

Assessing the Difficulty Index of Course Materials in National Open University of Nigeria

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ABSTRACT

To have a sustainable learning outcome in open and distance learning there must be availability of quality course materials for the students, which is one of the criteria considered in setting up a new programme; it is also used by the public in determining the quality of education the students are expected to receive. National Open University of Nigeria (NOUN) is not an exception in this regard. Therefore, the researcher is interested in assessing the difficulty index of NOUN course materials; which is a criterion for determining quality. The assessment of course materials is not a new phenomenon, educational researchers and practitioners have over the time recognised this. To find out the level of text difficulty of NOUN course materials, three research questions were raised – Are required course materials available? Do the available course materials meet the standard specified for ODL? What should be the criteria in reviewing course materials published in 2004? To answer these questions the survey method was used to generate responses. All registered students in Lagos Study Centre formed the population, Through judgment/purposive sampling method 100 students were selected for the sample; while systematic sampling technique was used in selecting 10% out of the total number of printed course materials that were available as at the time of research. Following this, the Gunnings's Fog Index, Flesch Reading Ease, Cloze text and Rowntree's Complexity Quotient were used to assess the difficulty index of selected course materials; while questionnaires were designed to elicit data from the learners to get their perception on the content, format and language of the course materials including any other opinion they may share. The results showed a shortfall of course materials, fairly adequate age matching of text, a need for course material review, and fairly adequate difficulty level of text.

INTRODUCTION

Course materials are vital tool which determine the progress of academic sessions in Open and Distance Learning (ODL). The need for availability and quality course materials cannot be overemphasized especially for new institutions like The National Open University of Nigeria (NOUN) where the populace wants to know the quality of knowledge that would be received by the learners; which is a determinant of the quality of products. It therefore means that to attain a sustainable learning outcome in Open and Distance Learning, quality course materials must be available.

Presently, NOUN is faced with the challenge of course materials production, more so that the course materials need to be reviewed in every five years. One major challenge faced during course material production is 'Editing', which includes content, language and format, where the shafts are sieved from the wheat; because it is during the editing stage you determine the quality. It therefore means that the editors need to know the areas of concentration that would be used to determine quality. To find solution to the challenge the following research questions were raised – Are the required course materials available? Do the available course materials meet the standard specified for ODL? What should be the criteria in reviewing course materials published in 2004? To answer these questions, the researcher assessed the difficulty index of available course materials.

LITERATURE REVIEW

Text difficulty is determined by looking at the ease the learner would have in comprehending a text and the interest the learner would derive. To be able to match students with appropriate texts, you need to assess the difficulty of the texts you consider using, as well as the likelihood that the students will be motivated to read them (Hiebert, 2005). Hiebert identified the following as factors influencing text difficulty: vocabulary, sentence structure, length, elaboration, coherence and unity, text structure, familiarity of content and background knowledge required, audience appropriateness, quality and verve of the writing, interestingness.

Vocabulary – is one of the major identifiable characteristics suggesting text difficulty. It should be noted that a mere replacement of difficult words with simple one does not make the difficulty level simple. Sometimes this type of replacement may lead to confusion because there are words that cannot be replaced if the meaning has to be retained (Anderson and Freebody, 1981). It should however be noted that a few difficult words may cause serious barrier to comprehension as shown by Freebody and Anderson (1983) that it takes a substantial proportion of difficult words to affect students' comprehension.

Sentence Structure – is one of the text characteristics that is easy to assess, very long and very complex sentences make text very difficult to read. But, sentence structure strength on text difficulty is not as strong as that of vocabulary (Coleman, 1971). Also, it is recommended that the sentence in a text need to be complex enough to clearly convey the meaning of the text (Pearson, 1974 – 1975).

Length – for learner who cannot read fluently, length could form a formidable obstacle. It is also applicable to those learners who have a short reading span.

Elaboration – “Texts can be written so that they present concepts without much explanation, or so that they present concepts along with a good deal of explanatory material – examples, analogies, and linkages of various sorts” (Hiebert and Fisher, 2005).

Coherence and Unity – Anderson and Armbruster, 1984; Beck and Mckeown, 1989, see coherence as the integration of material to how each topic and subtopic is defined and the relationship that exists between the parts. Unity is the oneness of purpose. Good texts are directed to a particular topic, objectives, concepts and particular points.

Text Structure – is the organisation of text. Drum, 1984 identifies narratives or expository as the two categories student text normally fall into.

Quality and Verve of the Writing – it is also important to consider the quality of the writing, the flair of the writing, the particular blend of topic, organisation and style that make one piece of writing intriguing and memorable and another mundane (Hiebert and Fisher, 2005).

Interestingness – is the most subjective factor, because the factor used in determining interest is dependent on the reader. What may serve as interest to one may not serve as an interest to another. In writing, the main theme must not suffer even while sustaining interest.

In addition to these factors, the aims, goals and objectives of each programme or course would be other elements to consider when matching texts and students.

METHODOLOGY

The descriptive method of research was used. Descriptive research involves “collection of data in order to test hypotheses or to answer questions concerning the current status of the subject of the study.” (Gay, 1992). The survey method was used in the collection of data. “A survey is an attempt to collect data from members of a population in order to determine the current status of that population with respect to one or more variables” (Gay, 1992).

All registered NOUN students and all available printed course materials formed the population of the study. For the purpose of this research, the students’ population was restricted to Lagos Study Centre because of the difficulty of getting all registered students in NOUN, but from statistics, Lagos Study Centre has the highest number of registered students among other Study Centres, which formed a good representation of the entire students.

Judgment/purposive sampling method was used in selecting the respondents while systematic sampling technique was used in the selection of the number of course materials used for the research.

Using the judgmental sampling method, 100 students comprising 40 postgraduate and 60 undergraduate students were sampled. 10% of the printed course materials were used (Table I).

Table 1: Available Printed Course Materials as at April 30th, 2008

S/N	School	Available Printed Materials	No of Printed Materials Used
1	School of Arts & Social Sciences (SASS)	116	11
2	School of Business & Human Resources Management (SBHRM)	47	5
3	School of Education (SED)	67	7
4	School of Law (LAW)	16	2
5	School of Science & Technology (SST)	72	7
Total		318	32

A questionnaire was designed to elicit information from the respondents. The questionnaire had three main sections – content, format and language. The items were drawn to get the learners (users) feeling about the three main areas which determine the quality of course materials. In addition to the main sections, a section was set aside for free comments. The items designed required ‘yes’ or ‘No’ answer. The validity and reliability of the instrument were tested using content and construct validity; and split-half reliability after which a pre-test of the questionnaire was carried out before it was finally administered to the selected respondents. 100 questionnaires were personally distributed by the researcher and only 80 were successfully filled and returned; which reflected 80% response.

The researcher also used Gunnings’s Fog Index, Flesch Reading Ease, Cloze text and Rowntree’s Complexity Quotient to assess the course materials as recommended by Staff Training and Research Institute of Distance Education (STRIDE) in 1993. STRIDE is an autonomous institution under the control of the Board of Management of Indira Gandhi National Open University (IGNOU). Gunnings’s Fog Index or Modified Gunning Fog Index was used in

measuring the level of reading difficulty of the course materials. Though it has received criticism, it is still a good instrument in knowing the tone and style of writing a particular text. The modified Fog Index helps in measuring the 'reading age' of a particular text. It is also important to know that the use of technical terms or jargon can increase Fog Index scores. The Modified Fog Index can be calculated as:

1. Count exactly 100 words from a paragraph of your text.
2. Underline those words that have 3 or more syllables (a, e, i, o, u).
3. Count the underlined words (A)
4. Count the number of sentences.
5. Workout the average words per sentence. Round up to the nearest (B).
6. Add A and B (C).
7. Multiply C by 4.
8. Divide D by 10 (E)
9. Add 5 to E and you will get fog Index

http://www.wikieducator.org/session_10

Before the modification of Fog Index, it was said that: The Fog Index does not determine if the writing is too basic or too advanced for a particular audience rather; it helps to decide whether a document could benefit from editing or using plain language techniques. (Klariti, 2000)

Flesch Reading Ease is another formula for calculating reading age and the formula is:

$$RE = 206.535 - 0.846w - 1.015s$$

Where:

- w = average number of syllabus per 100 words;
- s = average number of words per sentence.

The higher the RE, the easier the text. Harley (1994) in Wikieducator (2008).

Microsoft Word could also be used in calculating the Flesch Reading Ease. This can be assessed through 'Spelling and Grammar' from 'Tools' on the menu bar.

Cloze Test is also used for testing readability. "In the cloze test, every 5th or 7th word of a sample text is omitted, and the text is given to the target group to read by filling the missing words. Readability is calculated on the basis of predicting the correct words, and a 60% score is considered satisfactory for comprehension, while 40 – 60% indicates partial comprehension, and less than 40% indicates inadequate comprehension." (Wikieducator, 2008).

Rowntree's (1996) Complexity Quotient is another way of testing the readability of a text. The writer further suggests the calculation of complexity quotient viz:

1. Count the number of complete sentences you have on a page (A).
2. Count the number of "long" words (three or more syllables) (B).
3. Divide B by A to get complexity quotient.

The prose is regarded as difficult ones when the score exceeds 3 as compared to most novelists.

PRESENTATION OF DATA

Table 2: Percentage of Learners' Response on the Quality of Course Materials Content

S/N	Details	% YES	% NO	% NR
1	Is the introduction of modules adequate?	91	9	0
2	Does the Introduction of a unit/module relate the present unit/module to the previous unit/module and the next, to ascertain continuity?	94	3	3
3	Does the Introduction reflect the reason for studying the content in that unit/module?	91	6	3
4	Does the Introduction serve as a good motivator for the learners?	94	6	0
5	Are there clearly stated behavioural objectives in the course materials?	85	15	0
6	Do the objectives cover the entire unit content?	70	27	3
7	Would the objectives help you assess your own learning?	97	3	0
8	Do the objectives set achievable task before you?	91	6	3
9	Is the study material planed to meet the theme of the unit?	85	15	0
10	Is the content logically sequenced?	85	12	3
11	Is the level of content appropriate for your level?	94	6	0
12	Is the content lucid and learner friendly?	82	12	6
13	Are explanations in the course materials adequate?	67	33	0
14	Is the content designed to sustain your interest by using example, illustrations, humour, anecdotes etc?	67	21	12
15	Are there adequate self-practice activities for you?	91	6	3
16	Are ideas and arguments sequential?	70	21	9
17	Are relevant information supplied in the content?	73	21	6
18	Is the given information up-to-date and accurate?	64	36	0
19	Are the conclusions in the course materials adequate?	64	30	6
20	Does the summary review the main points for your recapitulation and reinforcement?	85	12	3
21	Does the summary contain statements of major concepts?	91	6	3
22	Are the T.M.A's well structured to cover what has been learnt in a unit?	88	6	6
23	Did you notice any plagiarism in the text	24	55	21
Total		1843	367	90
Average Percentage		81	16	3

Note: NR means No Response

Table 3: Percentage of Learners' Response on The Quality of Course Materials Format

S/N	Details	% YES	% NO	% NR
1	Does the arrangement of the content make your reading easy?	85	15	0
2	Are you comfortable with the font size?	82	15	3
3	Are you comfortable with the font type?	88	9	3
4	Are you comfortable with the appearance of the text?	88	6	6
5	Does the spacing enhance your reading ability?	91	3	6
6	Does the Course Material meet the house style format?	94	0	6
7	Is the title page well presented?	88	6	6
8	Is the Table of Content well presented?	82	12	6
Total		698	66	36
Average Percentage		87	8	5

Table 4: Percentage of Learners' Response on The Quality of Language used in the Course Materials

S/N	Details	% YES	% NO	% NR
1	Is the language learner friendly?	94	6	0
2	Is the style of writing personalized?	48	48	4
3	Is the text written in simple and short sentences?	76	18	6
4	Is the communication effective and readable?	88	12	0
5	Is the paragraphing adequate?	97	3	0
6	Are the sentences free of grammatical errors?	36	64	0
7	Are all words spelt correctly?	39	58	3
8	Are all the spellings in UK English format?	55	33	12
9	Are active voice used correctly?	55	24	21
10	Is the usage of idioms adequate?	61	21	18
11	Is the text in conversational format?	67	18	15
12	Is the language in the course material gender sensitive?	30	58	12
13	Does the writing style makes the learner feel he/she is being talked to? By using the words "You", "I", "We"	79	12	9
14	Did the level of the language match the level of the content?	73	12	15
15	Are the vocabulary and technical terms used adequate?	85	6	9
16	Is the language used simple and clear?	76	15	9
17	Did the language used meet with the linguistic ability of the learners?	76	15	9
18	Is the complexity quotient adequate?	61	24	15
19	Is the fog index adequate?	52	24	24
20	Is the cloze test adequate?	49	24	27
21	Are there inconsistent spellings?	52	36	12
22	Are the quotations used very essential to the theme?	79	6	15
23	Are there superfluous words or phrases?	36	46	18
24	Are there clichés and worn out phrases?	36	40	24
25	Are the tenses inconsistent?	39	39	22
26	Are the punctuations adequate?	55	27	18
27	Are there verbal expressions?	58	21	21
28	Is the use of nominal expression avoided?	61	21	18
29	Is the use of non English words in an English text expressed in bold format?	43	36	21
Total		1756	767	377
Average Percentage		61	26	13

Comments On Availability of Course Materials by Respondents

From the section of the questionnaire where respondents were given opportunity to comment as desired, 90% of the total number of respondents expressed dissatisfaction with the non availability of most of their course materials.

Table 5: Presentation of Difficulty Index of the Selected Course Materials at the Undergraduate Level

S/N	Course Code	Modified Fog Index	Flesch Reading Ease	Complexity Quotient	Cloze Test
1	BIO 111	16	50.4	1	58%
2	BIO 191	16	54.3	0.5	55%
3	BIO 222	16	38.1	2.2	60%
4	CSS 105	18	49.3	2.6	60%
5	CTH 011	16	46.9	2.0	65%
6	CTH 025	17	47.6	2.1	58%
7	CTH 031	20	53.2	2.5	57%
8	DFR 022	19	48.7	2.5	60%
9	EDU 202	17	44.5	2.2	56%
10	EDU 204	22	43.2	3.5	63%
11	HCM 112	20	57.1	1.7	61%
12	INR 101	17	29.0	2.3	55%
13	LAW 102	19	41.0	3.0	66%
14	NSS 217	18	50.5	2.0	58%
15	NSS 301	19	47.4	1.5	57%
16	PHY 204	16	39.7	2.2	50%
Total		286	740.9	33.8	939%
Average		18	46.3	2.1	59%

Table 6: Presentation of Difficulty Index of the Selected Course Materials at the Post Graduate Level

S/N	Course Code	Modified Fog Index	Flesch Reading Ease	Complexity Quotient	Cloze Test
1	BHM 667	23	26.5	3.7	60%
2	CTH 603	22	40.5	2.5	54%
3	EDA 710	21	33.3	3.0	62%
4	EDU 634	20	40.2	3	62%
5	EDU 702	16	34.7	1.7	61%
6	HEM 603	16	47.6	1.5	62%
7	JLS 602	19	47.8	2.0	61%
8	JLS 608	20	37.6	1.8	53%
9	LED 605	20	39.0	2.5	60%
10	MBA 701	20	34.5	2.5	66%
11	MED 708	22	39.2	3.3	60%
12	MPA 704	19	30.9	2.5	60%
13	MPA 706	23	38.4	2.0	65%
14	PCR 601	27	48.6	2.6	56%
15	PCR 702	18	50.6	2	61%
16	SED 713	21	41.9	3.8	58%
Total		327	631.3	40.4	961%
Average		20	39	2.5	60%

DISCUSSION

Research Question 1:

Are the required course materials available?

From the data presented in Table 1, there were only 318 printed course materials in NOUN as at April 30th, 2008. Considering the total number of courses offered in the various schools; the total number of course materials required would be about 1000. This, therefore means that there is a short fall in the production of course materials, which implied that students might have problem completing their programmes as at when due. This was further confirmed by the respondents' free comments in the questionnaire.

It was discovered that the management of the university was also disturbed about the non availability of course materials; which was expressed by the vice chancellor at the Senate, for which the management is presently doing every thing possible to salvage the situation.

Research Question 2:

Do the available course materials meet the standard specified for ODL?

In testing the standard specified for ODL, the researcher calculated the index difficulty of the course materials using Fog Index, Flesch Reading Ease, Cloze Test and Rowntree's Complexity Quotient. The Fog Index and the Flesch Reading Ease help to calculate the reading age, which will help determine the matching of the course materials with the age of learners. From the results presented in Tables 5 and 6 above, the average reading age for the course materials prepared for the undergraduate level is 18 and that of the post graduate 20 years. Considering the recommended minimum school age for university education in Nigeria, which is 16 and the practical age at which students turn out of university education these days, it could be said that the course materials fairly suit the students age. Fairly, because using the government regulations, the minimum age for post graduate would have been 21, age attained after the National Youth Service Corps (NYSC). That is to say that the level of difficulty in the course is what they could cope with. Considering the suggested table presented by Flesch Formula Readability Ease Score which states thus:

Table 7

RE Value	Description of Style	Required Reading Skill
90 – 100	Very Easy	5 th Grade
80 – 90	Easy	6 th Grade
70 – 80	Fairly Easy	7 th Grade
60 – 70	Standard	6 th – 9 th Grade
50 – 60	Fairly Difficult	10 th – 12 th Grade
30 – 50	Difficult	13 th – 16 th Grade
0 – 30	Very Difficult	College Graduation

and its equivalent in Nigeria as shown below:

Table 8

RE Value	Description of Style	Required Reading Skill	
			Nigerian Equivalent
90 – 100	Very Easy	5 th Grade	Primary 5
80 – 90	Easy	6 th Grade	Primary 6
70 – 80	Fairly Easy	7 th Grade	JSS 1
60 – 70	Standard	8 th – 9 th Grade	JSS 2 & 3
50 – 60	Fairly Difficult	10 th – 12 th Grade	SSS 1 – 3
30 – 50	Difficult	13 th – 16 th Grade	Under Graduate Levels
0 – 30	Very Difficult	College Graduation	Post Graduate Levels

A fair judgment could be made on the Flesch Reading Ease of the course materials. From Tables 5 and 6, the average Flesch Reading Ease record 46.6 for undergraduate and 39 for the post graduate. Using Tables 7 and 8, it could be said that the course materials prepared for undergraduate students have their correct level of difficulty. But that of the post graduate levels need an upgrade in the level of difficulty to adequately suit the level it is meant for. This is very important at the time of review. A close look at Tables 5 and 6 revealed the need to stabilise difficulty levels for which course materials are written e.g. INR 101, a 100 level course, shows a Flesch Reading Ease of 29.0 which is an indication that this course material is very difficult for this level, again the difficulty may have been as a result of some or all the factors influencing text difficulty – vocabulary, sentence structure, length, elaboration, coherence and unity, text structure, familiarity of content and background knowledge required, audience appropriateness, quality and verve of the writing, interestingness as stated by Hiebert (2005). Also PCR 702 records a Flesch Reading Ease of 50.6 and a Modified Fog Index of 18. From the formula, 50.6 is below the level of a post graduate programme but comparing the Flesch Reading Ease of 50.6 and the Modified Fog Index that showed the reading age at 18, which is the age that mostly falls under the undergraduate level, it could be said that the course material matches the age and not the level. There is a need to watch out for the appropriateness of the level of difficulty in course material production, because inappropriateness of difficulty level may bring discouragement to students in the programme.

Using Rowntree's Complexity Quotient, any text with a score that exceeds 3 is regarded as a difficult text. From the analysis given above, the undergraduate course materials record complexity quotient average of 2.1 and post graduate 2.5. This implies that the texts are not difficult for the levels they are meant for, but rather considered fairly adequate.

The Cloze Test rule says that when the cloze test of a text is 60% it means the text is satisfactory for comprehension, when it is 40% - 60% it would be considered partial for comprehension and less than 40% is taken as inadequate comprehension. With this rule in place, it could be said that the cloze test for the undergraduate text which has an average of 59% and the postgraduate average of 60% are partial for comprehension. This reflects the need for improvement on the content and language of the course materials, though some of the course materials are satisfactory for comprehension.

Research Question 3:

What should be the criteria in reviewing course materials published in 2004?

From the results gathered in the field, the focus in the review of course materials published in 2004 should be on:

- adequate upgrade of course materials level of difficulty,
- adequate review of content and language of every course material,

FINDINGS

The following were the findings from the research:

1. Students expressed great dissatisfaction with the non availability of course materials. Also some of the postgraduate students did not stop with the non availability but extended it to the inadequacy in content in some of the course materials.
2. The course materials written in 2004 are due for review.
3. From the analysis of data in this research it was revealed that the editing part of the course material production need to be given more attention especially in getting the difficulty level index. In doing this, the content and the language of the text must be properly edited so as to get the right difficulty level.
4. That though NOUN course materials need some improvement to adequately meets with the specification of ODL course writing.

RECOMMENDATIONS

From the findings, the following recommendations are made:

1. In starting an Open and Distance Learning, the institution should ensure availability of all 1st and 2nd year course materials before taking off. This might not be through development but adaptation and better still adoption where possible. While the 1st and 2nd sessions are running the courses of other levels would be undergoing development. Through this process there would be a minimal shortage and stagnation of sessions.
2. The university should procure software for calculating Text Difficulty Index to be used in calculating the Difficulty Index of course materials in the university. The use of the software will enhance adequacy in the quality of course materials.
3. There should be a re-training for course materials reviewers.
4. Difficulty Index of the text should be considered at whatever method the course materials are produced – development, adaptation and adoption.

References

- Anderson, R. C., & Freebody, P. (1981). Vocabulary Knowledge. In Hiebert, E. H. & Fisher C. W. *The Effect of Text Difficulty on Second Graders' Fluency Development*.
- Anderson, T. H., & Armbruster, B. B. (1984). Content Area Textbooks. In R. C. Anderson, J. Osborn, & R. J. Tierney (Eds.), *Learning to Read in American Schools* (pp 193 – 226).
- Coleman, E. B. (1971). Determining a Technology of Written Instruction: Some Determiners of the Complexity of Prose. In E. Z. Rothkopf & P. E. Johnson (Eds), *Verbal Learning Research and The Technology of Written Instruction*. New York: Teachers College Press. An early look at factor affecting text difficulty.
- Drum, P. (1984). Children's Understanding of Passages. In J. Flood (Ed), *Promoting Newark, DE: International Reading Association*. A very lucid examination of what children understand from narrative & expository texts.

- Freebody, P., & Anderson, R. C. (1983). Effects on text comprehension of differing proportions and locations of difficult vocabulary – *Journal of Readings Behaviour*, 15, 19-39.
- Gay, L. R. (1992). *Educational Research: Competencies For Analysis & Application*. New York, Macmillan Publishing Coy. Pp 217 – 219).
- Hiebert, E. H. & Fisher C. W. (2005). The Effect of Text Difficulty on Second Graders' Fluency Development. <http://quikreads.org/publications/text-difficulty>. Retrieved 13th May, 2008.
- Klariti. <http://www.klariti.com/business-writing/fog-Index-Readability-fromulas.shtml>. Retrieved 11th April, 2008.
- Lively, B., & Pressey, S. (1923). A Method for Measuring the “Vocabulary Burden” of textbooks. *Educational Administration and Supervision*, 99, 389 – 398. In Hiebert, E. H. (in press). *Standards, Assessment and Text Difficulty*.
- Pearson, P. D. (1974 – 1975). The Effect of Grammatical Complexity on Children's Comprehension, recall, and Conception of Certain Semantic reactions. *Reading Research Quarterly*, 10, 155, 192.
- STRIDE Handbook (1993). *Editing in Distance Education*. Revised & Re-Designed by P. R. Ramanujam (2002), Indira Gandhi National Open University, Krishna Printers.
- Wiki Educator: http://www.wikieducator.org.session_10. Retrieved 11th April, 2008.