An analysis of the reading profiles of first-year students at Potchefstroom University: a cross-sectional study and a case study

Charl Nel, Carisma Dreyer* and **Mariaan Kopper**
Graduate School of Education, Potchefstroom University, Private Bag X6001, Potchefstroom, 2520 South Africa

* To whom correspondence should be addressed

Many South African students enter higher education under-prepared for the reading demands that are placed upon them. These students very often become part of the "revolving door syndrome". An analysis of the reading assessment profiles of a group of first-year students at Potchefstroom University indicated that these students experienced problems across all aspects of the reading process (i.e. vocabulary, fluency, reading comprehension, and reading strategy use). The reading assessment profiles of an efficient and an inefficient learner indicated that their profiles were diverse and that any one measure of reading achievement may not be sufficient to identify strengths and needs for instruction. Recommendations are made in terms of the reading support needed by these students.

Introduction

According to the South African government's White Paper on Higher Education Transformation (Department of Education, 1997), student enrolment should be expanded and access should be broadened to reach a wider distribution of social groups and classes, including adult learners. This key recommendation is central to the framework underpinning the transformation of higher education in South Africa (Edrong, 2000). How higher education institutions have responded to these policy pressures varies across sub-sections and from institution to institution. However, there are indications that major improvements have occurred in student enrolment patterns in terms of race, gender and number (Harper & Cross, 1999). For example, Harper and Cross (1999) indicate that African student enrolments increased from 191 000 in 1993 to 332 000 in 1999, an increase of 74%.

These policies, although proactive, were not accompanied by adequate strategies to face the challenges that emanated from their implementation. We no longer have a homogenous group of students, possessing the fundamental skills necessary for higher education (*cf.* Harper & Cross, 1999; Van Wyk, 2001). Students from different social and cultural backgrounds, with different experiences and varying levels of education bring with them different needs and academic potential (*cf.* Harper & Cross, 1999). A South African newspaper (Sunday Times, 23 July 2000) reports that at least 100 000 students drop out of tertiary institutions each year, and institutions have poor follow through rates (70% and below) and poor graduation rates (15% or below). One way of addressing this issue is by identifying (i.e. profiling) the learner variables that can affect the academic achievement of specifically first-year students in order to prevent them becoming part of the "revolving door syndrome".

Research indicates that a key, but often overlooked, skill that is essential to academic and professional success is reading ability (*cf.* Strydom, 1997; Pretorius, 2001). Reading is the skill upon which success in every academic area is based. According to Blue (1993), students at tertiary level are required to understand the overall content, distinguish main points from supporting detail, skim, scan, question, look for assumptions and intentions, analyse, synthesise and evaluate. However, research indicates that a significant number of first-year university students commence their studies with less than adequate reading comprehension abilities and reading strategy use (*cf.* Perkins, 1991; Strydom, 1997; Dreyer, 1998; Van Wyk, 2001). Many first-year students, therefore, enter tertiary institutions unable to meet the expectations of the academic community (*cf.* Strydom, 1997; Van Wyk, 2001; Pretorius, 2001).

The purpose of this article was to report on the reading assessment profiles of a group of first-year students at Potchefstroom University in order to a) determine the scope of the reading problem, b) assess the strengths and weaknesses of the reading assessment profiles of one efficient and one inefficient student (i.e. case study), and c) make recommendations in terms of the reading support needed by these students.

Reading at university

One of the biggest problems at university, but one which is often not fully recognised by either students or lecturers until some way into academic courses, is the problem of reading, perhaps because reading per se is not assessed. However, the results or outputs from reading are assessed. Reading for university courses is demanding. A typical first-year student (Faculty of Arts) at Potchefstroom University takes seven to eight modules (8 credits each) in the first semester (Potchefstroom University, 2002), each with extensive reading loads (approximately 600–1200 pages) serving several purposes.

Students, therefore, need to cope with a large quantity of reading in a limited amount of time. They need to use what they read for purposes such as absorbing, analysing and summarising information to use in writing or in seminars. They need to identify specific issues, questions or misunderstandings which they can raise in seminars, with subject tutors, or critique in oral presentations or in written work (*cf.* Taraban *et al.*, 2000). Taraban *et al.* (2000:284) state that: "In terms of cognitive processing, college reading is quite demanding considering the sheer amount, the range of topics, and the variety in the tasks". The question is, therefore, whether first-year students have the reading skills to meet this challenge?

Components of a reading assessment profile

Reading assessment is used to gather data to understand students' strengths and weaknesses in reading. The information of tests of several components is then used to create profiles of students' reading ability (*cf.* Chall, 1994). Educators have traditionally used reading assessment to measure student growth in reading achievement and to diagnose individual strengths and weaknesses in reading in order to plan for instruction (Askov *et al.*, 1997). Profiles result in a comprehensive view of students' strengths and weaknesses across many aspects of the reading process and can be used to design a programme of instruction that addresses all aspects of the reading process during instruction. This ensures a balanced approach to reading instruction (National Reading Panel, 2000; Snow *et al.*, 1998). According to Kruidenier (2002), assessing several components of reading in order to generate profiles of students' reading ability give educators much more instructionally relevant information than any test of a single component can. In addition, the reading assessment profiles of English Second Language (ESL) learners may be so diverse that any one measure of reading achievement may not be sufficient to identify strengths, weaknesses and needs for instruction.

The National Reading Panel (2000) identified four major components of reading instruction: alphabetics (phonemic awareness and word analysis), vocabulary, fluency and reading comprehension. In

this study the focus is on three of the components, namely vocabulary, fluency and reading comprehension, in order to obtain comprehensive reading assessment profiles of ESL first-year students. Alphabetics is not assessed because of its relevance for mainly beginning and intermediate readers (*cf.* Kruidenier, 2002).

Vocabulary
Vocabulary knowledge is fundamental to comprehending text (Nagy, 1998). Researchers distinguish between many different types of vocabularies. Receptive vocabulary is the vocabulary that we can understand when it is presented to us in text (i.e. reading vocabulary) or as we listen to others speak, while productive vocabulary is that vocabulary we use in writing or when speaking to others (i.e. oral vocabulary) (National Reading Panel, 2000:4-15). The National Reading Panel (2000:4-15) states that: "Oral vocabulary is a key to learning to make the transition from oral to written forms, whereas reading vocabulary is crucial to the comprehension processes of a skilled reader".

Students must also learn to comprehend specific content-area information (West, 1978). Technical vocabulary includes words that relate specifically to each content-area subject or topic. Students must learn the definitions of these words to understand content-area reading text and to learn the language of the discipline. To promote comprehension, students need to develop an understanding of how words can be used across different contexts and be able to understand the meaning of words quickly while reading.

The relationship between vocabulary knowledge and comprehension is, however, extremely complex. Research shows that there is a strong positive correlation between vocabulary knowledge and comprehension (*cf.* Beck & McKeown, 1991). It is possible, however, that this maybe as a result of background knowledge, rather than isolated vocabulary recognition. Unless students have some relevant experiences (prior knowledge) to bring to a text, they are unlikely to be able to construct its meaning. Proficient readers acquire new words by wide reading and repeated exposures to words in varying contexts (Blachowicz & Fisher, 2000). Research also indicates that there is an equivocal relationship between teaching vocabulary and improving comprehension (Tomeson & Aarnoutse, 1998).

Fluency and eye-movement analysis
Fluency in reading today is widely recognised as a critical need in terms of reading competency (*cf.* National Reading Panel, 2000; Kame'enui & Simmons, 2001). The development of fluent reading involves learning to look at each word more quickly or efficiently (National Reading Panel, 2000:3-9).

Research on a student's eye movements has provided a perspective from which to observe the fluent reading process (*cf.* Rayner, 1998). A record of a student's eye movements during reading provides objective evidence of his reading performance, or the way he/she habitually employs his/her eyes in reading. Research into eye-movements in reading, conducted by a French ophthalmologist, Professor Emile Javal around 1879, revealed that rather than move in a continuous, sweeping motion, the eyes move in alternating jumps and pauses across a line of text. The jumping movements, called saccades, take approximately 20 milliseconds, whilst the pauses, called fixations, last approximately 150-300 milliseconds. The fixation can be considered the heart of the reading act, for it is during the fixation that perception takes place. The number of fixations is significant because it indicates the number of separate perceptions that must be made, sorted out, and added up to realise the meaning of the whole. Excess fixations and regressions (reverse fixations — eye movements in a right-to-left direction) to recognise words results in the expenditure of more time and energy which in turn will reduce reading rate and inhibit ease and comfort in reading (Logan, 1997; National Reading Panel, 2000).

According to Taylor (2000), visual/functional efficiency, perceptual accuracy and word recognition automaticity, and information processing efficiency is a basic requirement for fluency in reading to emerge. It is essential that a student maintain both good binocular coordination and vergence (team use of both eyes), possess acceptable ocular motility (the ability to rotate the eyes and not the head) and track accurately (staying on the line and progressing sequentially across lines of print with good left to right directional attack) (Atzmon, 1993). Many struggling readers have difficulty moving to a level of automaticity and fluency that allows them to easily comprehend what they are reading (Hook & Jones, 2002). In essence, if word recognition is overly time consuming, and especially if multiple fixations are required to recognise words, there is little time and attention left to devote to the meaning of what is being read (Torgeson *et al.*, 2001).

Reading comprehension
Reading comprehension is often called the "essence of reading" (Durkin, 1993). In fact, all reading interactions culminate in comprehension. Reading comprehension can be described as understanding a text that is read, or the process of constructing meaning from a text (National Reading Panel, 2000:4-5). For comprehension to occur, words must be decoded and associated with their meanings in a reader's memory. Phrases and sentences must be processed fluently so that the meanings derived from one word, phrase or sentence are not lost before the next one is processed. The reader must monitor this construction process, solving problems and making repairs as needed (*cf.* Snow *et al.*, 1998). This involves the conscious use of reading comprehension strategies (*cf.* Nist & Holschuh, 2000).

Reading comprehension strategies are planned and purposeful tools that strategic readers use to draw meaning from text (*cf.* Pressley, 1999). Strategies help readers to engage with the text, to monitor their comprehension, and to fix comprehension when it has failed (*cf.* Pressley & Afflerbach, 1995; Nist & Holschuh, 2000). There is consensus among researchers that skilled readers have a plan for comprehending; they use a variety of reading strategies effectively to monitor their own comprehension before, during and after they read (Salembier, 1999). There is ample research evidence supporting the efficacy of strategy training during reading as a means to enhance students' comprehension (Pressley *et al.*, 1989; Dreyer, 1998; Taraban *et al.*, 2000).

South African research indicates a bleak picture with regard to the reading comprehension levels of our students (*cf.* Blacquiere, 1989; Perkins, 1991; Pretorius, 2000; 2001; Dreyer & Nel, 2003). Orndorff (1987) states that the inability of many students to read critically and with comprehension may be the single most important problem in tertiary education. Not only do students have difficulty selecting authors' main ideas and seeing how they have been developed into a coherent whole, but they are also unable to infer, synthesise and restructure ideas, especially from complex texts (*cf.* Pretorius, 2000; 2001; Dreyer & Nel, 2003).

Research, therefore, seems to indicate that students who have problems with reading comprehension and don't use reading strategies optimally come unprepared for the expectations of the academic community and that typically characterise university coursework (*cf.* Pugh *et al.*, 2000), and that may very well be a part of their upcoming job responsibilities (*cf.* Department of Education, 1997; Kasper, 2000).

Method of research
Design
A one-shot cross-sectional survey and case design was used.

Participants
A total of sixty-two (n=62) randomly selected students taking the first-year English for Professional Purposes course (N=131) participated in this study. Students studying both full-time and part-time were included in the study. The age of the students ranged from 18–22 years. The participants included speakers of Afrikaans and Setswana majoring in Communication Studies (N=42) and Psychology (N=20).

Instrumentation
The following instruments were used in this study:
• The vocabulary component of the ELSA Plus test for Higher

Education and Training (Business Enterprises, 2002) was used to measure the receptive vocabulary (i.e. the vocabulary we can un-derstand when it is presented to us in text) of the students. The vocabulary component consisted of 30 multiple-choice items.

- The Communication Vocabulary Test was used to test the students' Communication content-specific vocabulary. This test was devised by the researchers in consultation with the Communication Studies lecturer. The test consisted of 15 multiple-choice items and 15 give the meaning of items.

- The Psychology Vocabulary Test was used to test the students' Psychology content-specific vocabulary. This test was devised by the researchers in consultation with the Psychology lecturer. The test consisted of 15 multiple-choice items and 15 give the meaning of items.

- The Visagraph II eye-movement recording system was used to measure the efficiency of the fundamental reading process of students: visual/functional proficiency (visual co-ordination, ocular motility and precision in tracking), perceptual development (accuracy in visual discrimination and word recognition automaticity) and information processing competence (efficiency in the use of short-term memory and language experience) (*cf.* Taylor, 2000).

- Section III of the TOEFL test, namely the Vocabulary and Reading Comprehension section, was administered to determine the vocabulary and reading comprehension of the students. (Educational Testing Service, 1989). The vocabulary and reading comprehension section measures the ability to understand non-technical reading material and the contextual meaning of words; it is divided into two parts. Each reading comprehension passage is followed by a series of questions about the main and secondary ideas of the passage. For each vocabulary question, the student must choose the word or phrase that would best preserve the meaning of a given sentence if it were substituted for the underlined word(s) in that sentence. Section III consisted of 60 multiple-choice items.

- The Reading Performance Test in English: Advanced Level (Roux, 1996) was used to determine the students' reading performance level in English within the range of Senior Secondary Performance Levels (i.e. Grades 10, 11 and 12). The term "reading performance" in this context refers to the ability to get meaning from print (i.e. reading comprehension). This standardised test consists of 50 items. Questions are based on prose passages, advertisements, a film review, a cartoon and two cloze-test passages. All the questions are in multiple-choice form consisting of four options per item. The raw scores of the students were converted to a stanine scale. The stanine scale is a nine-point standard scale according to which raw scores are divided into nine intervals. It provides standard scores ranging from 1 (very poor) to 9 (very good) with a mean of 5 and a standard deviation of 1.96. The norms for second language speakers are specified in Roux (1996: 22).

- A Reading Strategies Questionnaire, based on the work of Oxford (1990), Pressley & Afflerbach (1995), and Pressley *et al.* (1995), was used to determine students' use of reading strategies. The reading questionnaire was divided into three sections:

Part A: Before reading strategies
Part B: During reading strategies
Part C: After reading strategies

Students answer in terms of how well a certain statement describes them. For example, a typical statement would be: "I briefly skim the text before reading".

The student must then choose one of the following:

1   Never or almost never true of me
2   Usually not true of me
3   Somewhat true of me
4   Usually true of me
5   Always or almost always true of me

Each of the three parts is then summed to get the total for each part. The sum of each part is then divided by the number of items contained in each part in order to get the students' average use of that particular group of strategies. The following guide was used to assess the frequency of strategy use:

High	Always or almost always used	4.5-5.0
	Usually used	3.5-4.4
Medium	Sometimes	2.5-3.4
Low	Usually not used	1.5-2.4
	Never or almost never used	1.0-1.4
	(Oxford, 1990:300).	

In addition to the above-mentioned questionnaires and tests, semi-structured interviews were conducted with the efficient learner and the inefficient learner. The purpose of the interviews was to determine the reading habits of the two students in terms of amount and variety as well as their knowledge of reading strategies.

Data collection procedure

The questionnaires were completed in scheduled contact session periods within the first two weeks of the second semester of 2002. All questionnaires were completed under testing conditions. The TOEFL test was completed under testing conditions as specified by Educational Testing Services. Special sessions were scheduled for testing students on the Visagraph at the Potchefstroom University reading laboratory. The two interviews were scheduled at a time convenient to both the primary researcher and the two students. All background information on the students was obtained from the university academic administration.

Visagraph recording functions

The student slips on goggles and they are adjusted to his/her inter-pupillary distance. The Visagraph requires no calibration or adjustment. A reading selection in the test booklet is then read silently. During the reading/recording, the Visagraph samples eye-movement positions 60 times per second and automatically computes various reading performance measures. Following this reading, a comprehension check determines whether or not the student read with reasonable comprehension.

Analysis

Descriptive statistics (i.e. means, standard deviations and percentages) were used to analyse the data. Pearson product-moment correlations were used to determine the direction and strength of the relationship between reading comprehension ability and academic performance in a course major (i.e. Communication Studies and Psychology). The interview data are reported as narratives.

Results and discussion

The results of this study are presented under the following headings:
- The scope of the reading problem
- Comparing two reading assessment profiles in terms of strengths and weaknesses

The scope of the reading problem

An analysis of the reading assessment profiles of the students participating in this study indicated that they experienced problems across all aspects of the reading components assessed (vocabulary, fluency, and reading comprehension and reading strategies) (*cf.* Table 1).

The mean score on the ELSA test was 14.66, indicating that the majority of the students in this study performed below the norm set for first-year students at the Potchefstroom University. The students majoring in Psychology achieved a mean score of 13.50 out of a potential maximum score of 30. The students majoring in Communication Studies obtained a mean score of 23.45 out of a potential maximum score of 30 (*cf.* Instrumentation section; Table 1). One reason for the difference between the mean scores of students majoring in Communication Studies and those majoring in Psychology may be the fact that Communication vocabulary, in general, is far more common than the Psychology vocabulary (i.e. greater exposure — television, radio, newspapers, etc.). Research indicates that learning a word comes from

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multiple exposure over time in a variety of contexts (Ruddell, 1994).

Table 1 First-year students' reading assessment profiles

Instrumentation	Variable	M	SD	Min	Max	Norm for first-year students
Vocabulary						
ELSA Plus	Vocabulary	14.66	4.63	4	24	16
Communication Vocabulary test	Communication content-specific vocabulary	23.45	3.24	13	28	–
Psychology Vocabulary test	Psychology content-specific vocabulary	13.50	3.69	3	20	–
Fluency						
Visagraph	Fixations/100 words (Right eye)	105.08	20.89	68	134	90
	Fixations/100 words (Left eye)	104.78	21.95	51	134	90
	Regressions/100 words (Right eye)	13.72	10.56	1	33	15
	Regressions/100 words (Left eye)	14.98	10.25	1	32	15
	Average span of Recognition (words) (Right eye)	0.99	0.21	0.75	1.47	1.11
	Average span of Recognition (words) (Left eye)	1.00	0.27	0.75	1.96	1.11
	Average duration of Fixation (sec.) (Right eye)	0.25	0.03	0.20	0.33	0.24
	Average duration of Fixation (sec.) (Left eye)	0.25	0.03	0.19	0.31	0.24
	Reading rate	224.50	49.37	170	350	280
	Directional attack	13.48	7.79	1	26	17%
Reading comprehension and reading strategies						
TOEFL Section III (raw score converted percentage)	Vocabulary and Reading Comprehension	27	5.23	22	54	–
Reading Performance test	Reading comprehension	5	0.72	2	8	5=Average, 7=Above average 8=Good
Reading Strategies Questionnaire	Reading strategies: Before reading	2.77	0.49	1.80	4.17	High, Usually used 3.5-4.4
	Reading strategies: During reading	3.78	0.46	2.36	4.27	High, Usually used 3.5-4.4
	Reading strategies: After reading	2.59	0.60	1.24	3.78	High, Usually used 3.5-4.4

The ramifications of limited vocabulary knowledge, as revealed by these students, include difficulties with reading fluency and comprehending content area text. It is, therefore, important that instructional intervention be considered in order to help inefficient readers develop and apply vocabulary knowledge across a variety of contexts and to increase their repertoire of strategies for figuring out new vocabulary independently.

The fluency assessments indicated that the students performed below the norm required for first-year level on the following aspects: number of fixations, the average span of recognition of words, the average duration of fixations, reading rate and comprehension questions answered correctly (*cf.* Table 1). The results, therefore, indicated that the visual/functional proficiency of these students (i.e. their binocular coordination and vergence) is not what it should be for first-year students (*cf.* Table 1); there is a difference in the mean scores of the left eye and right eye in terms of the number of fixations and regressions. This indicates a lack of "teamwork" between the eyes and can affect the ease and comfort in reading. In addition, the results seem to indicate that the perceptual accuracy and word recognition automaticity of these students, as evidenced by the number of fixations per minute, and the average span and duration of recognition, is not what is expected for first-year students. In essence, if word recognition is overly time consuming there is little time and attention left to devote to the meaning of what is being read. Slowness in recognising words will, therefore, tend to increase the length of a student's duration of fixation.

The students' reading comprehension ability was also of concern. They obtained a mean raw score of 27 out of a potential maximum score of 60 on the Vocabulary and Reading Comprehension section of the TOEFL test, and their average stanine score on the Reading Perfor-

mance Test was 5, indicating that their reading comprehension ability was "average" (*cf.* Table 1). This is roughly equal to a Grade 9 level (*cf.* Roux, 1996:20). Pearson product-moment correlations were calculated to determine the direction and strength of the relationship between the students' reading comprehension ability, as measured by the Reading Performance Test, and their performance in their academic major, as measured by their first semester examination scores. A correlation of $r = 0.81$ ($p < 0.05$) was found between the reading comprehension scores of the students majoring in Communication Studies (N=42) and their performance in the Communication examination. A correlation of $r = 0.84$ ($p < 0.05$) was found between the reading comprehension scores of the students majoring in Psychology (N=20) and their performance in the Psychology examination. Both these correlations are also practically significant $r = 0.5$) (*cf.* Cohen, 1977:77-81).

With regard to the frequency of their reading strategy use, the results indicated that the students only "sometimes used" before and after reading strategies. Their use of the during reading strategies group fell into the "usually used" category (*cf.* Table 1). On the whole, it seems as if this group of students has a very limited repertoire of reading strategies. An analysis of each strategy group indicated that with regard to the before reading, the students seldom activate prior knowledge, generate questions to guide their reading or identify a purpose for reading. During reading, the students' main focus seems to be on identifying the main idea, underlining, making notes and paraphrasing. After reading, the students mainly focus on summarising and reviewing the text. The strategy results, therefore, seem to indicate that the students have a relatively poor knowledge base of reading strategies and lack metacognitive control.

Comparing two reading assessment profiles in terms of strengths and weaknesses

An analysis of the efficient student's reading assessment profile indicated that her profile is far flatter than that of the inefficient student; the efficient student has far fewer ups and downs in her profile than the inefficient student (i.e. the majority of the efficient student's mean reading assessment scores are scattered around or above the norm/ guidelines for first-year students) (*cf*. Table 2, Appendix A, and Appendix B).

Table 2 A comparison of an efficient and an inefficient reading assessment profile

Instrumentation	Variable	Score/Average Efficient student	Score/Average Inefficient student
ELSA Plus	Vocabulary	24	16
Communication test Vocabulary test	Communication content-specific vocabulary	26	–
Psychology Vocabulary test	Psychology content-specific vocabulary	–	7
TOEFL Section III (raw score converted to percentage)	Vocabulary and Reading comprehension	75%	40%
Reading Performance test	Reading Comprehension	9	4
Reading Strategies Questionnaire	Reading strategies: Before reading	3.52	2.38
	Reading strategies: During reading	4.45	4.24
	Reading strategies: After reading	3.60	1.45

The vocabulary assessments indicated that the efficient student had a score of 24 on the ELSA Plus test which is above the norm set for the first-year students at Potchefstroom University. The inefficient student obtained a score of 16 on the ELSA Plus test indicating that her score was on par with the norm. The efficient student got a score of 26 out of a potential maximum of 30 for her Communication vocabulary test, whereas the inefficient student obtained a score of 7 out of a potential maximum of 30 on her Psychology vocabulary test. It is not really possible to compare the two content-specific vocabulary test scores because we are of the opinion that the vocabulary used in the Communication Studies course is far more common (e.g. television, newspaper, radio and magazine exposure) than that in the Psychology course. An analysis of the data recorded during the interviews indicated that the efficient student read far more frequently (daily) than the inefficient student (only when told to do so by the lecturer). The efficient student also read and/or skimmed/scanned a greater variety of texts (e.g., textbooks, articles, documents, websites, etc.). The possibility of the efficient student being exposed to new and more vocabulary words within a variety of contexts seems to be greater than that of the inefficient student. Although the relationship between vocabulary knowledge and comprehension is extremely complex (*cf*. Vocabulary section), there is little question that one component of proficient comprehension is the ability to cope with any unfamiliar words encountered during reading (*cf*. Caverly & Orlando, 1991).

A comparison of the fluency assessment profiles indicated that the efficient student was reading at a Grade 13.2 level (first-year level), whereas the inefficient student was reading at a Grade 6.9 level (*cf*. Appendix A and Appendix B). The reading level of the student is determined by the Visagraph system by taking the following aspects into consideration: fixations, regressions and reading rate with comprehension (words/min). The fluency profile of the efficient student indicated the following strengths: fixations, regressions, average span of recognition and directional attack. The efficient student revealed weaknesses in the following areas: average duration of fixation (12% deviation from the grade norm) and his/her reading rate with comprehension (–7% deviation from the grade norm). The fluency profile of the inefficient student indicated weaknesses in the following areas: fixations (29% deviation from the grade norm), regressions (73% deviation from the grade norm), average span of recognition (–22% deviation from the grade norm), average duration of fixation (8% deviation from the grade norm), reading rate with comprehension (–29% deviation from the grade norm) and directional attack difficulty (7% deviation from the grade norm). The proficient student made relatively few fixation pauses and few regressions per line of print. This contrasted with the inefficient student who showed a relatively high frequency of fixations and regressions. The visual/functional proficiency as well as the perceptual accuracy of the inefficient student is below the norm required for first-year students. An analysis of the data recorded during the interviews indicated that the inefficient student had far greater difficulty getting through the required prescribed reading for her various modules than did the efficient student. This is particularly significant when one takes into consideration that the fluency assessment was done on a text of 100 words. It is, therefore, very possible that the reading fluency of this student may become progressively worse when confronted with a more demanding reading load. The results indicated that eye movement analysis can make a very significant contribution toward identifying students' basic fluency strengths and weaknesses. By making use of eye movement analysis it is possible to identify those students whose reading skills are not adequate to meet the reading demands required at first-year level. By using the Visagraph to analyse students' eye movements it is possible to prescribe and evaluate corrective instruction in the form of visual discrimination and reading fluency training. Knowledge about eye movement is important because this movement can reflect both cognitive processing and level of reading skill.

With regard to their reading comprehension assessment measure, the results indicated that the efficient student was reading at a Grade 12 level on the Reading Performance test, whereas the inefficient student was reading at a low average level (approximately Grade 7–8) (*cf*. Table 2). This finding seems to correlate with their reading rate with comprehension as measured by the Visagraph (*cf*. Appendix A and Appendix B). It is clear that the more efficient student, also the more fluent reader, read with greater comprehension than the inefficient student.

An analysis of the students' frequency of reading strategy use indicated that there was a difference in terms of the processes that occurred before reading, during reading, and after reading (*cf*. Table 2). The efficient student was active during all three phases of reading. The strategy use of the inefficient student, on the other hand, indicated that she lacked sufficient and effective strategically orchestrated use of the necessary higher order processes (i.e., metacognitive strategies), which would enable her to assess the different reading tasks and bring to bear the necessary strategies for their completion. The results of the interviews indicated that the inefficient student typically failed to evaluate her understanding and apply strategies for adjusting her comprehension to different texts and purposes (e.g. I guess I know I didn't understand when I get my test results back, and I failed). The inefficient student seemed to "stall" at the during reading stage, while the efficient student continued to process after reading by re-skimming to pinpoint important ideas and reflecting on the meaning of the passage or text. Therefore, although the inefficient student has metacognitive knowledge about reading strategies, it seems to be much less elaborated than that of the efficient student. It is also possible that the systematic use of reading strategies, particularly metacognitive strategies, may be modulated not only by cognitive variables but also by affective and motivational variables (e.g. I always stress when I have to prepare for a test in this module; I don't really know how to read/ study for this module; I just need to pass this module).

Conclusion and recommendations

Identification of the reading components that can have a potentially debilitating effect on academic performance is important at this point in the history of South African higher education. With the expanding of South African universities over the last few years to provide equal access for all, comes an increasing diversity of students' needs, skills and abilities. To fully embrace this equity initiative, universities must cater for this diverse student population and implement strategies and interventions based on sound research, to give all students a fair chance for academic success.

The results of this study, although conducted on relatively few students and based on the case study, indicated that students with different experiences and varying levels of education bring with them different needs and academic potential, specifically reading ability. The challenge for Potchefstroom University, specifically, and for most South African universities, in general, is to recognise this diversity of reading needs and cater for this changing and heterogeneous population of students. The results also indicated a need for student reading support interventions. Specialised reading enhancement programmes need to be introduced and evaluated to provide students with the reading skills required to cope with first-year reading demands. Interventions could be aimed at highlighting the importance of the reading process for promoting academic achievement as an important part of integration into the university.

Based on a review of the literature and the results presented in this study, the following recommendations are made in order to support both efficient and inefficient first-year students with regard to the reading process:

Lecturers at university, and specifically those responsible for teaching courses such as English for Academic/Professional Purposes, need to have knowledge of students' strengths and needs in reading in order to ensure the most effective instruction possible. Reading assessment profiles result in a comprehensive view of learner strengths and needs across all aspects of the reading process and should be used to design a programme of instruction that addresses all aspects of the reading process during instruction. This will ensure a balanced approach to instruction in which no one aspect of the reading process is over- or under-emphasised.

Lecturers should adopt a learning and learner-centered approach to teaching and learning. University students are, or should be, active participants in control of their learning; they are self-regulated, autonomous, and good strategy users. Common to all these labels is the operational definition of effective independent learners as those who plan, implement, and control the learning strategies that enhance learning. However, research indicates that most university students are not efficient and effective independent learners (Dreyer & Bangeni, 2002), the most logical outcome for English for Academic/Professional Purposes courses would be to teach students a repertoire of reading strategies and tactics that will prepare them for the tasks and texts they encounter at university.

Research indicates that students have problems with transferring specific strategies to the particular academic literacy demands of each course. It is, therefore, recommended that a content-based approach be considered for English for Academic/Professional Purposes courses. The work of Kasper (1997; 2000) has reported both improved language and content performance among students exposed to content-based EAP programmes, higher scores on measures of reading proficiency, and higher pass rates on ESL courses. She also provides quantitative evidence that such students establish and retain a performance advantage over students exposed to non-content based EAP training. It is, therefore, the task of the lecturers to train students to be able to select, modify, monitor, evaluate and transfer a variety of strategies to their own learning tasks. To be effective independent learners, students need to be able to control and regulate the strategies they employ. Such control is a critical aspect of metacognition that involves learners in planning, monitoring, and evaluating a plan of action across a variety of tasks and texts (Kluwe, 1987).

Electronic literacy now also counts among the basic skills necessary for success at university and within the workforce (*cf.* Warschauer, 1999). Finding ways to use technology to support course/module outcomes has, therefore, become increasingly important. According to Kasper (2000:109), content-based instruction "is inherently task-based, student-centred, and project-oriented and so offers a natural context for the integration of technology into instruction." It is recommended that the integration of technology into English for Academic/Professional Purposes courses be considered, specifically where reading is concerned. According to Taylor (2000), reading technology is the only direct and efficient means of developing fluency in silent reading.

Many first-year students underwent a secondary school experience that left them under prepared for the academic literacy demands of university learning. These students are often alliterate and suffer wide gaps in their prior knowledge, they are not generally prepared to read regularly, widely, or critically. It is possible that these students not only have problems with the ability to implement strategic reading or to draw upon metacognitive awareness, but that they also have deficiencies in conceptual background knowledge and reading vocabulary. It is also recommended that lecturers must provide experiences that immerse students in a) the "language of the academy", b) the advanced general vocabulary used by scholars as they communicate; and c) the specialised "languages of the disciplines" or those unique technical terms, symbols, etc. that permit scholars within a field to communicate effectively. The focus of reading intervention programmes should be on multiple components instructions (all components of the reading process) that can lead to increased reading comprehension achievement and a strategic reading approach relevant to all academic courses.

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Appendix A

Reading Profile Visagraph version 4.2

Grade/Goal	Left	Right	Grade Norms
Fixations/100 words	83	83	90
Regressions/100 words	5	4	15
Av. Span of Recognition (words)	1.20	1.20	1.11
Av. Duration of Fixation (sec)	0.27	0.27	0.24
Rate with Comprehension (words/min)	260	280	
Grade Level Efficiency	13.2		
Level of Text Read	7		

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Directional Attack Difficulty	6%	Countable lines in text	10
Rate adj. for Rereading (words/min)	312	Lines found	10
Comprehension Questions Correct	80%	Saccades in Return Sweeps	13
Cross Correlation	0.939	Anomalies (Fix/Regr/Both)	2/0/2

Subject information

Name :   Grade: 13   Filename : THC-80-0.REC

Class :   13   Born : 12/15/1983   Sex :   F   Recorded : 04/24/2003 08:54

School :   W n B   Directory : C:\WINVISA\rec

Examiner :

Text information

Filename :   C:\WINVISA\TEXTS\amer_eng\t--7--80.txt

Title :   John Holland 7-80

Answers :   Y Y Y N Y Y Y Y Y N   No of questions :   10

Norms used : TAYLOR.NOR   Correct answers :   8

Countable part statistics

No of lines :   10

No of words :   100

Av. word length :   4.7

Recording information

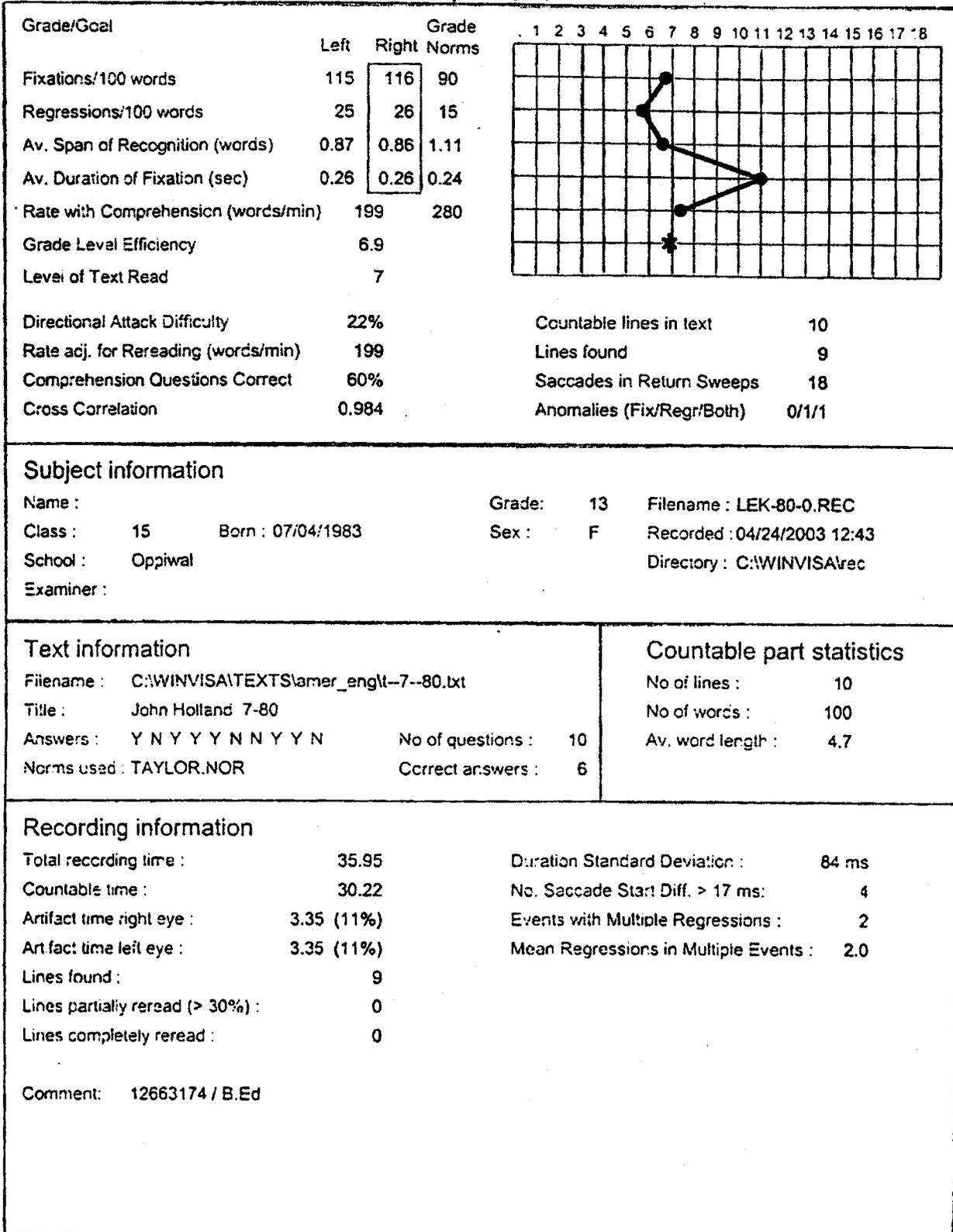|			
Total recording time :	28.15	Duration Standard Deviation :	84 ms
Countable time :	23.03	No. Saccade Start Diff. > 17 ms:	4
Artifact time right eye :	0.00 (0%)	Events with Multiple Regressions :	0
Artifact time left eye :	0.00 (0%)	Mean Regressions in Multiple Events :	
Lines found :	10		
Lines partially reread (> 30%) :	2		
Lines completely reread :	0		

Comment: 12450545 / B.Ed

Figure A1 An efficient student's fluency assessment profile

Appendix B

Reading Profile Visagraph version 4.2

Grade/Goal	Left	Right	Grade Norms
Fixations/100 words	115	116	90
Regressions/100 words	25	26	15
Av. Span of Recognition (words)	0.87	0.86	1.11
Av. Duration of Fixation (sec)	0.26	0.26	0.24
Rate with Comprehension (words/min)	199		280
Grade Level Efficiency	6.9		
Level of Text Read	7		

Directional Attack Difficulty	22%	Countable lines in text	10
Rate adj. for Rereading (words/min)	199	Lines found	9
Comprehension Questions Correct	60%	Saccades in Return Sweeps	18
Cross Correlation	0.984	Anomalies (Fix/Regr/Both)	0/1/1

Subject information

Name :		Grade: 13	Filename : LEK-80-0.REC
Class : 15	Born : 07/04/1983	Sex : F	Recorded : 04/24/2003 12:43
School : Oppiwal			Directory : C:\WINVISA\rec
Examiner :			

Text information

Filename :	C:\WINVISA\TEXTS\amer_eng\t--7--80.txt
Title :	John Holland 7-80
Answers :	Y N Y Y Y N N Y Y N No of questions : 10
Norms used : TAYLOR.NOR	Correct answers : 6

Countable part statistics

No of lines :	10
No of words :	100
Av. word length :	4.7

Recording information

Total recording time :	35.95	Duration Standard Deviation :	84 ms
Countable time :	30.22	No. Saccade Start Diff. > 17 ms:	4
Artifact time right eye :	3.35 (11%)	Events with Multiple Regressions :	2
Artfact time left eye :	3.35 (11%)	Mean Regressions in Multiple Events :	2.0
Lines found :	9		
Lines partially reread (> 30%) :	0		
Lines completely reread :	0		

Comment: 12663174 / B.Ed