DOCUMENT RESUME

ED 382 920 CS 012 121

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TITLE The Development and Use of a Reading Strategy Inventory for ESL College Students.
PUB DATE 11 Nov 94
NOTE 25p.; Paper presented at the Annual Meeting of the Mid-South Educational Research Association (Nashville, TN, November 9-11, 1994).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS College Students; *English (Second Language); Factor Analysis; *Foreign Students; Higher Education; Reading Research; *Reading Strategies; *Test Construction; Test Validity; Test Wiseness
IDENTIFIERS Reading Uses

ABSTRACT

Reading is an essential way of attaining information, particularly for students studying in a university. Using reading strategies is extremely important for non-native readers of English because it serves as an effective way to overcome language deficiency and obtain better reading achievement. A study determined the psychometric properties of a reading strategy inventory for English-as-a-Second-Language learners, identified the common factors underlying the instrument, and investigated if ESL college students responded differently to the instrument. Subjects were 176 ESL graduate or undergraduate readers studying or staying in Tuscaloosa, Alabama who were from 36 countries in Europe, Africa, Asia, and South America. Based on a literature review and pilot testing, a 20-item instrument was developed. Results indicated that the reading strategy inventory was a reliable instrument to measure the use of reading strategies for ESL college readers. Construct validity was established by basing the items on previous reading strategy research. The common factor analysis yielded a three-factor solution for the instrument--organizing information in meaningful patterns; meaning construction; and holistic compensation approach. Statistical results indicated that the subjects' use of reading strategies as reflected in the composite scores was a function of such variables as nationality, major, and English proficiency. Further research should focus on further exploration into and the theoretical explanation for the effects of nationality, major, and English proficiency on the use of reading strategies. (Contains 20 references. Four appendixes of data and the survey instrument are attached.) (RS)

# The Development and Use of a Reading Strategy Inventory For ESL College Students

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Paper Presented at Mid-South Educational Research Association
in Nashville, Tennessee
November 11, 1994

# The Development and Use of a Reading Strategy Inventory For ESL College Students

## Introduction

Reading is an essential way of obtaining information, particularly for students studying in a university. Research discovered that readers spontaneously use reading strategies in reading (Pritchand, 1990). Literature also suggested that the use of reading strategies result in improved reading achievement (Oxford, 1990, Olson & Gee, 1991). Using reading strategies is extremely important for non-native readers of English because it serves as an effective way to overcome language deficiency and obtain better reading achievement both for regular school assignments and on language proficiency tests (Oxford, 1990, Zhang, 1992). To measure the extent to which non-native readers of English use reading strategies, a reading strategy inventory for ESL (English as a second language) readers was developed based on the variables identified through literature review. The purpose of the present study was to (a) determine the psychometric properties of the instrument, (b) identify common factors underlying the instrument, and (c) investigate if ESL college students respond differently to the instrument due to differences in nationality, major, and English proficiency.

## Literature Review

A review of the literature indicated that four major sets of reading strategies have been identified or recommended. They are cognitive strategies, compensation strategies, memory strategies,

and test-taking strategies.

Cognitive strategies

Reading comprehension is a cognitive process. Various cognitive strategies can be employed to facilitate reading comprehension. Examples of cognitive strategies include predicting the content of the upcoming text based on prior knowledge (Nolan, 1991), monitoring one's comprehension, analyzing text organization by looking for specific patterns (Numrich, 1989, Oxford, 1990), and self-questioning (Nolan, 1991).

Perhaps the most discussed cognitive strategy is using prior knowledge. Successful activation and utilization of relevant prior knowledge may enhance the interaction between the reader and the text (Anderson, 1977, Lipson, 1983, Langer, 1984, Zhang, 1989, Zhang, 1992). The more background knowledge a reader brings to a text, the easier it is to comprehend the text (Feeley, Wepner & Willging, 1985). Thus specific background knowledge is a reliable predictor of passage-specific comprehension (Langer, 1984). Prediction (Nolan, 1991) and meaning construction (Afflerbach, 1990) are two other important aspects of cognitive strategies.

Compensation strategies

The reader's comprehension of a text may be hindered either by limited vocabulary or by inadequate subject matter knowledge. This is where compensation strategies come into play. The reader can use context clues and word formation knowledge to guess the

meaning of unknown words (Sinatra & Dowd, 1992). To overcome the problems caused by limited knowledge, the reader can seek information from structural clues such as title, section headings, abstract, transitions and summaries (Oxford, 1990). These devices enable the reader to guess about the meaning of a paragraph, the position of the author, and the theme of an article. Accepting ambiguity is also considered a compensation strategy (Pritchard, 1990).

Memory strategies

The study of memory strategy is another focus in reading research. Examples of memory strategies include creating mental/visual images, grouping, story mapping, and organizing information in meaningful patterns.

Visual imagery of verbal information may enhance reading comprehension (Paivio, 1986). However, people differ in their ability to generate imagery based on verbal material (Paivio, 1986, Finke, 1989). This difference in imagery ability may account for individual differences in text interpretation and meaning construction (Cothern, Konopak & Willis, 1990).

Other important memory strategies are related to organizing information. Included in the list is organizing information in meaningful patterns such as cause/effect pattern, descriptive pattern, problem/solution pattern, etc. If the reader can identify the pattern in which the information is presented, he/she stands a better chance of comprehending the text.

Test-taking strategies

strategies more frequently than other people. Oxford and Burry-Stock (1994) concluded that the frequency of use of language strategies is related to motivation which is affected by one's career. Other patterns of strategy use emerged with regard to geographical location. Asian students were similar in that they were structured, analytic, memory-based whereas Puerto Rico students were laden with metacognitive, affective, and social strategies (Oxford & Burry-Stock, 1994). Obviously nationality is another factor that affects one's use of language strategies.

In short, four sets of reading strategies have been identified and recommended in the literature: cognitive strategies, compensation strategies, memory strategies, and test-taking strategies. It was based on these four sets of strategies that the items for the instrument were generated.

## Procedures of the Study

### Sample

The sample consisted of 176 ESL readers. At the time the data were collected (fall, 1993), all the respondents were studying or staying in Tuscaloosa, Alabama. To make the sample more representative of the population, efforts were made to include in the sample as many ethnic groups as possible. The respondents included students from 36 countries in Europe, Africa, Asia and South America. 75 students were female and 101 were male. 2 planned to study for undergraduate degree, 117 were undergraduate students, and 57 were enrolled in graduate programs. 109 subjects were in humanities and social science, 59

were in science, the remaining 8 did not reveal their majors. The average age of the sample was 28.8.

The data were collected over a period of two months. Some Students responded to the instrument in a classroom setting while others did it on an individual basis. Since directions were clearly provided in written form, it was assumed that the administration of the instrument would not affect the subjects' response.

Instrumentation

The theoretical construct of the instrument was the use of reading strategies by non-native readers. Based on the four major sets of strategies identified through the literature review, 24 items were generated. After a pilot study with 61 subjects, the items were revised. The current version contained 20 items. Each item described a specific reading strategy. The language level of the items was kept simple to suit non-native readers. A rating scale from 1 to 7 was adopted to measure the respondents' use of reading strategies. The continuum of 1 to 7 served the purpose of detecting variability among respondents in their strategy use.

Demographic information about the respondents' nationality, age, gender, major, degree, years of stay in the U.S. and TOEFL score (Test of English as a Foreign Language) was also collected.

The statistical analysis of the data indicated that the instrument maintained high degree of internal consistency (alpha = .8320). All item to total correlations were above the cutoff

point of .2000 with the highest one being .6046 and the lowest one .2666. The standard error of measurement was 5.78. It was thus concluded that the instrument was reliable. The construct validity of the instrument was established by basing the construction of the items directly on previous reading strategies research. For more information about the psychometric properties of the instrument, please refer to Appendix 1.

## Results and Discussion

Factor analysis

To identify the underlying dimensions for the instrument, common factor analysis was adopted with principal axis as the method of extraction and squared multiple correlation (SMC) as the prior communality estimate. After considering the Scree plot and the percentage of the variance explained, three factors were retained. The three-factor solution accounted for 86.33% of the variance. Varimax orthogonal rotation was used to make the factors more interpretable.

Appendix 2 provides the eigenvalues, percent of variance and cumulative percent for the three factors. The factors are reported in the order of their importance to the instrument based on their percent contributions to the total variance of the instrument.

The factor loadings and communality estimates of individual items on the factors, factor names, and related items are presented in Appendix 3. The factor loadings are presented according to the following criteria: (1) factor loadings

compensate for language or knowledge deficiency by focusing on the understanding of the whole text rather than individual words and sentences. Accepting ambiguity, using context clues, and grasping overall ideas constitute important characteristics of this factor. Visualizing people and events in a story and putting oneself in the shoe of the character further explain how the reader can achieve holistic understanding of a passage through active mental participation in reading.

The common factor analysis reveals three underlying dimensions for the instrument. This is at odds with the initially classified four sets of strategies. Most items related to memory strategies load high on Factor I, Organizing Information in Meaningful Patterns. Most items related to cognitive strategies load high on factor II, Meaning Construction. Two word-guessing strategy items and one test-taking strategy item are also affiliated with factor II because of their high loadings. This suggests that word-guessing and test-taking strategies are manifestations of human cognitive activity. The items related to compensation strategies on the whole load high on factor III, Holistic Compensation Approach. What differentiates between the initial set of compensation strategies and factor III is that all the items that load high on this factor focus on overall understanding whether it is about a vocabulary item or a person or an event. We thus label the factor holistic compensation approach. Much like the analogy about the sight of a tree in relation to the whole forest, this

factor reminds us that in reading, we should not embrace the details at the expanse of neglecting the whole theme of a text.

The major difference emerges from this factor analysis is the initially identified test-taking strategies do not stand out as one factor. One item related to test-taking strategies loads high on cognitive factor and the other item has extremely low loadings across all three factors. One possible explanation for this result is test-taking strategies should not be treated as a separate category. Rather it forms a subcategory of cognitive strategies. An alternative solution is to add more test-taking strategy items in the instrument to see if they constitute an individual factor. In short, in comparison with initially identified four set of strategies, the current three-factor solution is more theoretically coherent.

Statistical tests based on factor analysis

Based on the factor analysis I regrouped the 19 items into three subgroups (item 20's loading on each factor is < .3000, so it is discarded in the subsequent statistical analysis). Thus we now had three subtotals as the dependent variables: subtotal I--reading strategies related to factor I, organizing information into meaningful patterns, subtotal II--reading strategies related to factor II, meaning construction, and subtotal III--reading strategies related to factor III, holistic compensation approach. Did the 176 subjects use these subgroups of strategies homogeneously or was their use of reading strategies a function of other variables such as nationality, major, and English

proficiency as indicated by their TOEFL scores? A 3x2x2 MANOVA was conducted to investigate the effects of these variables on the use of reading strategies in the three subgroups.

First of all, Let me explain how the subjects were classified on each independent variable in this study. In terms of nationality, the subjects were classified into three groups: European, South American, and Asian. In terms of major, the subjects were classified into natural science (e.g. engineering, math, geology, material science, etc.) and social science and humanities (e.g. education, law, business management, language arts, international relations, etc.). In terms of English proficiency, the subjects were classified into two groups: those whose TOEFL scores were > 600, and those whose TOEFL scores were < 600.

A 3x2x2 MANOVA with nationality, major, and English proficiency as the independent variables produced significant multivariate interaction effects between nationality and major ($P<.001$) and between nationality and English proficiency ($P<.001$). The follow up test for nationality by major interaction effect suggested that on subtotal II natural science majors from South American group scored significantly higher than natural science majors from Asian group ($F=5.35$, $P<.05$). The follow up test for nationality by English proficiency interaction effect suggested that on subtotal I Asian students with higher level of English proficiency scored significantly higher than South American students with similar level of English proficiency

(F=7.87, P<.01). On subtotal II Asian students with higher level of English proficiency scored significantly higher than South American students with similar level of English proficiency (F=11.48, P<.001). For summary infc mation on the follow up tests, please see Appendix 4.

In short, statistical analysis indicated that South American science majors used meaning construction strategies more often than Asian science majors. On the other hand, Asian students with higher level of English proficiency used both information organization and meaning construction strategies more often than South American students with similar level of English proficiency. These findings lent support to Oxford and Burry-Stock's (1994) conclusion that Asian students (Taiwan and Japanese ) appear far more structured, analytic and memory-based than any other group. The study also pointed to the fact that nationality, major and English proficiency play a role in one's use of reading strategies. When equipped with a better command of English, Asian students make more cognitive efforts in reading. Linguistic originality may account for this phenomenon. Remember many Asian languages such as Japanese, Korean, Chinese, and Arabic are more distinctly different from English than South American Languages. The linguistic differences between one's native language and the target language may affect a person's reading performance in the target language. To overcome the differences, Asian students need to make more conscious efforts whenever possible. Linguistic differences make the use of

strategies necessary, adequate English proficiency makes it possible. This explains why we detected significant interaction effects between nationality and English proficiency.

## Conclusion

The results of the study indicated that the reading strategy inventory was a reliable instrument to measure the use of reading strategies for ESL college readers. The reliability coefficient of the instrument was .832. The construct validity of the instrument was established by basing the items on previous reading strategy research.

The common factor analysis with varimax rotation yielded a three-factor solution for the instrument. The three factors were (1) organizing information in meaningful patterns, (1) meaning construction, and (3) holistic compensation approach. The three-factor solution provided a more theoretically coherent framework for the reading strategies commonly identified in the literature. Based on the factor analysis the items were regrouped into three composite scores which were then used as dependent variables in the follow up 3x2x2 multivariate analysis. The statistical result suggested that the subjects' use of reading strategies as reflected in the composite scores was a function of such variables as nationality, major, and English proficiency. Asian students with better English proficiency used information organization and meaning construction strategies more often than South American students with similar English proficiency. It was also discovered that science majors from South American group

used meaning construction strategies more often than science majors from Asian group. These findings produced some useful information for reading research. Future research should focus on further exploration into and the theoretical explanation for the effects of nationality, major, and English proficiency on the use of reading strategies. It is also recommended that the study is replicated with a larger sample.

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Appendix 1 Psychometric Properties of the instrument

| variable | mean | standard deviation | item-to-total correlation | reliability coefficient | standard error of measurement |
|---|---|---|---|---|---|
| item1 | 4.87 | 1.61 | .3032** | | |
| item2 | 5.45 | 1.26 | .5066** | | |
| item3 | 5.45 | 1.20 | .5288** | | |
| item4 | 4.76 | 1.65 | .4197** | | |
| item5 | 4.41 | 1.32 | .5261** | | |
| item6 | 5.41 | 1.42 | .5239** | | |
| item7 | 4.70 | 1.53 | .4293** | | |
| item8 | 5.04 | 1.41 | .5192** | | |
| item9 | 4.98 | 1.31 | .5339** | | |
| item10 | 5.09 | 1.43 | .6007** | | |
| item11 | 4.99 | 1.38 | .5823** | | |
| item12 | 4.41 | 1.34 | .5716** | | |
| item13 | 4.06 | 1.55 | .5585** | | |
| item14 | 4.57 | 1.45 | .5830** | | |
| item15 | 4.58 | 1.34 | .5130** | | |
| item16 | 4.82 | 1.39 | .6046** | | |
| item17 | 5.57 | 1.31 | .5104** | | |
| item18 | 4.66 | 1.52 | .4248** | | |
| item19 | 4.87 | 1.79 | .4232** | | |
| item20 | 5.10 | 1.62 | .2666** | | |
| total | 97.78 | 14.12 | | .832 | 5.78 |

** significant at .01 level.

Appendix 2 Eigenvalue, Percent of Variance, and Cumulative Percent for the Chosen Factors

| Factor | Eigenvalue | Percent of Variance | Cumulative Percent |
|---|---|---|---|
| I | 4.5776 | 60.41 | 60.41 |
| II | 1.0565 | 13.94 | 74.35 |
| III | 0.9077 | 11.98 | 86.33 |

Appendix 3 Factor Loadings and Communality Estimates for the Items on the Three Factors

| Factor and Related Items | Loadings | Communality Estimates |
|---|---|---|
| **Factor I Organizing Information in Meaningful Patterns** | | |
| 16 cause/effect pattern | .7412 | .5847 |
| 15 problem/solution pattern | .7162 | .5279 |
| 12 similarity/difference pattern | .5481 | .3875 |
| 13 categorize information | .5273 | .3695 |
| 14 descriptive pattern | .5179 | .3653 |
| 11 time sequence | .5037 | .3509 |
| **Factor II Meaning Construction** | | |
| 7 predict upcoming text | .5747 | .3344 |
| 5 guess new words by restatement | .5643 | .3560 |
| 8 use structure clues | .4989 | .3093 |
| 10 use topic sentence | .4838 | .3780 |
| 6 use previous knowledge | .4570 | .2984 |
| 4 guess new words by word formation | .4175 | .1998 |
| 9 form and revise main idea | .3978 | .2828 |
| 19 read test questions first | .3157 | .1456 |
| **Factor III Holistic Compensation Approach** | | |
| 2 use context clues | .6280 | .4368 |
| 1 accept ambiguity | .5295 | .2821 |
| 3 grasp overall idea | .5178 | .3596 |
| 17 visualize information | .4815 | .3374 |
| 18 place oneself in character's position for comprehension | .3964 | .1946 |

Appendix 4 Results of Follow up Tests Based on 3x2x2 MANOVA

| dependent variables | independent variables | F value | P value |
|---|---|---|---|
| subtotal I-- information organization | Asian higher EP* (mean=55.6) vs South American higher EP* (mean=53) | 7.87 | .0056 |
| subtotal II-- meaning construction | Asian higher EP* (mean=80) vs South American higher EP* (mean=69) | 11.48 | .0009 |
| | South American science majors (mean=79.5) vs Asian science majors (mean=75.5) | 5.35 | .0219 |

* English Proficiency

ZZ,1994

Name _____(optional), Sex_____
Nationality_____, Age_____
Major_____,
Degree of current study_____ ,
How long have you been in U.S.A.?_____
TOEFL score_____

A Measurement Instrument on the use of
Reading Strategies

Directions: This instrument is designed to investigate your use of reading strategies in reading. In the next section you will find a number of statements that describe how people read English. Please read each statement carefully. Next to each statement, write the response (1, 2, 3, 4, 5, 6 or 7) that tells HOW TRUE OF YOU THE STATEMENT IS.

1. Never true of me
2. Almost never true of me
3. Usually not true of me
4. Somewhat true of me
5. Usually true of me
6. Almost always true of me
7. Always true of me

Answer in terms of how well the statement describes you. Do not answer how you think you should be, or what other people do. There are no right or wrong answers to these statements. Read the following statements, and choose a response (1 through 7 as described above), and write it in the space provided after each statement.

Please choose a response (1, 2, 3, 4, 5, 6 or 7) and write it in the space provided after each statement.

1. Never true of me
2. Almost never true of me
3. Usually not true of me
4. Somewhat true of me
5. Usually true of me
6. Almost always true of me
7. Always true of me

1. I read English without looking up every new word in the dictionary. _____
2. I guess the meaning of a new word by looking at the words around it. _____
3. I pay more attention to the overall idea of a passage than the individual words in it. _____
4. I use prefixes and suffixes to guess the meaning of an unfamiliar word._____
5. I use restatement to guess the meaning of a new word._____
6. When I read a passage, I use what I already know about the topic to help me understand the information. _____
7. Before I read a passage, I use the background information provided by the teacher to actively predict the content of the passage. _____
8. When I read a passage, I get an overall idea about the content by looking at the structure (title, abstract, introduction, and conclusion)._____
9. When I read a passage, I try to find the main idea and revise the main idea if necessary later on. _____
10. To understand a text, I pay more attention to topic sentences. (Sentences that contain main points of a paragraph. They are usually at the beginning of a paragraph.) _____
11. To understand a passage, I try to figure out what happens first, second, third, and so on._____

Please choose a response (1, 2, 3, 4, 5, 6 or 7) and write it in the space provided after each statement.

1. Never true of me
2. Almost never true of me
3. Usually not true of me
4. Somewhat true of me
5. Usually true of me
6. Almost always true of me
7. Always true of me

12. To understand a passage, I look at similarities and differences between the events, objects or people._____
13. To understand a passage, I classify the information into categories or groups._____
14. To understand a passage, I try to remember descriptions of people, places, events, objects, and so on.)_____
15. To understand a passage, I analyze the problem posed by the author and the possible solutions._____
16. To understand a passage, I look for causes and effects._____
17. When I read a story, I visualize in my mind the people, the place, and the events of the story. _____
18. When I read a story, I try to understand how the people in the story feel by putting myself in the same situation. _____
19. When I take a reading test, I read the questions first and then look for the answers to those questions in the passage. _____
20. In dealing with multiple-choice questions, I eliminate unlikely answers first and then locate the right one._____