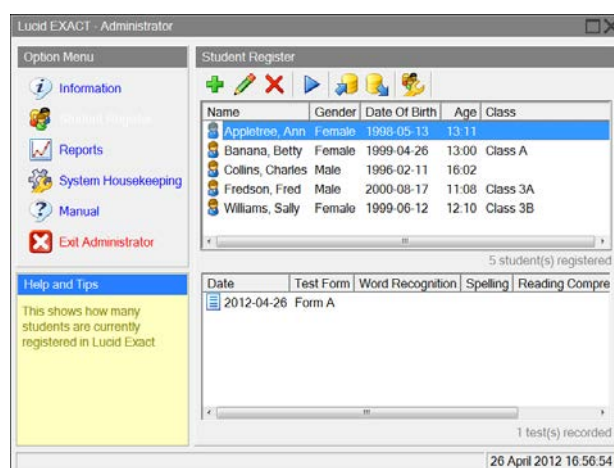
Student Register

2.3.7 Exporting students (optional)

You can export students to a text file for use within other applications. The export function will export student details in exactly the same format as they are imported (see Section 2.3.6). The export file will contain the details of all the students you highlight on the student Register screen. The records themselves will remain in Lucid Exact.

Click on the 🗐 icon to export students.

Select the folder and enter the filename that you wish to export to and click the **Save** button.

Lucid Exact will display a feedback message giving the location and name of the export file.

Note: All exported files are saved by default into a folder called 'Archives'.
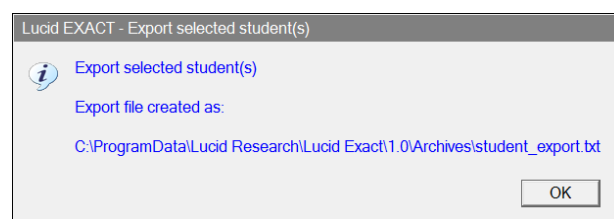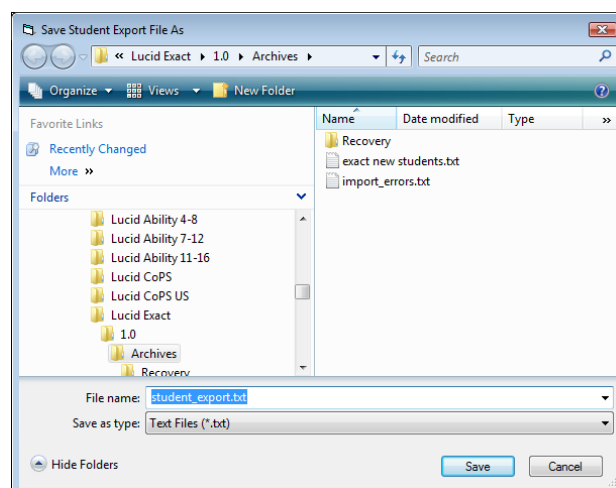
2.3.8 Manage student classes (optional)

The Manage Student Classes function allows you to move students into different classes. You define the classes, so they could match school classes or forms. Or you could group students into performance-based groups.

Click on the 🧑 icon.

Select the Source class from the drop down list (see figure opposite).

Then check the boxes of the students you wish to allocate to a new class and click the **Allocate** button.
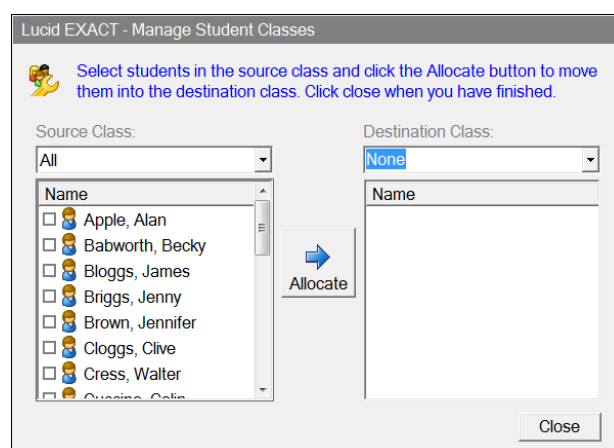
This will copy the students into the right hand side(see figure opposite).

Select a Destination Class from the drop down list or type a new one into the field.

Click on the Close button.

To remove a student from a class you can either allocate them to their new class or allocate then to class 'none'.
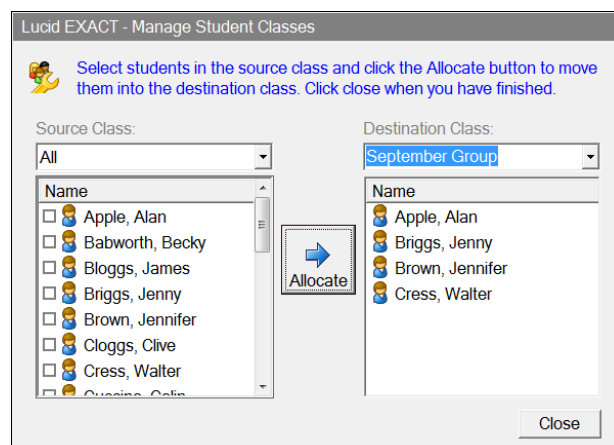
The Student Register Screen should show the students allocated to their new class.

Notes:

You can sort the list by clicking on the appropriate column heading.

Each student can be assigned to **one** class or group only.

2.3.9   Retest batches of students (optional)

This option, introduced in Version 1.7, allows you to create new test records for multiple students, provided that they have all previously completed a test. An example of use of this option could be that an entire year group took Form A test in September and in April you wish to retest them all using Form B.

Click on the 🌟 icon.
Choose the class (see figure opposite) and then select the New Test Form, which can be Flip Flop (the form the student has not completed last time, Form A or Form B).
Untick any test components you don't want the students to do in their new test. Select OK to confirm your choices or Cancel to abandon this option.

2.4   Start a Lucid Exact test

2.4.1   Logging In

When Lucid Exact starts you are presented with the Student login screen.

You can either login as a student and start a Lucid Exact test or you can click the Admin button to log into the Administration mode and access the Administration menu. In the latter case, the Administrator password must be entered to proceed (see Section 2.2.3).

Use the drop down list box to choose the appropriate student.

Enter their password and click the OK button. This will take you to the Tests Menu (see 2.4.2).

See Section 2.3.2 for information about student passwords.
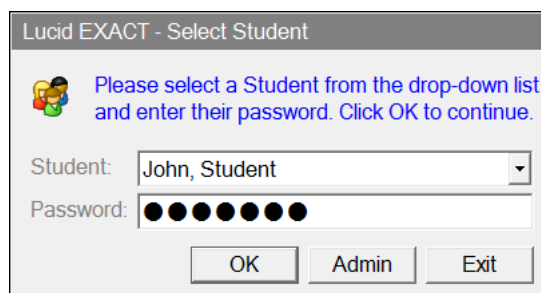
In Administration mode, highlighting a student and then clicking on the ▶ icon will take the user straight to the Tests Menu where the four test components can be undertaken.

2.4.2   Tests Menu

When a student logs into *Lucid Exact* they will be presented with the Tests Menu (see figure opposite). Clicking on any of the four tasks will take the student to those tasks (except where there is a green tick adjacent to the task, which signifies that the task has already been completed by that student).

Having completed a task the student returns to this menu page. To exit this screen and return to the Administrator login panel, click on ❎ **Exit** .

When the student has finished his or her tasks and exited the Tests Menu, the password panel will appear and the Administrator will need to enter the Administrator password to return to the Student Register screen for another student.

Tests menu

For further information on the Lucid Exact tests and guidance on test administration, please see Chapter 3.

NEW! In version 1.7 a Sound Check option is added on the Tests Menu. By clicking on this, the student can hear a sample voiceover clip and determine if the sound volume coming through the speakers or headphones is loud enough.
If not, the test screen can be minimized and the appropriate action taken by the teacher or ICT technician to adjust the computer's sound volume.

NOTE: If you wish to exit from a test prematurely you can press the *F4 key* on the keyboard at almost any point in any task. This action will mean that no results will be saved for that test, the exception being if you exit from 'Dictation' after the typing task and during the handwriting task, the typing task data will be saved.

2.5   Reports

2.5.1   Types of report

Lucid Exact creates four A4 pages of results for each student, as follows:

1. **Results profile**. This shows all the key data needed for JCQ forms in both graphical and tabular form. There is a space for assessor's comments, which can either be typed into the computer or written on the print-out.

2. **Results breakdown.** This gives a complete breakdown of test scores, including comparison of ability to read and spell regular and irregular words, frequency of spelling errors in handwriting and typing, and the complete passage as typed to dictation by the student.

3. **Itemised responses.** This gives the student's responses for all items in reading comprehension and spelling.

4. **Handwriting to dictation.** The handwritten story may be scanned in and included in the results, or simply attached in hardcopy form.

For examples of each of these four pages of reports, please see Chapter 4. For guidance on interpreting and using results, please see Chapters 4, 5 and 6.

Using the Report Screen

Click on the Report menu option to view reports for each student.

The student can be chosen using the drop down list box towards the bottom of the page.

The report has up to 4 pages.

Click on 🖨 to print just the report currently being displayed.

NEW! A feature introduced in v1.7 is the batch printing option 🖨.
To use this, choose the Group/Class from the dropdown list (choose 'All' to show everybody). Select the students you want by clicking on each one or choose 'Select All' to pick all those in the list. In the right hand panel first choose which test Forms you wish to print (in case students have been tested on both Form A & B and you only want to print, say Form B reports, choose 'B only'). Tick the report pages you wish to print (Pages 1 to 4). Finally select 'Print' and you will be given the opportunity to choose a printer and print the pages out. The program will tell you in advance how many sheets will be printed in total in case you've made any incorrect selections.
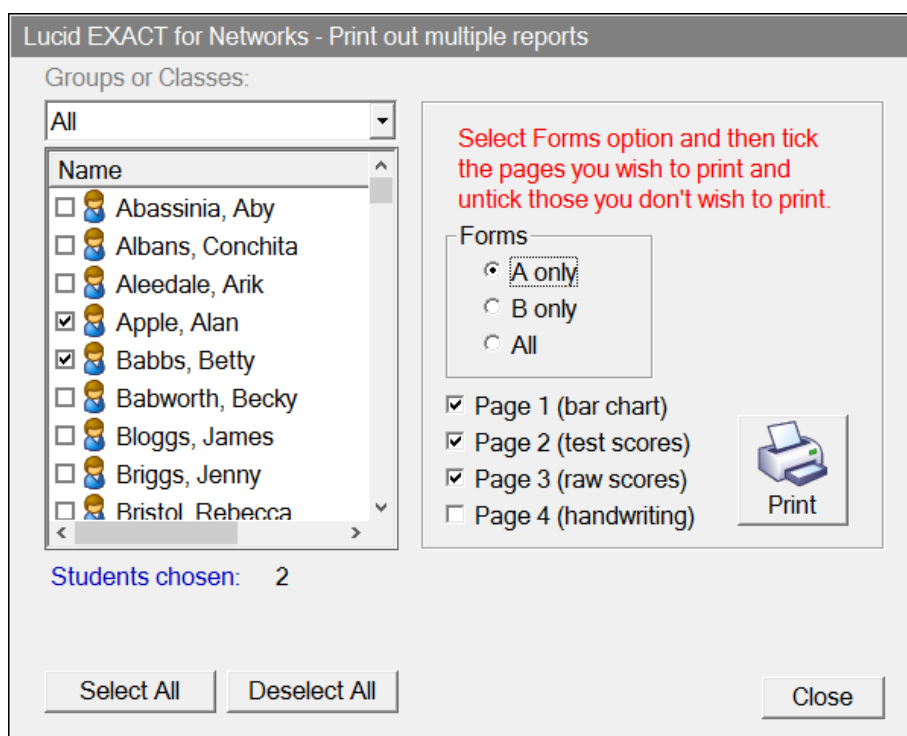
Batch Printing of reports

Click on to save scores and other student information into files which can be imported into Microsoft Excel® or similar spreadsheet applications.

A panel similar to the batch print panel will appear. Choose those students for whom you wish the program to compute scores. Select the format you wish the file to be saved as; Excel will be an Excel worksheet files with the extension (.xlsx). The comma separated values (CSV) file is a pure text file which can be imported into several different applications such as Microsoft Excel®, Access®, Word® and other text editors.

If you wish to export the scores achieved by a single student, you do get a wealth of detail saved, including individual items chosen in the Spelling and Reading Comprehension test: For details, see [section 7.3](#).

To use this option, first ensure that the target student's report is currently being displayed on the Reports screen; bring up the batch export panel by clicking on and click on the box marked *Export Raw Scores to Excel (.xlsx)* so that it is ticked. Note you may only choose the (xlsx) output option.

To create the export file, click on *Next*. You will be presented with a File Dialogue box from which you can name and save your file to a location of your choice.
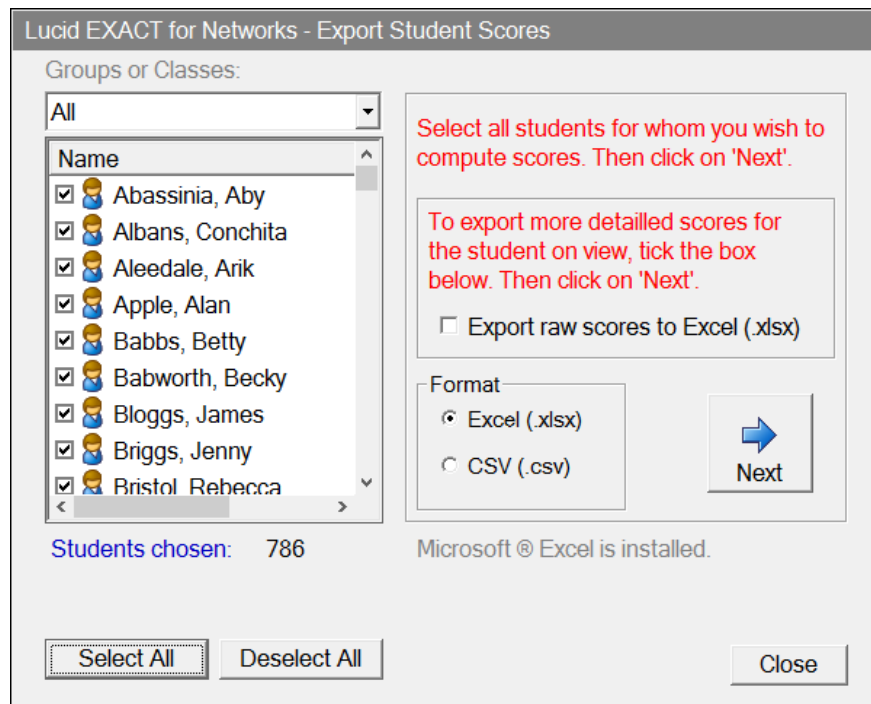
Export scores to a spreadsheet or 'csv' file

Select *Close* to exit this panel.

The first line in the xlsx or csv file is the 'header' which contains the names of all the columns separated by commas. If you chose to export one or more students by selecting them from the list box, you will find that each student has one row in the spreadsheet. If you would like to see what data are saved, use this export option to save a sample file of some of your students and then import it into a spreadsheet application such as Microsoft Excel. Alternately, see section 7.3.

If you exported a single student's data using the 'Export raw scores to Excel' option, you will find there are three data sheets which contain data representing data items shown on pages 1 through 3 of the graphical reports.

Click on to copy the report page you can see into the Windows clipboard. This can then be pasted into a suitable document as you wish.

Click on to zoom in or out of the report.

Click on to move forwards or backwards to different report pages.
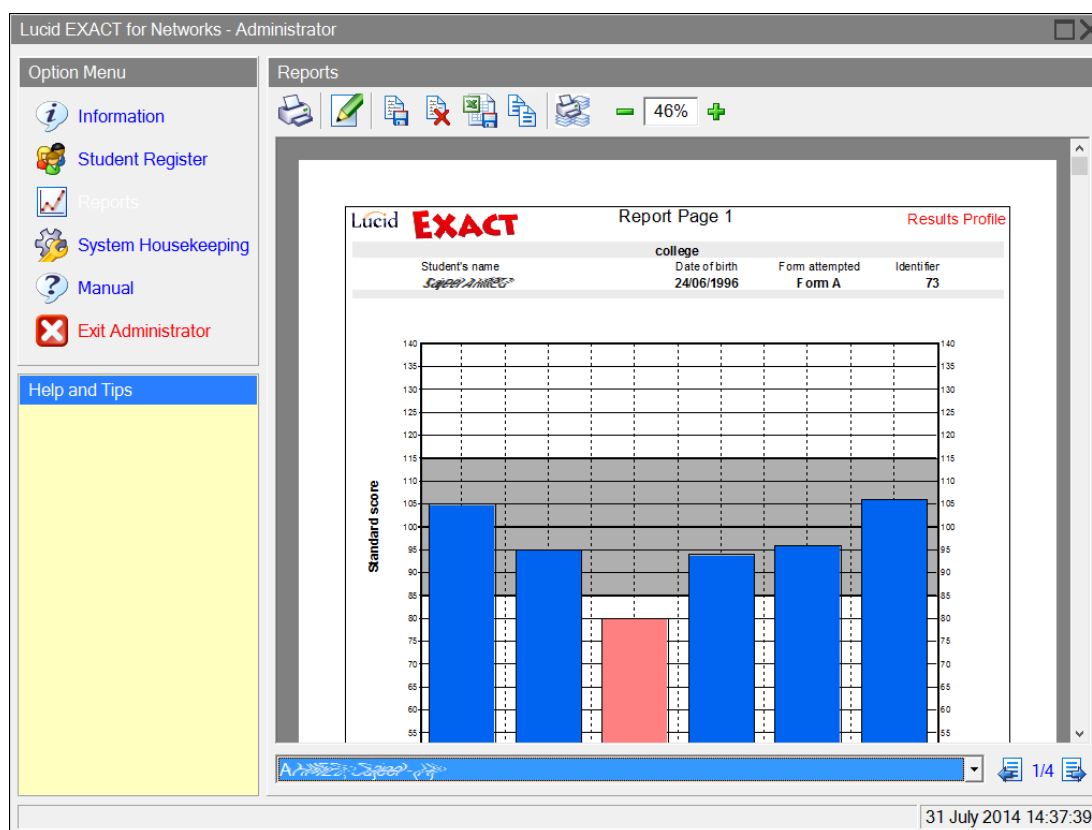
Report menu

2.5.2   Adding a comment to the report (optional)

Clicking on the icon allows the administrator or supervisor to add a comment to the report (see figure opposite) or to edit a previously entered comment. This text will be shown in the box at the foot of page 1 of the report. As a rough guide, about 250 words may be displayed in the comment.

Note: The program does not check the length of the text entered, so if more than about 250 words are entered (or if there are several line spaces) the text may overflow the bottom of the box or even overflow the bottom of the page. If this is observed on printing, then it is recommended that the text be edited to reduce it to a more appropriate size.

Edit report screen

2.5.3 Inserting a count of the number of words in the dictation tests

The numbers of words typed and handwritten in the dictation tests are estimated by the computer based upon the typed text saved and the number of phrases listened to by the student for the handwriting task. In 95% of cases these figures are of sufficient accuracy to be safely used in the report. However, in a few cases the computer's estimates can be significantly different to the actual figures (e.g. because the student has not followed the instructions properly).

Administrators should therefore <u>always</u> carry out a visual check of the number of words typed or handwritten, and if a discrepancy is suspected, the administrator should manually count the number of words and enter the true figures into the computer. The manually entered figures will then replace the computer's estimated figures in the report.
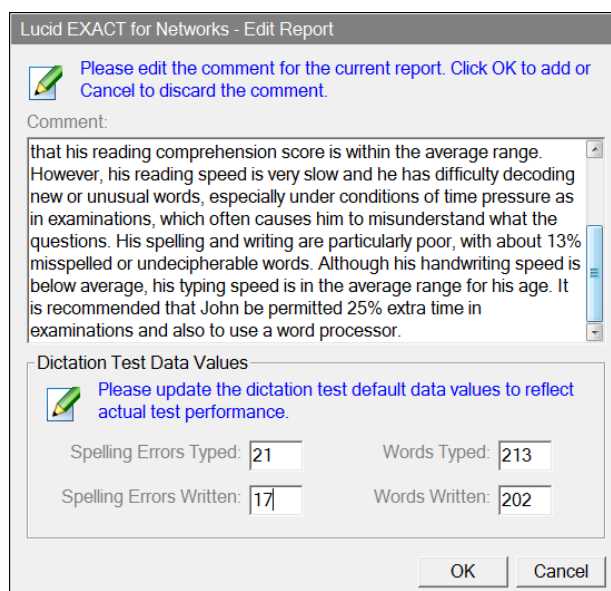
The true figures should be typed into the boxes provided on the *Add a Comment* screen shown in Section 2.5.2, above, which is accessed by clicking on the ✏ icon.

2.5.4 Inserting a count of the number spelling errors in dictation

The computer does not estimate the number of spelling errors made in the dictation tasks. However, the administrator can manually enter values for the number of spelling errors made by the student in the two dictation tests, which will enable the percentage of spelling errors to be calculated and shown on the report.

Note: If these figures are not entered, they will be shown as zeros on the report.
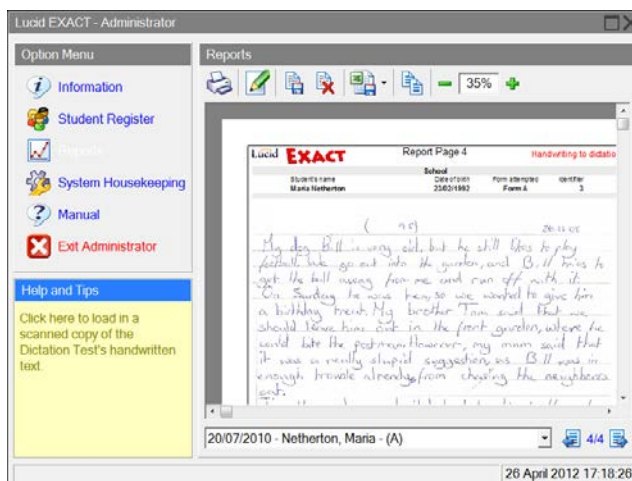
The number of spelling errors should be typed into the boxes provided on the *Edit report screen* shown opposite, which is accessed by clicking on the ✏ icon.

Edit report screen

2.5.5 Inserting a scanned image of handwriting (optional)

Clicking on the 🖼 icon allows the import of a scanned image of the student's handwritten passage. This comprises the fourth page of the report (see figure opposite). The image must be pre-scanned into either a bitmap (.bmp) or jpeg (.jpg) image, and should be in portrait (not landscape) orientation and it should ideally have an aspect ratio (width/height) of between 0.7 (A4) and 0.75.

Inserting handwriting

To load the scanned image on to the report page choose the save icon from the Reports menu bar. Then browse to the folder where the image resides, highlight the image file and select 'Open'. The image will be scaled without altering its aspect ratio and then displayed on the Report.

Note: All scanned files are saved by default into a subfolder called 'Images', which is within the 'Archives' folder referred to in Section 2.3.7.

This facility is optional, and if an image is not available page 4 will remain blank. However, as an alternative, a copy of the handwriting may be glued on to the fourth report page after printing out.

2.6 System housekeeping

2.6.1 Administrator options menu

Clicking on **System Housekeeping** in the Option Menu presents various features for managing databases (archiving).

There is an option to change the administration password see Section 2.6.5).

There is also an option called **Upgrade user licence**. This allows the renewal of a software licence which has expired (or is about to) or the upgrading of a network licence for more users.
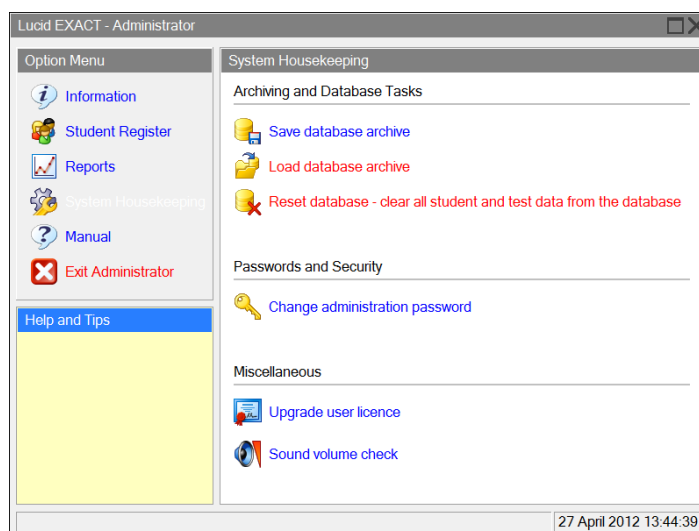
Administrator options

2.6.2 Create a database archive

You should regularly archive your Lucid Exact database and store the backup file on a different computer or backup media in order to prevent data loss.

Click on **Save database archive.**

Browse to the folder you wish to save the archive in or accept the default folder.

Type an appropriate filename or accept the default.

Click on the **Save** button.
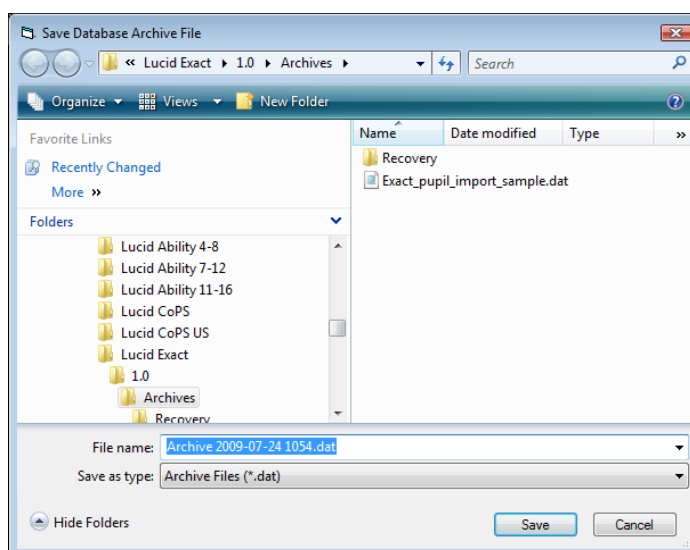
Creating a database archive

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2.6.3 Load a saved database archive

You may need to restore a database archive after any sort of machine failure or if the database becomes unusable.

Warning! Restoring a database will overwrite or replace all the data stored within the current database.

Click on **Load Database Archive**

Confirm you want replace all the data in the current database with an archive by clicking the **Yes** button.

Browse to the folder that stores the database archive.

Select the appropriate file and click the **Open** button.

The database archive will be loaded into the active database, replacing any previously held information.
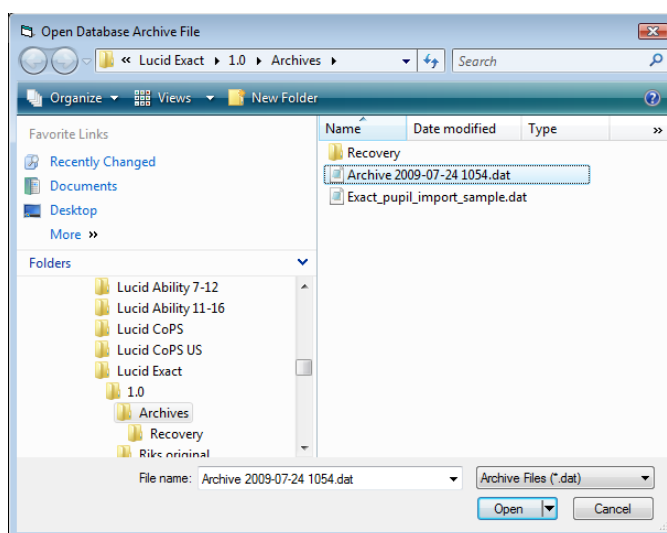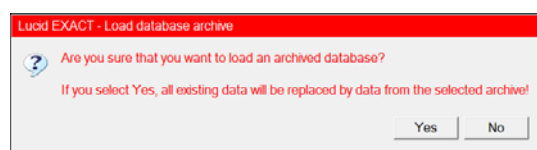
2.6.4 Resetting the database

Warning: This function will completely erase all of the information in your Lucid Exact database. Ensure you have taken an archive copy (see Create a database archive, Section 2.6.2) before performing a database reset.

Click on the 'Reset Database' option.

Confirm you want to clear the database by clicking on the **Yes** button (see figure opposite).
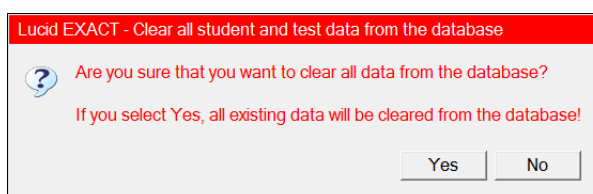
2.6.5 Change administration password

Click on the **Change Administration Password** option.

Enter the current password.

Enter the new password and confirm it by entering the new password again in the confirm box.

Click **OK**
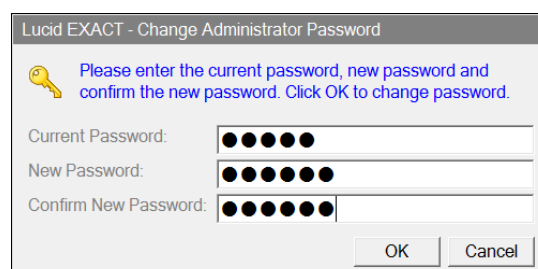
2.6.6 Sound Volume Check

This feature[9] allows the teacher or other administrator to test the sound level on any computer (you need to be running Lucid Exact on that computer with the headphones or speakers plugged in. Click on this menu link to hear a sample voiceover clip. If the sound is not at the desired volume, it is recommended that you alter the computer's sound volume – usually there will be a speaker icon with volume control on the Taskbar at the bottom right of the screen.

NEW! A sound check has been introduced onto the Tests Menu (v1.7 onwards) for the benefit of students, who, with the assistance of the teacher or ICT support person, can alter the sound volume before they begin their assessments.

2.6.7 Administrator's Manual

Clicking on the **Manual** option from the menu will display a copy of this manual. The manual will be opened as a pdf version in Adobe Acrobat Reader® or, if you do not have Adobe Acrobat Reader installed on your computer, it will open as an hmtl version within your default web browser. If you wish to install the latest version of Adobe Acrobat Reader (free of charge) go to www.adobe.com/downloads/ Both versions have active links both within the document and to websites featured in the document.

2.6.8 Exit Administrator

Click on the **Exit Administrator** menu option to return to the normal student login prompt.

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[9] This is feature is found in version 1.5 onwards.

3   Details of each test

3.1   Word recognition

Word recognition is a speeded test of the ability to recognise individual real words out of context (see Section 1.1.2 for explanation of speeded tests). It depends on fluent and efficient reading accuracy. In each item the student is presented with six real words shown on a circular location space in the centre of the screen.[10] One of those words (the 'target') is spoken by the computer and the task is to identify the target word by clicking on it using the computer mouse as quickly as possible. [It is essential that students doing this test on a laptop use a mouse rather than a touchpad, because use of the latter creates an unacceptable delay in response times.] A total of five seconds is allowed for a response, with an audible prompt being given after three seconds. The remaining five words (the 'distractors') have been selected in order to maximise lexical and phonological similarity with the target word, e.g.:

Target word: century

Distractors: centre, sanctuary, centrally, scented, central

Each of the two forms of the word recognition test comprises a total of 60 items, with equal numbers of regular and irregular target words. Difficulty – in terms of the frequencies of the target words in written English – has been balanced across the two forms. The test begins with two practice items.

Because the distribution of raw scores for this test tends to be negatively skewed – i.e. scores tend to bunch towards the upper end of the scale – the raw score has been transformed to give the normal (bell-shaped) distribution that is required for generating standard scores. This transformation takes into account the speed of response, and has minimal effect on scores of students with raw score below the mean, but somewhat greater effect on scores above the mean. For students who have below average word recognition, over 70% of the variance in transformed score is predicted by raw score – i.e. for these students the standard score produced by this test is largely a function of their reading accuracy rather than speed. For students whose word recognition is highly skilled, however, differences are largely a function of speed rather than accuracy.

Results are provided for overall words (Report, page 1, see Section 4.1.1), and for regular words and irregular words (Report, page 2, see Section 4.1.4). In practice, students do not use a phonetic approach when recognising words at speed, and their scores are usually very similar for both phonetically regular and irregular words. The standard scores in this test correlate well with spelling ability, and a standard score below 85 is a useful pointer to literacy problems such as dyslexia.

3.2   Reading comprehension

Each of the two forms of the reading comprehension test comprises five passages of increasing length and difficulty. Each passage is accompanied by a number of multiple choice questions that demand good literal and inferential reading comprehension skills. The characteristics of each passage are shown in Table 4.

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[10]   This is an improvement made to version 1.5; in previous versions the words were displayed in random locations around the screen (for explanation see Section 1.3).

Table 4. Passages in the reading comprehension test

Item No.	Type of passage	No. of questions	Form A		Form B	
			Title	*Length*	*Title*	*Length*
1	Recipe	5	Mrs Beeton's Biscuit Recipe, 1907	72 words	Coffee, Iced (Mrs Beeton, 1907)	95 words
2	Advert	10	New Homes for Sale	78 words	Sleepee–byes Beds	83 words
3	Short story	10	Computer Games	144 words	A Giant Meal	206 words
4	Factual report	10	Drama at Sea	182 words	Plane Crash	197 words
5	Excerpt from classical literature	10	*Nostromo* (Joseph Conrad, 1904)	240 words	*Barchester Towers* (Anthony Trollope, 1857)	221 words

The passage is still available when the questions are shown. If is to avoid students having to remember the text, which would confound reading comprehension with memory ability. Each question has three possible answers: 'Yes', 'No', or 'Can't tell', the last of these being appropriate when the answer cannot be determined or inferred from the information given in the passage.

Note that 'Can't tell' is not equivalent to 'Don't know', which would indicate the student's inability to deduce the answer rather than the inherent indeterminacy of the answer; this is explained in the practice phase of the test.

The test begins with a practice item, after which students are allowed a maximum of 10 minutes for the whole test, with no restrictions on the proportions of time spent on the five passages. A 'progress bar' is visible throughout the duration of the test, so that students can see how long they have left to complete the test. Students are permitted to return to a previous passage if they wish.

Students should be encouraged to work swiftly but conscientiously, and to make a fair attempt at each question. The overall score is designed to reflect careful reading and considered understanding, so students who adopt the tactic of moving on if they cannot immediately determine the answer to a particular question are likely to score rather poorly. Students need to appreciate that they have to think about the questions (as in an examination). Some students may be inclined automatically to click 'Can't tell' if they are unable immediately to find the answer to a question within the passage. Students should be made aware that the answer can often be *deduced* or *worked out* from the information given in the passage, and that the 'Can't tell' option should only be selected when there is insufficient information given in the passage to enable the answer to be deduced.

Students should be made aware that although the reading comprehension test only lasts 10 minutes, they are not expected to finish it in that time and they should take enough time to get the earlier (easier) questions right. The later passages are quite difficult – the last passage, in particular, will be a significant challenge for students at higher education level – so it is much easier to amass points for answers in the early passages, and students should not rush these.

Results for reading comprehension accuracy and reading comprehension speed are given (Report, page 1, see Section 4.1.1). The reading comprehension accuracy score is the total number of correct answers given. The program calculates reading comprehension speed by dividing the estimated number of words read in each of the five passages (including the questions) by the time taken to read each passage and answer the associated questions. 'Dubious' or 'aberrant' cases – i.e. students who simply select answers at random without reading or giving proper consideration to the passages – are flagged up by the program as statistical 'outliers', and drawn to the attention of the administrator. These cases tend to have suspiciously high reading comprehension *speed* but low reading comprehension *accuracy* (see Section 4.1.2 for further explanation of this). A full breakdown of responses for each question, plus times and accuracy levels for each item, is provided to assist administrators in interpreting results [Report, page 2 (Section 4.1.4) and page 3 (Section 4.1.6)].

3.3 Spelling

Spelling is a speeded test of the ability to spell regular and irregular words (see Section 1.1.2 for explanation of speeded tests). Each form comprises 30 regular words and 20 irregular words that are presented in order of difficulty (which was established by previous trials with large numbers of students). In each item the target word is spoken by the computer both in isolation and in the context of a sentence. A cartoon picture associated with the sentence appears on the screen. The task is to type in the target word as quickly as possible. Note that students can begin typing in the target word immediately they hear it and do not have to wait for the contextual sentence to be heard.[11]

The time allowed for each item is a function of the *length* of the word (3–14 letters), with a minimum of 9 seconds and a maximum of 31 seconds. An audible prompt is given 3 seconds before the allowed time is up. However, the time allowed does *not* increase as a function of the *difficulty* of the words. There are two reasons for this. The first reason is that if the time allowed *did* increase as a function of the difficulty of the words this would reduce the effectiveness of the test to identify poor spellers. The second reason is that, at this age, spelling is mostly *automatised* – that is, through practice the student has learned how to spell the word without much conscious effort – and hence the time taken to produce a spelling is largely due to how many letters have to be written or typed. Hence the test is efficient in revealing the lack of automaticity of poor spellers (see Section 1.1.2 for a discussion of the importance of automaticity in skilled literacy).

The spelling test is *adaptive* insofar as the entry point is determined by performance on a number of 'probe' items of increasing difficulty given at the start of the test. When a student fails a probe item (or all the probes have been successfully answered) the program jumps to the appropriate place in the test. This preserves the sensitivity of the test for assessing poor spellers whilst avoiding boredom of more able students, who would otherwise find it very tedious and demotivating to have to spell lots of very easy words. Items that are jumped in this way are credited as having been passed correctly by the student. The test is automatically discontinued when four out of the last six items attempted have been answered incorrectly. Since all the items are in order of difficulty the score obtained still accurately reflects the students' spelling ability even though they have not necessarily attempted all the items.

Results are provided for overall words (Report, page 1, see Section 4.1.1), and for regular words and irregular words (Report, page 2, see Section 4.1.4). A breakdown of all responses in this test is also provided for assessors who wish to use this information diagnostically (Report, page 3). However if the Administrator wishes to assess the "number of spelling

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[11] This is an improvement made to version 1.5.

errors that are unrecognisable as the target word" (as optionally requested on Page 3, Para 3 of the JCQ Form 8), it is best to look at the Exact Dictation pieces – typed and handwritten. In secondary school students, spelling is often a more accurate measure of dyslexia than reading ability, and standard scores below 85 may be another pointer to that diagnosis (for an example, see the case study presented in Section 5.1).

3.4   Writing to Dictation

There are a limited number of tests available for assessing the speed of handwriting, and the most widely used of these, which includes standardised norms, is an assessment of free writing. However, these tests include such a large and variable element of thinking time that they cannot offer a reliable measure of actual writing speed. We have therefore designed dictation tests which eliminate thinking time and are a pure measure of handwriting speed and legibility. Inevitably, the handwriting speed for a dictated piece is very different from the speed obtained from free writing, and the two should not be confused. Both types of test may be required to fully assess a student's handwriting difficulties.

Since it is a requirement by the examining authorities that students should be proficient on a keyboard in order to be allowed to use a word processor in examinations, we have also included a typed piece which can be compared with the handwriting.

In each form of the writing to dictation test two passages are dictated by the computer. For the first passage the student has to type the dictated text using the computer keyboard. For the second passage the student has to write the dictated text by hand. A total of seven minutes is allowed for each passage, which is approximately 200 words in length. Passages are dictated in chunks of around 4–6 words, followed by a pause. The student has to press the 'page down' key to hear the next chunk or can press the 'control' key to hear that chunk repeated. In order to avoid confounding spelling skills with typing and writing speeds, the passages have been designed to impose minimal demands on spelling skills in the early paragraphs.

Some students under the age of 13 tend to find typing to dictation very difficult, and it is possible for the administrator to bypass this particular test and go straight to the handwritten dictation. However, as an incidental finding, the typed piece of dictation is often of interest because it clearly demonstrates spelling difficulties and problems with auditory memory, both of which may suggest dyslexia (for an example, see the case study presented in Section 5.1).

The results for this test show the speeds of handwriting and typing in words per minute (Report, page 1, see Section 4.1.1), and the number of words handwritten and typed (Report, page 2, see Section 4.1.4). The number of handwritten words is estimated by the program based on the number of words dictated. The number of typed words is calculated by the program, which treats a string of characters separated by spaces as 'words', and counting up accordingly. Our research has shown that in 95% of cases the computer estimation of the number of words is sufficiently close to the actual number of words that it makes no appreciable difference to the standard score. However, in about 5% of cases, there may be substantial divergence between the computer estimation of the number of words and the actual count. This may arise because the student has been listening to the story and not writing or because they have neglected to put spaces between several words.

Administrators should therefore always carry out a visual inspection of the handwritten and typed pieces of work and where anomalies are suspected the actual count should be entered into the computer to replace the estimated count (see Section 2.5.3 for explanation of how to do this).

In addition, if desired, the administrator can count up the number of misspelled or illegible words and enter these into the computer, and the program will calculate these measures as

percentages of the total number of words typed or handwritten (Report, page 2, see Section 4.1.4). See Section 2.5.4 for explanation of how to do this. However, it should be stressed that this is not intended to be a test of spelling and hence most students make few errors. In the standardisation sample, about 70% of students made fewer than 5% spelling errors in either passage.

If desired, the student's handwritten production can be scanned into a computer and the image loaded into Lucid Exact (see Section 2.5.5 for explanation of how to do this), in which case it will be displayed on page 4 of the Report (see Section 4.1.7). This facility is optional, and if an image is not available page 4 will remain blank. However, as an alternative, a copy of the handwriting may be glued on to the fourth report page after printing out.

3.5 Guidelines for test administration

3.5.1 Trial run-through including how to exit during a test

Assessing students with Lucid Exact is straightforward but before the teacher or administrator attempts to test any student it is advisable first to run through the complete suite of tests to familiarise themselves thoroughly. Ideally, this should be done in the same or similar test situation as the students will be in (see Section 3.5.3). To do this, register yourself as the 'student'. If you wish to exit any test and return to the tests menu before the end, then press **F4**. This quick exit from a test is also useful when demonstrating the program to other teachers or for use in training sessions. However, the **F4** key should not be used when testing a student unless absolutely necessary, as data from that test will not be saved. (After pressing the **F4** key the program gives a dialogue box requiring the administrator to confirm the intention to exit the test; this avoids accidentally exiting.)

3.5.2 Testing environment and equipment

The ideal testing environment is one that is reasonably quiet, with minimal distractions. Ideally, this should be a separate room, but Lucid Exact has been designed to be robust for use in the ordinary classroom, provided visual and auditory distraction (both to the student being tested and to other students in the class) have been minimised. To minimise auditory distraction, headphones are recommended. Inexpensive lightweight headphones of the type used for portable audio equipment will be adequate (but not the type that are inserted into the ear). Teacher or supervisor judgement is paramount in ensuring the appropriate testing environment.

If assessment is going to be carried out in an ordinary classroom in which there are other pupils, the computer and the student should be positioned in such a way that the student is not looking directly at the rest of the class, nor should the rest of the class easily be able to see the monitor screen. The best position for this is usually in the corner of the room. Students should not attempt the tests when other students are in a position in which they can become involved in the task or act as a distraction. It will be hard for other students to inhibit their reactions and their behaviour may influence the decisions of the student being tested.

The teacher or supervisor should check that the equipment being used for the assessment is functioning correctly. This includes checking:

- that the sound system (speakers or headphones) is audible (not too loud or too soft, and without interference) – see Section 2.6.6 for guidance on how to check this.

- that the mouse is functioning correctly (non-optical types, particularly, require regular cleaning) and is positioned in front of the student on a suitable surface so that its movements are unimpeded. Please note that Lucid Exact should be used with a mouse (wired or wireless), not a touch pad as this will affect response times.

Lucid Exact should not be used for testing when any other applications are running on the computer, as these can interfere with the timings and recording of results. Please close down all other applications before starting Lucid Exact.

3.5.3 Student preparation

Before testing, each student must be registered for the program (name and date of birth). See Section 2.3 for guidance on this. The tests are selected from the Tests Menu screen (see Section 2.4). The tests can be done in any order but it is usually best to start with word recognition which students generally find quick and easy. Instructions are spoken by the computer, and each test commences with a practice or demonstration of the task. When the student has completed the practice items, the test phase begins.

The student should be sitting comfortably at a suitable level in front of the computer screen (not too high or low, in order for them to see the screen and use the mouse satisfactorily). It is not recommended that students attempt the tests standing up, as they are more likely to move about and alter the angle at which the screen is viewed – this can lead to failure to see everything that is happening on the monitor, and can also disrupt mouse control. The supervisor should check for reflections on the monitor from windows and lights that could impair the student's perception. To do this the supervisor should check by viewing the screen from the same position that the student will adopt.

If necessary, students should be shown how to indicate responses to the computer using the mouse, and when to respond (essentially when the tests will allow them to respond). This is particularly important when testing students with physical disabilities. As with any format assessment, students should not be allowed to take the tests if they are unwell, as results are likely to be unreliable.

Most students will experience no difficulties in understanding what is required of them when taking the tests in Lucid Exact, enabling them to follow the practice tasks easily and progress to the test phase without special attention from the teacher or supervisor. However, it is important that the administrator ensures that student understand the nature of the tasks in Lucid Exact: that they are tests and not games, and they must work swiftly but thoughtfully and try their best at all times.

This is particularly important in the reading comprehension test, in which some students may be inclined automatically to click 'Can't tell' if they are unable immediately to find the answer to a question within the passage. Students should be made aware that the answer can often be *deduced* or *worked out* from the information given in the passage, and that the 'Can't tell' option should only be selected when there is insufficient information given in the passage to enable the answer to be deduced.

Students should also be made aware that although the reading comprehension test only lasts 10 minutes, they are not expected to finish it in that time and they should take enough time to get the earlier (easier) questions right.

In the rare event that a student does not understand the instructions spoken by the computer the supervisor may re–express them in a more suitable manner. Explaining and re-expressing the task requirements to the student may continue into the demonstration and practice stages of each test. This is particularly useful for any student who is experiencing problems in understanding the true nature of the task. It is often easier for the student to comprehend the task requirements by experience of the practice stages, than by more abstract oral explanation. Once the test items commence there should be no further aid given to the student.

3.5.4   Supervision

It is usually not necessary for students to be closely supervised while attempting the tests, unless the teacher or administrator has a particular reason to do so, e.g. when assessing the need for exam access arrangements, where JCQ regulations require the specialist who signs the JCQ forms to supervise the assessment (see Section 1.2.5). As with all computer delivered group tests, Patoss recommends that when assessing for exam access purposes, Lucid Exact should be administered carefully so that individual student responses can be observed and monitored. The tests in Lucid Exact have been designed to be interesting and stimulating for students in this age group and the vast majority of students are highly motivated to do their best. Once the teacher is satisfied that the student understands the requirements of a test, has completed the practice items and has moved on to the test items, the teacher may leave the student to complete that test.

Where the teacher suspects that a student may not be well motivated to complete the test, or may be easily distracted, or may be performing deliberately below their capabilities, closer supervision will be necessary. Disaffected students may display non-compliance by clicking on test items or answers at random, rather than thinking about the tasks and selecting answers after proper consideration. Such students, or those with very low ability, may need close supervision in order to provide encouragement and ensure they remain on task. This is particularly important in the reading comprehension test, which requires careful thought (see Sections 3.2 and 3.5.3).

In order for the assessment to be 'fair' (i.e. to give a reasonably accurate representation of the student's abilities) it is essential to ensure that during the test:

- the student is paying attention, is 'on task', is not distracted and trying their best
- the student does not become unduly fatigued
- there is no teaching or helping with the task during the test items (whether from the supervisor or other students)
- that feedback from the supervisor is minimised and encouragement consistent (see further comments below).

3.5.5   Giving encouragement, prompts and feedback

As much as possible, the supervisor should avoid giving specific feedback to students during a test, because this may influence their behaviour in an undesirable fashion. This is good practice in any testing situation. There is a risk of feedback differentially affecting students, so that some are encouraged and others discouraged. Nevertheless, some students (particularly younger children or children with special educational needs) will try to elicit feedback from the supervisor about their performance. This may take the form of both verbal and non-verbal behaviours. For example, the student may ask directly if they were correct. Many students will look for the supervisor's facial and bodily reactions to their responses. Some students may even try to evaluate the supervisor's reaction by observing the supervisor's reflection in the monitor screen. For these reasons it is usually preferable that if the supervisor is going to be near the student to observe the assessment they should sit to the side and slightly behind the student to minimise any feedback to the student which may bias the results.

Rather than specific feedback, general encouragement should be given to the student. This encouragement should be referenced to task completion rather than task accuracy and ideally should be delivered equitably to all students. However, it is inevitable that some students will require more encouragement than others, and where this is the case the teacher should be mindful of the possibility of influencing results unduly. Differential encouragement between students is likely to have an influence on the results obtained, and therefore should be avoided where possible. Some key phrases and general incentive

prompts which may be used to aid the administration of the tests include: "well done"; "you were good at that, now try the next one"; "you will like this game"; "now concentrate on this"; "try hard"; "listen very carefully"; "have a go at these ones"; "have a try"; "just do your best".

3.6   Assessing students under age 11

It is standard practice that normative tests are not generally recommended for use outside the age range for which they have been standardised. Any test, such as Lucid Exact, which meets basic psychometric criteria must be standardised on a given population and this will determine the range of applicability of the test (see Section 1.4 for explanation of the standardisation process.) Tests appropriate to the students' chronological age should be used wherever possible, to avoid the dangers of inappropriate decisions being made – e.g. that a student is 'at risk' (or not 'at risk') when the evidence for this may be unsound.

If the student being assessed is younger than 11:0, then Exact will use the norms for 11-year-olds when analysing results, and this will almost certainly lead to an underestimation of their performance as chronological age generally has a major impact on performance in childhood. Consequently, use of Lucid Exact with children under the age of 11 is not recommended, and use with children under the age of 9 is definitely not approved. However, if it is necessary to use Lucid Exact with children between 9 and 11, **age equivalents** would be the preferred form of scores for the teacher or administrator to use, and results should always be interpreted with caution. An age equivalent is defined as the chronological age range of individuals that would be expected to achieve a given raw score. However, age equivalents are a less accurate way of representing results than standard scores or centile scores, and so should be used with caution. For further information about age equivalents, see Section 4.2.4.

3.7   Assessing students age 25 and older

Lucid Exact was designed for use with students aged up to 24 years 11 months and use with students older than this can create uncertainties when interpreting results. If the student is older than 24:11 then the program will use the norms for 24-year-olds when analysing results. However, international research studies have shown that, for the vast majority of the population within developed countries, literacy skills do not alter significantly during the period from age 24 to 54.[12] Consequently, it is acceptable to use Lucid Exact with adults aged 25 and over if there are no satisfactory alternative tests available. Normative results for adults aged 25-54 should not be significantly different to those for adults aged 24; nevertheless administrators should exercise caution when drawing conclusions about results of older adults and this particularly applies to results of the typing to dictation test.

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[12] Satherley, P. & Lawes, E. (2008) *The Adult Literacy and Life Skills (ALL) Survey: Age and Literacy.* Ministry of Education, New Zealand.

Scottish Government (2009) *Scottish Survey of Adult Literacies: Report of Findings, Part 4.* Edinburgh: The Scottish Government.

Cascio, E., Clark, D. & Gordon, N. (2008) *Education and the age profile of literacy into adulthood.* (Working Paper 14073) Cambridge, MA: National Bureau of Economic Research.

Sloat, E. & Willms, J.D. (2000) The International Adult Literacy Survey: Implications for Canadian Social Policy. *Canadian Journal of Education,* 25(3), 218-233.

Normative assessment of typing speed in adults aged 25 and over presents particular psychometric challenges because of significant effects of cohort (i.e. most younger adults are able to type while most older adults cannot) and experience (i.e. most adults who have to use computers in their jobs can type much better than others), and also because this skill is changing very rapidly in the population as use of computers increases dramatically. Consequently norms for typing speed of adults aged 25+ will inevitably be subject to large confidence limits, which would affect their reliability when making decisions about eligibility for access arrangements in examinations. When making decisions about whether use of a words processor in examinations would be appropriate for adults aged 25+, assessors are therefore advised to rely more on their professional judgement about the typing competence of the individual than on normative test results for typing speed, for which Lucid Exact can only be certified up to age 24 years 11 months at the present time. However, Lucid Exact test results for typing speed will provide a useful comparison between the skills of any adult age 25+ and the typical adult in their early 20s.

3.8   Retesting and repeated assessment

Lucid Exact has two forms of equivalent difficulty: Form A and Form B, which allow for retesting or repeated assessment if desired. The two forms can be alternated over time in order to record progress, e.g. in response to intervention given to students with literacy difficulties (referred to here as 'continuous assessment'). However, the current version of Lucid Exact was designed primarily for identifying students who require access arrangements in examinations – i.e. for identifying significant weaknesses in literacy skills – not specifically for *continuous assessment*, which is focused on measuring improvement in literacy skills as a result of educational input.

3.8.1   Cautions regarding retesting and repeated assessment

When embarking on retesting or continuous assessment, it is particularly important to remember that when students are assessed on any psychometric test (whether administered conventionally or by computer) and the test (or a parallel form of it) given again at some time later, it must not be expected that the scores of all students will either stay the same or increase. Inevitably some will show a decline in scores, but this should not be taken to indicate that these latter students have necessarily decreased in the relevant ability. The reasons for this, which are explained here, include not only the unsystematic and unpredictable variations to which all human performance is naturally subject, but also certain systematic factors that can dramatically influence test results. These factors include: rate of working, practice effects and regression to the mean. If misinterpretation of results is to be avoided when Lucid Exact is used repeatedly, it is important to that administrators understand these factors and are fully aware of their possible impact on results.

3.8.2   Rate of working

Since Lucid Exact was designed primarily for access arrangements assessments all the assessments in the suite have strict time constraints (i.e. they are 'speeded' tests). The reason behind this has already been explained in Section 1.1.2. In all speeded tests the rate at which the student works is an inherent factor in determining the results. The type of time constraint differs across the tests in Lucid Exact and this is more important in certain tests than others. In the tests of Word Recognition and Spelling a given time is allowed for each item; a fixed time limit (5 seconds per item) in the Word Recognition test and a variable time limit (geared to word length) in the Spelling test. In the Reading Comprehension and Writing to Dictation tests test an overall time limit is imposed rather than a time limit per item. In Reading Comprehension 10 minutes is allowed for the whole test, and students are required to attempt as many items as they can within that time (but not necessarily to

attempt all the items). Each of the tests in Writing to Dictation has an overall time limit of 7 minutes.

The Word Recognition and Spelling tests may be regarded as *simple tests* because:

- they comprise a large number of items
- items are independent of each other
- the student either knows or does not know the answer
- as soon as one item has been completed the student is immediately presented with the next.

This means that the task is automatically paced by the time constraints placed on each item. If an item is not completed within the time limit, the program automatically advances to the next item, and so on. Although variation in speed of working between different students is likely to affect the results, variation in the speed at which an individual student works on different testing occasions is unlikely to affect the results very much. Consequently, time is a less important factor in these tests and differences in scores on these tests from one occasion to the next are principally a result of changes in student ability, rather than speed of working.

The Writing to Dictation tests employ a different type of time constraint but the nature of the tasks means that each item (i.e. a phrase heard by the student) can be regarded as essentially independent of the other items (i.e. previous and subsequent phrases in the passage). As soon as the student signals they have finished writing one phase, the computer automatically gives the next phrase, and so on until the time limit is reached. The task is self-paced and, in principle, differences in scores on these tests from one occasion to the next could arise from the student not working as hard on one of the occasions as on the other. In practice, however, it turns out that time is not such an important factor because item independence coupled with task simplicity results in differences between testing occasions being principally attributable to changes in writing ability.

The Reading Comprehension test contrasts markedly with the other tests in the Lucid Exact suite. Text passages are presented and several items (in the form of multiple-choice questions) relating to each passage have to be attempted within the time limit. In order to answer questions the student may have to refer back to the text or consider answers to previous questions. Hence this test may be regarded as *complex* rather than simple because items within a passage are not independent and it is not simply a case of either knowing or not knowing the answer but, rather, of being prepared to devote sustained mental effort at an optimum rate over the whole task in order to work out each answer. The 'optimum rate' is a speed that is consistent with their word recognition and verbal comprehension ability. If they exceed their optimal speed they will make more word recognition errors and be more likely to misunderstanding sentences, which will result in a lower score. If they read slower than their optimal speed they will have insufficient time to attempt all the passages and so be prevented from the opportunity of answering more questions than the less able readers, which will also result in a lower score. Either way, the student will appear to be a less able reader than is really the case.

It should be apparent that if the student is tired, less well-motivated or not in a positive mood, or if they perceive that the consequences of less effort will not matter very much, they will tend to work slower and will be less inclined to put in the necessary cognitive effort. If this happens their score will be unlikely to reflect their true ability.

3.8.3   Practice effects

'Practice effects' are the positive or negative psychological impacts of previous assessment(s) on a student's performance.[13] Positive impacts, which include factors such as item familiarity and increased confidence as a result of previous experience with the tasks, tend to inflate scores on subsequent assessment occasions. Negative impacts, which include factors such as decreased motivation due to boredom with the tasks or overconfidence as a result of feedback from previous assessments, tend to deflate scores on subsequent assessment occasions. In general, the magnitude of practice effects is a function of how often students have been assessed and the time interval between assessments. Both positive and negative psychological impacts tend to increase as the time interval between assessments decreases. Furthermore, practice effects will not necessarily affect all students to the same extent. Some students may experience more negative effects while others may experience more positive effects.

3.8.4   Regression to the mean

All test scores, by their very nature, are variable. On any psychometric test the actual score obtained is an estimate of the student's true score, which will fall within a certain range of the actual score; this range is known as the 'confidence interval'. It means that one can have a certain level of confidence (in this case 90% confidence) that the students' true score lies within a range of the actual score that is equal to plus or minus the 'confidence interval'. On another occasion on the same test, the same student is likely to score slightly differently, which could be higher or lower than the previous score. The confidence interval for any test is determined by the test's reliability – i.e. the extent to which it can be relied on to give the same result on another occasion.

Consequently, human beings do not perform at the same level on every occasion, and some assessment tasks are more influenced by this variability. Over time, a person's skills may increase as a result of learning, practice and general experience. However, many other things also influence performance, such as mood, motivation, tiredness, instructions and perceived consequences. As explained above, *simple tests*, i.e. ones where the student either knows or does not know the answer (e.g. Lucid Exact Word Recognition and Lucid Exact Spelling) are less subject to such influences than more *complex tests*, such as Lucid Exact Reading Comprehension, where it is not a case of either knowing or not knowing the answers but, rather, of being prepared to devote sustained mental effort at an optimum rate over the whole task in order to work out the answers.

Coupled with the general tendency of any measurement process to involve a degree of random error, these natural variations in test scores result in the statistical phenomenon known as 'regression toward the mean', whereby a score that is extreme (meaning further away from average performance) on its first measurement, will tend to be closer to the average on its second measurement, and if it is extreme on its second measurement, it will tend to have been closer to the average on its first.[14]

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[13] For further explanation of practice effects see: Kulik, J.A., Kulik, C-L. C. and Bangert, R.L. (1984) Effects of Practice on Aptitude and Achievement Test Scores. *American Educational Research Journal*, 21, 435-447.

[14] Upton, G. & Cook, I. (2006) *Oxford Dictionary of Statistics*, Oxford University Press.
Stigler, S.M. (1997). Regression toward the mean. *Statistical Methods in Medical Research,* 6, 103–114.
Tweney, R.D. (2013) Reflections on regression toward the mean. *Theory and Psychology,* 23, 271-274.

3.8.5 What interval should be allowed before retesting?

The previous three subsections make clear that, when carrying out repeated testing, variation in test performance is always to be expected, and gains cannot be counted on. Even when the best teaching has been provided, it is likely that a few students will exhibit apparent drops in performance from one test occasion to the next. This is due to various factors, including the impact of rate of working (more noticeable in complex as opposed to simple test formats), practice effects (more pronounced if the interval between testing occasions is short), and regression toward the mean (scores that are extreme on the first measurement will tend to be closer to the average on the second measurement). When interpreting results and conveying results to pupils, teachers, parents, or if using results to demonstrate 'value added', it is essential that administrators take these factors into account and avoid drawing naïve or simplistic conclusions from changes in scores from one testing occasion to the next.

Therefore it is recommended that, in normal circumstances, the interval between successive assessments should be preferably one year or, at the very least, one term or semester. Even though there are two parallel forms, if the period between successive assessments is relatively short (i.e. a matter of weeks or up to a school term or semester), practice effects could still arise and confound results. Research has shown that when retesting after a long school holiday performance is more likely to have declined.[15]

Occasionally exceptional situations may arise where a teacher needs to re-administer one or more of the tests in Lucid Exact after a much shorter interval, e.g. if it is discovered that when the student first took the tests he or she was unwell, or where a fire drill interrupted the assessment, or if the student was clearly not applying proper attention or effort to the tasks. In such cases, the results are unlikely to give a true indication of abilities and it is permissible to re-test the student. Nevertheless, there should be a delay of at least two weeks before re-administering the test(s) and the alternative form should be used. The first result should be discarded and the second result should be regarded as the true result.

3.8.6 Activating a retest

To allow a retest, the student needs to have completed all tests in the current form. When the student is highlighted in the Student Register, the RETEST icon with its yellow star will be visible. (See figure opposite) Click on this link and then confirm you wish to create a new test on the dialogue box which appears. Note that the new test will be the Form B test if the previous test was Form A.
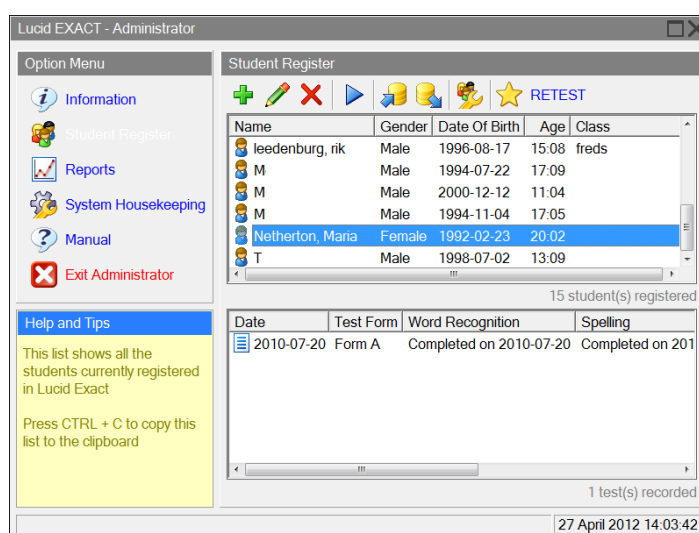
Retesting a student with the parallel form

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[15] See: Sainsbury, M., Whetton, C., Mason, K. and Schagena, I. (1998) Fallback in attainment on transfer at age 11: evidence from the Summer Literacy Schools evaluation. *Educational Research,* 40, 73-81.

3.9   Assessing students who have limited English

Assessment of any student who has limited proficiency in spoken or written English is often problematic. All the tests in Lucid Exact require considerable knowledge of written English and students who lack this knowledge would be expected to be impaired across the full range of measures in the suite. Lucid Exact results of students for whom English is an additional language should therefore be considered in relation to the level of English knowledge of the student with conclusion being modified in the light of this. Factors that should be taken into consideration include whether or not English is one of the languages spoken in the student's home, how long the student has been living in an English-speaking environment, and how long the student has been educated in English.

When using the results of Lucid Exact in conjunction with applications for exam access arrangements, it is important to be aware that limited proficiency in spoken or written English <u>solely because</u> English is not the student's first or main language (EAL) is <u>not</u> a criterion for having difficulties in learning, cognition, language or communication. What must be evidenced is that: "**The candidate must have an impairment in their first language which has a substantial and long term adverse effect.** A candidate **does not** have a learning difficulty simply because their first language is not English, Irish or Welsh." [*JCQ Regulations 2014-15, Section 4.1*] Consequently, where it is suspected that an EAL candidate has difficulties that might qualify for exam access arrangements, great care is taken to evidence this by means of appropriate test results that show impairment in cognitive skills such as working memory, processing speed, etc., and by showing that the student's experience of English has been adequate for normal literacy skills to be expected.

For further information on assessment of learning difficulties in literacy (including dyslexia) in EAL students and other multilingual students, see Cline (2000), Cline and Frederickson (1999), Cline and Shamsi (2000), Durkin (2000), Gunderson, D'Silva and Chen (2011), and Peer and Reid (2000).[16]

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[16] Cline, T. (2000) Multilingualism and dyslexia: Challenges for research and practice. *Dyslexia: An international journal of research and practice,* 6(1), 3-12.

Cline, T. and Frederickson, N. (1999) Identification and assessment of dyslexia in bi/multilingual children. *International Journal of Bilingual Education and Bilingualism,* 2(2), 81-93.

Cline, T. and Shamsi, T. (2000) Language needs or special needs? The assessment of learning difficulties in literacy among children learning English as an additional language (Research Report RR184). London: Department for Education and Employment.

Durkin, C. (2000) Dyslexia and bilingual children – Does recent research assist identification? *Dyslexia: An international journal of research and practice,* 6(4), 248-267.

Gunderson, L., D'Silva, R. and Chen, L. (2011) Second language reading disability: International themes. In McGill-Franzen, A. and, Allington, R.L (Eds) *Handbook of Research on Reading Disabilities.* Oxford and New York: Routledge, pp.13-24.

Peer, L. and Reid, G. (Eds) (2000) *Multilingualism, literacy and dyslexia.* London: Fulton.

4 Understanding results

4.1 Types of report

Lucid Exact creates four A4 pages of results for each student, each of which contains various sections. These are outlined below.

4.1.1 Results profile (Report, Page 1)

This shows the standard scores for the six different measures (word recognition, reading comprehension accuracy, reading comprehension speed, spelling, typing speed and handwriting speed) in forms in both **graphical** and **tabular form.** The key data needed for JCQ Form 8 may be extracted from these. The summary table of results also shows centile scores for each test. Note that on the chart the average score range (standard score 85 – 115) is shaded grey. To aid speedy identification of areas of difficulty, the bars on the chart are coloured blue if the standard score is 85 or above (i.e. within the normal range or better), and red if below 85 (i.e. below the normal range, indicating that the result is a matter of concern). An example is shown in Figure 1. For explanations of the meaning of 'standard scores' and 'centile scores' see Sections 4.2.1 and 4.2.3, respectively.

4.1.2 Cautionary warning regarding dubious reading speeds (Report, Page 1)

The program checks whether the student has devoted a reasonable amount of time to the reading comprehension passages. If a student has completed the reading comprehension test in **less than eight minutes** the results should be regarded as '**doubtful'**, i.e. it is unlikely that proper consideration has been given to the answers, and hence the scores will be unreliable and should not (on their own) be used as meaningful evidence for exam access arrangements. If a student completes the reading comprehension test in **less than five minutes**, the results should be regarded as' **impossible',** i.e. the student has answered the comprehension passages so quickly that it is impossible for them to have given proper consideration to the answers, and hence the scores are not safe to be used as evidence for any purpose.

When the program detects doubtful or impossible performance a warning is given in red underneath the summary table of results on page 1 of the report, and the bars relating to that performance are shown in coloured hatching rather than solid block colour. Since this outcome necessarily places limitations on the use that can be made of the results of the reading comprehension test, assessors may wish to repeat this test having provided appropriate guidance to the student regarding how the test should properly be attempted (see Section 3.2 for further advice on this matter). When re-testing, the alternate form of the test (A or B, as appropriate) should be employed (see Section 3.8 for guidance on this).

4.1.3 Assessor's comments (Report, Page 1)

There is a space at the foot of page 1 for assessor's comments, which can be typed into the computer as shown in Section 2.5.2. As a rough guide, about 250 words may be included in the comment. The report will not check the length of the text entered, so it may overflow the page if too many words are entered. Alternatively, comments may be typed separately, printed out and pasted in, or written directly on to the Lucid Exact print-out.

4.1.4 Results breakdown (Report, Page 2)

This gives a complete breakdown of all the test scores in several tables, including comparison of ability to read and spell regular and irregular words, and the complete passage as typed to dictation by the student. An example is shown in Figure 2. Results on this page are shown in the following principal formats: standard scores (for explanation see Section 4.2.1), confidence intervals (for explanation see Section 4.2.2), centile scores (for explanation see Section 4.2.3) and age equivalents (for explanation see Section 4.2.4). In addition, this page includes raw scores (or, in the case of word recognition, transformed score – see Sections 1.4 and 3.1 for explanation regarding this) and (where appropriate) times.

When the program detects doubtful or impossible performance on the reading comprehension test a warning is given in red underneath the results breakdown for that test (for further information see Section 4.1.2).

4.1.5 Checking the scores from the dictation tests (Report, Page 2)

The raw scores for the dictation tests (i.e. the number of words typed and handwritten) are estimated by the computer based on the typed text saved and the number of phrases listened to by the student for the handwriting task. In about 95% of cases these figures are sufficient accurate to be safely used in the report. However, in a few cases where the student has not followed the instructions properly the computer's estimates can be significantly different to the true figures.

> Administrators should therefore carry out a visual inspection of the number of words typed and handwritten and if a discrepancy is suspected, the administrator can manually count the number of words and enter the figures into the computer as shown in Section 2.5.3. The manually entered figures will then replace the computer's estimated figures in the report.

This page will also show the number and percentages of spelling errors in handwriting and typing if the raw data for these have been entered. The computer does not count or estimate the number of spelling errors made in the dictation tasks and hence if this information is required on the report, the administrator must manually enter the relevant data. The procedure for this is shown in Section 2.5.4. The program will then calculate the percentages of spelling errors and display these on the report. If the relevant data are not manually entered, the number and percentages of spelling errors in handwriting and typing will be shown as zeros on the report.

4.1.6 Itemised responses (Report, Page 3)

This gives the student's responses for all items in reading comprehension and spelling. This information can be useful for diagnostic purposes. An example is shown in Figure 3. Note that as the spelling test is adaptive not all items are administered; skipped items are shown as a dash but are credited to the score as if passed correctly.

4.1.7 Handwriting to dictation (Report, Page 4)

The fourth and final page of the Report is reserved for incorporating and displaying a scanned image of the student's handwriting to dictation. The procedure for this is described in Section 2.5.5. This facility is optional, and if an image is not available, page 4 will remain blank, but a copy of the handwriting work may, if desired, be glued on to the fourth report page after printing it. An example is shown in Figure 4.

4.2   Types of scores

All raw scores on Lucid Exact are saved automatically to a single data file on completion of each test. The data saved also includes the date and time the test was completed, as well as the registered details of the student. If a test has been abandoned before completion, then no results will be saved for that test. Reports are calculated in real time (at the moment of access or viewing) so that if ever any information has changed it will be incorporated in the current displays. This is important, for example, where errors have been made in entering the student's date of birth, in which case the wrong norms may have been used by the program. Therefore if any mistakes of this nature were made then it is important to recalculate the results by generating new reports after any corrections have been made.

The program then refers to the standardised norms in order to convert raw scores to the following three types of score.

- Standard scores (and Confidence intervals)
- Centile scores
- Age equivalents

The first of these is shown in graphical (bar graph) format as well as numerical format, while the remaining two are shown only in numerical format. These different types of score formats are explained in the following sections.

	Lucid EXACT	Report Page 1		Results Profile

City Academy

Student's name	Date of birth	Form attempted	Identifier
Student John	**10/12/1994**	**Form A**	**132**

	Word recognition	Reading comp accuracy	Reading comp speed	Spelling	Typing speed	Handwriting speed
Standard score	81	89	78	74	96	83
Centile score	10	23	7	4	40	13
Test date	03/07/2009	03/07/2009	03/07/2009	05/07/2009	05/07/2009	05/07/2009
Test age	14y 6m	14y 6m	14y 6m	14y 6m	14y 6m	14y 6m

A detailed breakdown of results is given on Page 2

Assessor's comment

John is a bright boy who has a diagnosis of dyslexia. His reading, writing and spelling skills have been noted by teachers to be below levels expected for his age and general ability, and this is confirmed by the tests, with all literacy measures except reading comprehension and typing speed below standard score 85. John tries to use his intelligence to compensate for his poor reading skills with the result that his reading comprehension score is within the average range. However, his reading speed is very slow and he has difficulty decoding new or unusual words, especially under conditions of time pressure as in examinations, which often causes him to misunderstand what the questions. His spelling and writing are particularly poor, with about 13% misspelled or undecipherable words. Although his handwriting speed is below average, his typing speed is in the average range for his age. It is recommended that John be permitted 25% extra time in examinations and also to use a word processor.

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Figure 1. Example of Results profile (Reports page 1)

Lucid EXACT

Test date: 03/07/2009   ## Word Recognition   Age at test: 14y 6m

Measure	Regular words	Irregular words	Overall words
Standard score	88	75	81
Confidence interval	84 - 92	70 - 80	75 - 87
Centile score	21	5	10
Transformed score	12	9	21
Age equivalent	12:0-12:11	9:4-10:3	11:4-11:7

Test date: 03/07/2009   ## Reading Comprehension   Age at test: 14y 6m

Measure	Accuracy	Speed
Standard score	89	78
Confidence interval	79 - 95	68 - 88
Centile score	23	7
Raw score	24	50 wpm
Age equivalent	12:8-13:3	9:7-9:11

Passage number	1	2	3	4	5	Total
Questions	5	10	10	10	10	45
Attempts	5	10	10	10	3	42
Correct answers	4	8	7	4	1	24
Time (m:s)	1:0	2:37	3:03	2:25	0:56	10:0

Test date: 05/07/2009   ## Spelling   Age at test: 14y 6m

Measure	Regular words	Irregular words	Overall words
Standard score	67	82	74
Confidence interval	62 - 73	76 - 90	67 - 81
Centile score	1	12	4
Raw score	14	8	22
Age equivalent	8:8-8:11	11:1-11:3	9:7-9:8

Test date: 05/07/2009   ## Writing to Dictation   Age at test: 14y 6m

Mode	Typing	Handwriting
Words	147	128
Speed	21 wpm	18 wpm
Standard score	93	83
Confidence interval	86 - 100	75 - 91
Centile score	32	13
Age equivalent	13:0-13:5	12:0-12:5
Spelling errors (count)	21	17
Spelling errors (percent)	14%	13%

Age equivalents are approximate and should only be used where Standard scores or Centile scores are inappropriate

Typed passage

one day last year we saw a lot of bees going in and out of some hold hifes behind our garige. My frend once sat on a bee and got stong on the bottem so i was a bit scared of them but i know a lady who keeps bees and i asked her if she will take them away. However she thortlernt to keep them myself. She told me what i needed and what cloves to buy the was a speshal jacket, which included a hat and vayal, and some thick lever gloves, then she sowed how the bees beld ther come on trans in the hive and she tote me hoe to handel them. Then we lifted off the roof of the hife and looked at the fraims where the quean was laying her eggs. When we spotted her, we marked her with a dab.

Figure 2. Example of Results breakdown (Reports page 2)

City Academy

Student's name	Date of birth	Form attempted	Identifier
Student John	**10/12/1994**	**Form A**	**132**

Reading Comprehension Accuracy

Passage 1

	Correct	Response	Score
1	no	no	1
2	yes	yes	1
3	no	no	1
4	can't tell	can't tell	1
5	18	12	0

Passage 2

	Correct	Response	Score
1	yes	yes	1
2	no	no	1
3	can't tell	can't tell	1
4	yes	yes	1
5	no	no	1
6	yes	yes	1
7	no	no	1
8	yes	can't tell	0
9	yes	can't tell	0
10	no	no	1

Passage 4

	Correct	Response	Score
1	no	yes	0
2	yes	yes	1
3	no	no	1
4	no	no	1
5	can't tell	can't tell	1
6	no	can't tell	0
7	yes	no	0
8	can't tell	yes	0
9	yes	no	0
10	can't tell	no	0

Passage 3

	Correct	Response	Score
1	yes	yes	1
2	no	yes	0
3	can't tell	can't tell	1
4	no	no	1
5	yes	can't tell	0
6	no	no	1
7	can't tell	can't tell	1
8	yes	yes	1
9	can't tell	yes	0
10	no	no	1

Passage 5

	Correct	Response	Score
1	no	yes	0
2	yes	can't tell	0
3	yes	yes	1
4	no	not attem'd	0
5	no	not attem'd	0
6	can't tell	not attem'd	0
7	no	not attem'd	0
8	no	not attem'd	0
9	no	not attem'd	0
10	yes	not attem'd	0

Spelling Accuracy (test is adaptive)

Passage 1

Item	Correct	Spelt as
P1	bed	bed
P2	nose	nose
P3	juice	joos
P4	increase	--
P5	crumb	--
6	foot	--
7	name	--
8	top	--
9	day	--
10	man	--
11	pan	--
12	egg	--
13	ice	--
14	sea	--
15	kick	--
16	girl	--
17	goal	--

Passage 2

Item	Correct	Spelt as
18	web	web
19	knife	knife
20	pair	pear
21	nature	nature
22	diagram	diergam
23	infection	infeckion
24	engine	engine
25	ghost	ghost
26	captain	captain
27	acrobat	akrobat
28	festival	festeval
29	height	height
30	physics	pysics
31	theatre	theatre
32	sphere	sfere
33	anchor	--
34	referee	--

Passage 3

Item	Correct	Spelt as
35	orchestra	--
36	aquarium	--
37	mysterious	--
38	mosquito	--
39	binoculars	--
40	observatory	--
41	literature	--
42	photosynthesis	--
43	environment	--
44	architecture	--
45	circumference	--
46	necessary	--
47	rhythm	--
48	hygienic	--
49	catastrophe	--

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Figure 3. Example of Itemised responses (Reports page 3)

City Academy

Student's name	Date of birth	Form attempted	Identifier
Student John	**10/12/1994**	**Form A**	**132**

Figure 4. Example of Handwriting to dictation (Reports page 4)

4.2.1   Standard scores

Standard scores are provided in 3-month age bands from 11:0 to 18:11 and in 12-month age bands from 19:0 to 24:11. Standard scores have a mean (average) 100 and a standard deviation of 15. [17] They are distributed in a normal (bell shaped) curve as shown in Figure 5. Approximately two-thirds of the population will have scores that fall between plus or minus one standard deviation of the mean (i.e. score range 85 – 115, which is the area shaded blue on the graph in Figure 5). In some scoring systems the range 85 – 115 is regarded as the 'average range', while other systems treat 90 – 110 as the 'average range'; in the latter case, 50% of the population will fall into the average band. The more extreme the score the fewer individuals are found in that category, so that only about 2% of the population have very low scores (less than 70) and about 2% have very high scores (130+). This distribution of scores is a characteristic of all human attributes (height, weight, strength, sociability, etc.), i.e. most people tend to cluster around a central point and as one approaches the extremes (known as the 'tails' of the distribution) fewer people are found.
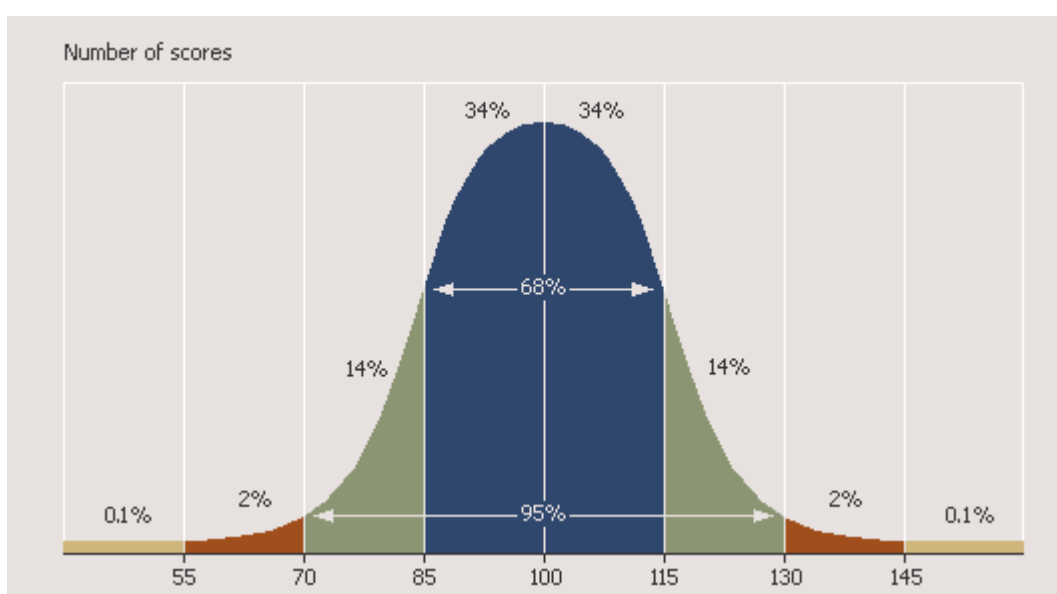
Figure 5. Distribution of Lucid Exact scores on a normal curve
(for explanation see Section 4.2.1).

4.2.2   Confidence intervals

When reporting a standard score, it is good practice also to report the *confidence interval* attached to that score. The reason for this is that all psychological and educational tests scores give only *estimates* of ability, based on a sample of behaviour at a given point in time. If you were to assess a student on several occasions you would not expect him or her to obtain exactly the same score each time – there would be a spread of scores and somewhere within that spread we would expect the (hypothetical) *true score* to lie. The amount of spread or variation of actual scores obtained by an individual is dependent on the *reliability* of the test. The confidence interval is the zone around the standard score in which we are reasonably confident the *true score* lies. Different confidence intervals may be set: for Lucid Exact we have set a confidence level of 90%, which means that there is a 90% probability that the true standard score lies within the stated confidence interval. Put another

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[17] The standard deviation is a measure of the variation of scores in a distribution.

way, if the student was retested 100 times, on 90 out of 100 occasions the score would lie within the stated confidence interval.

Confidence intervals are calculated on the basis of the *Standard Error of Measurement* (SEM) of a test which, in turn, is determined by the reliability of the test and the standard deviation of test scores (see Section 1.6). Confidence intervals are shown on page 2 of the Lucid Exact report.

4.2.3   Centile scores

Centile scores are provided in 3-month age bands from 11:0 to 18:11 and in 12-month age bands from 19:0 to 24:11. Centile scores (sometimes referred to as 'percentile' scores) represent the student's performance in comparison with the population norms in centile units which range (roughly) from 1 to 99. A centile score of 63, for example, means that the students' score lay at the point where 63% of the population scored less, and 37% scored more. A centile score of 50 indicates that the student's score lay exactly on the median (middle point) of the distribution, with half the age group scoring higher and half lower. As will be obvious from Figure 5, centile scores have a strict relationship with standard scores as shown in Table 5.

Table 5. Relationship between standard scores and centile scores.

Standard score	70	80	85	90	100	110	115	120	130
Centile score	2	9	16	25	50	75	84	91	98

4.2.4   Age equivalents

Age equivalents are provided for the age range 6:0 to 18:11 (over this age, age equivalents become meaningless). Age equivalents may be defined as the average chronological age of students who would be expected to achieve a given raw score on the test. The most common type of age equivalent in educational testing is the 'reading age'. For example, to say that a student has a reading age of 14 means that they read like an average 14-year-old, regardless of their chronological age. Note that age equivalents, by their very nature, are not as precise as standard scores or centile scores; age equivalents are approximations and hence are often given in bands. Age equivalents should be used with caution and only in cases where standard scores or centile scores would be inappropriate or unhelpful. It is embarrassing and demotivating for a teenager or adult to be told (for example) that they have a spelling age of a 7-year-old! However, some teachers working in special education prefer to use age equivalents rather than centile scores, because age equivalents enable them to conceptualise the ability level of the student they are teaching, and so pitch the work at the correct level.

4.3   Using Lucid Exact with LASS or LADS Plus

Lucid Exact is designed to provide measures of literacy skills and although these measures may in some cases suggest dyslexia or other learning problems, Lucid Exact is not a diagnostic test as such. Administrators who require a test that will identify dyslexia should consider using LASS 11-15 (for the age range 11:0 – 15:11) or LADS Plus (for ages 15 and upwards). In fact, a combination of Lucid Exact with either LASS 11-15 or LADS Plus, is a very powerful toolset not only for *identifying* dyslexia or other learning problems but also for determining the extent to which dyslexia or other learning problems are impairing the student's capacity to learn, and for determining appropriate remedial intervention. For

further information about these programs, please visit the Lucid website www.lucid-research.com

4.3.1   LASS 11-15

LASS 11-15 is a fully computerised multifunctional assessment system for use with students in the age range 11 years 0 months to 15 years 11 months ('LASS' stands for '**L**ucid **A**ssessment **S**ystem for **S**chools'). The suite comprises eight different tests that assess the following skills:

- single word reading
- sentence reading
- spelling
- reasoning (nonverbal intelligence)
- auditory memory ('*Mobile*')
- visual memory ('*Cave*')
- phonic skills ('*Nonwords*')[18]
- phonological processing ('*Segments*')

Unlike Lucid Exact, none of the tests in LASS 11-15 is speeded. The full LASS 11-15 suite takes about 45–60 minutes to administer. However, if LASS 11-15 is administered after Lucid Exact, the tests of single word reading, sentence reading and spelling may be omitted as this information will already have been provided by Lucid Exact. By omitting these three tests, administration of LASS 11-15 is generally reduced to less than 30 minutes. Results can be viewed on screen or printed out immediately.

LASS 11-15 enables teachers to:

- identify students with dyslexia (specific learning difficulty) or who have related learning problems
- obtain a reasonable estimate of the student's intelligence
- identify students who are under-performing in literacy compared with their intelligence
- identify underlying weaknesses in memory or phonological processing skills that could be the cause of literacy difficulties
- identify students with poor phonic decoding skills that may require remedial intervention
- assess improvements in memory, phonological and phonic decoding skills brought about by appropriate training or intervention

4.3.2   LADS and LADS Plus

LADS Plus is a computerised test designed to screen for dyslexia in persons of 15 years and older ('LADS' stands for **L**ucid **A**dult **D**yslexia **S**creening). LADS Plus comprises five assessment modules, which measure:

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[18]   Nonwords are sequences of letters that are not real words but which nevertheless conform to the orthographic rules of the language (e.g. 'sploff', 'blust', 'goster') and so can be decoded and pronounced as though they were real words. Since nonwords will not have been encountered by the reader previously, the person can normally only use phonological rules in order to decode them (visual, semantic or contextual strategies are of no help in decoding isolated nonwords). Nonwords thus provide a pure test of a person's competence in phonological decoding or what is often referred to in education as 'phonics'.

- Nonverbal Reasoning (matrix reasoning)

- Verbal Reasoning (verbal conceptual reasoning, suitable for readers and non-readers)

- Word Recognition (lexical decoding involving speeded recognition of real word from non-words).

- Word Construction (speeded lexical encoding of non-words from syllables)

- Working Memory (backwards digit span)

The last three of the tests in the list are *dyslexia sensitive* measures, which are reasonably independent of education and intelligence. However, the two reasoning tests have been included in order to increase the accuracy of detection of dyslexia further, and reduce the incidence of false negatives and false positives. These also enable the administrator to obtain a rough estimate of the person's intellectual ability, which may be important when making decisions about further action after screening.

The tests in LADS Plus are adaptive; that is, the program varies the items given according to the performance of the individual taking the test. This means that the assessment is swift and efficient. Each of the five modules takes about five minutes, so the whole screening can usually be completed in about 20–25 minutes. Results can be viewed on screen or printed out immediately.

Administration of LADS Plus does not require professional training in education or psychology. The tests are self-administered and results very easy to interpret. The program assists interpretation by stating the probability that the person has dyslexia: 'high probability, 'moderate probability', 'borderline', and 'low probability'. However, because all the results of any LADS Plus screening are available to administrators they are not forced to accept the recommendations of the program; instead, they are free to use their own professional judgment when interpreting results and in making decisions about what to do next.

5 Illustrative Case Studies

5.1 Case A: A 17-year-old with dyslexia

5.1.1 Page 1. Results profile

Figure 6 shows the typical profile of a dyslexic who has become a fairly competent but slow reader. He still has spelling problems, but the reading comprehension tests show that his reading accuracy is in the normal range, although he reads slowly. His typing and handwriting speeds are both within the normal range.

5.1.2 Page 2. Results breakdown

See Figure 7. The breakdown of his Reading Comprehension scores ('correct answers' and 'time') show that he used the full 10 minutes of the test appropriately but struggled to comprehend the more complex language in passage 4, so that he had only just started passage 5 by the end of the test.

However if we look at the typed passage, we see a number of typically dyslexic spelling errors ('are' for 'our' – a homophone; 'friend' for 'friend' – right letters in an irregular word, but in the wrong order; 'lurn' for 'learn' – a phonetic spelling).

5.1.3 Conclusion

On the grounds of his spelling and reading comprehension speed, he should be entitled to extra time in examinations.

His competent typing would also suggest that he should use a keyboard for as much of his coursework is possible. He will only be eligible to use a keyboard in exams if it is his usual method of working in school. Note, however, that permission to use a word processor does not grant permission to use a spell checker.

If he has not already been assessed for dyslexia, use of LADS/LADS Plus would be helpful in this regard (see Section 4.3.2).
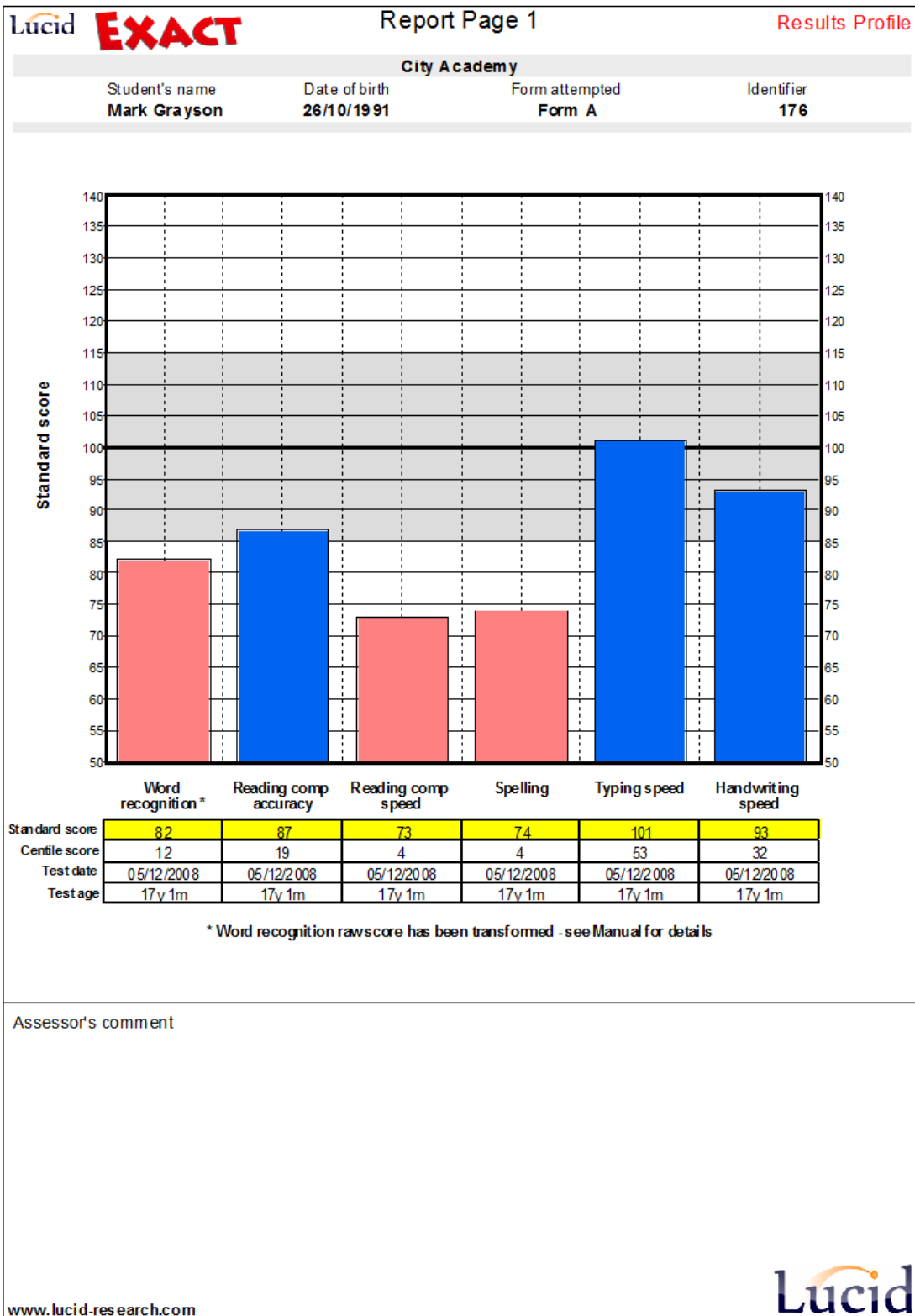
Figure 6. Results profile for Case A.

City Academy

Student's name	Date of birth	Form attempted	Identifier
Mark Grayson	**26/10/1991**	**Form A**	**176**

Test date: 05/12/2008   **Word Recognition**   Age at test: 17y 1m

Measure	Regular words	Irregular words	Overall words
Standard score	80	90	82
Confidence interval	76 - 84	85 - 95	76 - 88
Centile score	9	25	12
Transformed score	12	13	24
Age equivalent	13:0-13:11	14:0-14:11	13:4-13:7
Total words correct	52	**Total time (min:sec)**	2:11

Test date: 05/12/2008   **Reading Comprehension**   Age at test: 17y 1m

Measure		Accuracy			Speed	
Standard score		87			73	
Confidence interval		77 - 97			63 - 83	
Centile score		19			4	
Raw score		22			52 wpm	
Age equivalent		11:8-11:11			9:7-9:11	
Passage number	1	2	3	4	5	Total
Questions	5	10	10	10	10	45
Attempts	5	10	10	10	1	36
Correct answers	4	7	6	4	1	22
Time (min:sec)	0:47	2:50	2:32	3:14	0:38	10:01

Test date: 05/12/2008   **Spelling**   Age at test: 17y 1m

Measure	Regular words	Irregular words	Overall words
Standard score	66	82	74
Confidence interval	60 - 72	74 - 90	67 - 81
Centile score	1	12	4
Raw score	16	10	26
Age equivalent	9:4-9:7	11:8-11:11	10:4-10:7

Test date: 05/12/2008   **Writing to Dictation**   Age at test: 17y 1m

Mode	Typing	Handwriting
* Words dictated / actual count	192	157
Speed	27 wpm	22 wpm
Standard score	101	93
Confidence interval	94 - 108	85 - 101
Centile score	53	32
Age equivalent	17:0-17:11	15:0-15:11
* Spelling errors (count)	0	0
Spelling errors (percent)	0.00	0.00

* Actual figures can entered manually by the assessor - see Manual for details
ADVICE: Age equivalents are approximate and should only be used where Standard scores or Centile scores are inappropriate

Typed passage

One day lats year we saw alot of bee's going in and out of some old hive's behind are garage.
My freind once sat on a bee and got stung on the bottom, so i was a bit scared of them. But i know a lady that keeps
bee's, and i asked her if she would take them away. However she thought that i should lurn to keep them myself.
she told em what i needed and what cloths to but. The was a special jaket, which included a hat and vail, and some
thick leather gloves. Then she showed me how the bee's build the comb on trains in the hive, and she taught me how
to handle them.
We used a smoker to puff out smoke which calms the down. Then we lifted of the roof of the hive and loked at the
frames were the queen was laying her egg's. when we spoted her, we marked her with a dab of white marker ink on
her body. we made certain that she was in the bottom box of frames and put a wire mesh called a queen exluder, ontop
of that box.

Figure 7. Results breakdown for Case A.

5.2   Case B: A 14-year-old of high average ability

5.2.1   Page 1. Results Profile

See Figure 8. The chart clearly demonstrates that this student is performing in the high average range in all fields, with standard scores between 103 and 115. It is immediately obvious that she does not have any literacy problems and does not need any exam concessions.

5.2.2   Page 2. Results breakdown

See Figure 9. This page shows her scores in more detail and the typed passage demonstrates that she can correctly spelt such words as *special, veil, calms*; words that many 14-year-olds find difficult.

5.2.3   Conclusion

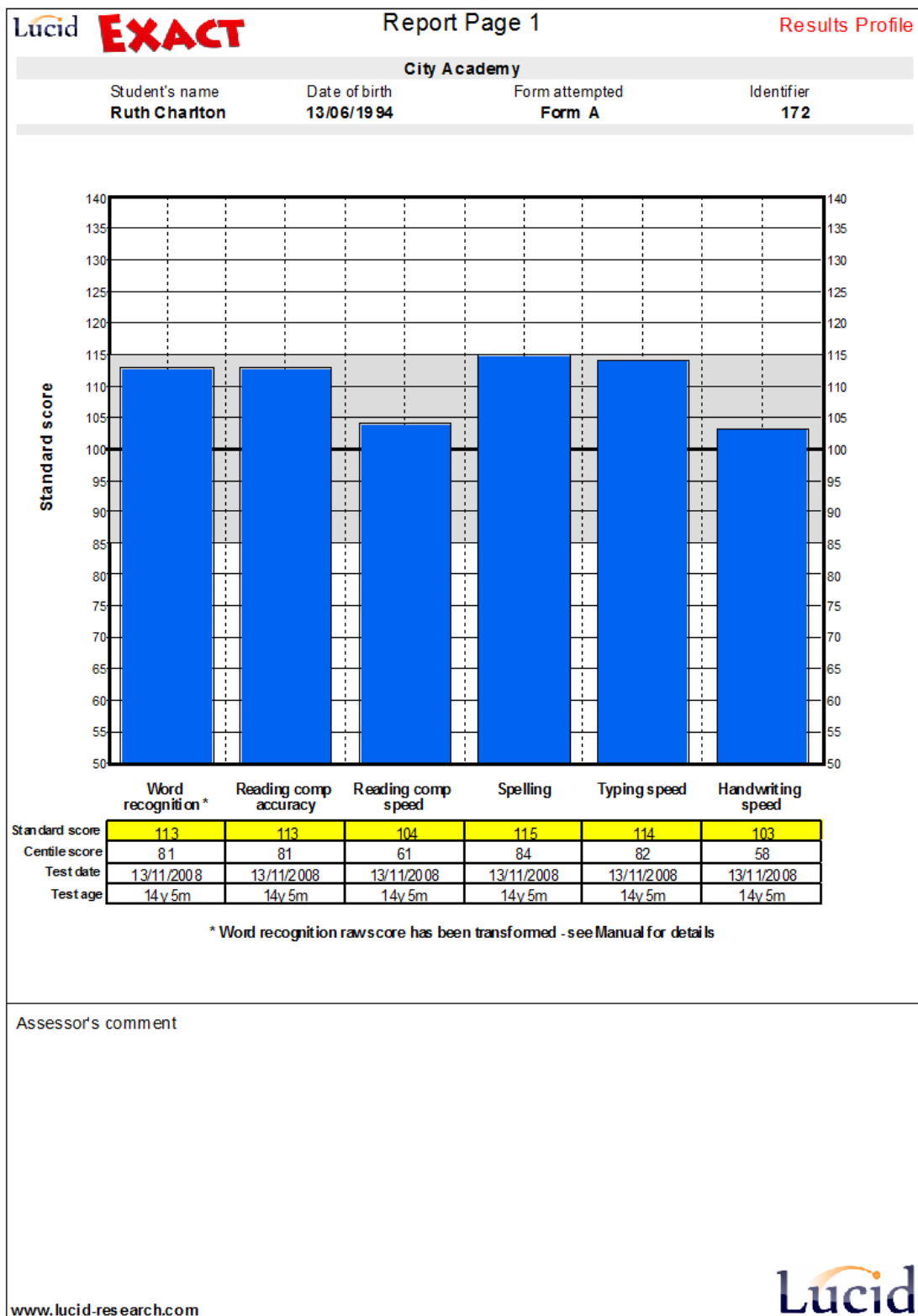There are no grounds for Access Arrangements in this case.

Figure 8. Results profile for Case B.

City Academy

Student's name	Date of birth	Form attempted	Identifier
Ruth Charlton	**13/06/1994**	**Form A**	**172**

Test date: 13/11/2008   ## Word Recognition   Age at test: 14y 5m

Measure	Regular words	Irregular words	Overall words
Standard score	111	114	113
Confidence interval	107 - 115	109 - 119	107 - 119
Centile score	77	82	81
Transformed score	16	16	32
Age equivalent	17:0-18:11	>18:11	>18:11
Total words correct	60	Total time (min:sec)	1:54

Test date: 13/11/2008   ## Reading Comprehension   Age at test: 14y 5m

Measure		Accuracy			Speed	
Standard score		113			104	
Confidence interval		103 - 123			94 - 114	
Centile score		81			61	
Raw score		31			97 wpm	
Age equivalent		>18:11			16:4-16:7	

Passage number	1	2	3	4	5	Total
Questions	5	10	10	10	10	45
Attempts	5	10	10	10	10	45
Correct answers	5	8	9	6	3	31
Time (min:sec)	0:43	2:12	1:40	2:19	2:11	9:05

Test date: 13/11/2008   ## Spelling   Age at test: 14y 5m

Measure	Regular words	Irregular words	Overall words
Standard score	113	115	115
Confidence interval	107 - 119	107 - 123	108 - 122
Centile score	81	84	84
Raw score	28	18	46
Age equivalent	>18:11	>18:11	>18:11

Test date: 13/11/2008   ## Writing to Dictation   Age at test: 14y 5m

Mode	Typing	Handwriting
*Words dictated / actual count	203	163
Speed	29 wpm	23 wpm
Standard score	114	103
Confidence interval	107 - 121	95 - 111
Centile score	82	58
Age equivalent	>18:11	16:0-16:11
* Spelling errors (count)	0	0
Spelling errors (percent)	0.00	0.00

* Actual figures can entered manually by the assessor - see Manual for details
ADVICE: Age equivalents are approximate and should only be used where Standard scores or Centile scores are inappropriate

Typed passage

One day last year we saw alot of bees going in and out of some old hives behind our garage.
My friend once sat on a bee and got stung on the bottom, so i was a bit scared of them. But i know a lady who keeps bees, and i asked her if she would take them away. However she thought that should learn to keep them myself. She told me what i needed and what clothes to buy. There was a special jacket, which included a hat and veil, and some thick leather gloves. The she showed how the bees build the comb on frames in the hive, and she tought me how to handle them.
We used a smoker to puff out smoke which calms them down. Then we lifted off the roof of the hive and looked at the frames where the queen was laying her eggs. When we spotted her, we marked her with a dab of white marker ink on her body. We made certain that she was in the bottom box of frames and put a wire mesh called a queen excluder, on top of that box. This keeps her from laying eggs in the boxes above.

Figure 9. Results breakdown for Case B.

5.3   Case C: A 15-year-old of average ability

5.3.1 Page 1. Results Profile

See Figure 10. Although this student has a wider spread of scores than case B, they are all within the normal range. He has performed less well in the two tests where speed is important (Word Recognition and Reading Comprehension Speed) which suggests that he is a slow but conscientious worker.

He types well, but his handwriting is good and he does not use a keyboard in class, so he will not be allowed to use a keyboard in exams, although he should obviously use one for as much coursework as possible. However, if use of a word processor was his normal practice in school he would now be able to use it in the exam.

5.3.2 Page 2. Results breakdown

See Figure 11. The Reading Comprehension scores show that he took longer than usual on each passage, but that this paid off because he got full marks on all the first three passages, even though it only allowed him 55 seconds on the fifth passage.

5.3.3 Conclusion

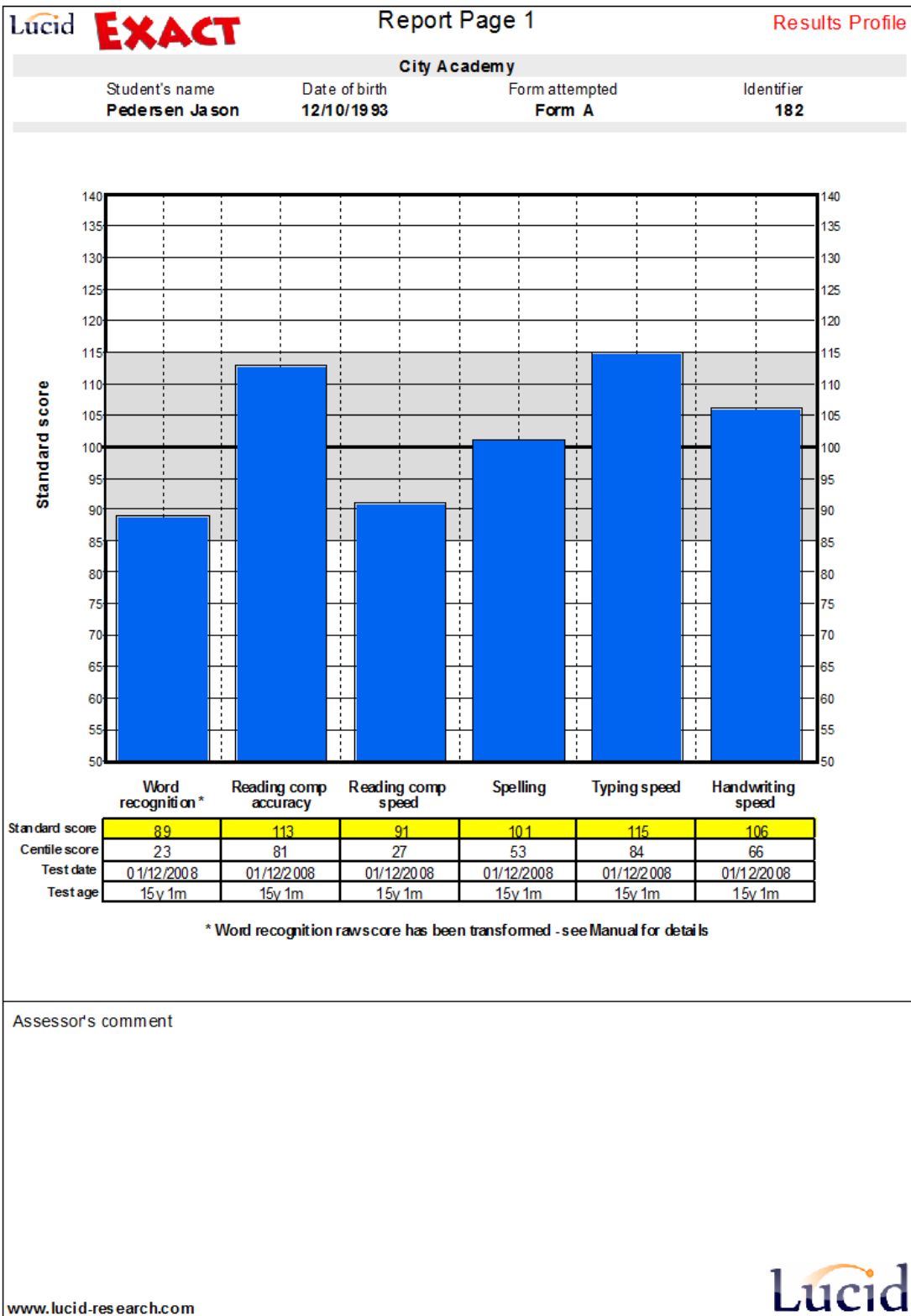There are no grounds for Access Arrangements in this case.

Figure 10. Results profile for Case C.

City Academy

Student's name	Date of birth	Form attempted	Identifier
Pedersen Jason	**12/10/1993**	**Form A**	**182**

Word Recognition

Test date: 01/12/2008   Age at test: 15y 1m

Measure	Regular words	Irregular words	Overall words
Standard score	88	91	89
Confidence interval	84 - 92	86 - 96	83 - 95
Centile score	21	27	23
Transformed score	12	12	24
Age equivalent	13:0-13:11	13:0-13:11	13:4-13:7

Total words correct	56	Total time (min:sec)	2:21

Reading Comprehension

Test date: 01/12/2008   Age at test: 15y 1m

Measure	Accuracy	Speed
Standard score	113	91
Confidence interval	103 - 123	81 - 101
Centile score	81	27
Raw score	32	77 wpm
Age equivalent	>18:11	12:0-12:3

Passage number	1	2	3	4	5	Total
Questions	5	10	10	10	10	45
Attempts	5	10	10	10	2	37
Correct answers	5	10	10	6	1	32
Time (min:sec)	1:06	2:23	2:35	3:02	0:55	10:01

Spelling

Test date: 01/12/2008   Age at test: 15y 1m

Measure	Regular words	Irregular words	Overall words
Standard score	98	103	101
Confidence interval	92 - 104	95 - 111	94 - 108
Centile score	45	58	53
Raw score	24	15	39
Age equivalent	14:0-14:11	15:8-17:3	15:0-15:7

Writing to Dictation

Test date: 01/12/2008   Age at test: 15y 1m

Mode	Typing	Handwriting
*Words dictated / actual count	213	172
Speed	30 wpm	24 wpm
Standard score	115	106
Confidence interval	108 - 122	98 - 114
Centile score	84	66
Age equivalent	>18:11	17:0-17:11
* Spelling errors (count)	0	0
Spelling errors (percent)	0.00	0.00

* Actual figures can entered manually by the assessor - see Manual for details

ADVICE: Age equivalents are approximate and should only be used where Standard scores or Centile scores are inappropriate

Typed passage

One day last year we saw a lot of bees going in and out of some old hives behind our garage. My friend once sat on a bee and got stung on the bottom, so I was a bit scared of them. But I know a lady that keeps bees, and I asked her if she would take them away. However she thought that I should learn to keep them myself. She told me what I needed and what clothes to buy. There was a special jacket, which included a hat and bale, and some thick leather gloves. Then she showed me how the bees build their come on frames in the hive, and she taught me how to handle them.
We used a smoker to puff out smoke which calms them down. Then we lifted off the roof of the hive and looked at the frames where the queen was laying her eggs. When we spotted her, we marked her with a dab of white marker ink on her body. We made certain that she was in the bottom box of frames and but a wire mesh called a queen excluder, on top of that box. This keeps her from laying eggs in the boxes above, where the other bees store honey.

Figure 11. Results breakdown for Case C.

5.4 Case D: A 12-year-old with multiple problems

5.4.1 Page 1. Results Profile

See Figure 13. The bar charts for this student show the wide range and severity of her difficulties. In spite of these difficulties, however, her Reading Comprehension Accuracy is in the normal range, which suggests that she is of normal intellectual ability. Her <u>extremely low</u> score for handwriting indicates that she probably has severe dyspraxia/dysgraphia, but that is only part of her difficulties.

5.4.2 Page 2. Results breakdown

See Figure 14. It is apparent from her Reading Comprehension times that she worked slowly but steadily through the passages and was able to answer the majority of the questions in the second and third passages correctly, which confirms that she understood these passages. Nevertheless, her low scores in spelling and word recognition strongly suggest dyslexia, as does the fact that she only managed to spell two irregular words correctly. In the typed passage she (surprisingly) managed to spell 'hives' and 'garage' correctly, but writing '*now*' for '*know*' and '*how*' for '*who*' are typically dyslexic errors, as is her tendency not to notice omissions (*sung, scard, ask*).

Her handwriting speed is very slow (7 wpm, below 50 standard score). Figure 12 shows her actual writing, which is legible – i.e. it is possible to read all the letters – but she makes a number of spelling mistakes. (Note that the student's handwriting attempt may be scanned, stored and displayed on page 4 of the Lucid Exact report – see Section 2.5.5 for information on how to do this.)

5.4.3 Conclusion

This student would probably be eligible for Access Arrangements when the time comes – see Section 6 for guidance on this. In the meantime, she clearly needs support on all areas of literacy and should be encouraged to become more fluent on a keyboard. If she has not already been assessed for dyslexia, use of LASS would be helpful in this regard (see Section 4.3.1).
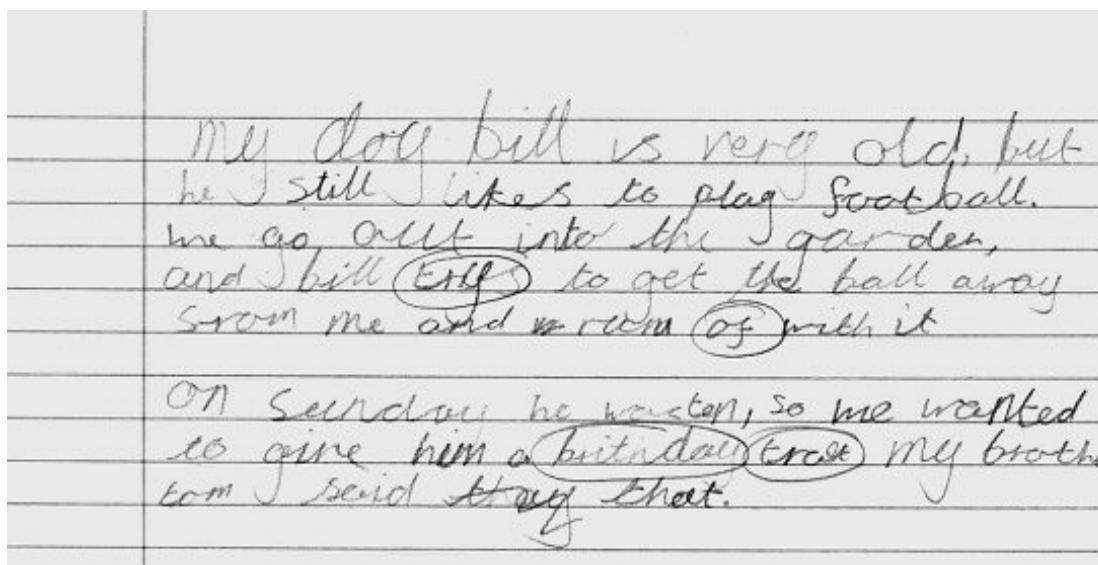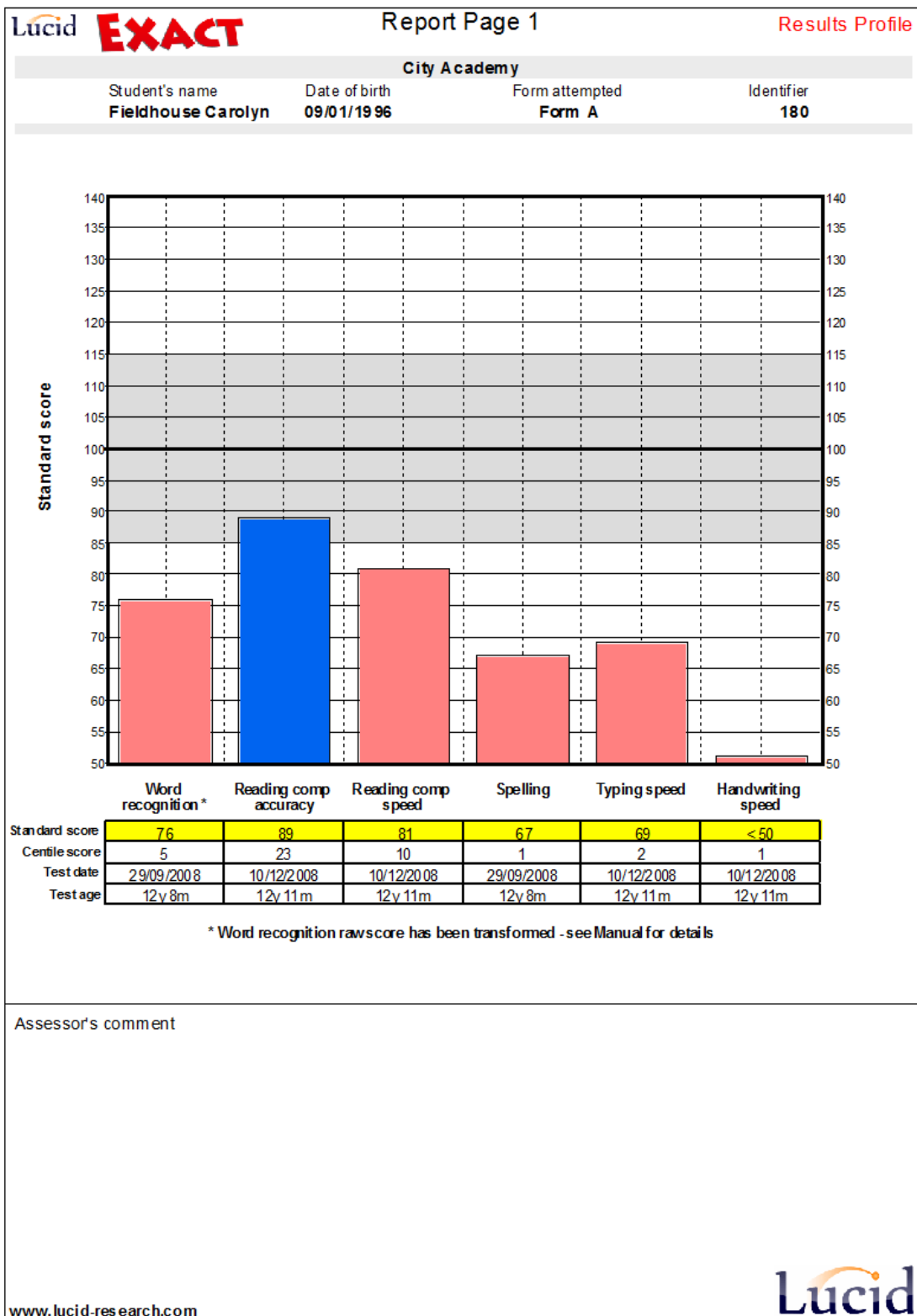

Figure 12. Sample of handwriting by Case D.

Figure 13. Results profile for Case D.

City Academy

Student's name	Date of birth	Form attempted	Identifier
Fieldhouse Carolyn	**09/01/1996**	**Form A**	**180**

Word Recognition

Test date: 29/09/2008   Age at test: 12y 8m

Measure	Regular words	Irregular words	Overall words
Standard score	73	80	76
Confidence interval	69 - 77	75 - 85	70 - 82
Centile score	4	9	5
Transformed score	6	7	13
Age equivalent	8:0-8:11	9:0-9:11	8:8-8:11
Total words correct		39	Total time (min:sec)	3:11

Reading Comprehension

Test date: 10/12/2008   Age at test: 12y 11m

Measure	Accuracy	Speed
Standard score	89	81
Confidence interval	79 - 99	71 - 91
Centile score	23	10
Raw score	19	47 wpm
Age equivalent	10:8-10:11	9:4-9:7

Passage number	1	2	3	4	5	Total
Questions	5	10	10	10	10	45
Attempts	5	10	10	10	3	38
Correct answers	2	6	8	3	0	19
Time (min:sec)	1:20	2:39	2:53	2:03	1:06	10:01

Spelling

Test date: 29/09/2008   Age at test: 12y 8m

Measure	Regular words	Irregular words	Overall words
Standard score	67	69	67
Confidence interval	61 - 73	61 - 77	60 - 74
Centile score	1	2	1
Raw score	12	2	14
Age equivalent	8:0-8:3	8:7-9:3	8:1-8:2

Writing to Dictation

Test date: 10/12/2008   Age at test: 12y 11m

Mode	Typing	Handwriting
*Words dictated / actual count	63	53
Speed	9 wpm	7 wpm
Standard score	69	< 50
Confidence interval	62 - 76	43 - 59
Centile score	2	1
Age equivalent	9:0-9:3	8:0-8:3
* Spelling errors (count)	0	0
Spelling errors (percent)	0.00	0.00

* Actual figures can entered manually by the assessor - see Manual for details

ADVICE: Age equivalents are approximate and should only be used where Standard scores or Centile scores are inappropriate

Typed passage

One day last year we saw a lot of bees going in and out of some old hives behind our garage.
My frined once sat on a bee and got sung on the bottom so i was a bit scard of them .But i now a lady how keeps bees,and i ask her if she would take them away.however she thought that i should

Figure 14. Results breakdown for Case D.

6 Use of Lucid Exact when applying for Access Arrangements

6.1   JCQ regulations

In England, Wales and Northern Ireland, applications for Access Arrangements for GCSE and GCE examinations are now made on-line using the Access Arrangements Online (AAO) tool. Centres are encouraged to record assessment information on the Joint Council for Qualifications 'Form 8' (available at www.jcq.org.uk). Section C of Form 8 (also referred to as the 'Diagnostic Report') can be downloaded prepopulated with the candidate's details when an application for certain arrangements is made online at AAO. Some of the information recorded on Form 8 will be required in order to make an application online.

This chapter is specifically aimed at helping assessors to complete the sections of this form that are relevant to students with difficulties in reading speed and comprehension, spelling and handwriting. Please also refer to the guidance notes in Chapter 7 of the JCQ regulations when completing Form 8.

All evidence for use in completing Form 8 must be drawn from assessments conducted no earlier than Year 9 (JCQ Regulations 2014-15, Section 5.2.2). In order to confer eligibility for access arrangements, the evidence must demonstrate difficulties that have a 'substantial adverse effect' or result in substantial impairment' (JCQ Regulations 2014-15, Section 5.2.2).

Note that Section 1 (on page 5) of the current JCQ Form 8 cannot be completed using Lucid Exact, because it does not include an "untimed test of single word reading accuracy" as currently required by JCQ (See Section 7.5.9 of the JCQ Regulations 2014-15).

6.2   Guidelines on using Lucid Exact

This subsection provides guidelines for the use of Lucid Exact in Examination Access Arrangements in accordance with JCQ Regulations Sept 2014 – Aug 2015. A copy of these guidelines can also be found on the Lucid website www.lucid-research.com JCQ gave formal approval to these guidelines on 15th November 2013[19], and the current version was reconfirmed as accurate on 26th June 2015 by Nick Lait, Head of Examination Services, JCQ.

6.2.1 Purpose

The purpose of these guidelines is to clarify how Lucid Exact may be used when assessing students for examination access arrangements, which are governed by regulations set out in the document *Adjustments for candidates with disabilities and learning difficulties: Access Arrangements and Reasonable Adjustments'* published annually by JCQ (hereinafter called 'JCQ Regulations').

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[19] Note that JCQ does not approve any tests for exam access arrangements as this is left to the professional discretion of the specialist assessor concerned.

6.2.2 General

1. Lucid Exact is a fully computerised, UK nationally standardised suite of literacy tests for the age range 11 years 0 months to 24 years 11 months. It can be used by Specialist Assessors (either appropriately qualified specialist teachers or educational psychologists) as an integral part of their assessment of students who may require examination access arrangements and the results from Lucid Exact can be entered into Section C of JCQ Form 8. The sections below outline exactly how the results from Lucid Exact may be used for this purpose.

2. **No single test on its own is adequate and Lucid Exact must not be viewed as the complete assessment solution; results from other tests are likely to be required**.

3. All test results must be backed up by evidence showing that the access arrangement requested is part of the student's normal way of working in the classroom, i.e. 'painting the picture' of the student's need for the arrangements [see JCQ Regulations 2014-15, Section 5.2.2].

4. Lucid Exact may also be used as a screening system to help identify students who may qualify for access arrangements, and who will then require assessing by a Specialist Assessor. If Lucid Exact is used solely as a screening test then the test result cannot be entered into Section C of Form 8. The result would have to be commented upon within Section A. Screening may be administered by a Specialist Assessor or a non-specialist (e.g. a SENCo or trained Higher Level Learning Support Assistant) but if administered by a non-specialist the results cannot be entered into Section C of JCQ Form 8 because a Specialist Assessor has to sign to say that they carried out the assessments. If Lucid Exact has been used as a screening test by a non-specialist the student may be retested by a Specialist Assessor using the parallel (equivalent) form of the test – see the Lucid Exact Administrator's Manual Section 3.8 (accessed from the program and from the Lucid website).

5. Lucid Exact is available for individual use or multiple users over a network. Lucid Exact should be administered in accordance with the instructions given in the Lucid Exact Administrator's Manual. As with all tests it is important to supervise students closely when administering the test, whether screening or carrying out a specialist assessment. Those who don't engage fully with the tasks may have questionable results. **Assessors, wherever possible, must use paper based tests alongside the Lucid Exact to confirm their findings**.

6. Although a standard score of 84 or less in an appropriate test is regarded as the key criterion for access arrangements, JCQ Regulations also allow consideration being given to 'rare and exceptional' cases where standard scores from more than one appropriate tests are in the range 85-89, provided there is supportive evidence regarding the student's normal way of working [see JCQ Regulations 2014-15, Section 5.2.2 for details].

6.2.3 Extra time in Exams

The following results from Lucid Exact are appropriate when applying for 25% extra time in examinations.

- **Reading Comprehension Speed (standard score 84 or below)**

[JCQ Regulations 2014-15, Section 5.2.2]

The Lucid Exact Comprehension Speed measure is valuable in showing those students (e.g. compensated dyslexics) who can read accurately but slowly. It is one of the few timed tests of comprehension that are easy to administer and, being a computer based test, it is free

from administrator bias or inconsistency. However, some students may attempt the test too quickly by just guessing without giving the questions proper consideration. This, of course, is a potential factor in any multiple-choice test, not only computer-based tests. Before they start the test, the administrator should therefore point out to students that they should make use of all the time allowed and should try to get as many answers right as possible, but they are not expected to answer all the questions, and if they complete the test too quickly their score will not be valid.

6.2.4 A Reader or Computer Reader in Exams

The following results from Lucid Exact are appropriate when applying for a reader or computer reader in examinations.

- **Reading Comprehension Accuracy (standard score 84 or below)**

- **Reading Comprehension Speed (standard score 84 or below)**

[JCQ Regulations 2014-15, Section 5.5].

Both the Lucid Exact Comprehension Accuracy and the Comprehension Speed measures give useful evidence of a student's need for a reader or computer reader. This may be backed up by a low score in Lucid Exact Word Recognition and/or an untimed test of single word reading (e.g. WRAT4 Reading, WIAT-II Reading). Note, however, that the Lucid Exact Word Recognition test does not meet the JCQ criteria of an untimed test of single word reading. But its scores correlate well with WRAT4 reading and it is very quick to administer, so it can be a very useful extra tool in 'painting the picture of need' and can be commented upon in Section A of Form 8.

6.2.5 Writing: Use of a scribe or word processor with spell check enabled or voice recognition technology

The following results from Lucid Exact are appropriate when applying to use a scribe or a word processor with spell check enabled or voice recognition technology in examinations.

- **Spelling (standard score 84 or below) which renders the writing illegible**

[JCQ Regulations 2014-15, Section 7.5.10].

Note that although the dictation test in Lucid Exact is particularly useful in demonstrating students with handwriting difficulties, it cannot be used as the only evidence for the use of a scribe or word processor, because for this purpose the JCQ regulations specify use of a test of free writing (rather than writing to dictation). Nevertheless, students with illegible handwriting or very slow writing due to dysgraphia/dyspraxia are immediately apparent from the results of the dictation test in Lucid Exact, and it is very clear from their typing speed and accuracy whether they should use a word processor or have a scribe.

If a student is going to use a word processor in examinations with spell check and word prediction functions disabled, no further evidence is required provided it is the student's normal way of working and is appropriate to their needs [see JCQ Regulations 2014-15, Section 5.8].

A few students handwrite adequately to dictation but write slowly when free writing; this discrepancy is valuable because it shows that their difficulty is not with the mechanics of writing but with 'thinking time' or uncertainty because of spelling difficulties. These students require further assessment of their processing speeds and spelling, and probably require extra time rather than as scribe. However, the Lucid Exact dictation test will again have been useful in deciding whether a word processor is more appropriate than a scribe.

DASH (Detailed Assessment of Speed of Handwriting) provides a useful further assessment tool for handwriting speeds, including a 10 minute free writing test.

6.2.6   Painting the picture of need

All the test results from Lucid Exact can also be used as part of the evidence to paint the picture of the student's needs within Section A of Form 8 [see JCQ Regulations 2014-15, Sections 5.2.2, 7.5.12 and 7.6.1].

6.3   Assessment of writing skills

6.3.1   Slow handwriting

The writing tests in Lucid Exact take the form of timed writing (both handwriting and typing) to dictation. A poor score in the Lucid Exact handwriting component is, *ipso facto,* clear evidence of slow writing speed indicating that the student may be entitled to appropriate Access Arrangements. A satisfactory score in the Lucid Exact typing component is, *ipso facto,* good evidence of adequate typing skills such that the student would be able to use a word processor in examinations if this was thought appropriate and applied for.

However, the current JCQ regulations specify that the assessor should "comment on the candidate's free writing under timed conditions" (see JCQ Regulations 2014-15, Section 7.5.10), and, obviously, free writing is different from writing to dictation. Unlike the free writing, writing to dictation does not require the student to think of the words to write, nor to monitor what is being written to ensure fidelity to the intended meaning. In fact, free writing confounds the two component processes of *thinking* and *writing*.

6.3.2   Difficulty in expressing meaning

If the student experiences difficulty in thinking what to say and what words to use to express their meaning, this may be reflected in slow writing. Where a student has problems in generating the words to express their ideas, this will not be measured by writing tests in Lucid Exact, but could be a valid reason for requesting Access Arrangements. Therefore, when assessing these students for Access Arrangements, in addition to using the Lucid Exact tests of writing to dictation, it is recommended that a free writing task be employed (for further information on assessing free writing consult the Patoss website: www.patoss-dyslexia.org or the Patoss guide *Dyslexia: Assessing the need for Access Arrangements during Examinations: A Practical Guide*).

6.4   Difficulties with reading

6.4.1   Case E: Application for a reader or computer reader

Student E is dyslexic and reads slowly. He is also inaccurate because he misreads so many words. Section 2 (of Form 8) is appropriate to this student as his normal way of working is with the help of a reader, and his standard scores for both reading comprehension speed and reading comprehension accuracy are less than 85 (see Figure 15). JCQ Regulations (Section 5.5) also permit the use of a computer reader in such circumstances.

Figure 15. Student E – JCQ Form 8, Reading Speed and Accuracy.

6.4.2   Case F: Application for extra time

Student F is dyslexic but can read accurately given enough time. Although her reading accuracy score is above 85, her reading comprehension speed is less than 85. Technically she could qualify for the help of a reader with a comprehension speed score below 85, but this is not her normal way of working and she prefers to be allowed extra time and read herself. See Figure 16.

Figure 16. Student F – JCQ Form 8, Reading Speed.

6.5   Difficulty with spelling

6.5.1   Case G: Application for a transcript

Student G has problems with spelling. Not only is his standard score for spelling below 85 but a significant number of words are difficult to read because they are misspelt (see Figure 17). The Lucid Exact spelling test gives his spelling standard score, but to obtain the percentage of unreadable words it is easier to look at his handwriting to dictation in Lucid Exact.

The handwriting is poor, bordering on illegible in places. However, it is possible to read most of the letters and it is the poor spelling that makes this writing particularly difficult for someone not familiar with the candidate's work to read. An adult familiar with the writing is likely to be able to decipher it, and will be able to make a transcript of any words that the examiner is likely to struggle with. Spelling can be corrected for non-technical words, but technical words can only be transcribed letter by letter in the transcript. An alternative provision that might be more appropriate in such a case would be for the student to use a word processor <u>with the spell check and/or predictive text *__enabled__*</u>, or voice recognition technology (see example Case H, below).
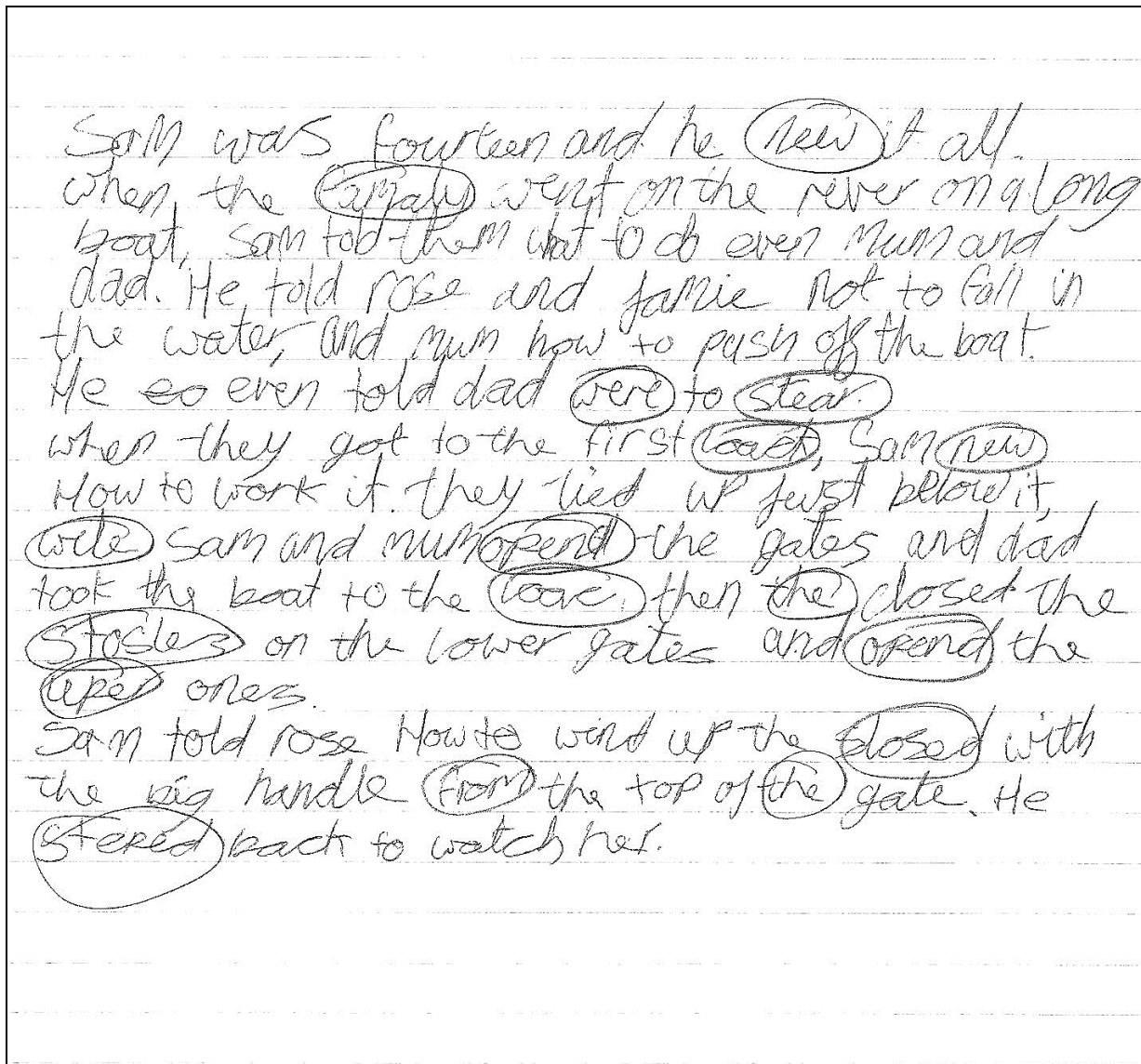

Figure 17. Student G – Handwriting difficult to read because of spelling errors.
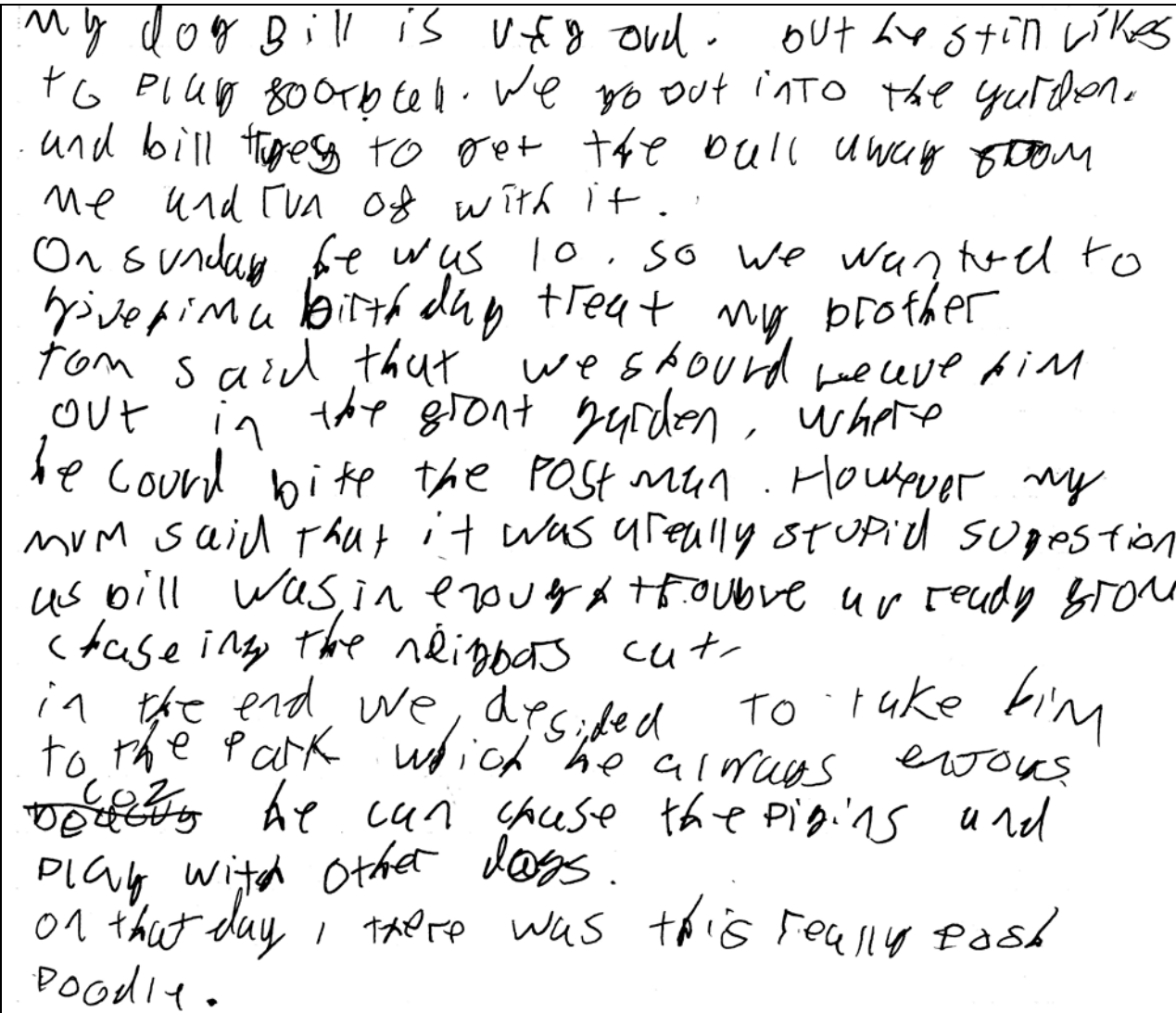
6.6   Dysgraphia

6.6.1 Case H: Illegible handwriting – application to use a word processor or voice recognition technology

In this case the handwriting is difficult to read because of the illegibility of the writing rather than the number of spelling errors – see Figure 18. This boy wrote 127 words in 7 minutes which gave him a writing speed of 18 wpm (standard score 88 for his age of 13 yrs 10 months), which is in the low average range. His typing speed was 21 words a minute (standard score 97), which confirms competence on a keyboard.

In this case, JCQ regulations [Section 7.5.10] permit the candidate to take examinations using a word processor with the spell check and/or predictive text *enabled*, or voice recognition technology.

However, evidence of an underlying difficulty based on standard scores is not required for a a candidate to be able to use a word processor with spell check or predictive text *disabled*. There is therefore no need to complete Form 8 for such cases. Evidence that the candidate uses a word processor as normal classroom practice, and that the word processor is needed is all that the Centre needs to process the application.

Figure 18. *Student H. Illegible handwriting.*

6.6.2 Case I: Slow but legible writing – application to use a scribe

Student I writes legibly but very slowly (see Figure 19). His writing speed to dictation is only 15.7 words a minute, which for a student aged 15 years 11 months gives a standard score of 68. As this student is not proficient in the use of a word processor, after consultation with the student and his teachers, it was agreed that it would be appropriate to request the use of a scribe (amanuensis) as Access Arrangements – see Figure 20 and Figure 21 (please note that in the 2014-15 version of Form 8, Sections 3 and 4 are slightly different to those shown in the figures, but the principal content is essentially the same).
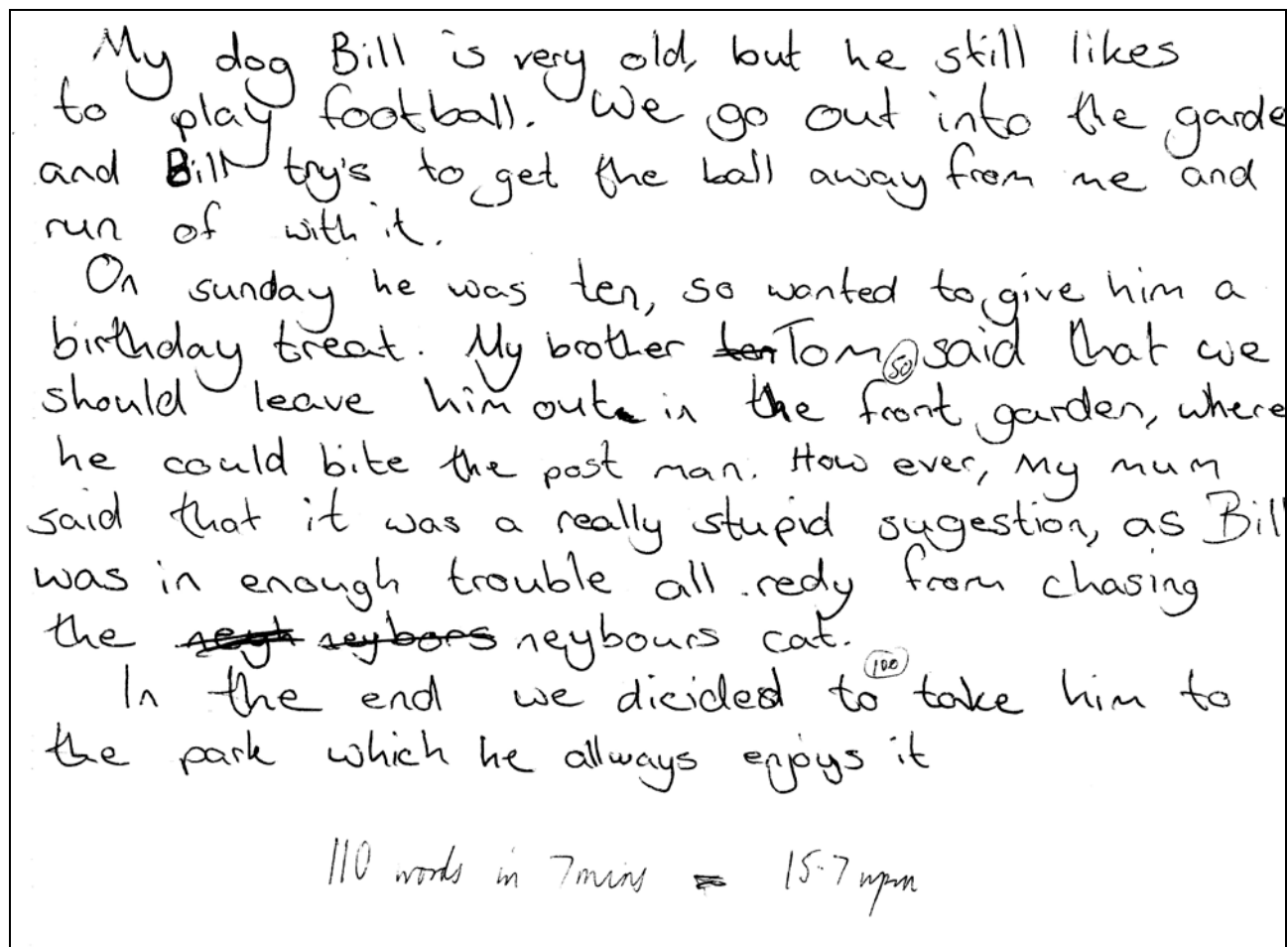

Figure 19. Student I – Slow but legible handwriting.

Writing Skills

3. **Accuracy & Legibility**

Is the candidate's spelling accuracy in the below average range? YES ☐ NO ☒

Does the candidate's spelling and/or handwriting render his or her free writing largely illegible to someone who is not familiar with it? YES ☐ NO ☒

Is the candidate's free writing incomprehensible to someone who is not familiar with it? YES ☐ NO ☒

A word processor will be permitted only if the candidate is proficient in its use and there is evidence of impairment or their writing is produced at a below average speed.

Is the candidate proficient in the use of a word processor? YES ☐ NO ☒

Please give the results of a spelling assessment, stating how many errors were unrecognisable as the target word.

Name of test	Lucid Exact - Spelling
Test ceiling	24 yrs 11 months
Date of administration	23/4/2009
Spelling Standardised Score	96
Errors unrecognisable as target word, expressed as a percentage of the whole assessment	

4. Does the candidate express him/herself in written form, more slowly than is average for his/her age? YES ☒ NO ☐

Name of test	20mins Free writing & Lucid Exact - Dictation
Free writing speed (wpm)	8.35wpm
Percentage of indecipherable words	0
Free writing speed (wpm) when dictated to scribe/word-processed	See over
Quality of language - please comment	

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Figure 20. Student I – JCQ Form 8, Writing Skills.

Other relevant information

Please see guidance notes in **Chapter 3** *of the JCQ publication Access Arrangements, Reasonable Adjustments and Special Consideration.*

Lucid Exact - Dictation
Handwriting Speed to dictation = 15.7wpm (= Standard score 68 for age 15.11)
Typing speed to dictation = 15 wpm (= standard score 73 for age 15.11)

Figure 21. Student I – JCQ Form 8, Other relevant information.

7 Appendices

7.1   Dictation Texts for FORM A

FORM A – Typed text

Bee – keeping

One day last year we saw a lot of bees going in and out of some old boxes behind our garage.

My friend once sat on a bee and got stung on the bottom, so I was a bit scared of them. But I know a lady who keeps bees, and I asked her if she would take them away. However she thought that I should learn to keep them myself.

She told me what I needed and what clothes to buy. There was a special jacket, which included a hat and veil, and some thick leather gloves. Then she showed how the bees build their comb on frames in the hive, and she taught me how to handle them.

We used a smoker to puff out smoke which calms them down. Then we lifted off the roof of the hive and looked at the frames where the queen was laying her eggs. When we spotted her, we marked her with a dab of white marker ink on her body. We made certain that she was in the bottom box of frames and put a wire mesh called a queen excluder, on top of that box. This keeps her from laying eggs in the boxes above, where the other bees store honey.

[212 words]

FORM A – Handwritten text

My Dog, Bill

My dog Bill is very old , but he still likes to play football. We go out into the garden, and Bill tries to get the ball away from me and run off with it.

On Sunday he was 13, so we wanted to give him a birthday treat.
My brother Tom said that we should leave him out in the front garden, where he could bite the postman.
However, my mum said "No. That was a really stupid suggestion," as Bill was in enough trouble already from chasing the neighbour's cat.

In the end we decided to take him to the park which he always enjoys because he can chase the pigeons and play with other dogs.

On that day, there was this really posh poodle dressed up in a tartan jacket. You could see that Bill thought she was terrific. He couldn't take his eyes off her and kept bouncing around in front of her as if he was a puppy.

She was having absolutely nothing to do with him and walked away with her nose in the air. Poor Bill. To make up for his disappointment, we bought him one of those artificial bones that dogs love to chew.

[201 words]

7.2   Dictation texts for FORM B

FORM B – Typed text

Biking

My name is Ben and I live in the country. If I want to see my mate Joe, I have to ride my bike, because he lives 2 miles away on a farm.

They have a quad bike there for looking after the sheep, and we are allowed to ride it all round the place. We have made a track over a hill, through a wood and down the side of a field to the farmyard. At the end, there is this really sharp bend between a combine harvester and a derelict tractor, where it is very bumpy and I usually fall off.

Yesterday I completed the course in 4 minutes 20 seconds, which is a record. I almost fell off at the last corner, but I managed to hold on to the handlebars, run beside the quad bike for a few paces and jump on again. It was like you see the bobsleigh teams do on TV.

Normally if you let go of the throttle, the bike just stops. However last week when Joe came off, it jammed open and the bike went at full speed into some hay bales. Luckily it wasn't damaged and we didn't let on to his dad what had happened.

[206 words]

FORM B − Handwritten text

The Lock

Sam was 14 and he knew it all.

When the family went on the river in a long boat, Sam told them what to do, even Mum and Dad. He told Rose and Jamie not to fall in the water, and Mum how to push off the boat. He even told Dad where to steer.

When they got to the first lock, Sam knew how to work it. They tied up just below it, while Sam and Mum opened the gates and Dad took the boat into the lock. Then they closed the sluices on the lower gates and opened the upper ones.

Sam showed Rose how to wind up the sluices with the big handle on the top of each gate. He stepped back to watch her and lost his balance on the narrow footway, falling backwards into the lock with a tremendous splash. Dad fished him out with the boat hook. He was filthy, wet and furious, but everyone else just laughed including the lock keeper, and people from two cruisers.

[190 words]

7.3   Exporting students' scores – details of data

Multiple student exports (Excel® .xlsx or .csv)

1. Surname
2. Forename
3. Class/Group
4. Age
5. Test date
6. Word Recognition Standard Score
7. Word Recognition Confidence band
8. Word Recognition Age Equivalent (Accuracy)
9 Reading Comprehension accuracy Standard Score
10. Reading Comprehension accuracy Confidence band
11. Reading Comprehension accuracy Age Equivalent
12. Reading Comprehension speed Standard Score
13. Reading Comprehension speed Confidence band
14. Reading Comprehension speed Age Equivalent
15. Retest advice (see ******)
16. Spelling Standard Score
17. Spelling Confidence band
18. Spelling Age Equivalent (accuracy)
19. Dictation typing speed Standard Score
20. Dictation typing speed (wpm)
21. Dictation typing Speed Confidence band
22. Dictation typing speed Age Equivalent
23. Dictation handwriting speed Standard Score
24. Dictation handwriting speed (wpm)
25. Dictation handwriting speed Confidence band
26. Dictation handwriting speed Age Equivalent

** *Retest Advice*

This field will have one of three values:
1. Definitely: Signifies that the student completed the Reading Comprehension test in under 5 minutes of the 10 minutes allowed. In these cases it is deemed impossible that the student would have answered most or all of the questions thoughtfully.
2. Recommended: The student completed the Reading Comprehension test in a time of between 5 and 8 minutes of the 10 allowed.
These students would have this notification on pages 1 and 2 of their reports:
"Reading Comprehension accuracy would probably be higher if the full time was utilized"
3. [blank] Retest should not be necessary.

Single student export (Excel® .xlsx)

Sheet 1

Name, date of birth, form completed, ID
Word Recognition: Standard score, Centile score, Test date, Test age
Reading Comprehension Accuracy: Standard score, Centile score, Test date, Test age
Reading Comprehension Speed: Standard score, Centile score, Test date, Test age
Spelling: Standard score, Centile score, Test date, Test age
Typing to Dictation: Standard score, Centile score, Test date, Test age
Writing to Dictation: Standard score, Centile score, Test date, Test age

Sheet 2

Word Recognition Test
Standard Scores
Confidence intervals
Centile scores
Transformed scores
Age equivalents
Total words correct
Total time taken
Reading Comprehension Test
Standard Scores
Confidence intervals
Centile scores
Raw scores
Age equivalents
For each passage:
Number of questions
Questions attempted
Correct answers
Time taken
Spelling Test
Standard Scores
Confidence intervals
Centile scores
Raw scores
Age equivalents

Dictation Test (for both typing and handwriting components)
Words dictated / actual count
Speed (wpm)
Standard score
Confidence interval
Centile score
Age equivalent
Spelling errors (must be entered manually)
Spelling errors (percentage)
The passage typed by the student is also displayed in its entirety

Sheet 3

Reading Comprehension Accuracy
For all 45 questions:
Correct answer
Answer given
Score (0,1)
Spelling Test (note this test is adaptive so not all items will be presented)
Item number
Correct spelling
Spelling entered